Australian Nature Conservation Agency
National Reserves Systems Co-operative Program

Project No N703

Conservation Status of Vegetation Types throughout Western Australia.

Final Report

May 1996

Principal Investigator: AJM Hopkins
Consultant: J Coker
Collaborators: G R Beeston
P Bowen
J M Harvey

Department of Conservation and Land Management, Western Australia
and
Department of Agriculture, Western Australia

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Table of Contents

List of Figures and Tables

Summary

This report gives details of the results of a project, the principal aim of which was to provide an up-to-date assessment of the conservation status of the vegetation units described and mapped within Western Australia at a scale of 1:250,000 by J.S. Beard.

Data on the vegetation for the whole of Western Australia were captured from Beard's original working drawings, where these were available, or from published maps, all at the scale of 1:250,000. The linework in each map sheet was either digitized, or scanned and then converted from raster to vector. Each of the 30,000 polygons on 160 map sheets was given a unique number that was the first attribute loaded into the first of three related tables in an ORACLE database. The second table has the numeric codes representing the vegetation types on the original maps and details of the the classification system devised during this project. This system is a new taxonomy of vegetation types for the State which explicitly recognises the relationships between types in an heirarchical fashion. At the scale of 1:250 000 we now recognise 821 Types: 698 vegetation types including 46 which occur only in combination, 120 mosaics and 5 unvegetated types. The basic types can be amalgamated into 199 Groups which can, in turn, be amalgamated into the 50 Supergroups used in producing the new 1:3 000 000 scale map of the vegetation of the State. A further table contains original data from Beard's maps: vegetation descriptive text and/or an alpha-numeric floristic/structural code for each polygon.

The spatial data have been overlaid with the cadastral data for the CALM-managed conservation estate which now includes over 1 300 reserves totalling almost 17 million hectares. The cadasta were derived from CALM's recently commissioned TENure Information System (TENIS). Two sets of conservation estate data were used: the first is reserves which satisfy criteria for IUCN Protected Area Categories I - IV (National Parks, Nature Reserves, Marine Parks, Marine Nature Reserves and Conservation Parks) and the second is those same reserves plus additional areas where the primary purpose is nature conservation. The overlay has produced a vegetation map, with accompanying tables, for each and every reserve. Tables listing areas of each vegetation type and areas reserved (and %) have also been generated.

Of the 769 Types (including mosaics and unvegetated types) used in the analyses, 116 Types are adequately represented in existing National Parks, Nature Reserves, Marine Parks, Marine Nature Reserves and Conservation Parks, with ≥10% of their original areal extent in those categories of reserves (102 vegetation types, 13 mosaics, 1 unvegetated type). The contribution of the additional reserves in the second data set increases this figure to 163 Types: 141 vegetation types, 20 mosaics and 2 unvegetated type. 432 are not represented in existing National Parks, Nature Reserves, Marine Parks, Marine Nature Reserves and Conservation Parks (363 vegetation types, 69 mosaics). Adding the additional reserves in the second data set to the analyses reduces this figure to 360 (305 vegetation types, 55 mosaics). A further 246 Types are poorly represented in existing National Parks, Nature Reserves, Marine Parks, Marine Nature Reserves, Conservation Parks and selected additional reserves (1201 vegetation types, 42 mosaics, 3 unvegetated types). 174 Types are present in the reserve system but have a total area within that system of <2,000 ha.

The distribution of inadequately reserved vegetation Types has been examined at a coarse scale based on occurrence in biogeographic regions. High numbers of inadequately reserved vegetation Types occur in the Avon Wheatbelt, Murchison, Carnarvon, Coolgardie, Dampierland, Pilbara and Ord-Victoria Plains Regions. Of these, Avon Wheatbelt and Coolgardie have high numbers of vegetation Types that are not in reserves at all. Vegetation Types occuring in Warren and Hampton are relatively well conserved.

Results of the analysis provide a sound basis for deciding priorities for survey, acquisition and management. The database is amenable to gradual improvement as more detailed vegetation data come to hand.

A new vegetation map of Western Australia at a scale of 1:3,000,000 and a spatially corrected digital version of the Western Australian part of the Interim Biogeographic Regionalisation of Australia have been produced.

1. Introduction

1.1 Project objectives

The principal aim of the project is to provide an up-to-date assessment of the conservation status of the vegetation units described and mapped within Western Australia at a scale of 1:250,000 by J.S. Beard.

Two map products have also been produced using the Geographic Information System (GIS) database of all the vegetation mapping data: a new vegetation map of Western Australia at a scale of 1:3 million and a spatially corrected digital version of the Western Australian part of the Interim Biogeographic Regionalisation of Australia.

1.2 Previous assessments of the reserves system

1.2.1 Background

The importance of designated reserves to nature conservation has long been recognised in Western Australia: the State's best known conservation reserve, Perth Park (now Kings Park) was declared on 1 October 1872, under newly proclaimed Land Regulations "for the purpose of a public park and recreation". Although the purpose for which Kings Park is set aside now as a reserve is "Public Park", the accepted tradition is that the majority of the area will remain unaltered for the preservation of the natural environment (WAS 1965). In 1894, the first reserve primarily for nature conservation was created when an area of 160,000 acres (64,750 hectares) in the Darling Range near Pinjarra was set aside for the "Preservation of Flora and Fauna" (WAS 1965). This reserve was changed to "Timber" in 1907 and included in State Forest in 1911. The importance of particular individuals and scientific and natural history organisations in promoting concepts of nature conservation and reserve systems and the significance of evolving legal provisions in the reservation process are well summarised in WAS (1965).

It is from these early beginnings that the Western Australian conservation estate has grown, so that it now includes over 1300 National Parks, Nature Reserves, Conservation Parks, Marine Parks and Marine Nature Reserves, and other reserves totalling almost 17 million hectares (see later). This growth has not been even over time. Five events, or phases, are worth describing in a little detail.

1.2.2 Reservation from the 1950s

The first event was the creation of the Fauna Protection Advisory Committee (FPAC) in 1950. This Committee accepted control of existing flora and/or fauna reserves and provided the impetus for the creation of new, additional reserves: by 1960 there were 23 such reserves vested in FPAC and by mid-1970 there were 156, with a further 159 reserves unvested. The formation of the National Parks Board at about the same time (13 April 1956, WAS 1965) also signalled also a recognition within Government of the importance of parks and reserves for tourism and of the need to commit resources to management of Parks for tourism. The National Parks Board assumed management of the lands previously under control of the State Gardens Board (see Shapcott 1939) which were mainly within or adjacent to the Perth metropolitan area (eg Matilda Bay foreshore, East Perth Cemetery; Yanchep

National Park, Serpentine Falls, John Forrest National Park respectively), with the exceptions being Walpole Nornalup National Park, Porongorup National Park and Hamelin Bay camping area. Four small national Parks near Pemberton continued to be managed by the Pemberton National Parks Board until March 1977 when the areas were transferred to the newly formed National Parks Authority (Jenkins 1980).

1.2.3 The AAS Committee on National Parks and Nature Reserves

In 1958 the Australian Academy of Science established a Committee on National Parks and Nature Reserves to provide information that might lead to the establishment of a comprehensive system of reserves for the Australian continent. This Committee, in turn, established State Sub-committees to determine what had been done, what was being done and what should be done to have adequate land set aside for National Parks and Nature Reserves. The Western Australian Sub-committee presented its report to the Academy in 1962 (WAS 1965). This report was a landmark in the history of nature conservation in Western Australia: not only did it lead to the establishment of some new reserves, but also, and perhaps more importantly, it further legitimised the view that there should be a system of reserves representing all natural ecosystems and scenic types by according formal, scientific recognition to that position. Implementation of the Committee's recommendations (and others) saw the conservation estate grow to almost four million hectares in 1969 and to 6.5 million hectares in 1972 (Pouliquen-Young 1995).

1.2.4 The Conservation Through Reserves Committee

The third significant event is the work of the Environmental Protection Authority's Conservation Through Reserves Committee (CTRC). This Committee met for the first time on 15 February 1972 and initiated a comprehensive review of the reserve system throughout the State in 12 geographic regions (Systems). It reported to the Environmental Protection Authority in 1974 on all but System 6 (greater Perth and Darling Range region) and System 7 (Kimberley); these two were considered separately with the System 7 report received in 1978 and System 6 in 1981. Because these reports were printed in green covers, they became known as the Green Books (CTRC 1974, 1977, System 6 Study 1981). The Environmental Protection Authority in turn called for public comments on each of the CTRC/ System 6 Study Green Books and reviewed those submissions before making its own recommendations to Government in a series of four reports, from 1976 to 1984. These reports, printed in red covers, came to be known as the Environmental Protection Authority Red Books (EPA 1975, 1976, 1980, 1983), and the recommendations they contained, the Red Book recommendations.

The recommendations contained in the first two Red Books (Systems 4, 8, 9, 10, 11, 12; Systems 1, 2, 3, 5 plus one further recommendation for System 11, EPA 1975, 1976) were endorsed by Government in February and October 1976 respectively. The System 7 recommendations were released in September 1981 and were accepted by Government as a guide for the establishment of conservation reserves in the Kimberley (EPA 1980). In March 1984, the Government accepted the general principles of the System 6 Red Book and approved the progressive implementation of the locality specific recommendations as far as possible (EPA

1983, 1993). The System 7 Green Book was reviewed and amended in 1991 (Burbidge *et al.* 1991).

Implementation of Red Book recommendations (and ongoing reservation actions) saw the conservation estate grow from 555 National Parks and Nature Reserves totalling 7,374,739 hectares in mid-1975 to 1194 Parks and Reserves totalling 14,330,000 hectares in 1985 (NPB 1975, NPA 1985, WAWA 1985, DCALM 1985).

1.2 5 Systematic survey

The fourth event was the initiation of systematic and comprehensive regional biogeographical surveys by the Department of Fisheries and Fauna, in conjunction with the National Parks Board, the Western Australian Herbarium (now all the Department of Conservation and Land Management) and the Western Australian Museum (see BSC 1984). As a consequence of this approach, both the database and the level of theoretical understanding used in designing and establishing the reserve system have developed considerably over the past 25 years or so. Major regional surveys have covered the Kimberley (Burbidge and McKenzie 1978, Kabay and Burbidge 1977, Miles and Burbidge 1975, McKenzie 1981, 1983, McKenzie et al. 1991, Wilson 1981 and subsequent Parts), Nullarbor (McKenzie and Robinson 1987, McKenzie et al. 1989), Great Victoria, Little Sandy and Gibson Deserts (Burbidge et al. 1976, McKenzie et al. 1979), wheatbelt (Burbidge et al. 1978, Kitchener 1976 and subsequent Museum publications, McKenzie 1973, McKenzie and Youngson 1975) and goldfields (BSC 1984 and subsequent Museum publications).

The Department of Fisheries and Fauna (later Fisheries and Wildlife) also instituted a program of systematic assessment of remnant native vegetation on public land throughout the agricultural region. B G Muir surveyed 28 local municipal council areas (Shires) using the rapid assessment procedures developed during the Museum survey program (Muir 1977, 1983 and unpublished survey reports) and Departmental field officers surveyed other areas using standardised procedures. As a consequence of this program, many of the surveyed areas were gazetted as nature reserves and vested in the Western Australian Wildlife Authority.

1.2.6 The Specht reports

An event of significance elsewhere in Australia but overshadowed in Western Australia by the work of the Environmental Protection Authority and the Conservation Through Reserves Committee was the comprehensive national survey of conservation status of plant communities in Australia, the results of which were published in 1974 (Specht *et al.* 1974). This survey, conducted as part of Australia's contribution to the International Biological Programme through the Australian Academy of Science, relied on contributions from all of the States and Territories and New Guinea. The survey used a definition of plant communities based on the physiognomy of the tallest stratum (Table 1) together with the floristics of that stratum. The final report contains a description of plant communities in each national park, nature reserve or other designated reserve and a summary of the conservation status of each of those communities, State by State.

Table 1. Classification of the vegetation of Australia based on structure, MARK IV Version, from Specht *et al.* (1995). The basic scheme was developed by Specht (1970) and used in Specht et al. (1975). Additional life form and height categories have been introduced into the present version

Life form and height of tallest stratum	**Code**	**Projective foliage cover of tallest stratum (%)**			
		Dense (70 - 100%)	Mid-dense (30 - 70%)	Sparce (10 - 30%)	Very sparce (<10%)
Trees > 30m	T	Tall closed-forest	Tall open-forest	Tall woodland	Tall open-woodland
Trees 10 - 30m	M	Closed-forest	Open-forest	Woodland	Open-woodland
Trees 5 - 10m	L	Low closed-forest	Low open-forest	Low woodland	Low open-woodland
Trees < 5m	VL	Very low closed-forest	Very low open-forest	Very low woodland	Very low open-woodland
Shrubs > 2m	S	Closed-scrub	Open-scrub	Tall shrubland	Tall open-shrubland
Shrubs 0.25 - 2m sclerophyllous & semi-sclerophyllous	Z	Closed-heathland	Open-heath	Low shrubland	Low open-shrubland
Shrubs 0.25 - 2m non-sclerophyllous	C	Closed-heathland	Open-heath	Low shrubland	Low open-shrubland
Shrubs < 0.25m sclerophyllous & semi-sclerophyllous	D	Closed-heath	Open-heath	Low shrubland	Low open-shrubland
Shrubs < 0.25m non-sclerophyllous	W	Closed-heath	Open-heath	Low shrubland	Low open-shrubland
Hummock Grasses	H	-	Dense hummock grassland	Hummock grassland	Open hummock grassland
Herbaceous layer graminoids & grass	G	Closed (tussock) grassland	(Tussock) grassland	Open (tussock) grassland	Sparse (tussock) grassland
Herbaceous layer sedges	Y	Closed-sedgeland	Sedgeland	Open-sedgeland	Sparse-sedgeland
Herbaceous layer ferns	F	Closed fernland	Fernland	-	-
Herbaceous layer reeds/rushes	R	Closed-reedland	Reedland	-	-

Despite being handicapped by the lack of documentary information pertaining to Western Australia's conservation reserves and the flora and vegetation as a whole, the principal contributor for the State, Mr T E H Aplin of the Western Australian Herbarium compiled an impressive data set which was used to develop conservation priorities and to support conservation arguments for some time.

This national survey has recently been repeated using a more refined methodology and drawing on up-to-date published floristic and vegetation data (Specht *et al.* 1995). The new survey defined 921 major and minor plant communities occuring in Australia and evaluated conservation status of each of these using available maps of the conservation estate. It found that grasslands (including grassy understories in savanna ecosystems) are the most poorly conserved plant formation throughout Australia. Acacia-dominated formations, dry scrubs, monsoon rainforests and humid and arid wetlands are also poorly conserved. The assessment showed that, for the major plant communities within Western Australia, only 37% are adequately conserved (reasonable 27%, poor 12%, very poor 2%, unreserved 22%) and for the minor plant communities, only 22% are adequately conserved (reasonable 17%, poor 11%, very poor 3%, unreserved 42%).

1.2.7 Beard's assessments

Beard and Sprenger (1984) compiled data on the extent of clearing of native vegetation for agricultural, urban and industrial land-uses using overlays of land-use categories on 1:1,000,000 scale maps of the original vegetation of the State (see later). The analysis showed that Cypress pine low forest and Banksia low woodland with scattered jarrah (both on the Swan Coastal Plain) were not reserved although the former is well represented on Garden Island. *Acacia rostellifera* low forest, Thicket with scattered eucalypts, Tall woodland of tuart, Marri-wandoo woodlands, and Open wandoo woodlands had all been extensively cleared (< 10% remaining).

1.2.8 The Conservation and Land Management Act

In 1983 a new Government was elected in Western Australia on a comprehensive environment platform that included commitments to improve the national park and nature conservation reserve system throughout the State. As the first step in the process of implementing the platform, the Government instituted a review of land management arrangements (TFLRM 1984) which resulted in the passage of the Conservation and Land Management Act 1984 and the creation of the Department of Conservation and Land Management. This merger of the Forests Department, the National Parks Authority and the Wildlife components of the Department of Fisheries and Wildlife (and later, the Western Australian Herbarium) removed many of the institutional barriers that had impeded the creation of National Parks particularly in the area covered by State Forests. In the ensuing 10 years, significant areas of State Forest have been gazetted for purposes other than production forestry; these include Shannon, Mount Frankland, Leeuwin Naturalist, and Tuart Forest National Parks, Lane Poole Reserve (Conservation Park), Dale, Monadnocks and Lupton Conservation Parks, and further commitments are made in the most recent management plans (LFC 1994). In addition, the Government addressed some of the long-outstanding EPA/CTRC recommendations and created or extended National Parks at D'Entrecasteaux, Mount Augustus, Lesueur, Francios Peron, Kennedy Range, Purnululu, Scott, and Fitzgerald River, and created some additional Nature

Reserves. The new Conservation and Land Management Act included provision for Marine Parks and Marine Nature Reserves, so a number of these have also been created. Over the 10 year period since the passage of the Conservation and Land Management Act, the Western Australian conservation estate has increased by over 200 reserves totalling almost 3 million hectares.

1.2.9 The IBRA framework for assessment

The adequacy of the conservation reserve system has recently been assessed on a national basis using the new environmental regionalisation developed for that purpose: the Interim Biogeographic Regionalisation for Australia (IBRA)(Thackway and Cresswell 1992,1994,1995). The new version of IBRA builds on the biogeographic regionalisations developed separately by each of the States and Territories, integrates them across borders, and provides an assessment of the conservation status of each region based on a scale 0%, <1%, 1 - 5%, 5 - 10%, >10% by area and an estimate of bias (cf representativeness) from nil bias to low, moderate, high and no reserves. For Western Australia, a unique bias classification was used (see 4.7.2 in Thackway and Cresswell 1995). Results of this assessment show that, for the 26 IBRA regions in Western Australia, only nine regions are adequately conserved (Table 2).

1.2.10 Threatened ecological communities

A list of threatened ecological communities has recently been compiled by the Department of Conservation and Land Management in the course of developing a Nature Conservation Strategy (DCALM 1992a). The current version of the list, which is reproduced in Table 3, shows a total of 54 communities at risk, some of which are described using Beard's vegetation types subdivided by substrate where possible, as surrogates for, or approximations of ecological communities.

Table 2. Reservation status and index of bias in representation of each IBRA region in Western Australia. Data are derived fromThackway and Cresswell (1995) Table 14. Note that bias categories are different from those used for the remainder of Australia; details are given in 4.7.2 of that publication.

Region	Reservation status (% of Region in reserves)	Bias
Avon Wheatbelt	<1% <5%	High if threshold >2000ha considered, Moderate if all reserves considered
Carnarvon	<10%	Moderate
Central Kimberley	<5%	High
Central Ranges	0%	-
Coolgardie	<10%	Moderate
Dampierland	<5%	High
Esperance Plains	>10%	Low
Gascoyne	2%	High
Geraldton Sandplains	>10%	Moderate
Gibson Desert	>10%	Low
Great Sandy Desert	<5%	High
Great Victoria Desert	<10%	Low
Hampton	>10%	Moderate
Jarrah Forest	>10%	Moderate
Little Sandy Desert	<10%	Moderate
Mallee	>10%	Moderate
Murchison	<1%	High
Northern Kimberley	>10%	Low
Nullarbor	>10%	Moderate
Ord-Victoria Plains	<10%	High
Pilbara	<5%	High
Swan Coastal Plain	4%	High
Tanami	0%	-
Victoria Bonaparte	<10%	Moderate
Warren	>10%	Low
Yalgoo	<1%	Moderate

Table 3. Threatened ecological communities in Western Australia and the IBRA Regions in which they occur, together with the endangering processes (from an up-dated version of Table 7 in DCALM 1992a).

Threatened Community	IBRA Region	Threatening Process
Assemblages in imminent danger of major structural and compositional change in the short to medium term		
South coast scrub heath	Esperance Plains	Dieback
South coast mallee heath	Esperance Plains	Dieback
South coast thickets (Barren Range Mt Ragged)	Esperance Plains	Dieback
Stirling Range thickets	Esperance Plains	Dieback
Mulga/bluebush scrub	Nullarbor	Grazing
Myall/bluebush scrub	Nullarbor	Grazing
Bluebush/saltbush	Nullarbor	Grazing
Donga communities	Nullarbor	Grazing
Avon District *E. macrocarpa* sandplain communities	Avon Wheatbelt	Clearing
Wheatbelt lakes, swamps and soaks	Avon Wheatbelt, Mallee	Clearing, eutrophication, salinity
Wheatbelt streams and rivers and associated riparian communities	Avon Wheatbelt, Mallee	Clearing, grazing, salinity
Marri, jarrah, *Casuarina* low woodlands (Swan Coastal Plain south of Perth)	Swan Coastal Plain	Clearing, urbanisation
Greenough alluvial flats	Geraldton Sandplains	Clearing (virtually extinct)
Acacia rostellifera low forest (Geraldton)	Geraldton Sandplains	Clearing, urbanisation
Short grass plains of Ord basin	Victoria Bonapatre	Grazing, feral animals
Assemblages which are geographically restricted and presently or potentially subject to threatening processes		
Frazer Range *Dodonia* scrub and woodland	Coolgardie	Grazing, mining
Limestone caves (Nullarbor)	Nullarbor	Increasing, unregulated access
Freshwater lakes	Mallee, Coolgardie	Inadequate information
Ravensthorpe Range thickets	Esperance Plains	Mining exploration, dieback
Heath on lateritic sandplains (mainly northern sandplains)	Geraldton Sandplains, Jarrah Forest.	Dieback
South and west coast estuaries	Swan Coastal Plain, Warren, Esperance Plains	Various, including eutrophication
Yate swamps	Esperance Plains, Mallee	Clearing, hydrological changes, tree dieback

Southern wheatbelt York gum woodlands	Avon Wheatbelt, Mallee	Clearing, weed invasion
Wheatbelt salmon gum woodlands	Avon Wheatbelt, Mallee	Clearing, weed invasion
Wheatbeltgranite rocks	Avon Wheatbelt, Mallee	Recreation, weed invasion, water harvesting
Goldfields greenstone communities	Coolgardie, Mallee, Murchison	Mining, grazing
Wongan Hills *Acacia/Casuarina* thickets	Avon Wheatbelt	Clearing, grazing
Tuart forest	Swan Coastal Plain	Weed invasion, insects, fire, human usage
Ephemeral wetlands of Swan Coastal Plain	Swan Coastal Plain	Clearing, drainage
Cypress low forest of Swan Coastal Plain	Swan Coastal Plain	Fire
Peat swamps	Warren, Jarrah Forest	Peat mining, fire
Swan Coastal Plain "stromatolytic" lakes	Swan Coastal Plain	Nutrient input, hydrological changes
Freshwater springs and soaks (pastoral areas)	Gascoyne, Murchison	Grazing, trampling (pastoral areas)
Bernier and Dorre Islands (mammal assemblages)	Carnarvon	Fire, feral animals
Hutt Lagoon	Geraldton Sandplains	Coastal development
Moresby Range communities	Geraldton Sandplains	Clearing
Northern wheatbelt York gum woodlands	Geraldton Sandplains	Clearing, grazing
Riverine and riparian communities (Murchison and Ashburton catchments)	Geraldton Sandplains, Pilbara, Carnarvon, Murchison	Grazing, soil degradation
Mulga communities in pastoral areas	Murchison, Gascoyne, Pilbara	Grazing, fire
Freshwater soaks	Murchison, Gascoyne	Grazing, trampling
Cave and groundwater communities	Carnarvon	Limestone mining, water use, pollution
Spring communities around Kennedy Range	Carnarvon	Grazing, trampling
Alluvial flats (Carnarvon, Gascoyne)	Carnarvon, Gascoyne	Grazing
Coastal grassy plains of Karratha area	Pilbara	Grazing
Barrow Island communities	Pilbara	Introduced spp., fire, oil development
Communities of Mandora palaeoriver (including peat	Dampierland, Pilbara	Grazing, trampling

swamps and Salt Creek)		
Mangrove communities	Pilbara, Carnarvon	Reduction in area, recreation
Rudall River outwash plains	Little and Great Sandy Deserts	Weed invasion (buffel grass)
Freshwater wetlands in pastoral areas (eg. Lake Gregory)	Tanami, Carnarvon	Grazing, trampling, sheet erosion
Roebuck Plains and other coastal shortgrass plains	Dampierland	Coastal development
Rainforest patches in areas with cattle	Dampierland, North Kimberley, Victoria Bonaparte	Grazing, fire
Alluvial communities of Fitzroy (grassy plains)	Dampierland	Grazing, weed invasion
Freshwater swamps in cattle country (especially Dampier Peninsula)	Dampierland	Grazing, trampling
Mitchell grass plains	Dampierland, Victoria Bonaparte.	Grazing

1.3 Vegetation mapping in Western Australia.

1.3.1 The work of J S Beard

In 1964 the Director of Kings Park and Botanic Garden Dr J S Beard and Professor M J Webb of the Geography Department of the University of Western Australia, initiated a project called the Vegetation Survey of Western Australia, designed to provide an inventory of plant communities throughout the State, to be used as the knowledge base for the work in the Botanic Garden. The project took 17 years to complete and produced seven 1:1 million scale maps of the vegetation of the State (Beard 1974, 1975a, 1975b, 1976a, 1979a, 1981a, Beard and Webb 1974), 24 1:250,000 maps for the south west corner of the State between Shark Bay and Esperence (Beard 1960, 1972a, 1972b, 1972c, 1972d, 1972e, 1973a, 1973b, 1976b, 1976c, 1976d, 1976e, 1976f, 1979b, 1979c, 1979d, 1979e, 1980a, 1980b, 1980c, 1980d) (all with explanatory text), together with a number of additional publications (eg. Beard 1980e, 1981b, 1990, Beard and Sprenger 1984). The Director of the National Parks Board, Dr F G Smith, produced the 1: 250,000 map sheets for the south west (Smith 1972, 1973, 1974) but mapped only existing vegetation, whereas Beard attemped to produce maps showing the vegetation as it might have been at the time of settlement and prior to the extensive clearing for urban development and agriculture.

Beard used a scheme based on physiognomy similar to that of Specht (1970, see Table 1) but classified the vegetation according to the ecologically dominant stratum rather than the tallest stratum (Table 3). The significance of this difference becomes apparent when considering such vegetation types as shrublands and grasslands with very sparse emergent trees: by the Specht scheme these would be classed as open-woodlands whereas, by the Beard scheme they are classed as shrublands or grasslands (tree savanna/steppe). It is at least partly as a consequence of this approach to classifying the vegetation that Beard included in his maps and texts information on the floristic composition of all significant strata of each vegetation type, using a formula, or alpha-numeric floristic/structural code based on those developed by Kuchler (1949, 1967) and Dansereau (1951). The formula incorporates Beard's physiognomic classification lettering system (see Table 3) with life form/height class represented by upper case letters (T-Tall tree, M-Medium tree, L-Low tree, S-Shrubland, Z-Dwarf shrub, H-Hummock grassland, C-Succulent Steppe, G-Grass) and cover or density represented by lower case letters (d-dense, c-complete cover, i-incomplete cover, r-rare or open cover, p-patchy cover, b-practically bare), with codes for important species in each stratum (eg a_1 is *Acacia aneura*, a_2 is *Acacia pyrifolia* ... e_1 is *Eucalyptus diversifolia* etc.

Beard went on to produce two State-wide vegetation maps: one at the scale of 1:3,000,000 which included 39 vegetation units plus a further 11 mosaic units (Beard 1981b) and the second at the scale of 1:10,000,000 with 27 vegetation types and two mosaics. The latter map was first published with brief explanatory notes in a school atlas (WAY79 1979); it was then published as a frontispiece in Ford (1985) and then included in Beard's own volume on the State's flora and vegetation (Beard 1990). A version of Beard's vegetation mapping was incorporated into the map of the vegetation of Australia (1:5,000,000 scale) by Carnahan (1990).

Table 4. Classification of vegetation used by Beard for the Vegetation of Western Australia project, from Beard (1981) with additional names collated from other map sheets and explanatory notes including Beard and Sprenger (1984). Note that the scheme outlined here differs from that given in Beard and Webb (1974), a version of which is included in Appendix 1 of this report. Letters in bold are the basis for the alpha-numeric floristic/structural code or formula used by Beard on maps and in the accompanying texts.

Table 4a. Communities classified by the upper stratum (ie the upper stratum is ecologically dominant)

Life Form/ Height Class	Canopy Cover				
	d: Dense canopy Projective foliage cover >70%	**c**: Mid-dense canopy; Projective foliage cover 30-70%	**i**: Incomplete canopy Projective foliage cover 10-30%	**r**: Sparce canopy Projective foliage cover ≤10%	**b**: Very sparce canopy Projective foliage cover ≅0%
T: Tall trees >30m tall	**Td**: Dense tall forest	**Tc**: Tall forest	**Ti**: Tall woodland	**Tr**: Open tall woodland	
M: Medium trees 10-30m tall	**Md**: Dense forest	**Mc**: Forest	**Mi**: Woodland	**Mr**: Open woodland	
L: Low trees <10m tall	**Ld**: Dense low forest	**Lc**: Low forest	**Li**: Low woodland	**Lr**: Open low woodland	**Lb**: Sparce low woodland
S: Shrubs > 1m tall	**Sd**: Dense thicket	**Sc**: Thicket	**Si**: Scrub	**Sr**: Open scrub	**Sb**: Sparce scrub
Z: Dwarf shrubs < 1m tall	**Zd**: Dense heath	**Zc**: Heath	**Zi**: Dwarf scrub	**Zr**: Open dwarf scrub	**Zb**: Sparce dwarf scrub
G: Bunch grasses, sedges	**Gd**: Dense grassland	**Gc**: Mid-dense grassland	**Gi**: Grassland	**Gr**: Open grassland	**Gb**: Sparce grassland
H: Hummock grasses			**Hi**: Hummock grassland	**Hr**: Open hummock grassland	**Hb**: Sparce hummock grassland
F: Forbs	**Fd**: Dense herbfield	**Fc**: Mid-dense herbfield	**Fi**: Herbfield	**Fr**: Open herbfield	**Fb**: Sparce herbfield
X: Lichens and mosses			**Xi**: Mat plants	**Xr**: Open mat plants	**Xb**: Sparce mat plants
C: Succulents			**Ci**: Succulent steppe	**Cr**: Open succulent steppe	**Cb**: Sparce succulent steppe

Table 4b. Communities classified according to the second stratum (ie the upper stratum is not the most important ecologically)

Description	Canopy Cover of Tree or Shrub Stratum			
	i: Incomplete canopy Projective foliage cover 10-30%	r: Sparce canopy Projective foliage cover ≤10%	b: Very sparce canopy Projective foliage cover ≅0%	Absent
Wooded bunch grassland	**Mi/LiGc**: Savanna woodland	**Mr/LrGc**: Tree savanna **SrGc**: Shrub savanna	**Mb/LbGc**: Sparce tree savanna **SiGc**: Sparce shrub savanna	**Gc** Grass savanna
Wooded hummock grassland	**Mi/LiHc**: Steppe woodland	**Mr/LrHc**: Tree steppe **SrHc**: Shrub steppe	**Mb/LbHc**: Tree savanna **SbHc**: Shrub savanna	
Wooded succulent steppe	**Mi/LiCi**:Thickly wooded succulent steppe	**Mr/LrCi**:Lightly wooded succulent steppe	**LbCi**: Sparcely wooded succulent steppe	**Ci**: Succulent steppe
Heath with trees		**Mr/LrZc**: Tree heath		
Heath with shrubs		**SrZc**: Scrub heath		
Heath with mallee		**eSrZc**: Mallee heath		

Table 4c. Communities with three significant strata (where the upper stratum is not the most important ecologically)

Description	Canopy Cover of Tree or Shrub Stratum		
	c: Mid-dense canopy; Projective foliage cover 30-70%	i: Incomplete canopy Projective foliage cover 10-30%	r: Sparce canopy Projective foliage cover ≤10%
Wooded thicket with grass	**Mi/LrScGi** Pindan		
Low wooded thicket with grass			
Wooded thicket with succulents	**Mi/LrScCi** Salt flat		
Low wooded thicket with succulents			

1.3.2 System 6 mapping

The vegetation of the EPA/CTRC System 6 area was mapped at the scale of 1:250,000 by Heddle *et al.*(1980) using a scheme that combined the structural approach of Specht (1970) and the phytosociological approach developed in the jarrah forest by Havel (1975a, b) and drawing on contemporary landform and soils mapping at the same scale (Churchward and McArthur 1980) . This produced a total of 76 vegetation complexes. As an example of the fine level of detail included in this mapping, for the Darling Plateau, Heddle *et al.*(1980) identified 29 vegetation complexes where Smith (1974) described only two.

1.4 Biogeographic regionalisations

1.4.1 Background

The idea that it is possible to recognise biogeographic regions or natural ecological regions within Australia and/or Western Australia, or groups of organisms with particular geographical affinities, has existed since the time of the earliest biological explorations of the continent. A range of schemes has been proposed over the years: these fall loosely into three streams in a manner that generally reflects the component of the environment of interest to the particular author. The three streams centre on botanical, zoological and physical/biophysical aspects of the environment.

1.4.2 Phytogeographic regionalisations

Botanical interpretations began when Ferdinand von Mueller drew attention to the special character of the south western flora and suggested a boundary running from Shark Bay to Israelite Bay (von Mueller 1867, 1983). A similar observation was later made by Ludwig Diels who divided the southern part of the State into two Botanical Provinces, the Southwest Province and the Eremaean Province, with the boundary between the two (again a crescentic line from Shark Bay to Israelite Bay) being climatically determined (Diels 1906). Diels went on to subdivide the South-west Province into six Botanical Districts and the Southern Eremaean Province into two, with each District being characterised by a range of climatic, floristic and vegetation factors. C A Gardner extended these concepts throughout the State, recognising a Northern Botanical Province with five Districts, adding a further three Districts to the Eremaean Province and adjusting the boundary of the South Western Province further to the east (Gardner 1942, Gardner and Bennetts 1956).

In her seminal work on the phytogeography of the Australian region, N T Burbidge (1960) proposed a treatment, based essentially on climate, which extended the Northern Botanical Province (renamed the Tropical Zone) around the northern coast of the continent and down the east coast into northern New South Wales. A Temperate Zone which included the South Western Province extended from the eastern side of the Great Australian Bight around the south coast (and including Tasmania) and up the east coast to south eastern Queensland. The area of overlap between the Tropical Zone and the Temperate Zone was named the MacPherson MacLeay Overlap (Burbidge 1960). The central arid and semi-arid core of the continent continued to be named the Eremaean Zone and Burbidge recognised three interzone areas, one of which coincides closely with Gardner and Bennett's (1956)

Coolgardie District. This phytogeographic regionalisation picks up on some of the earlier zoogeographic proposals in a manner that appears to provide a satisfactory blend, although it clearly lacks the local detail of Gardner and Bennett's (1956) Botanical Districts.

The work of Burbidge was subsequently refined by H Doing in a treatment that combined an analysis of plant species patterns with one of vegetation patterns (Doing 1970). Doing recognised some 25 regions, of which seven fall within Western Australia, conforming roughly with the Northern Province (Enw), the Eremaean Province (Cmn, Cmw, Emn) the South Western Province (Ewh, Ewf) and the Coolgardie District/Interzone (Emw).

Johnson and Briggs (1975) proposed a scheme of ecogeographic regions for Australia, based on an analysis of patterns of distribution of Proteaceae. This scheme has a Northern Monsoon Zone across northern Australia picking up Burbidge's (1960) Tropical Zone and some of her Interzone but terminating on the east coast near Rockhampton, a Non-tropical East Zone, which includes Burbidge's Temperate Zone and associated Interzone, and a Southwest Zone which includes the SW Focal Area of Burbidge's Temperate Zone and the associated Interzone. The central part of the continent continued to be the Eremaean Zone, and areas of rainforest along the east coast were mapped.

In the course of the Vegetation Survey of Western Australia project which is outlined above, Beard developed a deep insight into the ecological basis for the phytogeographic regionalisation that had been proposed previously and was able to refine the concepts and the boundaries. Beard began to incorporate redefined boundaries on his published 1:1,000,000 vegetation maps (eg.see Beard 1974a) and, in 1978 compiled the first detailed, State-wide map of his regionalisation at the scale of 1:2,500,000 and it was subsequently published with detailed explanatory notes (Beard 1980). The Phytogeographic Regions represent a very considerable refinement of the scheme of Gardner and Bennetts (1956) with boundaries that are largely coincident with boundaries of vegetation units mapped by Beard at the scale of 1:250,000, selected on the basis on factors such as geology and climate (and perhaps even lizards, see Pianka 1969, 1981) as well as vegetation. Beard recognises three major Provinces and an Interzone, and, within these, 21 Districts: the Northern Botanical Province comprising Gardner, Fitzgerald, Dampier and Hall Districts; the Eremaean Botanical Province comprising Canning, Mueller, Carnarvon, Fortescue, Keartland, Carnegie, Giles, Ashburton, Austin, Helms, and Eucla Districts; the Southwestern Interzone or Coolgardie District; and the Southwestern Botanical Province comprising Irwin, Darling, Avon, Roe and Eyre Districts. Beard also recognises Subdistricts: these are shown on the individual 1:250,000 map sheets. The 1:2,500,000 map of the Phytogeographic Regions includes considerable geographical detail so it is possible to locate other work quite precisely in relation to regional boundaries.

1.4.3 Zoogeographic regionalisations

The first zoogeographic interpretation of relevance to Western Australia was that of R Tate (1887) who distinquished the south-west corner of the State, the Autochthonian, from the Eremian or desert region, with the boundary between the two coinciding approximately with the 20 inch rainfall isohyet. The south-east and

east coastal parts of the continent were described as the Euronotian region. Baldwin Spencer (1896) erected a Torresian sub-region running from New Guinea through Cape York and down the east coast of Australia to the Clarence River, and taking in the tropical/monsoonal part of northern Australia including the Kimberley, a Bassian sub-region running along the remainder of the south-east coast east to the Great Divide and including Tasmania, and dispensed with the Autochthonian region, incorporating this last area within his Eyrean (desert) sub-region. Serventy and Whittell (1948) accepted this proposition insofaras it related to northern and central Western Australia. However, they suggested that the emphasis should be on characteristic faunal elements (which may move from time-to-time) rather than rigidly defined geographic regions, a view well supported by the work of Gentilli (1949). Using their data on bird distributions, Serventy and Whittell (1948) went on to argue that the south-west is a zone of intermingling of Eyrean and Bassian elements. Their crescentic line delimiting the distributions of most of the Bassian elements runs from around Geraldton (ie. south of Diel's line) to Israelite Bay. A numerical analysis of data on presence/absence of land birds at 121 sites throughout Australia by Kikkawa and Pearse (1969) gave four subgroups along the east coast from the Gulf of Carpentaria, including Cape York, around to Adelaide. Subdivisions of the remainder were, in order, the two subgroups comprising the remainder of northern Australia, Tasmania, and inland south-eastern Australia. The subgroup associated with a broad area of southwestern Australia was found to be very similar to the two remaining desert subgroups but very dissimilar to the southeastern group, results which suggest that the avifauna of that area is much more Eyrean and much less Bassian than Serventy and Whittell (1948) considered it to be. (See also the work of Campbell 1943 derived from an analysis of the patterns of distribution of birds and the commentary on that scheme in Keast 1959, and the modification of the Kikkawa and Pearse scheme proposed by Horton 1973 based on reptiles and amphibians).

Two recent contributions to the debate on the evolutionary biogeography of the Australian avifauna deserve mention with the hope of stimulating further discussion later on. Cracraft (1986) has examined patterns of distribution of groups of closely related taxa of birds and has proposed a series of nodes separated by evolutionary isolating barriers. In the north and east, the nodes are Kimberley Plateau, Arnhem Land, New Guinea, Cape York, Atherton Plateau and the eastern rainforests. Nodes in the remainder of mainland Australia are Western Desert, Eastern Desert, southwestern corner and southeastern corner. Cracraft suggests that the barrier between the southwestern fauna and the desert fauna predates the barrier represented by the arid, marine limestone of the Nullarbor plain. These nodes or areas of endemism have been refined to include Northern Desert and Pilbara nodes and and the southeastern corner has been subdivided into three: Southern Forest, Adelaide and Eyre Peninsula in Cracraft (1991), wherin the congruence with patterns of endemism of other elements of the vertebrate fauna is highlighted. Gentilli (1992) has analysed patterns of land bird species richness in relation to biophysical factors. Major nodes of richness are identified in the Kimberley and the area of the wet forests and woodlands of the coastal plain and near-coastal mountain ranges of eastern Australia. The south west corner of Western Australia is a minor node. Gentilli draws attention to a conspicuous barrier in the Pilbara of Western Australia

and suggests that it is reason to recognise the Pilbara as a distinct Eyrean sub-region.

Biogeographic regionalisations based on other elements of the fauna have been advanced or variously discussed by Iredale (1929), Iredale and Whitley (1938), McMichael and Hiscock (1958)(freshwater mussels), McMichael and Iredale (1959) (snails), Paramonov (1959) (Dipterofauna), Sloane (1915) (carabeid beetles), Whitley (1959) (freshwater fish), Walker (1981)(freshwater mussels) and Key (1959) (grasshoppers); some of these have been reviewed in relation to reptiles by Keast (1959). Main *et al.* (1958) and Tyler (1981) discussed the evolutionary biogeography of the southern Australian frogs in the context of the Baldwin Spencer scheme (and the modification proposed by Horton 1972, 1973 for reptiles and amphibians) while Tyler *et al.* (1981) produced a generalised scheme more representative of the distribution of Australian frogs as a whole.

The map of Pianka (1969, 1981), based on patterns of distribution of desert lizards, shows a total of 13 sub-regions of the Australian desert or Eremaean Zone/Eyrean Sub-region, with nine sub-regions in Western Australia.

It would seem that, with the exception of some of the authors already mentioned, Australian zoogeographers have exhibited a reluctance in recent years to locate boundaries; rather they have been content to identify nodes of endemism or species richness (eg. Cogger and Heatwole 1981, Kitching 1981, Lee *et al.* 1981, Keast 1981a, Main 1981, Pianka and Scholl 1981). The comprehensive review of the existing schemes, the richness data and other relevant information by Keast (1981b) does not give a satisfying synthesis but it does provide a solid foundation for future work in this direction.

1.4.4 Regionalisations based on biophysical parameters

In 1914, J T Jutson proposed a division of Western Australia into six distinct areas based mainly on geological and geomorphological features but taking into account patterns of drainage and vegetation (Jutson 1914). He subsequently (Jutson 1934) subdivided the Kimberley into three: North Kimberley, Fitzroyland and Ordland, and the North-West into two, Pilbaraland and Murchinsonia. The South-West or Swanland was more-or-less defined by the catchments of rivers draining to the coast between Geraldton and Esperance. The remaining inland part of the State was divided into Sandridge (with the Great Sandy Desert, Gibson Desert and Great Victoria Desert), Euclonia (with the Nullarbor Plain) and Salt Lake or Salinaland (with the internally drained parts of the agricultural region and the goldfields). Revised boundaries for Jutson's regionalisation are given by Gentilli (1979), and detailed up-to-date descriptions are included in Pilgrim (1979).

An alternative regionalisation based on physiography, geology and climate, in order of priority, by E deC Clarke (1926) distinguished 15 so-called natural regions and one sub-region. A further region was added in 1935 (Clarke 1935, see also Clarke *et al.*1948). This scheme keeps the North Kimberley and Ordland (now called Antrim), the Euclonia (now called Nullarbor), extends the Fitzroy, subdivides the Sandridge into Canning (Canning Sedimentary Basin/ Great Sandy Desert), Carnegie (Gibson Desert and Great Victoria Desert) and Warburton (Warburton Ranges), separates off the Carnarvon Region from the North-West, divides the South-West or Swanland into Greenough, Perth both west of the escarpment, Jarrah

(containing the main forested area) and Stirling along the south coast and subdivides the Salt Lake or Salinaland into Wheat Belt, Kalgoorlie and Murchison. New boundaries have been delimited using up-to-date geological data and satelite imagery, but based on Clarke's defining principles, by Gentilli (1979).

L J H Teakle recognised nine major soil zones in the State (Teakle 1938) and, in collaboration with C A Gardner with his botanical perspective, identified 33 Soil and Ecological Regions (see Gentilli 1979). Four Regions within the Kimberley soil zone are Drysdale, Brockman, Hann and Fitzroy. The Carnegie soil zone which includes much of Clarke's Canning and Fitzroy is not subdivided further; neither is the contracted Nullarbor soil zone. The north west soil zone includes Warralong, Nullagine, Hamersley and Lyndon Regions. The broad swathe from Carnarvon through to the Nullarbor is subdivided into Asburton, Gascoyne, Minilya, Murchison, Yalgoo, Barlee, Warburton and Giles. Within the broad south west, three soil zones were recognised: a semi-arid/goldfields zone containing the Hartogsi, Ningham, Merridin, Corrigin, Coolgardie, Fitzgerald and Zanthus Regions, a narrow wheatbelt zone containing the Irwin, Avon, Dwarda, and Stirling Regions and the coastal plain and Darling Plateau zone containing the Swan, Darling and Franklin Regions.

Two papers by J Macdonald Holmes describe 19 Regional Landscapes (Holmes 1938) or Landform Regions (Holmes 1944) based on physiographic relief and landform characteristics, together with 12 types of coast. Congruence with Clarke's Natural Regions is limited to the south west and up to Onslow. In the Kimberley, Holmes delimits three types of plain types and one each of upland and plateau. The Pilbara consists of one mountains type and one plateau type. South of the Pilbara through to the south coast there are four plain types, and four upland types, the Nullarbor is a plain type, and the central arid/semi-arid comprises three plain types and one small mountain type.

The Physiographic Regions of Gentilli and Fairbridge (1952) are perhaps better termed Structural Regions (Gentilli 1979) since definition of those Regions is based first and foremost on solid geology, with consideration being given to lithology, sculpture and texture. The 14 Regions that occur within Western Australia are 1 Yilgarn Block, Stirling-Mt Barren Block and Darling Hills; 2 Donnybrook Sunkland and Leeuwin-Naturalist Horst; 3 Swan Coastal Belt, Dandaragan Block and Greenough Block; 4 Carnarvon Basin and Shark Bay-Byro Plains; 5 Nullagine Platform, Pilbara Block, Fortesque Rift, Hamersley Plateau and Onslow Coastal Plain; 6 Canning Basin, Pindan Country, Fitzroy Valley and Eighty Mile Beach; 7 Kimberley Block, King Leopold Range and Durack Range; 8 Antrim Region and Ord Basin; 12 unnamed in Gentilli (1979); 13 MacDonnell Fold Belt; 14 Amadeus Sunkland; 15 Musgrave Block; 16 Nurrari Plain and 17 Eucla Basin and Eucla Coastal Plain.

Laut *et al.* (1975) analysed biophysical attributes (terrain, lithology, soils, vegetation and climate) of 4591 catchments covering the whole land surface of the Australian continent. Of the 300 biophysical regions recognised for the continent, 64 occur in Western Australia. Because the study is based on catchments, where the catchments are small the regions tend to be small eg the Kimberley, whereas where catchments are large the regions are also large eg. inland Pilbara. The scheme proposed by Laut *et al.* (1980) combines the results of this analysis with local

government areas (LGAs) for ease of use: this identifies 16 provisional environmental regions for Western Australia.

Tinley (1986) has also used drainage/hydrological characteristics as the first criterion to identify Ecological Regions in Western Australia. Tinley's map shows four Regions: Northern (≈ Jutson's original Kimberley), Northwest (≈ Jutson's original North-West), Southwest and Central, while the text describes 14 Subregions within those.

A similarly detailed analysis based on characteristics of landforms and associated surficial sediments has produced a scheme of Physiographic Regions for the whole of Australia (Jennings and Mabutt 1977, 1986). Under this scheme, Western Australia is divided into nine Provinces and 69 Regions (see also Wyrwoll and Glover 1989). The detailed line work for this scheme can most be related to that of the geology map of the State (Myers and Hocking 1988). Consequently, as noted by Gentilli (1981), most of the Provinces are similar to the major divisions recognised by Jutson (1914 and subsequent versions) and Clarke (1926 and subsequent versions)- Kimberley, Pilbara, Yilgarn Plateau, Nullarbor Plain- but the Sandland and Western Coastlands Province differ greatly. The map does not show much in common with the Soil and Ecological Regions of Teakle and Gardner (1938). Surprisingly too, the 11 landform-soil regions of Western Australia proposed by McArthur and Bettenay (1979), developed by amalgamating soil units mapped at 1:5, 000,000 scale, do not match well with the Regions of Teakle and Gardner (1938) or Jennings and Mabutt (1977).

The Department of Agriculture, Western Australia has recently embarked on a program for integrating soil mapping data for the State and has developed an heirarchical classification for this purpose (N Schoknecht, personal communication 1995). The highest level of the classification is the soil landscape regions of CSIRO Division of Soils (DoS 1983) of which there are three within Western Australia: Sandy Desert Region, Western Region and Kimberley - Arnhem - Cape York Region. At the next level are the provinces described by Bettenay 1983, Isbell 1983, Northcote and Wright 1983. Below this are zones defined on geomorphological and geological criteria and below this again are systems which delimit areas of recurring patterns of soils, landforms and vegetation. The basic regionalisation differs from those of Jennings and Mabutt 1977 and McArthur and Bettenay (1979) particularly; presumably since it post-dates those schemes and includes input from those authors it represents an improvement based on increased knowledge.

Various versions of the map of major geological units of Western Australia have been produced, with the most recent being the 1:2,500,000 map by Myers and Hocking (1988). The 19 major Morphometric-Geological Divisions (*sensu* Wyrwoll and Glover 1989) and Subdivisions plus seven sedimentary basins (including three offshore) are described in GSWA (1975) (see also McArthur and Bettenay 1979).

Regionalisations have also been proposed solely on the basis of climate. The scheme of Gentilli (1978) shows 19 Climatic Regions grouped into five zones for Western Australia: Summer Seasonal Rain Zone (4 Regions), Episodic But Occasionally Heavy Rains (1), Double Rainy Season Zone (2), Winter Maximum Rain Zone, Summer Drought (9), and Arid Zone (4). Beard (1990) has also prepared a Bioclimatic Map of the State using the classificatory scheme of Bagnouls

and Gaussen (1957) based on season and length of the dry period and individual ombrothermic diagrams for individual stations. Beard's map shows 10 bioclimatic zones with boundaries that bear some relationship to his phytogeographic regions: Desert/Eremean (3 zones), Semi-Desert/Sub-Eremean (3 zones), Mediterranean/Thermoxeric (3 zones) and Tropical/Thermochimenic (1 zone).

1.4.5 Development of IBRA

The concept of environmental regionalisation has been embraced by the Australian National Parks and Wildlife Service (now Australian Nature Conservation Agency) as the basis for planning and setting priorities for funding for land acquisition and research. In particular, it was thought that defining regions based on environmental factors rather than using existing political and administrative boundaries would provide a sound basis for designing a national network of nature conservation reserves. In the first approach, data in four themes- terrain (elevation), temperature and precipitation, soil (initial moist-state permeability and available soil water-holding capacity)- were analysed to produce a set of groups for the Australian continent and Tasmania (Thackway and Creswell 1992). The three maps showing the different levels of groupings show, for Western Australia, a strong latitudinal banding which is not evident in any earlier scheme and which suggests that temperature had an excessive influence in the analysis.

A subsequent approach involved development of a scheme based on matching the biogeographic regionalisations developed separately by each of the States and Territories (Thackway and Cresswell 1994). The Western Australian input to the national scheme is based on Beard's Phytogeographic Regions (Beard 1980e), with minor changes derived from new knowledge and contributed by N L McKenzie, G J Keighery, K F Kenneally, G Wardell-Johnson and J S Beard. The scheme resulting from this second approach has recently been used as the basis for an assessment of conservation status (Thackway and Cresswell 1995, see Table 2 above).

1.4.5 Conclusions

This review has revealed the existence of many different regional frameworks for considering environmental planning and management in Western Australia. The various authors have brought their particular perspectives to bear, considered different data sets and given different weightings to factors such as palaeoclimates and evolutionary processes. The precision with which boundaries can be defined is obviously a function of the kinds of data being used: the geological boundaries are fairly static, whereas the climatological patterns move, both from year to year, over a period of years as well as over geological time and the patterns of distribution of plants and animals track those climatological ones at speeds that reflect the mobility of the organisms in question. There does not yet seem to be a single scheme that brings all these aspects together although the most recent version of the Interim Biogeographic Regionalisation for Australia (Thackway and Cresswell 1995) has broad acceptance.

The advent of modern and powerful computational tools, particularly numerical analytical tools and Geographic Information Systems, provides an opportunity tocompare regionalisations in considerable detail and to attempt integration with other spatial data, in order to develop a biologically meaningful synthesis. Such an

approach would ensure that the conceptual basis for decisions is made explicit and that, therefore, there is a sound basis for on-going development.

1.5 Criteria for assessment of adequacy

1.5.1 Initial targets

Just as the level of knowledge and understanding of the State's flora and fauna have improved markedly over the past 25 years or so, the level of sophistocation of the reserve design and planning process has also improved. As an example, the initial reservation target set by the International Union for the Conservation of Nature and Natural Resources (IUCN, now the World Conservation Union) was to have 5% of the area of each nation set aside for nature conservation (Slatyer 1975, see also Turner 1981). This figure was later revised to 10%, and refined to be 10% of each biome (IUCN et al. 1991, IUCN 1993). A range of individuals and organisations within Australia have argued that the percentage targets should be higher and should relate to the original extent of each major ecosystem or community type (HORSCERA 1993).

Early theoretical studies using data mainly derived from islands suggested that a reserve system which randomly covers 5% of a uniform natural region will ensure the persistence of only about 40% of the species formerly present in that region. An increase in reserve area to 10% only increases the species coverage to 50% (Diamond 1975, Slatyer 1975). These early studies tend to imply an inverse exponential relationship between area reserved and proportion of the biota conserved. Recent studies, including local studies using real reserve data (eg. Margules *et al.* 1988, Pressey and Nicholls 1989a,b) have tended to confirm this general relationship but have indicated a family of curves rather than a single one: as the level of discrimination of the conservation unit improves eg. from geology to land systems to floristically defined plant communities to all species, so a greater percentage area is required to ensure representation in the reserve system. Similarly, as the degree of replication increases eg. from one sample of a conservation unit in the reserve system to two samples to three samples and so on, the percentage of land required for reservation also increases.

1.5.2 The CAR reserve system

The 10% requirement has been a useful target for establishing a basic reserve system but it is arbitrary and, in most cases, should be regarded as a minimum level of reservation. A more ecologically meaningful target is to establish a Comprehensive, Adequate and Representative reserve system (DPM&C 1995), designed to suit the characteristics of each region. Whilst there is some redundancy in the terminology, Comprehensive, Adequate and Representative (CAR), together the terms capture the desired concept of the ideal nature conservation reserve system. The principle of comprehensiveness requires that the reserve system includes at least one example of each community as distinguished at a particular scale. To achieve the goal of adequacy, reserves need to be of suitable size, number and arrangement, and all elements of biodiversity should be present in numbers and spatial arrangements that give high chance of survival in the long-term and allow continuing evolution. The principle of representativeness involves incorporating the full range of community, species and genetic variation that exists

across the landscape within the reserve system. In effect, comprehensiveness is an initial approximation on the way to representativeness: both terms are included in descriptions of the ideal reserve system in recognition of the limits to our knowledge of communities and species, the genetic variation within those species, and the processes supporting ongoing evolution.

1.5.3 The application of criteria in Western Australia

The IBRA assessment discussed above (section 1.2.9, Table 2, Thackway and Cresswell 1995) was based on estimates of the gross area of reserved land in bioregions that were discriminated at a continental scale. For Western Australia, this was the first attempt to evaluate the adequacy of the conservation reserve system in quantitative terms. A 10% threshold was used, but an estimate of bias was included to give some indication of the extent to which the reserves might be excessively concentrated around particular ecosystems or communities. Only four IBRA regions were found to have >10% of their areas in the conservation reserve system and to have a low level of bias in the distribution of those reserves within each region.

The present study involves a much finer level of discrimination of biological units to be included in the conservation reserve system. Beard's vegetation types defined at the scale of 1:250,000 are used as a surrogate for ecosystem or community types. The assessment is of 775 units as compared with the 26 used in the IBRA study. We have employed the 10% threshold, adding in an assessment based on a minimum area of 2,000 hectares to identify vegetation types that may be vulnerable because of their limited areal extent.

The present study represents a further iteration in the process of assessing the present conservation reserve system as the basis for ongoing reserve acquisition. Ultimately it will be necessary to make an assessment of reservation status of ecosystems or communities which are more finely discriminated. However, community composition data, for example, are available for only small parts of the State, and this situation is unlikely to improve dramatically in the forseeable future. In the interim, Beard's vegetation data constitute the only relevant biological data set which is available State-wide, gathered with a consistent methodology, and at a consistent scale.

Beard's data can also be used to select areas to complement existing conservation reserves, by locating new examples of underrepresented vegetation types in order to increase the level of representation to 10%. Better still, when the data are coupled with the analytical power of a Geographic Information System, the opportunity exists to design a Comprehensive, Adequate and Representative reserve system which reflects the patterns of biological diversity on a region-by-region basis. The data and the tools allow for development of explicit selection procedures which can optimise location of new reserves, and which improve the efficiency and effectiveness of the reserve selection process. Such development becomes increasingly critical as opportunities for reserve acquisition diminish (cf. Pressey 1992,1994).

2. Methodology

2.1 Data Sets

The project drew mainly on three digital data sets which were under development at the time of commencement:

- Vegetation of Western Australia derived from unpublished, original, 1:250,000 compilation sheets, supplemented by published 1:250,000 map data by J S Beard (see references above), for the whole State except for the area covered by the three sheets in the south west corner mapped by Smith (1972, 1973, 1974) where Beard's 1:1,000,000 published map data (Beard 1981a) were used,
- CALM's Land Tenure Information System TENIS (Bowen 1995), and
- the Interim Biogeographic Regionalisation of Australia (Thackway and Cresswell 1995).

A fourth developing data set, Remnant Vegetation in the South West and Eucla Land Divisions (G R Beeston, unpublished) remains to be interrogated.

Additional digital data sets that were accessed included the vegetation of EPA/CTRC System 6 (Heddle *et al.* 1980) and soils and landform maps for the south west (Churchward 1992, Northcote *et al.* 1967, Tille in press a, b, Tille and Lantzke 1990).

2.2 Vegetation graphics data

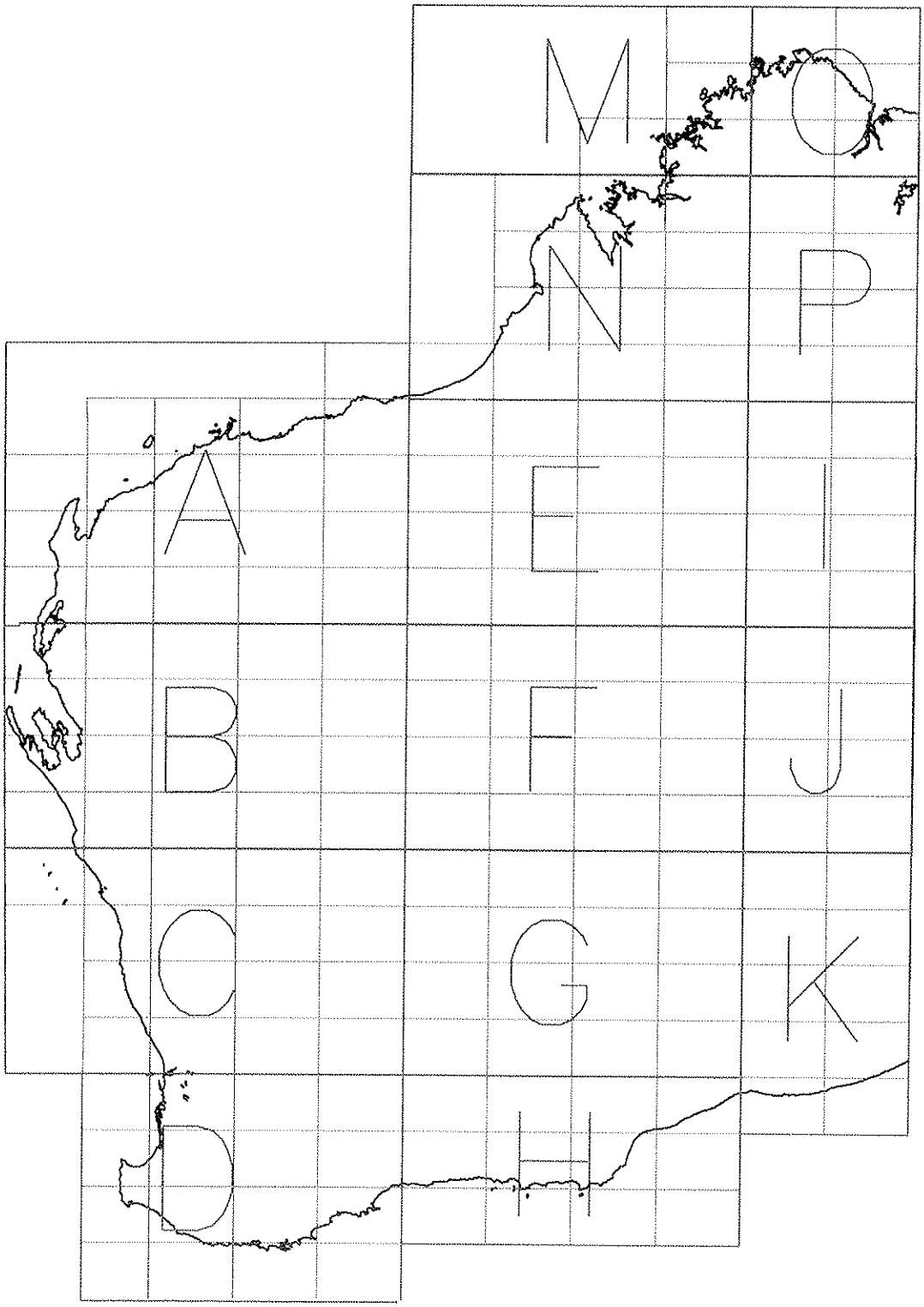
The vegetation data were captured from Beard's original compilation sheets, where these were available, or from published maps, all at the scale of 1:250,000 (1: 1,000,000 for the south-western portion of Swan, see later). The linework in each map sheet was either digitized using Microstation or scanned and then converted from raster to vector using Provec. Since the State contains over 160 1:250,000 mapsheets, the area was divided for convenience into tiles based on 6 degrees of longitude by 4 degrees of latitude (Figure 1). Each tile consisted of 16 1:250,000 map sheets although, because of the detail contained in some areas, some of the tiles were broken up to produce more than one digital file.

Each vegetation polygon was given a unique identification number (cell number or cell_no) which attached to its centroid. The prefix of the cell_no is based on a tile code (from A to P) and the position of the 1:250,000 map sheet in that tile. The suffix is the sequential number of that polygon on the 1:250,000 map sheet (Table 5).

Table 5. Coding system used to develop the unique number assigned to each polygon in the data capture phase of the project.

Alpha Code	Numeric Code	Unique Polygon Number
(A - P)	(2 digits)	(4 digits)
⇑	⇑	
6° long x 4° lat Tile	1:250,000 map sheet	

Figure 1. Map of Western Australia showingthe 6 degree longitude by 4 degress latitude tiles and the 1:250,000 mapsheets (green) used as the basis for data capture during this project.



Graphical data were checked for free end points and duplicate linework, feature coding was performed and linked to an ORACLE database table and the polygon identifier was loaded into the keyfield (cell_no). The linework and centroid were then used to calculate area of each polygon in Intergraph's Modular GIS Environment (MGE) and these area data were loaded into the database (beard_area). Additional fields in the database containing attributes such as vegetation description and Beard's formulae or floristic/structural codes (see later) link directly or indirectly to the key field. This process is illustrated in Figure 2.

With the graphical data (features) linked to the tabular data (attributes), some basic spatial analyses could be performed to facilitate validation of the data. Spatial anomalies were highlighted by converting the data to raster cells and producing coloured maps based on the classifications using MGGA Raster GIS utilities and IPLOT plotting software (Figure 2). Fictitious vegetation boundaries which were actually map sheet edges were dissolved, and non-matching vegetation boundaries at map sheet edges were redigitised. Missing linework and topological details were corrected when detected.

Inconsistencies in polygon nomenclature across map sheets, and between maps and text, were corrected on a case-by-case basis. For example, on the Hyden map sheet, Beard mapped a polygon as cSc (casuarina thicket), but the continuation of that same vegetation unit on the adjacent Lake Johnson map sheet was labelled c_3Sc. As an example of the disparity between map and text, a polygon on the Bremer Bay map sheet labelled e_1SZc is referenced in the text as e_2SZc (*Eucalyptus marginata* community).

In some cases it was necessary to subdivide very large polygons containing gradational sequences of vegetation. This was done in several instances with woodlands in the wheatbelt and goldfields where the mix of dominant tree species varies gradually from north to south and/or from west to east. For example, on the Corrigin sheet, the polygon labelled $e_{6,8}$Mi in the south is labelled $e_{6,8,34}$Mi in the north (York gum and salmon gum are joined by gimlet in the north). Subdivision was achieved by inserting additional linework after inspection of the relevant maps and text, and the linework was generally made straight to distinguish it from Beard's original linework.

For three 1:250,000 map sheets in the south west corner of the State, the mapping was done by F G Smith using Specht's classification (1970, Table 1 above) and provided detail of remaining vegetation only (Smith 1972, 1973, 1974). As a consequence, there is a disparity in the levels of detail between these map sheets and those for the remainder of the State done by Beard. To ensure consistency, these three sheets were captured from Beard's 1:1,000,000 Swan Sheet (Beard 1981a). Linework derived from the vegetation mapping for System 6 (Heddle *et al.* 1980) was matched with Beard's original mapping concepts and inserted for the Collie Sheet and the northern margin of the Pemberton & Irwin Inlet Sheet. For the remainder of that sheet and for the Busselton & Augusta Sheet, soils and landforms

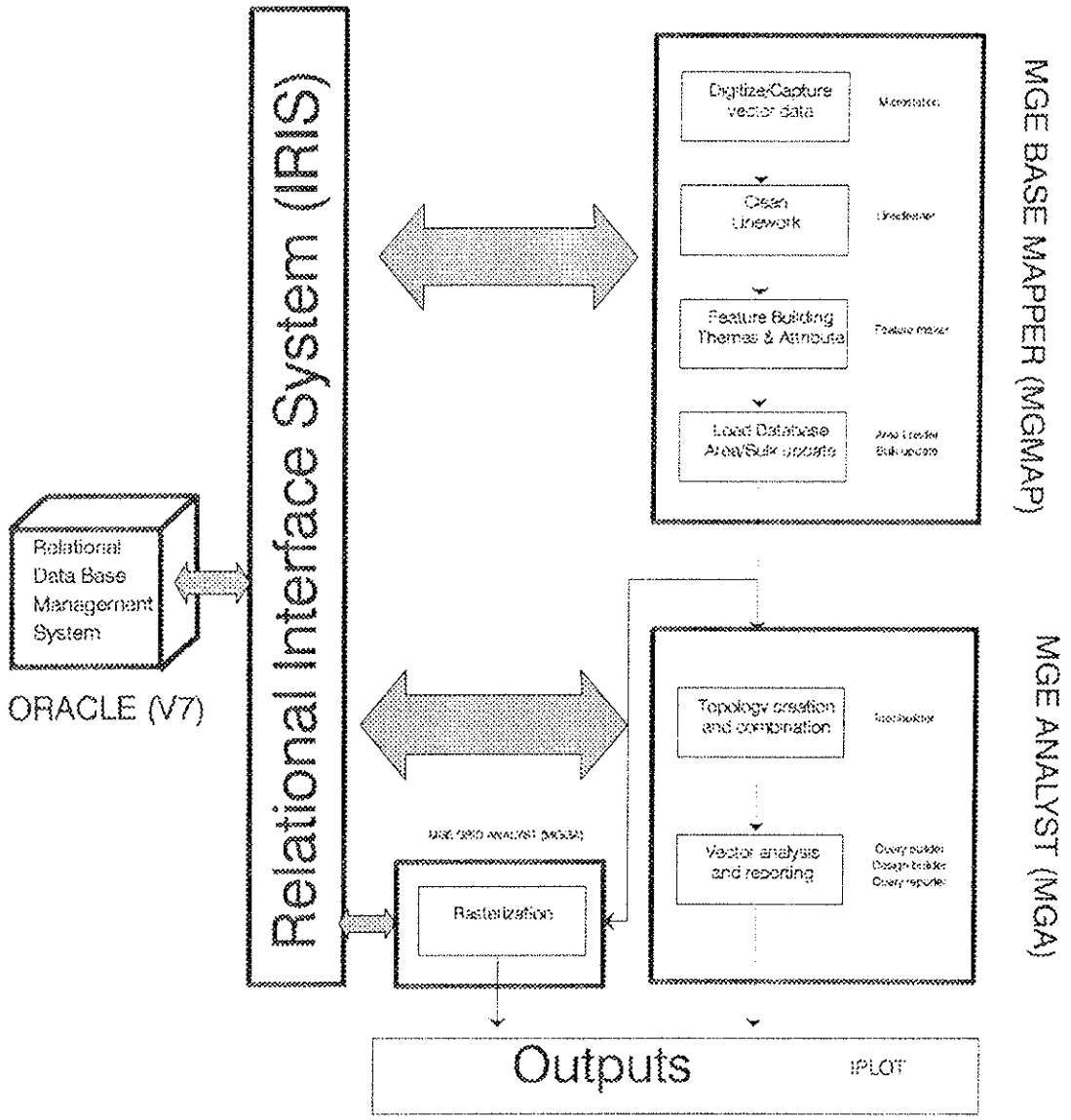


Figure 2. Flow chart of information processing for development of the graphics and tabular databases on the vegetation of Western Australia.

data from Churchward (1992), Northcote *et al.* (1967), Tille (in press a, b) and Tille and Lantzke (1990) are now available in digital format, but reinterpretation of these as vegetation units compatible with Beard's mapping has been deferred pending the outcome of a forest mapping project currently underway in the Department of Conservation and Land Management (F J Bradshaw, personal communication 1995, G Stoneman personal communication 1996).

2.3 Vegetation tabular data

On the original maps and compilation sheets from which the Beard's vegetation data were captured, each polygon delimiting an individual vegetation unit was labelled with vegetation descriptive text and/or an alpha-numeric floristic/structural code, or a symbol linking that polygon with another that was so labelled. These provided the basic attribute data captured as the linework was digitised

Attribute data were stored in three linked tables in an ORACLE database (see Figure 2). The structure of these tables is given in Table 3.

Initially, during data entry, the vegetation descriptions were referenced back to the list of 135 types (126 vegetation types, four mosaics plus five unvegetated categories) given in Beard and Sprenger (1984). These types and their codes could be identified on the keys to the 1:1,000,000 series maps, and were ordered in the following groups; tall forest and woodland, medium height forest and woodland, low forest and woodland, shrublands, sedgeland, grasslands, hummock grasslands, succulent steppe, bare areas and some mosaic (combination) units. These types were referred to as beards_unit 1 to 135. Where the data shown on the original map could not be referenced to an existing beards_unit, to preserve the integrity of the original map data, a new beards_unit was created and added to the list. For example, for a polygon labelled $e_{5,6,8}$Mi, the nearest existing type would be beards_unit 6 which is $e_{5,6}$Mi, but instead of being labelled beards_unit 6a the polygon would be given a new number, in this case beards_unit 1023. By the end of the data capture phase of the project, the list of beards_units had grown to 956 with numbers up to beards_unit 1166.

Initial check showed that 71 beards_units were duplicates and 147 (including some in the range beards_unit 1-135) had no polygon associated with them. These extraneous beards_units were eliminated while, at the same time, additional beards_units were added to deal with the nomenclatural anomalies between map sheets. For example beards_unit 51 (xGc) had polygons labelled sedgelands in the south west of the State as well as polygons labelled as short bunch grasslands in the north, so all occurrences had to be checked and reallocated. Where components of mosaics did not exist as discrete vegetation types, new units were created. Other discrepancies in the tabular data were also checked, usually by reference to the original compilation sheets and maps, the 1:1,000,000 series maps and the various explanatory memoirs and other relevent mapped information, and corrected.

Finally, the beards_units were reorganised systematically to group together vegetation types in a manner that reflects ecological relationships in accordance with Beard's classification concepts. Beards_units were first sorted by structure, as indicated by the alpha-numeric floristic/structural codes or formulae, and then resorted into the ecologically functional groupings used in the mapping and

Table 6. Structure and data content of the three ORACLE tables linked to the graphics data.

Table : beard_veg_cen

mslink	number (10)
mapid	number (10)
cell_no	number (10)
beard_area	float (21)
ms_250k	varchar2 (3)
beards_unit	varchar2 (5)
warms_group	varchar2 (5)
grid_load	number (10)
grid_load2	number (10)
harvey_code	varchar2 (10)
harvey_load	number (10)
hopkincode	varchar (30)

Table : beard_desc

num	char (5)
hopkins_code	char (35)
beards_code	char (45)
descript	char (250)
beards_unit	char (6)

Table : beards_unit

cell_no	char (8)
beards_unit	char (4)
tree1	char (4)
tree2	char (4)
tree3	char (4)
tree4	char (4)
tree5	char (4)
shrub1	char (4)
shrub2	char (4)
shrub3	char (4)
shrub4	char (4)
shrub5	char (4)
gc1	char (4)
gc2	char (4)
gc3	char (4)
gc4	char (4)
gc5	char (4)
comments	char (240)

evidenced by the various map keys. The beards_units were then agglomerated into smaller numbers of groups and supergroups in an heirarchical fashion. All the Beards_units were then allocated a new code (H Code) which reflects the taxonomic relationships between them.

2.4 Reserves cadastral data

The cadastral data for the CALM-managed estate (Department of Conservation and Land Management) were derived as primary data from the database supporting TENIS, CALM's Tenure Information System. This is a database of ownership details or tenure intelligence and key administrative information for all categories of CALM-managed lands and waters and other Crown Reserves which is designed for interactive interrogation using complex query criteria. It draws on the Western Australian Spatial Cadastral Database (SCD) developed through the Western Australian Land Information System. Data for TENIS are held in ORACLE tables which link an SCD pin (land parcel identification number) to data on tenure, vesting, purpose, classification under the Land Act, nomenclature and other administrative detail (Bowen 1995).

The original Microstation design files for the CALM-managed estate could not be obtained and the norm files (a data transfer format used in the Western Australian Land Information System community) proved to be inconsistent with the attribute data. Therefore it was necessary to develop a new procedure for transfer of linked feature and attribute data from TENIS to the Department of Agriculture's Integraph environment.

For the analyses, we used two data sets derived from TENIS. The first data set consists of reserves which satisfy criteria for the World Conservation Union (IUCN) Protected Area Management Categories I, II and IV (IUCN 1994), namely National Parks, Nature Reserves, Marine Parks, Marine Nature Reserves and Conservation Parks. The second data set consists of reserves in IUCN Categories I - IV plus additional areas managed primarily for nature conservation, including some reserves gazetted under Section 5g of the Conservation and Land Management Act 1984, Lol Gray, Highbury and Montague State Forests (Dryandra Woodlands), some miscellaneous reserves and five pastoral properties held in the name of the Executive Director, Department of Conservation and Land Management (Table 7).

2.5 Analysis: overlay of vegetation units with conservation estate

The captured data are stored as vector data, feature coded and attributed to a database within Integraph's Modular GIS Environment (MGE). In order to perform analyses, it is necessary to create a topology. This topological file contains the mathematical representations of the spatial relationships that exist between graphical features; it also contains the original pointer to the data linkages from the graphical features to the relational database.

Table 7. Statistics on land categories used for the assessment of conservation status of vegetation types throughout the State.

Reserve Type	Total Number	Total Area
National Parks	119	4,870,827.7
Nature Reserves	1144	10,782,404.4
Conservation Parks	23	117,315.8
Marine Parks (land)	6	703.0
Marine Nature Reserves (land)	0	0
Subtotals	1292	15,771,250.9
State Forest (in transition)	3	27,947.0[1]
CALM Act s5g reserves	19	141,457.9
Miscellaneous Reserves	8	2,386.7
Pastoral Leases	6	1,003,716.0
Subtotals	36	1,175,507.6
Totals	**1,328**	**16,946,055.5**

[1] Precise area to become National Park and Nature Reserve yet to be determined but whole area included in analyses.

Topology files of the two discrete, spatially co-registered area-themes, vegetation and cadastral boundaries of the CALM-managed estate, were built and those two themes were overlaid and intersected using the Modular GIS Analysis (MGA) module of MGE to produce a third topological file describing the faces of vegetation units within the CALM-managed estate. The new topology and the linked tables were used to generate a series of reports. The first report lists the vegetation types and areas of each vegetation type in each parcel of the CALM-managed estate. The second report is the area of each beards_unit in each of the two categories of the CALM-managed estate together with the total areal extent throughout the State. The data from the second report were taken into a spreadsheet program for further sorting and minor computation.

2.6 Vegetation Map of Western Australia

The existing 1:3,000,000 map of the vegetation of Western Australia (Beard 1981b) has been used extensively for teaching and general reference purposes, both within educational and research institutions (including schools) as well as within the wider community. This map is now out of print.

The development of the digital database which includes the newly constructed heirarchical vegetation taxonomy permits the production of vegetation maps at a scale that is greater than or equal to the scale of the original mapping, at any one of three levels of detail, and for any part of the State. Because there is a public demand for the 1:3,000,000 colour vegetation map, attention has been directed towards preparation of a new map at this scale and using a colour scheme similar to the one used in the previous map. The key for that map shows 39 vegetation types plus a further 11 mosaics plus three unvegetated categories.

The key for the new vegetation map is based on the 50 Supergroups (48 Vegetation Supergroups, 1 Mosaic Supergroup and 1 Unvegetated Supergroup) which form the upper level of the new classification. The systematic agglomerative process used to develop the classification means that each of the 821 Types at the basic level of the classification can be related directly to one of the Supergroups.

The linework for the new map is based on the 1:250,000 vegetation linework, as corrected in the course of this project. The unique identifier or cell_no for each polygon is linked to ORACLE tables containing the codes which relate the 821 Types to the 50 Supergroups. Thus it was possible to identify cell_nos associated with each Supergroups. A simplified graphics data set was produced using this listing, and merging adjacent polygons of the same Supergroups using MGE/MGA merge and Arc/Info's dissolve function in Arc.

Colours for the new vegetation map were selected from the palate of 64 million colours and shades of colours available in the Integraph system, attempting as far as possible to build on the colour scheme concepts described by Beard and Webb (1974) and taking into account the scheme used by Beard for the 1:3,000,000 map (Beard 1981b) and the various 1:1,000,000 maps (see Beard 1981a).

2.7 Interim Biogeographic Regionalisation for Western Australia

The digital version of the Interim Biogeographic Regionalisation of Australia (IBRA) obtained from ERIN (Environmental Resources Information Network) and the Reserve Systems Unit of the Australian Nature Conservation Agency (Thackway and Cresswell 1995) was captured from the 1: 3,000,000 vegetation map of Western Australia (Beard 1981a). When this was overlaid on the 1: 250,000 vegetation linework, considerable discrepancies became evident. Spatial improvement was achieved by printing out relevant sections of the 1: 250,000 linework at that scale and, with reference back to Beard's published maps, picking up the precise vegetation boundaries or features used by Beard to develop the Phytogeographic Regionalisation (Beard 1980e). Where inconsistencies appeared in Beard's work, for example where the boundary of the Northern Botanical Province mapped on the Great Sandy Desert Sheet in 1974 was modified on the Kimberley Sheet produced in 1978, then the last opinion was incorporated in this project. For the new boundaries included in IBRA, selection of the detailed linework was made after consultation with the contributors to IBRA, particularly N L McKenzie (personal communication 1995).

Boundaries of some of the Botanical Sub-districts have been picked up but these data are not presented here as they do not form part of the IBRA system.

processing protocols, there remains the potential for spatial error as a consequence of age of the source data.

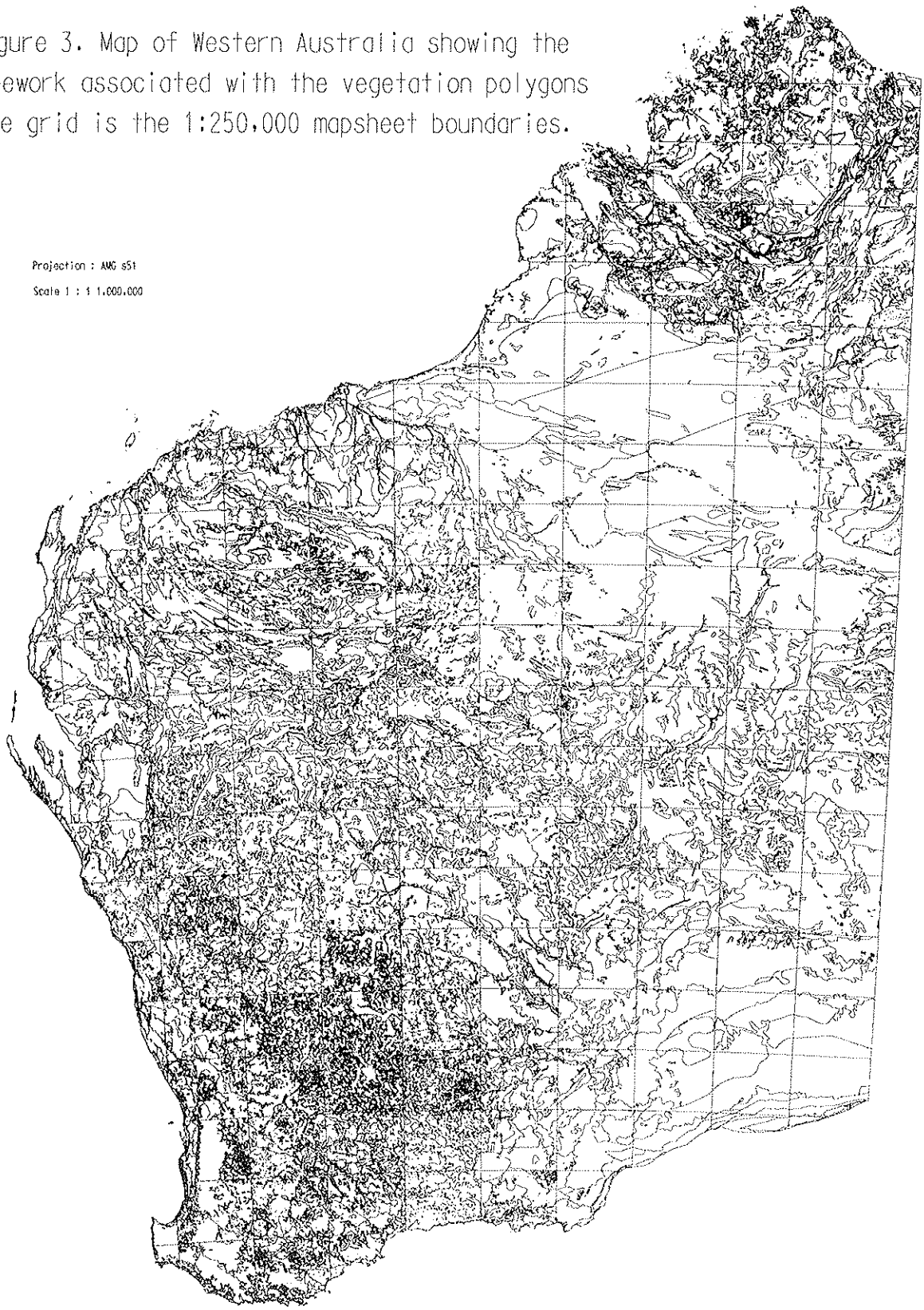
Fifthly, the area calculations provided through this project are specific to the scale and level of detail used in the original mapping. More detailed mapping which defines plant communities more precisely will provide more accurate area calculations. As an example, one could examine various estimates of the the area of karri forest at the time of European settlement. At the most general level, one could use the Warren IBRA region, an area of 1,042,000 ha, as this region is characterised by karri forest. At the next level, the area of Tall forest, a mix of karri, jarrah and marri forest types, calculated from mapping at the 1:1,000,000 scale by Beard and Sprenger (1984) (based, in this case, on the 1:250,000 mapping by Smith 1972, 1973, 1974) using a 2 km square grid overlay is 400,400 ha. In contrast, 1:15,840 scale detailed aerial photograph interpretation of the same area discriminates the tall forest into karri forest, jarrah and marri forest, tingle forest and non-forest vegetation types. The area of the karri forest component calculated from this aerial photograph interpretation using a two hectare grid cell is about 236,000 ha (F J Bradshaw personal communication 1995, G Stoneman personal communication 1996, see also Bradshaw and Lush 1981).

Finally, the major gap in the coverage of Beard's 1;250,000 vegetation data in the south west corner of the State creates problems in providing consistent and reliable conservation assessments for that area. Vegetation maps for five 1;250,000 map sheets in the south west corner and covering the major forested regions were produced by F G Smith using a vegetation classification that differs from the one used by Beard (Smith 1972,1973,1973 and see earlier section 1.3). Smith's mapping, particularly his generalised treatment of forest types, and Beard's 1: 1,000,000 scale data derived from that (Beard 1981a), are considered to be an inadequate basis for the type of analysis performed for this study. Furthermore, Government has approved a greatly expanded reserve system in this area (LFC 1994) but these changes are not yet reflected in the TENIS data set. Conservation analysis based on TENIS would, therefore, be misleading. For these reasons, and in anticipation of new, high resolution vegetation data becoming available in the near future (see section 1.3 above, G Stoneman, personal communication 1996), data for the six major forest vegetation types have not been included in this report.

3.2 Vegetation graphics

A total of 30,186 polygons have been incorporated into the graphics database in the course of this project. The polygons range in size from .0005 ha to 1,644,239 ha with a predominance of larger polygons occuring in the Little Sandy, Great Sandy and Gibson Deserts and parts of the Nullarbor (Figure 2). Many of these large polygons represent vegetation mosaics of dune and swale vegetation.

Figure 3. Map of Western Australia showing the linework associated with the vegetation polygons the grid is the 1:250,000 mapsheet boundaries.



3.3 Vegetation classification

Eight hundred and twenty-one distinct Types are now recognised as the basic units of vegetation in Western Australia: these include 696 vegetation Types of which 46 occur only as components of mosaics, 120 mosaics or combinations of individual Types and 5 unvegetated Types. These are listed and described in Appendix 1.

The basic Types can be amalgamated into 199 Groups (197 vegetation Groups, 1 unvegetated Group, 1 Group of mosaics) which can, in turn, be amalgamated into the 50 Supergroups (48 Vegetation Supergroups, 1 Unvegetated Supergroup, 1 Mosaic Supergroup) used for producing a new 1:3,000,000 scale map (Figure 4). The relationship between the vegetation categories in the classification hierarchy is exemplified for all the woodland communities in the State in Table 8. The Groups and Supergroups are also listed in Appendix 1.

A flexible coding system which reflects the relationship between all the basic vegetation Types in the hierarchical classification is shown in the Tables in Appendix 1 and in Table 4 (H Codes). This coding system uses the physiognomic classification lettering system developed by Beard (see Table 4) with life form/height class represented by upper case letters (T-Tall tree, M-Medium tree, L-Low tree, S-Shrubland, Z-Dwarf shrub, H-Hummock grassland, C-Succulent Steppe, G-Grass) and cover or density represented by lower case letters (d-dense, c-complete cover, i-incomplete cover, r-rare or open cover, p-patchy cover, b-practically bare). Where there are two or more structural layers the ecologically dominant layer is given first. If the layers are of the same density then the tallest layer is first. Where two layers differ considerably in density then the more open layer is given as a lower case eg eMr aSi becomes Sm, eLr aSr tHi becomes Hls. Potential for confusion with C being a structural layer and c a cover symbol as C only occurs as Ci when with other layers except for Sb Cr which is given the code Cr. The pindan shrublands, a three strata unit, is denoted as P and mangroves as A. The four groups of Kimberley grasses are prefixed by K or k to alleviate problems with transferring bold and italic lettering during the analysis (KG for Beards Gc - high grasses, kG for Gc - tall grasses, Kg for gc - short grasses and kg for *Gc* - curly spinifex. Mosaics are shown as component vegetation Types separated by a slash.

New vegetation types can be added to or deleted from the classification without upsetting the coding system: thus the system has the flexibility to be used as the basis for an expanding database as more detailed vegetation data become available.

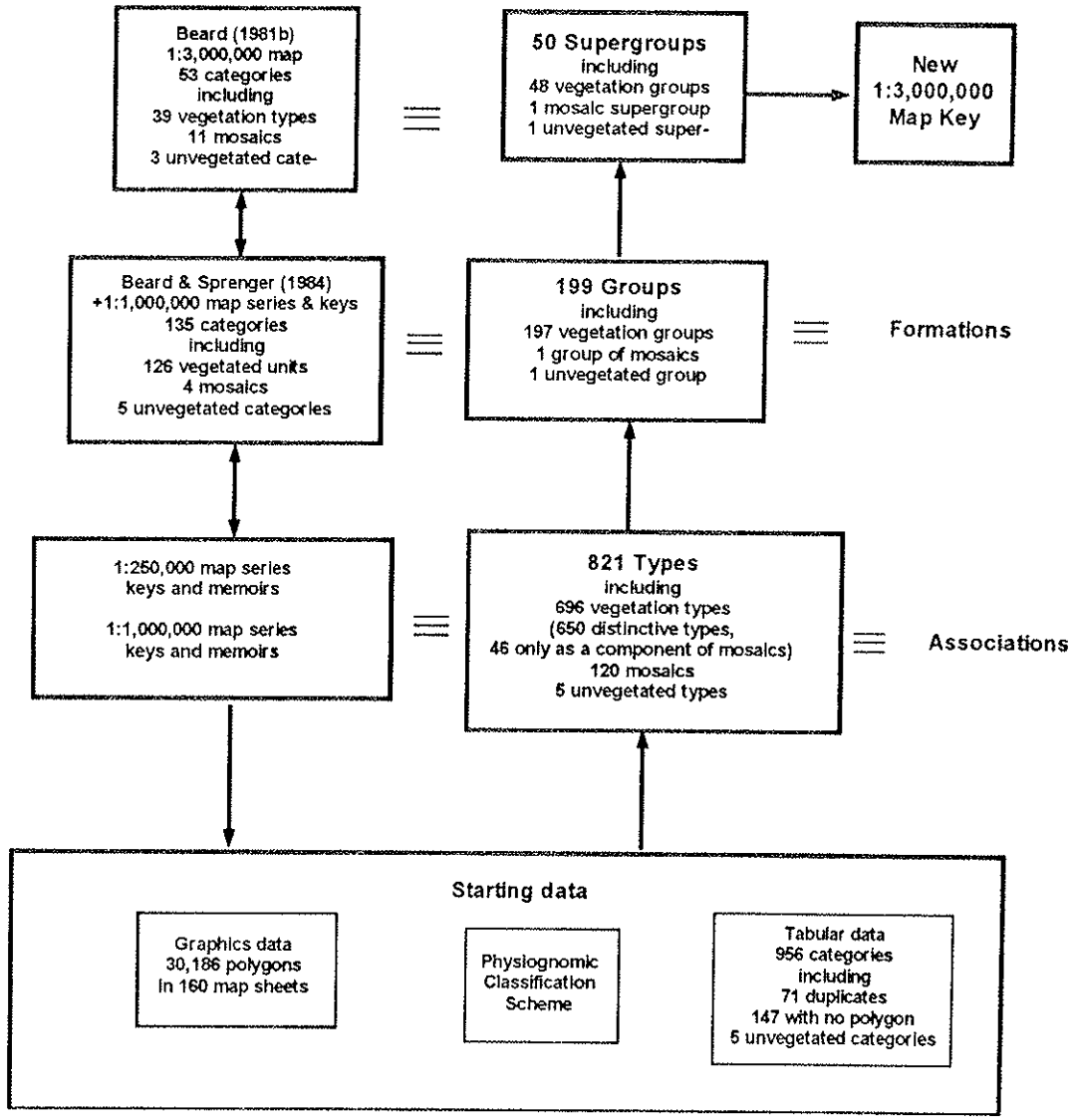


Figure 4. The hierarchy of the new vegetation taxonomy developed for this project and the relationships with the taxonomy used in the Vegetation Survey of Western Australia.

Table 8. Example of the hierarchical vegetation taxonomy developed for this project. Table 8a shows the two Supergroups of medium woodland (Mi) which incorrporate the 12 Groups in Table 8b which in turn incorporate the 80 Types in Table 8c.

Table 8a

H CODE	BEARD FORMULA	VEGETATION DESCRIPTION
Mi	e2,3,5 Mi	Woodland; jarrah-marri-wandoo
Mi	eMi	Woodland; other

Table 8b

H CODE	BEARD FORMULA	VEGETATION DESCRIPTION
Mi-01	e2,3,5 Mi	Medium woodland; jarrah-marri-wandoo (also with e7,45,63)
Mi-02	e4Mi	Medium woodland; tuart (also with e2)
Mi-03	e37Mi	Medium woodland; yate (also with e3)
Mi-04	e5,45,64Mi	Medium woodland; wandoo-powderbark-mallet
Mi-05	eMi wheatbelt	Medium woodland; central wheatbelt e5,6,8,9,14,34,35
Mi-06	eMi goldfields	Medium woodland; eastern goldfields e10,11,12,13,14,22,34,39 (also with 6,8,9)
Mi-07	eMi river N	Medium woodland; riverain north of Eneabba e17,18 (with e 52)
Mi-08	eMi river S	Medium woodland; riverain south of Eneabba e18 (with e2,3,6,71,72 & ag)
Mi-09	eMi swamps	Medium woodland; swamp e7 (also with e5,6,8)
Mi-10	e48,49Mi (lPi)	Medium woodland; tropical messmate - stringybark & woolybutt (also with palms)
Mi-11	ecMi	Medium woodland; eucalypts & casuarina e2,6 & c2,5,6
Mi-12	c6Mi	Medium woodland; wetlands, casuarina

Table 8c

H CODE	BEARD FORMULA	VEGETATION DESCRIPTION
Mi-01a	e2,3Mi	Medium woodland; jarrah & marri
Mi-01b	e2,3,5Mi	Medium woodland; jarrah & marri-wandoo
Mi-01c	e3,5Mi	Medium woodland; marri-wandoo
Mi-01d	e2,5Mi	Medium woodland; jarrah-wandoo
Mi-01e	e2,5,45Mi	Medium woodland; jarrah-wandoo-powderbark
Mi-01f	e3Mi	Medium woodland; marri
Mi-01h	e2,3,5,7Mi	Medium woodland; jarrah & marri-wandoo-yate
Mi-01j	e3,5,45Mi	Medium woodland; marri,wandoo, powderbark
Mi-01k	e5Mi	Medium woodland; wandoo
Mi-01l	e5Mi	Medium woodland; small wandoo patches surrounded by e2, 5Mi; e5, 7Mi

Table 8 continued

Mi-02a	e4Mi	Medium woodland; tuart
Mi-02b	e2,4Mi	Medium woodland; tuart & tuart-jarrah
Mi-03a	e37Mi	Medium woodland; yate
Mi-03b	e3,37Mi	Medium woodland; marri & yate
Mi-04a	e5,45Mi	Medium woodland; wandoo-powderbark
Mi-04b	e64,45Mi	Medium woodland; powderbark & mallet
Mi-04c	e64Mi	Medium woodland; mallet
Mi-04d	e5,64Mi	Medium woodland; wandoo & mallet
Mi-04e	e5,69Mi	Medium woodland; wandoo & blue mallet
Mi-04f	e5,9,69Mi	Medium woodland; wandoo, morrell & blue mallet
Mi-05a	e5,6Mi	Medium woodland; York gum & wandoo
Mi-05b	e5,6,8Mi	Medium woodland; York gum, wandoo & salmon gum
Mi-05c	e6Mi	Medium woodland; York gum
Mi-05d	e8Mi	Medium woodland; salmon gum
Mi-05e	e9Mi	Medium woodland; morrel
Mi-05f	e6,8Mi	Medium woodland; York gum & salmon gum
Mi-05g	e8,9Mi	Medium woodland; salmon gum & morrel
Mi-05h	e6,8,9Mi	Medium woodland; York gum, salmon gum & morrel
Mi-05i	e5,34Mi	Medium woodland; wandoo & gimlet
Mi-05j	e8,34Mi	Medium woodland; salmon gum & gimlet
Mi-05k	e9,35Mi	Medium woodland; morrell & blackbutt
Mi-05l	e9,14Mi	Medium woodland; morrel & Dundas blackbutt
Mi-05m	e6,8,34Mi	Medium woodland; York gum, salmon gum & gimlet
Mi-05n	e5,6,8,9,34Mi	Medium woodland; wandoo,York gum, salmon gum, morrel & gimlet
Mi-05o	e8,9,34,35Mi	Medium woodland; salmon gum, morrel, gimlet & blackbutt
Mi-05p	e6,8,9,34,35Mi	Medium woodland; wandoo,salmon gum, morrel, gimlet & blackbutt
Mi-05q	e35Mi	Medium woodland; blackbutt on greenstone hills
Mi-05r	e5,6,9 Mi	Medium woodland; wandoo, York gum & morrell
Mi-06a	e10,11Mi	Medium woodland; redwood & merrit
Mi-06b	e10,22Mi	Medium woodland; redwood & red mallee
Mi-06c	e12,13Mi	Medium woodland; coral gum & goldfields blackbutt (also some e10,11,)
Mi-06d	e11,12Mi	Medium woodland; merrit & coral gum
Mi-06e	e11,22Mi	Medium woodland; merrit & red mallee
Mi-06f	e8,13Mi	Medium woodland; salmon gum & goldfields blackbutt
Mi-06g	e8,14Mi	Medium woodland; salmon gum & Dundas blackbutt

Table 8 continued

Mi-06h	e13Mi	Medium woodland; goldfields blackbutt
Mi-06i	e13,14Mi	Medium woodland; goldfields blackbutt & Dundas blackbutt
Mi-06j	e13,22Mi	Medium woodland; goldfields blackbutt & red mallee
Mi-06k	e14,22Mi	Medium woodland; Dundas blackbutt & red mallee
Mi-06l	e22Mi	Medium woodland; red mallee group
Mi-06m	e6,22Mi	Medium woodland; York gum & red mallee
Mi-06n	e8,22Mi	Medium woodland; salmon gum & red mallee
Mi-06o	e34Mi	Medium woodland; gimlet
Mi-06p	e8Mi/e11,22Mi	Medium woodland; salmon gum mixed with merrit & red mallee
Mi-06q	e8Mi/e11,23Mi	Medium woodland; salmon gum mixed with merrit & desert bloodwood (*Eucalyptus* sp.)
Mi-06r	e8,9,34,39Mi	Medium woodland; salmon gum, morrel, gimlet & *Eucalyptus sheathiana*
Mi-06s	e8,10,11,34,39Mi	Medium woodland; salmon gum, redwood, merrit, gimlet & *Eucalyptus sheathiana*
Mi-06t	e8,9,10,11,34,39?Mi	Medium woodland; salmon gum, morrel, redwood, merrit, gimlet & *Eucalyptus sheathiana*
Mi-06u	eMi	Medium woodland; goldfield eucalypts (unknown species)
Mi-07a	e17Mi	Medium woodland; coolabah
Mi-07b	e18Mi	Medium woodland; river gum
Mi-07c	e18tMi	Medium woodland; river gum & terminalia
Mi-07d	e18tMi/e17,52Mi	Medium woodland; river gum & terminalia mixed with coolabah & ghost gum
Mi-07e	e17,18Mi	Medium woodland; coolabah & river gum
Mi-08a	e18Mi	Medium woodland; river gum
Mi-08b	e2,18Mi	Medium woodland; jarrah & river gum
Mi-08c	e6,18Mi	Medium woodland; York gum & river gum
Mi-09a	e7Mi	Medium woodland; yate
Mi-09b	e5,6,7Mi	Medium woodland; wandoo,York gum & yate
Mi-09c	e5,7Mi	Medium woodland; wandoo & yate
Mi-09d	e6,7Mi	Medium woodland; York gum & yate
Mi-09e	e7mMi	Medium woodland; yate & teatree
Mi-09f	e7,8Mi	Medium woodland; yate & salmon gum
Mi-09e	e6,7,8Mi	Medium woodland; York gum, yate & salmon gum
Mi-10a	e48,49Mi	Medium woodland-tropical messmate; stringybark & woolybutt
Mi-10b	e48,49MilPi	Medium woodland-tropical messmate; stringybark & woolybutt with understory of palms
Mi-11a	c5e6Mi	Medium woodland; York gum & *Allocasuarina huegelliana*
Mi-11b	c6e6Mi	Medium woodland; York gum & *Casuarina obesa*
Mi-11c	e6,8,c2Mi	Medium woodland; York gum, salmon gum & *Allocasuarina cristata*
Mi-12a	c6Mi	Medium woodland; *Casuarina obesa*

3.4 Conservation status of vegetation types

The occurrence of the 769 Types (647 vegetation Types, 117 mosaics, 5 unvegetated Types) in the individual land parcels comprising the CALM-managed conservation estate is listed in Appendix 2.

Table 9 summarises the conservation status of each of those 769 Types for each of the two categories of CALM-managed land, as previously described.

Table 9. Conservation status of vegetation types in Western Australia. Columns 1 and 2 are area (hectares) and % of the original areal extent in conservation reserves in IUCN categories I - IV: National Parks, Nature Reserves, Conservation Parks, Marine Parks and Marine Nature Reserves. Columns 3 and 4 are area (hectares) and % of original areal extent in all CALM-managed conservation reserves. Column 5 is the original areal extent of the vegetation type.

H Code	Vegetation Description	Area in IUCN (I)-(IV) Reserves	%	Area in all CALM Conservation Reserves	%	Total Area of Veg. unit in W.A.
Ti-01a	Tall woodland; tuart	793	8.4	800	8.5	9425
Mc-01b	Medium forest; jarrah-wandoo	1400	3.3	1910	4.5	42523
Mc-01c	Medium forest; jarrah-marri-wandoo	1648	5.9	2454	8.8	28035
Mi-01a	Medium woodland; jarrah & marri	7553	52.8	7581	53.0	14316
Mi-01b	Medium woodland; jarrah & marri-wandoo	9243	6.2	13616	9.1	149089
Mi-01c	Medium woodland; marri-wandoo	12985	1.2	19176	1.7	1123447
Mi-01d	Medium woodland; jarrah-wandoo	62	2.1	62	2.1	2918
Mi-01e	Medium woodland; jarrah-wandoo-powderbark	155	0.6	394	1.6	24405
Mi-01f	Medium woodland; marri	1171	0.6	1588	0.8	206137
Mi-01h	Medium woodland; jarrah & marri-wandoo-yate	398	1.7	517	2.2	23372
Mi-01j	Medium woodland; marri, wandoo, powderbark	467	26.5	628	35.7	1761
Mi-01k	Medium woodland, wandoo	84	0.5	182	1.0	17773
Mi-01l	Medium woodland; small wandoo patches surrounded by e2, 5 Mi / e5, 7Mi	150	8.2	150	8.2	1841
Mi-02a	Medium woodland; tuart	5356	8.9	5900	9.8	60395
Mi-02b	Medium woodland; tuart & tuart-jarrah	2118	3.7	2330	4.1	57507
Mi-03a	Medium woodland; yate	472	25.0	472	25.0	1888
Mi-03b	Medium woodland; marri & yate	1815	100.3	1815	100.3	1809
Mi-04a	Medium woodland; wandoo-powderbark	264	0.5	8027	15.3	52339
Mi-04b	Medium woodland; powderbark & mallet	1709	5.3	2167	6.7	32201
Mi-04c	Medium woodland; mallet		0.0		0.0	1746
Mi-04d	Medium woodland; wandoo & mallet	541	3.1	857	4.9	17528
Mi-04e	Medium woodland; wandoo & blue mallet	33	0.1	33	0.1	51795
Mi-04f	Medium woodland; wandoo, morrell & blue mallet	17	2.3	69	9.1	753
Mi-05a	Medium woodland; York gum & wandoo	242	0.1	658	0.3	247210
Mi-05b	Medium woodland; York gum,wandoo & salmon gum	2726	0.6	4395	0.9	498875
Mi-05c	Medium woodland; York gum	6001	0.4	8712	0.5	1627704
Mi-05d	Medium woodland; salmon gum	11551	1.3	23441	2.6	896293
Mi-05e	Medium woodland; morrel		0.0		0.0	702
Mi-05f	Medium woodland; York gum & salmon gum	22796	2.3	31220	3.1	1010690
Mi-05g	Medium woodland; salmon gum & morrel	11886	3.1	43419	11.2	387814
Mi-05h	Medium woodland; York gum, salmon gum & morrel		0.0		0.0	7220

Table 9 continued

Mi-05j	Medium woodland; salmon gum & gimlet	56616	5.1	229997	20.7	1109611
Mi-05k	Medium woodland; morrell & blackbutt		0.0	1378	6.9	19973
Mi-05l	Medium woodland; morrel & Dundas blackbutt		0.0		0.0	62160
Mi-05m	Medium woodland; York gum, salmon gum & gimlet	10699	1.8	11827	2.0	599338
Mi-05n	Medium woodland; wandoo,York gum, salmon gum, morrel & gimlet	2337	0.4	3033	0.5	638653
Mi-05o	Medium woodland; salmon gum, morrel, gimlet & blackbutt	1566	20.4	1566	20.4	7695
Mi-05p	Medium woodland; wandoo, salmon gum, morrel, gimlet & blackbutt	13807	2.8	111762	22.8	490191
Mi-05q	Medium woodland; blackbutt on greenstone hills		0.0		0.0	17921
Mi-05r	Medium woodland; wandoo, York gum & morrell	184	0.2	295	0.4	78061
Mi-06a	Medium woodland; redwood & merrit	5398	0.8	8021	1.2	698546
Mi-06b	Medium woodland; redwood & red mallee		0.0	111154	22.3	498529
Mi-06c	Medium woodland; coral gum & goldfields blackbutt	1654	0.5	11833	3.9	304202
Mi-06e	Medium woodland; merrit & red mallee	41930	2.9	133391	9.3	1433513
Mi-06f	Medium woodland; salmon gum & goldfields blackbutt		0.0	4249	0.9	475267
Mi-06h	Medium woodland; goldfields blackbutt		0.0		0.0	47496
Mi-06j	Medium woodland; goldfields blackbutt & red mallee		0.0		0.0	46226
Mi-06k	Medium woodland; Dundas blackbutt & red mallee		0.0	150117	43.9	341680
Mi-06l	Medium woodland; red mallee on calcarious earths		0.0	3065	2.4	127011
Mi-06m	Medium woodland; York gum & red mallee	574	4.4	574	4.4	12964
Mi-06n	Medium woodland; salmon gum & red mallee	12168	6.6	18095	9.8	184760
Mi-06o	Medium woodland; gimlet	525	2.3	525	2.3	23007
Mi-06p	Medium woodland mixed; salmon gum with, merrit & red mallee	521	72.9	521	72.9	715
Mi-06q	Medium woodland mixed; salmon gum with, merrit & desert bloodwood Eucalyptus sp.	2532	97.6	2532	97.6	2595
Mi-06r	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana	1911	0.8	9263	3.7	249503
Mi-06s	Medium woodland; salmon gum, redwood, merrit, gimlet & Eucalyptus sheathiana	758	100.0	758	100.0	758
Mi-06t	Medium woodland; salmon gum, morrel, redwood, merrit, gimlet & Eucalyptus sheathiana		0.0		0.0	32
Mi-07a	Medium woodland; coolabah		0.0		0.0	35834
Mi-07b	Medium woodland; river gum		0.0	245	0.2	102286
Mi-07c	Medium woodland; river gum & terminalia		0.0		0.0	11192
Mi-07d	Medium woodland-mixed; river gum & terminalia with coolabah & ghost gum		0.0		0.0	2694
Mi-07e	Medium woodland; coolabah & river gum	1071	3.0	1071	3.0	35845
Mi-08a	Medium woodland; river gum	117	10.4	117	10.4	1125
Mi-08b	Medium woodland; jarrah & river gum		0.0	43	1.8	2437
Mi-08c	Medium woodland; York gum & river gum	2310	97.4	2310	97.4	2372
Mi-09a	Medium woodland; yate	1305	4.8	1447	5.3	27184

Table 9 continued

Mi-09b	Medium woodland; wandoo,York gum & yate		0.0		0.0	10539
Mi-09c	Medium woodland; wandoo & yate	1000	0.4	1391	0.6	240510
Mi-09d	Medium woodland; York gum & yate	1219	1.7	1311	1.8	71105
Mi-09e	Medium woodland; yate & teatree	3682	15.9	4173	18.0	23181
Mi-09f	Medium woodland; yate & salmon gum		0.0		0.0	354
Mi-09g	Medium woodland; York gum, yate & salmon gum		0.0		0.0	1220
Mi-10a	Medium woodland-tropical messmate; stringybark & woolybutt		0.0		0.0	8543
Mi-10b	Medium woodland-tropical messmate; stringybark & woolybutt with understory of palms	5951	6.0	5951	6.0	99934
Mi-11a	Medium woodland; York gum & Allocasuarina huegelliana		0.0		0.0	2110
Mi-11b	Medium woodland; York gum & Casuarina obesa		0.0	10	0.4	2827
Mi-11c	Medium woodland; York gum, salmon gum & Allocasuarina cristata	15789	34.3	15789	34.3	46005
Mi-12a	Medium woodland; Casuarina obesa		0.0	107	21.4	501
Mr-01a	Medium open woodland; jarrah		0.0		0.0	315
Mr-01b	Medium open woodland; marri		0.0	9	0.2	4500
Mr-01c	Medium open woodland; wandoo	264	4.0	264	4.0	6527
Mr-02a	Medium open woodland; tuart	260	20.6	260	20.6	1264
Mr-02b	Medium open woodland; marri & tuart		0.0		0.0	1213
Mr-03a	Medium woodland; marri & river gum		0.0		0.0	7466
Mr-03b	Medium woodland; York gum & river gum		0.0	0	0.0	1438
Mp-01a	Medium sparse woodland; jarrah & marri		0.0		0.0	790
ML-01a	Medium-Low woodland; York gum & Callitris columellaris (cypress pine)	78230	33.1	78678	33.3	236393
Lm-01a	Medium open woodland; jarrah & marri, with low woodland; banksia		0.0		0.0	5818
Lm-01b	Medium open woodland; eucalypt, with low woodland; Banksia attenuata & B. menziesii		0.0		0.0	1710
Lm-01d	Medium very sparse woodland; jarrah, with low woodland; banksia & casuarina	498	0.9	829	1.4	57990
Lc-01a	Low forest; Acacia rostellifera	15	0.0	141	0.4	35344
Lc-02a	Low forest; callitris (cypress pine)		0.0		0.0	2353
Lc-03a	Low forest; teatree		0.0	113	20.1	561
Lc-03b	Low forest; teatree & casuarina		0.0		0.0	1100
Lc-04a	Low forest; mixed tropical deciduous forest.	117	1.0	117	1.0	11788
Lc-05b	Low forest; moort		0.0		0.0	4725
Lc-06a	Low forest; jarrah	4463	4.0	5076	4.5	113026
Lc-06b	Low forest; jarrah & Eucalyptus decipiens	1392	100.5	1392	100.5	1385
Lc-06c	Low forest; jarrah & casuarina	1500	8.8	1577	9.3	16973
Li-01a	Low woodland; jarrah-banksia	35609	44.0	36071	44.6	80866
Li-02a	Low woodland; mulga	230498	1.0	416981	1.7	24252102

Table 9 continued

Li-02b	Low woodland; mulga on dolerite		0.0		0.0	17904
Li-02c	Low woodland; mulga (with spinifex) on rises		0.0		0.0	156332
Li-03a	Low woodland; mulga between sandridges	354	0.0	23167	0.8	2976838
Li-04a	Low woodland; mulga & bowgada	3329	3.5	3329	3.5	95983
Li-04b	Low woodland; mulga & Acacia victoriae		0.0		0.0	205547
Li-04c	Low woodland; mulga & snakewood	25	0.0	25	0.0	684727
Li-04d	Low woodland; mulga Acacia victoriae & snakewood		0.0		0.0	280268
Li-04e	Low woodland; mulga, bowgada, Acacia quadrimarginea & minnieritchie (A. grasbyi)		0.0		0.0	10333
Li-05a	Low woodland; mulga mixed with Allocasuarina cristata, & Eucalyptus sp (e6)	54783	4.5	226724	18.4	1230987
Li-05b	Low woodland; mulga mixed with cypress pine, & york gum	18215	4.5	18215	4.5	403385
Li-05c	Low woodland; mulga & Allocasuarina cristata		0.0	119786	67.9	176405
Li-05d	Low woodland; mulga & callitris		0.0	2832	1.9	146457
Li-05e	Low open woodland; mulga & Allocasuarina cristata		0.0	6045	11.3	53740
Li-05f	Low woodland; mulga & red mallee		0.0		0.0	40134
Li-05g	Low woodland; York gum, and callitris (pine)	60740	58.1	60740	58.1	104466
Li-06b	Low woodland; waterwood		0.0		0.0	197179
Li-06c	Low woodland; Acacia victoriae & snakewood	882	0.1	882	0.1	635276
Li-06d	Low woodland; Acacia sclerosperma & A. victoriae		0.0		0.0	20885
Li-06e	Low woodland; bowgada & Acacia subtressarogona		0.0		0.0	476643
Li-07a	Low woodland; jarrah	11568	85.8	11622	86.2	13487
Li-07b	Low woodland; York gum		0.0		0.0	3562
Li-07c	Low woodland; salmon gum	23	0.3	23	0.3	8258
Li-07d	Low woodland; Eucalyptus sp. aff. aspera		0.0		0.0	474
Li-07e	Low woodland; Eucalyptus decipiens	561	35.3	561	35.3	1591
Li-08a	Low woodland; Agonis flexuosa	10874	30.7	12292	34.7	35417
Li-09a	Low woodland; banksia	18122	8.4	28336	13.2	215129
Li-09b	Low woodland; Banksia attenuata & B. menziesii	6273	4.5	8264	5.9	139955
Li-09c	Low woodland; Banksia prionotes	14131	16.4	14493	16.8	86041
Li-10b	Low woodland; Banksia prionotes& Allocasuarina huegellianna	14	2.0	23	3.2	719
Li-11a	Low woodland; Allocasuarina cristata	820	0.3	2709	1.0	269668
Li-11b	Low woodland; Allocasuarina huegelliana		0.0		0.0	780
Li-11c	Low woodland; Casuarina obesa, salt lake		0.0		0.0	164
Li-11f	Low woodland; Allocasuarina fraseriana & Jam		0.0		0.0	2269
Li-12b	Low woodland; jarrah or jarrah-casuarina		0.0		0.0	156
Li-12c	Low woodland; casuarina & eucalypts		0.0		0.0	7838

Table 9 continued

Li-12d	Low woodland; jarrah, Eucalyptus decipiens & Allocasuarina fraseriana	1483	2.2	3597	5.4	66576
Li-12e	Low woodland; Allocasuarina huegeliana& York gum		0.0	15	0.2	8622
Li-13a	Low woodland; paperbark, melaleuca	24725	27.3	25571	28.2	90696
Lr-01a	Open low woodland; Eucalypus sp. aff. aspera		0.0		0.0	721
Lr-01b	Open low woodland; Eucalyptus oraria		0.0		0.0	703
Lr-02a	Open low woodland; mulga		0.0		0.0	311829
Lr-02b	Open low woodland; bowgada	5830	95.7	5830	95.7	6093
Lp-01a	Sparse low woodland; mulga, discontinuous in scattered groups	21873	0.3	22811	0.3	6952783
Lp-01b	Sparse low woodland; mulga & A. victoriae, discontinuous in scattered groups		0.0		0.0	226885
Lp-01c	Sparse low woodland; Acacia victoriae & snakewood), discontinuous in scatttered groups		0.0		0.0	52832
A-01a	Low forest; mangroves(Kimberley) or Scrub; mangroves (Pilbara)	23047	11.6	25187	12.7	197944
LS-01a	Shrublands tree-heath between sandhills		0.0		0.0	35667
LS-01b	Shrublands low trees & scrub; teatree		0.0	31	1.2	2664
SM-01a	Medium woodland over scrub; York gum over bowgada & jam scrub		0.0		0.0	10566
SM-01b	Medium woodland over scrub; coolabah over bowgada scrub		0.0		0.0	3233
Sm-01a	Shrublands; teatree thicket with scattered wandoo & yate		0.0	312	2.2	14508
Sm-01b	Shrublands; Melaleuca uncinata thicket with scattered York gum		0.0	14	0.1	12687
Sm-01c	Shrublands; Melaleuca thyoides thicket with scattered York gum	1267	3.4	2353	6.3	37091
Sm-01d	Shrublands; Melaleuca thyoides thicket with scattered river gum	135	39.6	135	39.6	340
Sm-01f	Shrublands; thicket with scattered wandoo	642	2.6	883	3.5	25151
Sm-02b	Shrublands; bowgada & jam scrub with scattered York gum		0.0	31	0.1	43709
Sm-02c	Shrublands; jam scrub with scattered York gum	239	0.1	607	0.3	188003
Sm-02d	Shrublands; jam and A. rostellifera or hakea scrub with scattered York gum		0.0	910	1.0	91819
Sm-02e	Shrublands; bowgada & jam scrub with scattered York gum & red mallee	61	0.1	276	0.5	55738
Sm-03a	Shrublands; jam scrub with scattered casuarina & York gum	824	2.1	1050	2.7	38841
Sm-03b	Shrublands; bowgada & jam scrub with scattered casuarina & York gum	2855	5.1	2897	5.2	55531
Sm-03c	Shrublands; Acacia quadrimarginea thicket with casuarina & goldfields blackbutt woodland		0.0		0.0	36931
Sm-04a	Shrublands; mallee & acacia scrub with scattered York gum	60	0.1	745	0.9	86754
Sm-04b	Shrublands; mallee & acacia scrub with scattered York gum & red mallee		0.0	30	0.2	17461
Sm-05a	Shrublands; mallee with scattered York gum	1096	53.8	1096	53.8	2036
SL-01a	Low woodland over scrub; mulga over bowgada & minnieritchie scrub		0.0		0.0	990260
SL-01b	Low woodland over scrub; mulga over bowgada scrub		0.0		0.0	83671
SL-01c	Low woodland over scrub; Allocasuarina cristata over bowgada scrub	809	99.5	809	99.5	813
SL-01d	Low woodland over scrub; Allocasuarina heugelliana over jam scrub	16595	51.7	16595	51.7	32095
Sl-01a	Shrublands; Melaleuca thyoides thicket with scattered casuarina	3982	78.8	4142	82	5052

Table 9 continued

SI-01b	Shrublands; Melaleuca uncinata thicket with scattered powderbark wandoo mallee		0.0		0.0	361
SI-01c	Shrublands; casuarina & dryandra thicket with scattered wandoo and powderbark wandoo on laterite	257	8.4	321	10.5	3052
SI-02a	Shrublands; scrub with scattered mulga		0.0		0.0	24008
SI-02b	Shrublands; bowgada scrub with scattered mulga	36632	12.4	36632	12.4	295100
SI-02c	Shrublands; bowgada & minnieritchie scrub with scattered mulga		0.0		0.0	237955
SI-03a	Shrublands; bowgada scrub with scattered red mallee & Eucalyptus sp.		0.0		0.0	37406
SI-03b	Shrublands; bowgada & jam scrub with scattered York gum & red mallee		0.0		0.0	59285
SI-03c	Shrublands; bowgada scrub with scattered York gum	46055	65.0	46254	65.3	70846
SI-03d	Shrublands; bowgada scrub with scattered eucalypts.& callitris		0.0		0.0	2963
SI-03e	Shrublands; bowgada scrub with scattered eucalyptus & callitris or casuarina	162884	30.0	162884	30.0	542252
SI-03f	Shrublands; bowgada scrub with scattered callitris or casuarina	188687	76.1	188687	76.1	248012
SI-03g	Shrublands; Acacia quadrimarginea & jam scrub with scattered York gum & Allocasuarina huegelliana		0.0		0.0	1386
Sc-01a	Shrublands; thicket, acacia & Allocasuarina campestris		0.0	694	3.3	20851
Sc-01b	Shrublands; thicket, jam & Allocasuarina acutivalvis on ironstone		0.0		0.0	8517
Sc-01c	Shrublands; thicket, jam & Allocasuarina huegelliana	496	6.0	580	7.0	8296
Sc-01d	Shrublands; thicket, acacia-casuarina alliance	1869	0.6	20036	6.3	316796
Sc-02a	Shrublands; Acacia cyperophylla thicket	60688	15.2	69758	17.5	398714
Sc-02b	Shrublands; Acacia quadrimarginea thicket	510	1.4	4609	13.0	35372
Sc-02c	Shrublands; jam thicket	362	0.5	1902	2.7	70532
Sc-02d	Shrublands; Acacia ligulata x rostellifera thicket	9903	62.8	10335	65.5	15777
Sc-02e	Shrublands; Acacia rostellifera thicket	6136	8.0	6140	8.0	76738
Sc-02g	Shrublands; Acacia decipiens	7890	53.1	7896	53.1	14862
Sc-02j	Shrublands; Acacia neurophylla & other acacia thicket	17	0.2	17	0.2	8652
Sc-02l	Shrublands; Acacia neurophylla, A. beauverdiana & A. resinomarginea thicket	47562	4.1	114556	10.0	1150396
Sc-03a	Shrublands; bowgada, jam and Melaleuca uncinata thicket		0.0		0.0	329351
Sc-03b	Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket	3597	17.8	3597	17.8	20215
Sc-04a	Shrublands; Allocasuarina campestris thicket	16185	2.6	17660	2.8	629996
Sc-04b	Shrublands; Allocasuarina campestris scrub		0.0		0.0	660
Sc-05a	Shrublands; mallee & casuarina thicket	3761	0.5	6474	0.9	732523
Sc-06a	Shrublands; thicket, acacia-casuarina-melaleuca alliance	115138	6.8	175036	10.4	1685895
Sc-07a	Shrublands; thicket, casuarina-melaleuca alliance		0.0	64	1.9	3328
Sc-08a	Shrublands; Melaeuca uncinata thicket	510	18.9	510	18.9	2693
Sc-08b	Shrublands; Melaeuca thyioides thicket	286	7.8	286	7.8	3694
Sc-08c	Shrublands; Melaleuca cardiophylla thicket		0.0		0.0	13544
Sc-08d	Shrublands; teatree thicket	1998	5.9	3184	9.3	34120

Table 9 continued

Sc-09a	Shrublands; acacia-lamarchea thicket	17503	102.0	17503	102.0	17167
Sc-09b	Shrublands; tamma & dryandra thicket	182	12.6	585	40.6	1441
Sc-09c	Shrublands; casuarina - calothamus thicket	777	2.5	777	2.5	31475
Sc-09d	Shrublands; Mt Ragged heath	2460	78.8	3122	100.0	3122
Sc-09e	Shrublands; Dryandra quercifolia & Eucalytpus spp. thicket	2108	9.1	2108	9.1	23142
Sc-09f	Shrublands; mixed thicket	348	0.1	371	0.1	390311
Sc-09g	Shrublands; acacia, casuarina, Eucalyptus eudesmoides, Banksia ashbyi & other mixed species thicket	13247	8.7	13247	8.7	153004
Sc-09h	Shrublands; thicket, other spp	2376	5.0	2502	5.3	47192
Si-01a	Shrublands; mulga scrub	260323	5.9	260506	5.9	4392268
Si-01b	Shrublands; mulga & Acacia sclerosperma scrub		0.0		0.0	35833
Si-01c	Shrublands; mulga & bowgada scrub		0.0		0.0	136645
Si-01d	Shrublands; mulga, Acacia victoriae & snakewood scrub		0.0		0.0	38189
Si-01e	Shrublands; mulga & snakewood scrub	34075	1.9	34075	1.9	1822535
Si-01f	Shrublands; mulga & Acacia quadrimarginea scrub	25	0.0	3945	1.3	309889
Si-01g	Shrublands; mulga & minnieritchie scrub	29951	14.9	29951	14.9	200725
Si-01h	Shrublands; mulga, bowgada, Acacia quadrimarginea & minnieritchie scrub		0.0		0.0	18664
Si-02a	Shrublands; waterwood & A. victoriae scrub	58	0.1	58	0.1	82857
Si-02b	Shrublands; Acacia bivenosa		0.0		0.0	130199
Si-02c	Shrublands; Acacia sclerosperma & bowgada scrub	2298	0.8	2298	0.8	298504
Si-02d	Shrublands; Acacia sclerosperma, bowgada & A. victoriae scrub		0.0		0.0	71214
Si-02f	Shrublands; Acacia sclerosperma, bowgada & snakewood scrub		0.0		0.0	5652
Si-02g	Shrublands; Acacia sclerosperma, bowgada & jam scrub		0.0		0.0	6359
Si-02h	Shrublands; Acacia sclerosperma & A. victoriae scrub		0.0		0.0	89065
Si-02k	Shrublands; Acacia sclerosperma & snakewood scrub		0.0		0.0	353423
Si-02l	Shrublands; Acacia sclerosperma & minnieritchie scrub	155	0.4	155	0.4	44040
Si-02n	Shrublands; bowgada & Acacia victoriae scrub		0.0		0.0	11010
Si-02o	Shrublands; bowgada & Acacia quadrimarginea on stony ridges		0.0	880	1.6	56426
Si-02p	Shrublands; bowgada & minnieritchie scrub		0.0		0.0	118276
Si-02q	Shrublands; bowgada & jam scrub	447	0.1	447	0.1	638648
Si-02r	Shrublands; bowgada & A. murrayana scrub		0.0		0.0	89115
Si-02s	Shrublands; Acacia victoriae scrub		0.0		0.0	16752
Si-02t	Shrublands; snakewood & A. victoria scrub	49574	4.3	49574	4.3	1163124
Si-02u	Shrublands; snakewood scrub	13036	2.2	13036	2.2	595647
Si-02v	Shrublands; snakewood & minnieritchie scrub		0.0		0.0	9861
Si-02w	Shrublands; bowgada & other acacia scrub	188789	8.3	196464	8.7	2270559

Table 9 continued

Si-02x	Shrublands; acacia species, general or numerous scrub (Murchison)		0.0	770	5.3	14475
Si-02y	Shrublands; acacia various species scrub	1413	5.6	1432	5.7	25190
Si-03a	Shrublands; Acacia cyperophylla scrub		0.0		0.0	15071
Si-03b	Shrublands; Acacia quadrimarginea scrub		0.0		0.0	10840
Si-03c	Shrublands; Acacia quadrimarginea & jam scrub on greenstone	405	1.0	405	1.0	40743
Si-03d	Shrublands; Acacia brachystachya scrub	8740	6.5	34468	25.6	134622
Si-04a	Shrublands; acacia & banksia scrub		0.0		0.0	56110
Si-04b	Shrublands; bowgada & grevillea scrub	10430	47.9	10430	47.9	21763
Si-05a	Shrublands; peppermint scrub, Agonis flexuosa	20670	69.2	20745	69.5	29859
Si-07a	Shrublands; teatree scrub	2446	1.7	15939	10.9	146136
Si-08a	Shrublands; mallee & acacia scrub on coastal dunes	70121	49.2	72414	50.9	142401
Si-08b	Shrublands; mallee & acacia scrub on dunes	66230	36.5	70918	39.1	181323
Si-08c	Shrublands; mallee & acacia thicket on coastal dunes		0.0		0.0	3962
Si-09a	Shrublands; York gum mallee scrub	2818	101.2	2818	101.2	2786
Si-09b	Shrublands; York gum & Eucalyptus gonglocarpa mallee scrub		0.0		0.0	9345
Si-09c	Shrublands; York gum & Eucalyptus sheathiana mallee scrub	642	0.5	1093	0.9	127745
Si-10a	Shrublands; mallee scrub, Eucalyptus longicornis & E.sheathiana	6	40.8	6	40.8	14
Si-11a	Shrublands; mallee scrub, Eucalyptus eremophila	200937	9.8	253777	12.3	2056155
Si-11b	Shrublands; mallee scrub, Eucalyptus eremophila & red mallee	109	0.4	109	0.4	28954
Si-11d	Shrublands; mallee scrub, Eucalyptus eremophila & black marlock	2234	0.6	5376	1.5	357661
Si-11e	Shrublands; mallee scrub, Eucalyptus eremophila & Forrests marlock	2487	1.1	5818	2.5	237872
Si-12a	Shrublands; mallee scrub, Eucalyptus eudesmoides	40589	90.1	42882	95.1	45075
Si-13a	Shrublands; mallee scrub, black marlock	144775	11.9	164333	13.5	1213588
Si-13b	Shrublands; mallee scrub, black marlock & Eucalyptus decipiens	1227	33.5	1456	39.8	3661
Si-13c	Shrublands; mallee scrub, black marlock & Eucalyptus decipiens	76	22.4	76	22.4	339
Si-13d	Shrublands; mallee scrub, redwood & black marlock	1361	0.9	4335	2.7	158388
Si-14a	Shrublands; mallee scrub, Eucalyptus nutans	981	1.4	1158	1.7	69338
Si-15a	Shrublands; mallee scrub, red mallee		0.0		0.0	5159
Si-15b	Shrublands; mallee scrub, blue mallee Eucalyptus socialis	172073	23.6	172073	23.6	728386
Si-15c	Shrublands; mallee scrub, white mallee Eucalyptus cooperana	115674	79.8	120827	83.3	144999
Si-15d	Shrublands; mallee scrub, bushy yate & Bald I. marlock	934	27.7	2090	61.9	3377
Si-15e	Shrublands; mallee scrub, Eucalyptus dongarrensis	1480	47.6	1480	47.6	3113
Si-15f	Shrublands; mallee scrub between sand ridges (Great Victoria Desert)		0.0		0.0	446571
Si-15g	Shrublands; mallee scrub (Great Victoria Desert)		0.0	7432	2.1	351517
Si-15h	Shrublands; mallee scrub (Nullabor)	44482	90.0	44482	90.0	49410

Table 9 continued

Sr-01a	Shrublands; mulga open scrub		0.0		0.0	447400
Sr-01b	Shrublands; mulga & bowgada open scrub		0.0		0.0	793
Sr-02a	Shrublands; Acacia sclerosperma & A. victoriae open scrub		0.0		0.0	20947
Sr-02b	Shrublands; Acacia victoriae & snakewood open scrub		0.0		0.0	190018
Sr-02c	Shrublands; Acacia ligulata open scrub	70	1.3	70	1.3	5308
Sr-02d	Shrublands; Acacia rostellifera open scrub		0.0	54	1.3	4313
Sp-01a	Shrublands; mulga & minnieritchie scattered groups	1007	6.2	1007	6.2	16163
Sp-01c	Shrublands; Acacia sclerosperma & A. victoriae scrub, barren		0.0		0.0	12043
SZ-01a	Shrublands; jarrah mallee-heath	41009	24.0	41009	24.0	171129
SZ-01b	Shrublands; tallerack mallee-heath	187997	16.7	197027	17.5	1129402
SZ-01d	Shrublands; Albany blackbutt mallee-heath	1966	21.6	2001	22.0	9106
SZ-01e	Shrublands; mallee-heath (Stirling Ra.)	7602	31.3	8258	34.0	24269
SZ-01f	Shrublands; mallee-heath (Nullabor)	34409	96.5	34409	96.5	35654
SZ-02a	Shrublands; Acacia ligulata scrub-heath	1948	16.8	1948	16.8	11588
SZ-02b	Shrublands; Acacia rostellifera scrub-heath	2404	18.1	2404	18.1	13296
SZ-02c	Shrublands; Acacia scrub-heath	4657	7.3	8686	13.6	63725
SZ-03a	Shrublands; scrub-heath on coastal association	91616	27.5	92760	27.8	333647
SZ-03b	Shrublands; scrub-heath on sandplain	66306	13.5	84520	17.2	491503
SZ-03c	Shrublands; scrub-heath on lateritic sandplain	27478	5.0	27605	5.0	549846
SZ-03d	Shrublands; scrub-heath on deep sandy flats	0	0.0	0	0.0	4264
SZ-03g	Shrublands; scrub-heath on lateritic sandhills	13252	14.1	13252	14.1	94052
SZ-03h	Shrublands; scrub-heath on sandplain	30487	15.4	30658	15.5	197810
SZ-03i	Shrublands; scrub-heath (Wheatbelt)	10273	17.1	17624	29.4	59951
SZ-03j	Shrublands; scrub-heath	88979	8.7	116027	11.3	1027801
Zc-01a	Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath	7657	75.3	7657	75.3	10171
Zc-01b	Shrublands; melaleuca heath	773	26.6	773	26.6	2904
Zc-01c	Shrublands; Jacksonia horrida heath	5975	56.9	5975	56.9	10494
Zc-01d	Shrublands; heath on coastal limestone	7628	18.0	7628	18.0	42391
Zc-01e	Shrublands; mixed heath	4626	17.8	7187	27.7	25929
Zc-02a	Shrublands; dryandra heath	3119	5.2	3898	6.4	60529
Zi-01a	Shrublands; eremophila and cassia dwarf scrub		0.0		0.0	701715
Zi-01b	Shrublands; dwarf scrub on granite (South coast)	182	0.8	186	0.9	22001
Zi-01c	Shrublands; dwarf scrub (Dirk Hartog I)		0.0		0.0	5581
Zi-01d	Shrublands; dwarf waterwood (Acaciacoriacea) shrubs on recent dunes	172	0.6	172	0.6	29992
Zr-01a	Shrublands; open dwarf scrub, waterwood (Acacia coriacea) on recent dunes (Pilbara coast)	240	4.0	240	4.0	6032

Table 9 continued

P-01a	Shrublands, pindan; Acacia tumida shrubland with woolybutt & cabbage gum medium woodland over ribbon grass & curly spinifex		0.0		0.0	185854
P-01b	Shrublands, pindan; Acacia tumida shrubland with grey box & cabbage gum medium woodland over ribbon grass & curly spinifex	28186	2.3	28205	2.3	1230858
P-01c	Shrublands, pindan; Acacia tumida shrubland with ghost gum & E. setosa medium woodland over curly spinifex		0.0		0.0	35649
P-01d	Shrublands, pindan; acacia shrubland with eucalypt medium woodland over Plectrachne pungens		0.0		0.0	268
P-02a	Shrublands, pindan; Acacia eripoda shrubland with scattered low bloodwood & Eucalyptus setosa over soft & curly spinifex		0.0		0.0	2590696
P-02b	Shrublands, pindan; Acacia tumida shrubland with scattered low bloodwood & Eucalyptus setosa over curly spinifex		0.0		0.0	36227
P-02c	Shrublands, pindan; Acacia tumida shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex		0.0		0.0	3234
P-02e	Shrublands, pindan; Acacia eripoda & A. tumida shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex		0.0		0.0	53657
P-02f	Shrublands, pindan; Acacia tumida & A.impressa shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex		0.0		0.0	464010
P-02g	Shrublands, pindan; Acacia tumida & A.impressa shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex		0.0		0.0	16050
P-02h	Shrublands, pindan; Acacia eripoda & A. tumida shrubland with scattered low Eucalyptus confertifolia over ribbon & curly spinifex		0.0		0.0	12711
P-02i	Shrublands, pindan; Acacia pachycarpa & A. eripoda shrubland with sparse low bauhinia & bloodwood over ribbon & curly spinifex		0.0		0.0	21315
P-02j	Shrublands, pindan; Acacia pachycarpa & A. eripoda shrubland with sparse low bauhinia & grevillea over Triodia pungens & T. intermedia		0.0		0.0	15850
P-02k	Shrublands, pindan; acacia shrubland with scattered low trees over spinifex	1037	0.4	1066	0.4	249795
P-02l	Shrublands, pindan; acacia shrubland with scattered low trees over spinifex		0.0		0.0	663389
KGM-01a	Grasslands, high grass savanna woodland; bloodwood,stringybark & woolybutt over white grass on sandstone	107	1.3	107	1.3	8093
KGM-01b	Grasslands, high grass savanna woodland; grey box & cabbage gum over white grass	82714	7.7	82714	7.7	1078971
KGM-01c	Grasslands, high grass savanna woodland; grey box & cabbage gum over mixed/white grass		0.0		0.0	44035
KGM-01d	Grasslands, high grass savanna woodland; grey box & cabbage gum over mixed/white grass on basalt and dolerite		0.0	6340	0.8	811888
KGM-01e	Grasslands, high grass savanna woodland; cabbage gum & ghost gum over mixed/white grass, riverain	3637	6.6	3637	6.6	55520
KGM-01f	Grasslands, high grass savanna woodland; white grass		0.0		0.0	74
KGM-02a	Grasslands, high grass savanna woodland; bloodwood over upland tall grass & curly spinifex	17	0.0	17	0.0	41303
KGM-02b	Grasslands, high grass savanna woodland; bloodwood & stringybark over upland tall grass & curly spinifex	16165	1.6	44703	4.5	1001558
KGM-02c	Grasslands, high grass savanna woodland; bloodwood & stringybark over upland tall grass, mitchell grass & curly spinifex		0.0		0.0	34390
KGM-02d	Grasslands, high grass savanna woodland; bloodwood & woolybutt over upland tall grass & curly spinifex	36	0.0	36	0.0	242794
KGM-02e	Grasslands, high grass savanna woodland; bloodwood, strinybark & woolybutt over upland tall grass & curly spinifex	1296	0.5	1296	0.5	272166
KGM-02f	Grasslands, high grass savanna woodland; strinybark & woolybutt over upland tall grass & curly spinifex	142211	15.6	142211	15.6	914020

Table 9 continued

KGM-02g	Grasslands, high grass savanna woodland; strinybark & woolybutt over upland tall grass & curly spinifex	759317	26.2	759317	26.2	2895393
KGM-02h	Grasslands, high grass savanna woodland; ghost gum & E. foelscheana over upland tall grass & curly spinifex on basalt	924	1.0	924	1.0	93751
KGM-02i	Grasslands, high grass savanna woodland; cabbage gum & E. foelscheana over upland tall grass & curly spinifex on basalt		0.0		0.0	40711
KGM-03a	Grasslands, high grass savanna woodland; grey box, E.confertifolia & E. foelscheana over kangaroo, white & tall upland grass on sandy plain on limstone	101	0.1	101	0.1	75444
KGM-03b	Grasslands, high grass savanna woodland; grey box & E. foelscheana over kangaroo & white grass	3642	3.2	3642	3.2	114978
KGM-03c	Grasslands, high grass savanna woodland; ghost gum & bloodwood (E. polycarpa) over triodia & tall upland grass	2222	15.9	2222	15.9	14002
KGM-03d	Grasslands, high grass savanna woodland; ghost gum & bloodwood (E. polycarpa) over ribbon & tall upland grass		0.0		0.0	10023
KGM-03e	Grasslands, high grass savanna woodland; eucalypts over ribbon & tall upland grass		0.0		0.0	68
KGl-01a	Grasslands, high grass savanna low tree; terminalia over upland tall grass & blue grass		0.0		0.0	5953
KGl-01b	Grasslands, high grass savanna low tree; terminalia & bauhinia over upland tall grass	24	0.3	24	0.3	8071
KGl-01c	Grasslands, high grass savanna low tree; melaeuca over upland tall grass		0.0		0.0	2619
KGl-01d	Grasslands, high grass savanna sparse low tree; snappy gum over upland tall grass & curly spinifex on granite		0.0		0.0	59904
KGl-02a	Grasslands, high grass savanna low tree; E. dichromophloia & grey box over white grass &/or upland tall grass.		0.0		0.0	10166
KGl-02b	Grasslands, high grass savanna low woodland; grey box & cabbage gum over white grass &/or upland tall grass.		0.0		0.0	115088
KGl-02c	Grasslands, high grass savanna low tree; Mt House box & bloodwood (E. terminalis) over upland tall grass.		0.0		0.0	8952
KGl-02d	Grasslands, high grass savanna low tree; Mt House box & bloodwood (E. terminalis) over white grass on basalt		0.0		0.0	90765
KG-01a	Grasslands, high grass savanna sparse tree; bauhinia & coolabah over mitchell, blue & tall upland grasses	24276	8.8	24276	8.8	275692
KG-01b	Grasslands, high grass savanna sparse tree; bauhinia & coolabah over blue & tall upland grasses on black soil plain		0.0		0.0	10144
kGM-01a	Grasslands, tall bunch grass savanna woodland, grey box & cabbage gum over ribbon grass		0.0		0.0	174719
kGM-01b	Grasslands, tall bunch grass savanna woodland, grey box & cabbage gum over ribbon & blue grass		0.0		0.0	67519
kGm-01a	Grasslands, tall bunch grass savanna woodland, coolebah over ribbon grass	496	0.5	552	0.6	96994
kGm-01b	Grasslands, tall bunch grass savanna woodland, coolebah over ribbon/blue grass		0.0		0.0	126558
kGm-01c	Grasslands, tall bunch grass savanna woodland, coolebah & ghost gum over ribbon grass	40	0.1	264	0.5	49745
kGm-01d	Grasslands, tall bunch grass savanna woodland, bloodwood (E. polycarpa) over aristida grass riverine		0.0		0.0	11842
kGL-01a	Grasslands, tall bunch grass savanna low woodland, grey box & cabbage gum over ribbon grass		0.0		0.0	159909
kGl-01a	Grasslands, tall bunch grass savanna low tree; snappy gum over ribbon grass		0.0		0.0	10366
kGl-01b	Grasslands, tall bunch grass savanna low tree; bloodwood (E. dichromophloia) over ribbon grass		0.0		0.0	17630
kGl-01c	Grasslands, tall bunch grass savanna low tree; snappy gum & bloodwood (E. dichromophloia) over ribbon grass		0.0		0.0	47940
kGl-01d	Grasslands, tall bunch grass savanna low tree; bloodwood (E. dichromophloia) & cabbage gum over ribbon grass		0.0		0.0	73962
kGl-01e	Grasslands, tall bunch grass savanna low tree; grey box & bloodwood (E. terminalis) over aristida & ribbon grass	107526	95.0	107526	95.0	113193
kGl-01f	Grasslands, tall bunch grass savanna low tree; cabbage gum & silverleaved box over aristida & ribbon grass		0.0		0.0	59213
kGl-01g	Grasslands, tall bunch grass savanna low tree; cabbage gum & bloodwood (E. polycarpa) over ribbon & blue grass		0.0		0.0	42962
kGl-02a	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass		0.0		0.0	435144

Table 9 continued

kGl-02b	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon & blue grass		0.0		0.0	57316
kGl-02d	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass &spinifex		0.0		0.0	25571
kGl-03a	Grasslands, tall bunch grass savanna, sparse low tree; ribbon grass & paperbarks		0.0		0.0	27273
kG-01a	Grasslands, tall bunch grass savanna, sparse low tree,terminalia; mitchell grass	102	0.2	102	0.2	70516
kG-01b	Grasslands, tall bunch grass savanna, sparse low tree,terminalia; mitchell & blue grass on basalt		0.0		0.0	48680
kG-02a	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa & bauhinia over mitchell & ribbon/blue grass	19	0.0	1457	1.0	140621
kG-02b	Grasslands, tall bunch grass savanna low tree; bauhinia over mitchell & ribbon/blue grass on black soil		0.0	46	0.1	71977
kG-02c	Grasslands, tall bunch grass savanna low tree; x over mitchell & ribbon/blue grass on black soil		0.0		0.0	4209
kG-02d	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa over mitchell grass on black soil		0.0		0.0	35261
kG-02e	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa & bauhinia over ribbon/blue grass		0.0		0.0	30516
kG-02f	Grasslands, tall bunch grass savanna sparse low tree; bauhinia & coolabah over ribbon/blue grass on black soil		0.0		0.0	271042
kG-02g	Grasslands, tall bunch grass savanna sparse low tree; bauhinia & coolabah over ribbon grass on black soil		0.0		0.0	27160
kG-02h	Grasslands, tall bunch grass savanna low tree; bauhinia & coolabah over ribbon grass on black soil		0.0		0.0	9799
kG-02i	Grasslands, tall bunch grass savanna sparse low tree; scattered low trees over ribbon/blue grass on black soil		0.0		0.0	3461
kG-02j	Grasslands, tall bunch grass savanna sparse low tree; acacia over grass on black soil		0.0		0.0	13901
kG-03a	Grasslands, tall bunch grass savanna, mitchell & ribbon/blue grass		0.0	289	0.1	287557
kG-03b	Grasslands, tall bunch grass savanna, mitchell & blue grass		0.0	22	0.1	42367
kG-03c	Grasslands, tall bunch grass savanna, mitchell & blue grass		0.0		0.0	316017
kG-03d	Grasslands, tall bunch grass savanna, ribbon/blue grass		0.0		0.0	37287
Kgl-01a	Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass		0.0		0.0	134073
Kgl-02a	Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains		0.0		0.0	170651
Kgl-02b	Grasslands, short bunch grass savanna sparse low tree; scattered snappy gum over enneapogon short grass		0.0		0.0	38800
Kgl-02c	Grasslands, short bunch grass savanna low tree; snappy gum & bloodwood (E. terminalis) over enneapogon short grass on plains		0.0		0.0	6513
Kgl-03a	Grasslands, short bunch grass savanna low tree; bauhinia over Aristida prunosa short grasses on plains		0.0		0.0	65290
Kgl-03b	Grasslands, short bunch grass savanna low tree & sparse shrubs; bauhinia & Acacia eriopoda & A. impressa over Aristida brownii short grasses on river flats		0.0		0.0	62836
Kgl-03c	Grasslands, short bunch grass savanna low tree & acacia thicket; bauhinia & Acacia & A. impressa over aristida short grasses on river flats shrublands		0.0		0.0	8747
Kg-01a	Grasslands, short bunch grass savanna, grass; annual grasses (Enneapogon species) on dry plains	52016	19.7	52016	19.7	263545
Kg-02a	Grasslands, short bunch grass savanna, grass; salt water grassland (Sporobous virginicus)		0.0		0.0	247200
kgM-01a	Grasslands, curly spinifex, tree savanna woodland; snappy gum & bloodwood over curly spinifex on LST plateau		0.0		0.0	95426
kgM-01b	Grasslands, curly spinifex, tree savanna woodland; snappy gum & bloodwood over curly spinifex on LST plateau		0.0		0.0	6075
kgL-01a	Grasslands, curly spinifex, low tree savanna woodland; gnainger & Eucalyptus ferrruginea over Plectrachne pungens		0.0		0.0	1647519
kgl-01a	Grasslands, curly spinifex, low tree savanna; snappy gum over curly spinifex		0.0		0.0	1324414
kgl-01b	Grasslands, curly spinifex, low tree savanna; snappy gum & bloodwood (E.dichromophloia) over curly spinifex		0.0		0.0	504838

Table 9 continued

kgl-01c	Grasslands, curly spinifex, low tree savanna; snappy gum & E. perfoliata over Plectrachne pungens		0.0		0.0	78397
kgl-01d	Grasslands, curly spinifex, low tree savanna; bloodwood (E.dichromophloia) over curly spinifex		0.0		0.0	27417
kgl-01e	Grasslands, curly spinifex, low tree savanna; bloodwood (E.dichromophloia) & woolybutt over Plectrachne pungens	16	0.0	16	0.0	239102
kgl-01f	Grasslands, curly spinifex, low tree savanna; bauhinia over Plectrachne sp.		0.0		0.0	24237
kgl-02a	Grasslands, curly spinifex & short grass low tree savanna; snappy gum over enneapogon & curly spinifex		0.0		0.0	393201
kgl-02b	Grasslands, curly spinifex & short grass low tree savanna; snappy gum & bloodwood (E.dichromophloia) over enneapogon & curly spinifex on granite		0.0		0.0	246491
GM-01a	Sedgeland; sedges with medium woodland; sedges with coolabah over various sedges	64897	30.6	65491	30.9	211940
Gm-01a	Sedgeland; sedges with scattered medium trees; coolabah over various sedges		0.0		0.0	61073
Gm-01b	Sedgeland; sedges with scattered medium trees; coolabah & river gum over various sedges		0.0		0.0	17443
GL-01b	Sedgeland; sedges with low tree savanna woodland; coolabah & grey box over & various sedges		0.0		0.0	42583
Gl-01a	Sedgeland; sedges with open low trees; coolabah over various sedges (Millstream)	6442	3.7	6442	3.7	173391
Gl-01b	Sedgeland; sedges with open low tree sananna; Eucalyptus sp. aff aspera over various sedges		0.0	974	3.5	27862
Gc-01a	Sedgeland; reed swamps, occasionally with heath (South West)	16833	21.2	21701	27.3	79597
Gc-02a	Short bunch grassland - savanna /grass plain (Pilbara)	2	0.0	344	0.1	517889
Gc-02b	Grass savanna on clay plains (Tanami)		0.0		0.0	82801
Gc-02c	Sedgeland; Various sedges with very sparse snakewood		0.0		0.0	2042
HM-01a	Hummock grasslands, tree steppe; desert oak medium woodland		0.0		0.0	103023
HM-01b	Hummock grasslands, tree steppe; desert oak & soft spinifex between sandhills		0.0		0.0	84414
Hm-01a	Hummock grasslands, open tree steppe; Casuarina decaisneana & hard spinifex between sandhills		0.0		0.0	59047
HL-01a	Hummock grasslands, low tree steppe; silver-leaved box & melaleuca over plectrachne	893	0.5	893	0.5	179103
Hl-01a	Hummock grasslands, open low tree steppe; snappy gum over soft spinifex Triodia pungens		0.0		0.0	67756
Hl-01b	Hummock grasslands, open low tree steppe; snappy gum & bloodwood over soft spinifex Triodia pungens	1469	0.3	1469	0.3	484691
Hl-01c	Hummock grasslands, open low tree steppe; bloodwood over soft spinifex Triodia pungens		0.0		0.0	97661
Hl-01e	Hummock grasslands, open low tree steppe; eucalypts over soft spinifex Triodia pungens		0.0		0.0	702143
Hl-02a	Hummock grasslands, open low tree steppe; snappy gum over Triodia wiseana	241511	9.2	241614	9.2	2633332
Hl-02b	Hummock grasslands, open low tree steppe; bloodwood over Triodia wiseana		0.0	10144	12.4	81560
Hl-02c	Hummock grasslands, open low tree steppe; terminalia over Triodia wiseana on limstone		0.0		0.0	87435
Hl-03a	Hummock grasslands, open low tree steppe; snappy gum over curly spinifex		0.0		0.0	12096
Hl-03c	Hummock grasslands, open low tree steppe; bloodwood Eucalyptus dichromophloia and spinifex		0.0		0.0	8685
Hl-03d	Hummock grasslands, open low tree steppe; eucalypts and feathertop spinifex in sandy valleys		0.0		0.0	439
Hl-03e	Hummock grasslands, open low tree steppe; eucalypts over spinifex on laterite sand plains		0.0		0.0	227328
Hl-03f	Hummock grasslands, open low tree steppe; scattered low rare eucs in spinifex		0.0		0.0	3330
Hl-03g	Hummock grasslands, open low tree steppe; eucalypt over soft & feather spinifex between sandhills		0.0		0.0	875885
Hl-04a	Hummock grasslands, open low tree-steppe; snappy gum & bloodwood over Triodia pungens & T. wiseana	15102	12.5	15102	12.5	120693

Table 9 continued

Hl-04b	Hummock grasslands, open low tree-steppe; bloodwood over Triodia pungens & T. wiseana	91	0.1	2470	2.1	119498
Hl-04c	Hummock grasslands, open low tree-steppe; snappy gum over Triodia pungens & T. intermedia		0.0		0.0	181524
Hl-04e	Hummock grasslands, open low tree-steppe; snappy gum over Triodia intermedia		0.0	7957	7.4	106918
Hl-04f	Hummock grasslands, sparse low tree-steppe; snappy gum over Triodia inutilis		0.0		0.0	33489
Hl-04g	Hummock grasslands, open low tree-steppe; snappy gum over Triodia pungens & T. briziodes		0.0		0.0	251580
Hl-04h	Hummock grasslands, open low tree-steppe; Eucalyptus dongarraensis & E. foecunda over Triodia plurinervata		0.0		0.0	14450
Hl-04i	Hummock grasslands, open low tree-steppe; snappy gum & Mt House box over soft spinifex on shale plains		0.0		0.0	138937
Hl-04j	Hummock grasslands, open low tree-steppe; eucalypts over soft and feathertop spinifex between sandhills		0.0		0.0	5072097
Hl-04k	Hummock grasslands, open low tree-steppe; snappy gum over curly & spinifex		0.0		0.0	1436
Hl-05a	Hummock grasslands, open low tree steppe; bauhinia & Grevillea stiata over soft spinifex		0.0		0.0	15408
Hl-06a	Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges		0.0	7264	0.2	3456914
Hl-06b	Hummock grasslands, open low tree steppe; desert walnut over spinifex/plectrachne on sandplain		0.0		0.0	203168
Hl-07a	Hummock grasslands, open low tree steppe; mulga, Allocasuarina cristata & hard spinifex between sand ridges		0.0	1160	2.1	54572
Hl-08a	Hummock grasslands, open low tree steppe; mulga over Triodia scariosa		0.0	4426	39.3	11251
Hl-08b	Hummock grasslands, open low tree steppe; mulga & snakewood over Triodia pungens & T. basedowii		0.0		0.0	27045
Hms-01a	Hummock grasslands, open meduim tree & mallee steppe; marble gum & mallee (E. youngiana) over hard spinifex Triodia basedowii	189152	10.4	189152	10.4	1827880
Hls-01a	Hummock grasslands, low open tree & shrub steppe; bloodwood, kanji over soft spinifex		0.0		0.0	120653
Hls-01b	Hummock grasslands, low open tree & shrub steppe;scattered eucalypts, Acacia pachycarpa over Triodia basedowii		0.0		0.0	63000
Hls-01c	Hummock grasslands, low open tree & shrub steppe; sparse snappy gum, Acacia pachycarpa & A. victoria over Triodia pungens & T. briziodesi on chert		0.0		0.0	34175
Hls-01d	Hummock grasslands, low open tree & shrub steppe; sparse snappy gum, Acacia pachycarpa & A. victoria over T. briziodesi on chert		0.0		0.0	286507
Hls-02b	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. youngiana) over hard spinifex Triodia basedowii	222450	4.1	778833	14.5	5374573
Hls-02c	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. kinsmillii) over hard spinifex Triodia basedowii		0.0	55	0.6	9129
Hls-02d	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. youngiana) over spinifex Triodia scariosa	150134	3.5	395540	9.1	4327991
HS-01a	Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa	17060	27.7	23492	38.2	61504
Hs-01a	Hummock grasslands, shrub steppe; Acacia coriacea & hakea over hard spinifex Triodia basedowii	283831	40.7	283831	40.7	696734
Hs-01b	Hummock grasslands, shrub steppe; bowgada & snakewood over T. basedowii		0.0		0.0	3244
Hs-01c	Hummock grasslands, shrub steppe; Acacia pachycarpa & grevillea over Triodia pungens & T. intermedia on sandy plateau		0.0		0.0	108761
Hs-01d	Hummock grasslands, shrub steppe; acacia, grevillea, hakea over soft spinifex Triodia pungens on basalt		0.0		0.0	1189012
Hs-01e	Hummock grasslands, shrub steppe; mixed shrubs over spinifex between sandhills	121049	11.5	121049	11.5	1053504
Hs-01f	Hummock grasslands, shrub steppe; acacia species over Plectrachne melvillei		0.0		0.0	40982

Table 9 continued

Hs-02a	Hummock grasslands, shrub-steppe; kanji over Triodia pungens	10787	0.3	13598	0.4	3920687
Hs-02b	Hummock grasslands, shrub-steppe; kanji over Triodia pungens (+grevillea?) between sand ridges		0.0		0.0	8910
Hs-02c	Hummock grasslands, shrub-steppe; kanji & snakewood over Triodia pungens		0.0	187	1.2	15681
Hs-02d	Hummock grasslands, shrub-steppe; waterwood over Triodia pungens	6627	21.9	6627	21.9	30334
Hs-02e	Hummock grasslands, shrub-steppe; Acacia delibrata over Triodia pungens		0.0		0.0	58062
Hs-02f	Hummock grasslands, shrub-steppe; Acacia pachycarpa over Triodia pungens		0.0		0.0	2266108
Hs-02g	Hummock grasslands, shrub-steppe; Acacia pachycarpa & waterwood over Triodia pungens		0.0		0.0	99816
Hs-02h	Hummock grasslands, shrub-steppe; Acacia pachycarpa & A. tumida over Triodia pungens		0.0		0.0	124731
Hs-02i	Hummock grasslands, shrub-steppe; Acacia victoriae & snakewood over Triodia pungens		0.0		0.0	32170
Hs-02j	Hummock grasslands, shrub-steppe; snakewood over Triodia pungens		0.0		0.0	39943
Hs-02k	Hummock grasslands, shrub-steppe; Acacia eripodaover Triodia pungens		0.0		0.0	7524
Hs-02l	Hummock grasslands, shrub-steppe; mixed acacia over Triodia pungens (Tanami)		0.0		0.0	101844
Hs-03a	Hummock grasslands, shrub-steppe; kanji over Triodia basedowii	857	0.5	857	0.5	161776
Hs-03b	Hummock grasslands, shrub steppe; Acacia pachycarpa over Triodia basedowii		0.0		0.0	941537
Hs-03c	Hummock grasslands, shrub steppe; Acacia bivenosa over Triodia basedowii	2830	3.1	2830	3.1	90455
Hs-03d	Hummock grasslands, shrub-steppe; snakewood over Triodia basedowii	657	1.4	657	1.4	47623
Hs-03e	Hummock grasslands, shrub-steppe; acacia species over Triodia basedowii	46250	0.9	46250	0.9	4968707
Hs-03f	Hummock grasslands, shrub-steppe; acacia & grevillea over Triodia basedowii	1637	0.1	1637	0.1	3400600
Hs-03g	Hummock grasslands, shrub-steppe; scattered shrubs over Triodia basedowii		0.0		0.0	147944
Hs-04a	Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. basedowii	3477	1.2	3477	1.2	284451
Hs-04b	Hummock grasslands, shrub-steppe; acacia & spinifex on sandplain + laterite		0.0	146	32.4	449
Hs-05a	Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. wiseana	62468	3.6	130467	7.6	1718087
Hs-05b	Hummock grasslands, shrub-steppe; kanji & snakewood over Triodia pungens & T. wiseana		0.0		0.0	79342
Hs-05c	Hummock grasslands, shrub-steppe; Acacia pachycarpa & A. victoriae over T. pungens & T. wiseana		0.0		0.0	74995
Hs-05d	Hummock grasslands, shrub-steppe; snakewood over Triodia pungens & T. wiseana		0.0		0.0	593926
Hs-06a	Hummock grasslands, shrub steppe; kanji over Triodia pulchella & T. briziodes on basalt		0.0		0.0	53364
Hs-06b	Hummock grasslands, shrub-steppe; kanji over Triodia wiseana	1299	1.5	1299	1.5	87429
Hs-06c	Hummock grasslands, shrub steppe; Acacia impressa over Triodia pulchella & T. intermedia		0.0		0.0	1307
Hs-06d	Hummock grasslands, shrub steppe; Acacia pachycarpa & A. tumida over Triodia pulchella & T. intermedia sandplain		0.0		0.0	53453
Hs-06e	Hummock grasslands, shrub steppe; Acacia eriopoda & A. tumida over Triodia pulchella & T. intermedia sandplain		0.0		0.0	25709
Hs-06f	Hummock grasslands, shrub steppe; Acacia tumida over Triodia intermedia		0.0		0.0	6838
Hs-06g	Hummock grasslands, shrub steppe; Acacia impressa over Triodia intermedia on stony lateritic country		0.0	1006	2.1	48156
Hs-06h	Hummock grasslands, shrub steppe; Acacia pachycarpa & A. impressa over Triodia intermedia		0.0		0.0	12373
Hs-06i	Hummock grasslands, shrub steppe; Acacia ligulata over Triodia plurinervata	856	3.1	856	3.1	27682
Hs-07a	Hummock grasslands, shrub steppe; Grevillea refracta & hakea over soft spinifex Triodia pungens		0.0		0.0	90248

Table 9 continued

Hs-07b	Hummock grasslands, shrub steppe; Grevillea refracta over soft spinifex Triodia pungens		0.0		0.0	566
Hs-07c	Hummock grasslands, shrub steppe; corkwood (Hakea suberea) & acacia species over soft spinifex Triodia pungens		0.0		0.0	1808973
Hs-07d	Hummock grasslands, shrub steppe; hakea over soft spinifex Triodia pungens		0.0		0.0	436842
Hs-08a	Hummock grasslands, shrub steppe; mulga over soft spinifex		0.0		0.0	506639
Hs-08b	Hummock grasslands, shrub steppe; mulga over soft spinifex Triodia basedowii		0.0		0.0	62563
Hs-08c	Hummock grasslands, shrub-steppe; mulga & kanji over Triodia pungens & T. basedowii	174831	22.6	176406	22.8	772863
Hs-08d	Hummock grasslands, shrub-steppe; mulga over Triodia pungens & T. basedowii	23520	26.4	23520	26.4	89244
Hs-08e	Hummock grasslands, shrub-steppe; mulga & snakewood over Triodia. wiseana		0.0		0.0	33884
Hs-09a	Hummock grasslands, shrub steppe; mulga and mallee over soft spinifex		0.0		0.0	110201
Hs-09b	Hummock grasslands, shrub steppe; mulga and Eucalyptus kingsmillii over hard spinifex Triodia basedowii		0.0	47990	1.9	2493438
Hs-09c	Hummock grasslands, shrub steppe; mulga and red mallee over hard spinifex Triodia basedowii		0.0		0.0	997
Hs-09d	Hummock grasslands, shrub steppe; mulga and mallee(sp) over hard spinifex Triodia basedowii		0.0		0.0	1991941
Hs-10a	Hummock grasslands, shrub steppe; silverleaved box over soft spinifex Triodia pungens		0.0		0.0	8143
Hs-10b	Hummock grasslands, shrub steppe; Eucalyptus youngiana over hard spinifex Triodia basedowii		0.0	107888	12.1	894550
Hs-10c	Hummock grasslands, shrub steppe; red mallee over hard spinifex Triodia basedowii		0.0		0.0	42835
Hs-10d	Hummock grasslands, shrub steppe; red mallee over spinifex Triodia scariosa		0.0	115650	22.0	525766
Hs-10e	Hummock grasslands, shrub steppe; Eucalyptus gamophyllaover hard spinifex Triodia basedowii	6756	0.9	6756	0.9	734612
Hz-01a	Hummock grasslands, dwarf-shrub steppe; Acacia translucens over soft spinifex Triodia pungens		0.0		0.0	181518
Hi-01a	Hummock grasslands,sparse low tree-steppe; mulga over Triodia basedowii		0.0		0.0	80426
Hi-01b	Hummock grasslands, sparse low tree steppe; scattered low trees over Triodia wiseana	2125	4.5	9948	21.2	46824
Hi-01c	Hummock grasslands, sparse meduim tree steppe; Andersonia gregorii over open Triodia wiseana	1118	2.8	19570	48.8	40067
Hi-02a	Hummock grasslands, sparse tree steppe; snappy gum over soft spinifex Triodia pungens	254	0.1	254	0.1	439910
Hi-02b	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. terminalis) over soft spinifex T.pungens	31	0.0	31	0.0	71252
Hi-02c	Hummock grasslands, sparse tree steppe; snappy gum over spinifex Triodia pungens& T. intermedia	81080	88.3	81080	88.3	91817
Hi-02d	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. dichromophloia) over spinifex Triodia pungens& T. intermedia		0.0		0.0	64808
Hi-02e	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. dichromophloia) & E. setosa over spinifex Triodia pungens & T. intermedia		0.0		0.0	102504
Hi-03a	Hummock grasslands, sparse tree steppe; bloodwood over hard spinifex Triodia basedowii		0.0		0.0	153157
Hi-03b	Hummock grasslands, sparse tree-steppe; scattered bloodwood over Triodia pungens & T. sp. indet. aff. angusta	35331	42.1	35331	42.1	83991
Hi-03c	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia wiseana & T. intermedia		0.0		0.0	3383
Hi-03d	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. terminalis) overhard spinifex Triodia wiseana & T. intermedia on basalt and dolerite		0.0		0.0	110513
Hi-03e	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia intermedia		0.0		0.0	35712
Hi-03f	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia intermedia & T. inutilis	2	0.0	2	0.0	384141
Hi-03g	Hummock grasslands, sparse tree steppe; eucalypt & bauhinia over hard spinifex Triodia intermedia		0.0		0.0	51974

Table 9 continued

Hi-04a	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia basedowii		0.0		0.0	5980
Hi-04b	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia wiseana		0.0		0.0	56665
Hi-04c	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia briziodes		0.0		0.0	169878
Hi-04d	Hummock grasslands, sparse shrub steppe; kanji & Acacia bivenosa over hard spinifex T. basedowii & T.wiseana		0.0		0.0	242395
Hi-04e	Hummock grasslands, sparse shrub steppe; Acacia bivenosa & A. trachycarpa over hard spinifex T. wiseana		0.0		0.0	169190
Hi-04f	Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. brizoides		0.0	18413	15.8	116507
Hi-04g	Hummock grasslands, shrub-steppe; scattered shrubs over Triodia wiseana & T. sp. indet. aff. angusta		0.0		0.0	22806
Hi-05a	Hummock grasslands, patchy shrub steppe; Acacia pachycarpa over soft spinifex on ironstone plateau		0.0		0.0	754432
Hi-05b	Hummock grasslands, patchy shrub steppe; scattered groups of mulga over Triodia basedowii	951627	13.4	951627	13.4	7105655
Hi-06a	Hummock grasslands, grass steppe; soft spinifex Triodia pungens	105084	12.1	105850	12.2	871476
Hi-06b	Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. basedowii		0.0		0.0	59486
Hi-06c	Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. wiseana	4928	1.1	4928	1.1	436174
Hi-07a	Hummock grasslands, grass steppe; hard spinifex Triodia basedowii	1797	0.3	1797	0.3	540602
Hi-08a	Hummock grasslands, grass steppe; hard spinifex Triodia wiseana	86406	17.4	86406	17.4	495694
Hi-08b	Hummock grasslands, grass steppe; hard spinifex Triodia wiseana & T. basedowii		0.0		0.0	71685
Hi-09a	Hummock grasslands, grass steppe; hard spinifex Triodia intermedia		0.0		0.0	25200
Hi-09b	Hummock grasslands, grass steppe; spinifex Triodia inutiiis		0.0		0.0	28769
Hi-09c	Hummock grasslands, grass steppe; spinifex Triodia plurinervata	421	101.9	421	101.9	413
Hi-09d	Hummock grasslands, grass steppe; spinifex Triodia wiseana & T. basedowii /Plectrchne pungens		0.0		0.0	323
Hi-09e	Hummock grasslands, grass steppe; spinifex Plectrachne pungens on shale		0.0		0.0	21476
HX-01a	Hummock grassland, mixed sandplain - scattered low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with T. basedowii		0.0	12639	5.7	222451
HX-01b	Hummock grassland, mixed sandplain - scattered low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with Triodia scariosa & T.sp		0.0		0.0	61315
HX-01c	Hummock grassland, mixed sandplain - sparse low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with Triodia scariosa & T.sp		0.0	4086	3.3	125318
HX-01d	Hummock grassland, mixed sandplain - sparse low trees over sparse dwarf shrubs with spinifex; marble gum & red mallee mixed dwarf shrubs with Triodia scariosa & T.sp		0.0		0.0	21482
HX-02a	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex ; red mallee mallee & mixed sparse dwarf shrubs over T. basedowii	673	0.3	10135	4.4	230515
HX-03a	Hummock grasslands, mixed sandplain; bowgada, sugarbrother, mallee, Triodia basedowii & T. sp		0.0		0.0	98139
HX-03b	Hummock grasslands, mixed sandplain; bowgada, sugarbrother, mallee, Triodia scariosa & T. sp		0.0		0.0	17640
HX-03c	Hummock grasslands, mixed sandplain; bowgada ,mallee, heath and spinifex		0.0		0.0	20727
HX-04a	Hummock grassland; shrub steppe; mixed acacia scrub & dwarf scrub with T.riodia pungens & T. basedowii	4898	2.3	4898	2.3	216459
HX-05a	Hummock grassland; shrub steppe; mixed scrub, hard spinifex (T. basedowii) with dwarf shrubs	80303	69.8	80303	69.8	115069
HX-06a	Hummock grassland; shrub Steppe; mixed ericoid Hummock grassland; shrubs & spinfex,	3451	6.8	3451	6.8	51150

Table 9 continued

HX-06b	Hummock grassland; shrub steppe; wattle scrub & heath Acacia ligulata x rostellifera		0.0		0.0	52973
HG-01a	Spinifex, mitchell grass & kangaroo grass		0.0		0.0	2675
HG-01b	Mixed short grass and spinifex		0.0		0.0	45763
HG-01c	Mixed short grass and spinifex with scattered coolebah		0.0		0.0	22304
CM-01b	Succulent steppe; salmon gum woodland & saltbush		0.0		0.0	5786
CM-01c	Succulent steppe; salmon gum woodland & bluebush		0.0		0.0	100208
CM-01d	Succulent steppe; gimlet woodland & saltbush		0.0	16404	11.3	145818
CM-01e	Succulent steppe; eucalypt woodland & saltflats		0.0		0.0	451
CM-01f	Succulent steppe; York gum woodland, sparse teatree scrub & samphire	20293	0.0	20293	0.0	111046637
CM-01g	Succulent steppe; york gum woodland, sparse Melaleuca thyoides scrub & samphire		0.0	351	3.0	11792
CM-01h	Succulent steppe; Casuarina obesa woodland & samphire		0.0		0.0	1319
Cm-01a	Succulent steppe; saltbush & scattered york gum	436	3.7	1558	13.3	11711
Cm-01b	Succulent steppe; bluebush & scattered salmon gum & gimlet	202	0.1	5235	3.2	164161
Cm-01c	Succulent steppe; saltbush & scattered eucalypts	134	3.1	136	3.1	4335
Cm-01d	Succulent steppe; samphire, scattered salmon gum & sparse teatree scrub	4666	58.4	4666	58.4	7984
SCM-01a	Succulent steppe; york gum woodland, Melaleuca thyoides thicket & samphire	3027	2.0	3486	2.3	151138
SCm-01a	Succulent steppe; york gum open woodland, Melaleuca thyiodes thicket & samphire		0.0	2285	17.8	12852
SCm-01b	Succulent steppe; wandoo & Allocasuarina obesa open woodland, teatree thicket & samphire	1992	40.9	2399	49.2	4875
SCm-01c	Succulent steppe; wandoo, salmon gum & Allocasuarina obesa open woodland, teatree scrub & samphire	819	7.8	946	9.0	10574
SCm-01d	Succulent steppe; eucalypts & Allocasuarina obesa open woodland, teatree scrub & samphire		0.0		0.0	57
SC-01a	Succulent steppe; yorrell & Kondinin blackbutt sparse woodland, teatree scrub & samphire	1012	7.7	2768	21.1	13143
SC-01b	Succulent steppe; york gum & Kondinin blackbutt sparse woodland, teatree scrub & samphire	1673	4.3	4497	11.6	38878
SC-01c	Succulent steppe; sal;mon gum & morrell sparse woodland, teatree scrub & samphire		0.0		0.0	3214
CL-01a	Succulent steppe; myoporum low woodland over samphire	445	10.3	453	10.5	4331
CL-02a	Succulent steppe; saltbush with low woodland; mulga		0.0		0.0	9113
CL-02c	Succulent steppe; samphire with low woodland; mulga		0.0		0.0	10518
CL-03a	Succulent steppe; bluebush with low woodland; Acacia papyrocarpa		0.0		0.0	2430
CL-03b	Succulent steppe; saltbush & bluebush with low woodland; snakewood		0.0		0.0	85345
CL-04a	Succulent steppe; samphire with low woodland; sheoak		0.0		0.0	269
CL-04b	Succulent steppe; bluebush with low woodland; sheoak		0.0		0.0	4566
CL-05a	Succulent steppe; bluebush with open low woodland; mulga & sheoak		0.0	296538	13.1	2263570
CL-05b	Succulent steppe with open low woodland; mulga & sheoak		0.0	447638	95.4	469219
Cl-01a	Succulent steppe; saltbush with open low woodland; sheoak		0.0	188	0.2	96873
Cl-01b	Succulent steppe;saltbush & bluebush with open low woodland; sheoak		0.0		0.0	9152
Cl-02a	Succulent steppe; saltbush with open low mulga	2035	0.3	67913	11.1	612069

Table 9 continued

CI-02b	Succulent steppe; bluebush with open low mulga		0.0		0.0	191095
CI-02c	Succulent steppe with open low mulga		0.0		0.0	77547
CI-02d	Succulent steppe; saltbush & bluebush with open low mulga & Aacaia sclerosperma		0.0		0.0	577
CI-03a	Succulent steppe; salt bush, with open low woodland; mulga & sheoak		0.0	7697	5.1	149848
CI-03b	Succulent steppe; bluebush, with open low woodland; mulga & sheoak		0.0	943	2.2	42679
CI-04a	Succulent steppe; bluebush, with open low woodland; Acacia papyrocarpa		0.0		0.0	837423
CI-04b	Succulent steppe; saltbush & bluebushwith open low woodland; Acacia papyrocarpa	273	0.0	796824	29.5	2702923
SC-02a	Succulent steppe; Melaleuca thyiodes thicket over samphire	590	1.0	944	1.5	61932
SC-02b	Succulent steppe; teatree thicket over samphire	345	3.6	657	6.9	9558
SC-02c	Succulent steppe; teatree scrub over samphire		0.0		0.0	7929
SC-02d	Succulent steppe; teatree scrub over saltflats	11551	2.7	11551	2.7	432554
CS-01a	Succulent steppe; saltbush & samphire with waterwood & A. sclerosperma		0.0		0.0	10234
CS-01b	Succulent steppe; saltbush with snakewood		0.0		0.0	2373
CS-01c	Succulent steppe; various species with mulga		0.0	4687	1.8	260046
CS-01d	Succulent steppe; heterogeneous species with bowgada scrub		0.0		0.0	1451
CS-01f	Succulent steppe; saltbush & samphire with acacia species	253	14.1	279	15.6	1795
CS-01g	Succulent steppe; saltbush with acacia species	1782	5.8	1788	5.8	30791
Cs-01a	Succulent steppe; saltbush with scattered mulga shrubs	7813	15.4	17022	33.6	50726
Cs-01b	Succulent steppe; saltbush & bluebush with scattered mulga shrubs		0.0		0.0	2612
Cs-01c	Succulent steppe; saltbush & bluebush with scattered mulga & A. sclerosperma		0.0		0.0	210907
Cs-01d	Succulent steppe; saltbush & bluebush with scattered mulga & other wattle(s)		0.0		0.0	103845
Cs-02a	Succulent steppe; saltbush,with scattered bowgada & jam		0.0		0.0	45184
Cs-02b	Succulent steppe; bluebush,with scattered Acaica sclerosperma & A. victoriae		0.0		0.0	66290
Cs-02c	Succulent steppe; saltbush & bluebush with scattered Acaica sclerosperma & A. victoriae		0.0		0.0	20569
Cs-02d	Succulent steppe; saltbush & bluebush with scattered Acaica sclerosperma & bowgada		0.0		0.0	161101
Cs-02e	Succulent steppe; saltbush & bluebush with scattered A. sclerosperma		0.0		0.0	16737
Cs-02f	Succulent steppe; saltbush & bluebush with scattered bowgada & jam		0.0		0.0	35318
Cs-02g	Succulent steppe with scattered Acacia victoriae & snakewood		0.0		0.0	4318
Cs-02h	Succulent steppe with scattered Acacia sclerosperma& snakewood		0.0		0.0	5808
Cs-02i	Succulent steppe; saltbush with scattered wattles	2535	12.1	20246	96.6	20962
Cs-02j	Succulent steppe with scattered wattles		0.0		0.0	43290
Cs-02k	Succulent steppe; bluebush with scattered snakewood		0.0		0.0	58232
Ci-01a	Succulent steppe; heterogeneous spp	16578	1.4	71796	5.9	1221318
Ci-01b	Succulent steppe; heterogeneous spp k1,3,or3		0.0		0.0	8671
Ci-01c	Succulent steppe; heterogeneous spp		0.0		0.0	82045

Table 9 continued

Ci-02a	Succulent steppe; saltbush (& desert oak)	19	0.0	2349	1.6	146257
Ci-02b	Succulent steppe; saltbush & bluebush		0.0		0.0	2336
Ci-02c	Succulent steppe; saltbush & bluebush with very sparse mulga and A. sclerosperma		0.0		0.0	41402
Ci-02d	Succulent steppe; saltbush & samphire		0.0		0.0	96363
Ci-03a	Succulent steppe; bluebush	3805	0.1	393765	8.0	4901295
Ci-03b	Succulent steppe; bluebush (in dongas)	10422	1.7	10422	1.7	598583
Ci-03c	Succulent steppe; bluebush with grassy depressions		0.0		0.0	961676
Ci-03d	Succulent steppe; bluebush with saltbush in depressions		0.0	2748	1.9	148383
Ci-04a	Succulent steppe; samphire	29051	5.4	30120	5.6	538478
Cr-01a	Sparse succulent steppe; bluebush with very sparse snakewood shrubs		0.0		0.0	104283
fl	Bare areas; freshwater lakes	8556	3.6	9172	3.9	234818
cl/md	Bare areas; clatpans, mudflats	48163	4.9	76936	7.8	984853
r	Bare areas; rock outcrops	24038	6.6	40976	11.3	362979
sl	Bare areas; salt lakes	133092	3.5	248806	6.6	3788466
ds	Bare areas; drift sand	44193	52.9	45300	54.2	83522
Mc-01a/Mi-01c	Mosaic: Medium forest; jarrah marri/ medium woodland; jmarri-wandoo	18	0.3	114	2	5608
Mc-01a/Li-09a/Li-13a	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low woodland; paperbark		0.0		0.0	39396
Mi-01a/Li-09a/Lc-03a	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree	1186	2.3	1189	2.3	52413
Mi-01a/Li-09a/Lc-03a/Li-11d	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; Casuarina obesa		0.0	109	0.8	14085
Mi-01j/Zc-02a	Mosaic: Medium woodland; marri,wandoo, powderbark / Shrublands; dryandra heath	5267	63.4	5309	63.9	8310
Mi-05f/Sc-06a	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance		0.0		0.0	1100
Mi-05f/Sc-08c	Mosaic: Medium woodland; merrit & red mallee / Shrublands; Melaleuca cardiophylla thicket		0.0	11	0.8	1442
Mi-05h/Ci-02d	Mosaic: Medium woodland;York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire		0.0		0.0	251
Mi-05j/Mi-06e	Mosaic: Medium woodland; salmon gum & gimlet / Medium woodland; merrit & red mallee		0.0		0.0	235314
Mi-05j/HS-01a	Mosaic: Medium woodland; salmon gum & gimlet / Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa		0.0		0.0	282509
Mi-06e/Si-06a	Mosaic: Medium woodland; merrit (or a11) & red mallee / Shrublands; dryandra scrub		0.0	978	1.0	98812
Mi-06i/Si-06a	Mosaic: Medium woodland; goldfields blackbutt & Dundas blackbutt / Shrublands; dryandra scrub		0.0		0.0	76688
Mi-06m/HS-01a	Mosaic: Medium woodland; salmon gum & red mallee / Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa		0.0	42113	5.1	819567
Mi-06u/Ci-05a	Mosaic: Medium woodland; goldfield eucalypts / Succulent steppe; saltbush, with open low woodland; myoporum	4977	1.0	4977	1.0	505210
Mr-01b/Zc-02a	Mosaic: Medium open woodland; marri / Shrublands; dryandra heath		0.0	14	0.3	4993
Mr-01c/Zc-02a	Mosaic: Medium open woodland; wandoo / Shrublands; dryandra heath		0.0		0.0	1245
Mr-01d/Zc-02a	Mosaic: Medium open woodland; wandoo & powderbark wandoo / Shrublands; dryandra heath		0.0		0.0	3788
Mr-01c/Zc-01e	Mosaic: Medium open woodland; wandoo / Shrublands; mixed heath		0.0	7	0.1	9755

Table 9 continued

Mr-01b/Sc-08d	Mosaic: Medium open woodland; marri / Shrublands; teatree thicket		0.0		0.0	466
Mr-02c/Ci-02a	Mosaic: Medium open woodland; salmon gum & morrel / Succulent steppe; saltbush	412	11.1	2329	62.5	3729
Mp-01b/Ci-04b	Mosaic: Medium sparse woodland; salmon gum & morrel / Succulent steppe; samphire		0.0	2246	34.5	6517
Mp-01c/Ci-02d	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire	519	1.7	712	2.4	30314
Mp-01d/ Hi-07a	Mosaic: Medium sparse woodland; desert oak between sand dunes / Hummock grasslands, grass steppe; hard spinifex Triodia basedowii	18055	1.1	18055	1.1	1594927
LM-01a/Mp-01a	Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri	0	0.0	6910	17.4	39792
LS-01a/SZ-03j	Mosaic: Shrublands tree-heath between sandhills / Shrublands; scrub-heath	8779	45.7	8779	45.7	19198
Ld-01a/HI-03f	Mosaic: Low dense forest-mixed tropical deciduous forest / Hummock grasslands, open low tree steppe; scattered low rare eucs in spinifex		0.0		0.0	10525
Li-02a/Ci-02b	Mosaic: Low woodland; mulga / Succulent steppe; saltbush & bluebush		0.0		0.0	1928
Li-04a/Ci-04a	Mosiac: Low woodland; mulga & bowgada / Succulent steppe; samphire		0.0		0.0	39451
Li-06b/Si-02c	Mosaic: Low woodland; waterwood / Shrublands; Acacia sclerosperma & bowgada scrub		0.0		0.0	295656
Li-06b/Si-02i	Mosaic: Low woodland; waterwood / Shrublands; Acacia sclerosperma, A. victoriae & A. subtressarogona scrub		0.0		0.0	222359
Li-09a/Mr-02a	Mosaic: Low woodland; banksia / Medium open woodland; tuart		0.0		0.0	509
Li-09a/Sc-08d	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	91	0.2	8216	20.0	41154
Li-09a/Zc-02a	Mosaic: Low woodland; banksia / Shrublands; dryandra heath		0.0		0.0	1527
Lr-02a/Si-02p/Cp-01a	Mosaic: Open low woodland; mulga / Shrublands; bowgada & minnieritchie scrub / Scattered groups of saltbush/bluebush	416	1.0	416	1.0	39995
Lr-02a/Ci-02b	Mosaic: Open low woodland; mulga / Succulent steppe; saltbush & bluebush on greenstone		0.0		0.0	107156
Lr-02a/Ci-01b	Mosaic: Open low woodland; mulga / Succulent steppe; heterogeneous species on greenstone		0.0		0.0	17157
Lp 01a/Cp-01b	Mosaic: Sparse low woodland; mulga in scattered groups /Scattered groups of succulents		0.0		0.0	6065
SL-01b/Si-04b	Mosaic: Low woodland over scrub; mulga over bowgada scrub / Shrublands; bowgada & grevillea scrub on sandhills		0.0		0.0	2304
SL-02b/Si-04b	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; bowgada scrub with scattered mulga		0.0		0.0	129529
Sc-03b/Lp-01d	Mosaic: Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket / Sparse low woodland; illyarrie	1619	5.0	1619	5.0	32499
Sc-04a/Sm-02c	Mosaic: Shrublands; Allocasuarina campestris thicket / Shrublands; jam scrub with scattered York gum in the valeys	253	0.2	324	0.3	126656
Sc-04a/SL-02a	Mosaic: Shrublands; Allocasuarina campestris thicket / Shrublands; mallee & acacia scrub with wandoo low woodland		0.0		0.0	1575
Sc-01d/SZ-03d	Mosaic: Shrublands; thicket, acacia-casuarina alliance / Shrublands; scrub-heath on deep sandy flats	1605	1.9	24694	28.7	86030
Si-02c/Ci-04a	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Succulent steppe; samphire		0.0		0.0	6087
Si-02m/Si-02d	Mosaic: Shrublands; bowgada scrub / Shrublands; Acacia sclerosperma, bowgada & A. victoriae scrub	63	0.0	63	0.0	225015
Si-02c/Si-02t	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Shrublands; snakewood & A. victoria scrub		0.0		0.0	50287
Si-04b/Si-02m	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; bowgada scrub		0.0		0.0	6424
Si-04b/Si-02c	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; Acacia sclerosperma & bowgada scrub		0.0		0.0	28514
Si-02j/Zp-01a	Mosaic: Shrublands; Acacia sclerosperma, A. victoriae & snakewood scrub / Shrublands; patches of low mixed scrub	322	0.5	322	0.5	61541

Table 9 continued

Si-02t/Hs-04a	Mosiac: Shrublands; snakewood & A. victoria scrub / Hummock grasslands, shrub-steppe; kanji over T. pungens & T. basedowii		0.0		0.0	145532
Si-02m/HX-02a	Mosaic:Shrublands; bowgada scrub / Hummock grasslands, mixed sandplain - open red mallee mallee over sparse dwarf shrubs with spinifex	21388	72.1	21388	72.1	29669
Si-02p/Ci-02b	Mosaic: Shrublands; bowgada & minnieritchie scrub / Succulent steppe; saltbush & bluebush		0.0		0.0	2175
Si-02m/Ci-02b	Mosaic: Shrublands; bowgada scrub / Succulent steppe; saltbush & bluebush		0.0		0.0	141034
Si-02m/Ci-04a	Mosaic: Shrublands; bowgada scrub / Succulent steppe; samphire		0.0		0.0	83367
Si-02c/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Succulent steppe; saltbush & bluebush		0.0		0.0	149660
Si-04c/Ci-02a	Mosaic: Shrublands; acacia & melaleuca scrub / Succulent steppe; saltbush	1201	6.0	1201	6.0	20162
Si-9c/Mi-05i	Mosaic: Shrublands; York gum & E.sheathiana mallee scrub / Medium woodland; wandoo & gimlet		0.0	332	4.0	8303
Si-9c/Mi-05j	Mosaic: Shrublands; York gum & E.sheathiana mallee scrub / Medium woodland; salmon gum & gimlet	956	0.6	3284	2.1	159889
Si-10a/Mi-05j	Mosaic: Shrublands; mallee Eucalyptus longicornis & E.sheathiana scrub/ Medium woodland; salmon gum & gimlet		0.0		0.0	2256
Si-11a/Mi-06d	Mosaic: Shrublands; mallee scrub E. eremophila / Medium woodland; merrit & coral gum	0	0.0	370723	40.6	914248
Si-11a/Mi-06g	Mosaic: Shrublands; mallee scrub E. eremophila /Medium woodland; salmon gum & Dundas blackbutt		0.0	5745	36.1	15927
Si-11a/Mi-06n	Mosaic: Shrublands; mallee scrub E. eremophila /Medium woodland; salmon gum & red mallee	10101	2.6	21091	5.4	392836
Si-11a/Mi-06o	Mosaic: Shrublands; mallee scrub E. eremophila / Medium woodland; gimlet		0.0		0.0	38016
Si-11c/Mi-05g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & bloodwood E. dichromophloia / Medium woodland; salmon gum & morrel		0.0	11	100.5	11
Si-11d/Mi-05f	Mosaic: Shrublands; mallee scrub E. eremophila & black marlock / Medium woodland; York gum & salmon gum	111	0.1	114	0.1	129509
Si-11d/Mi-05g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & black marlock / Medium woodland; salmon gum & morrel	280	0.5	1592	2.5	62859
Si-13d/Mi-05i	Mosaic: Shrublands; mallee scrub, redwood & black marlock / Medium woodland; wandoo & gimlet	168	0.1	1686	0.9	197226
Si-13a/Mi-09a	Mosaic: Shrublands; mallee scrub, black marlock / Medium woodland; yate	146	1.1	146	1.1	12916
Si-13e/Mi-05g	Mosaic: Shrublands; mallee scrub, redwood / Medium woodland; salmon gum & morrel	2073	6.0	3389	9.9	34350
Si-13d/Mi-05d	Mosaic: Shrublands; mallee scrub, redwood & black marlock / Medium woodland; salmon gum	2664	1.4	3874	2.1	184813
Si-13a/SZ-01b	Mosaic: Shrublands; mallee scrub, black marlock / Shrublands; tallerack mallee-heath	52307	19.6	52572	19.7	266960
Sp-01f/Gc-02a	Mosaic: Shrublands; Acacia victoriae & snakewood scrub patches / Short bunch grassland - savanna /grass plain		0.0		0.0	313487
SZ-03f/Li-07f	Mosaic: Shrublands; scrub-heath / Low woodland; illyarrie	9470	10.4	12551	13.8	90806
SZ-03i/Lp-01e	Mosaic: Shrublands; scrub-heath / Sparse low woodland; wandoo & powderbark wandoo	73	0.6	73	0.6	11357
SZ-03j/Sc-03b	Mosaic: Shrublands; scrub-heath / Shrublands; acacia-melaleuca thickets		0.0		0.0	13059
SZ-03j/Sc-04a	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	616	0.5	1070	0.8	135911
SZ-03j/Sc-04b	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	619	3.2	1136	5.9	19108
SZ-03j/Si-02y	Mosaic: Shrublands; scrub-heath / Shrublands; acacia various species scrub	12	0.4	12	0.4	2845
SZ-03a/Sp-01g	Mosaic: Shrublands; scrub-heath on coastal association / Shrublands; acacia patchy scrub	283	0.9	283	0.9	32671
SZ-03j/SZ-01b	Mosaic: Shrublands; scrub-heath / Shrublands; tallerack mallee-heath	4223	15.1	4223	15.1	27925
SZ-03j/SZ-01c	Mosaic: Shrublands; scrub-heath / Shrublands; Eucalyptus incrassata mallee-heath	203549	64.8	203566	64.8	314282
SZ-03j/Zc-02a	Mosaic: Shrublands; scrub-heath / Shrublands; dryandra heath	53	0.3	120	0.6	19512

Table 9 continued

Zc-01a/Sc-03b	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket	29114	45.1	32805	50.8	64596
Zc-01a/Sc-02h	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; A.rostellifera & A. cyclops thicket	85	0.3	85	0.3	26236
Zc-01a/Sc-02i	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia cyclops thicket	602	101.3	602	101.3	594
Zc-01e/Sp-01g	Mosaic:Shrublands; mixed heath / Shrublands; acacia patchy scrub		0.0		0.0	12931
Zc-02a/SZ-04a	Mosaic: Shrublands; dryandra heath / Shrublands; hakea scrub-heath	29603	11.0	37291	13.9	269300
Zi-01a/Hi-08a	Mosaic: Shrublands; eremophila and cassia dwarf scrub / Hummock grasslands, grass steppe; T. wiseana		0.0		0.0	24884
kGl-02a/Hl-04c	Mosaic: Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass / Hummock grasslands, open low tree-steppe; snappy gum over T. pungens & T. intermedia		0.0		0.0	9048
Kgl-01a/KG-02a	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Grasslands; high grass savanna, white grass		0.0		0.0	11998
Kgl-01a/Hl-04d	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana & T. intermedia	4291	1.1	4291	1.1	375143
Kgl-01a/Hl-02a/KG-02a	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Grasslands; high grass savanna, white grass		0.0		0.0	143843
Kgl-02a/Hi-06d	Mosaic: Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains / Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. intermedia		0.0		0.0	68810
Kgl-02a/Hi-09a	Mosaic: Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia		0.0		0.0	47935
kgL-01a/kgL-01b	Mosaic: Grasslands, curly spinifex, low tree savanna woodland; gnainger & Eucalyptus ferrruginea over Plectrachne pungens / Grasslands, curly spinifex, low tree savanna woodland; snappy gum over curly spinifex on SST		0.0		0.0	305472
kgl-01a/Hi-09a	Mosaic: Grasslands, curly spinifex, low tree savanna; snappy gum over curly spinifex / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia		0.0		0.0	233173
kgl-01c/ kg-01a	Mosaic: Grasslands, curly spinifex, low tree savanna; snappy gum & E. perfoliata over Plectrachne pungens /Grasslands; sparse low tree savanna; Andersonia gregorii over Plectrachne bynoei		0.0		0.0	605447
GL-01a/Hi-06a/Ci-01a	Mosaic: Sedgeland; sedges with low tree savanna woodland; coolabah over various sedges /Hummock grasslands, grass steppe; soft spinifex Triodia pungens / Succulent steppe; heterogeneous spp		0.0		0.0	21335
Gc-02a/Li-06a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Low woodland; kanji	21412	42.9	21412	42.9	49936
Gc-02c/Hs-02a	Mosaic: Sedgeland; various sedges with very sparse snakewood/ Hummock grasslands, shrub-steppe; kanji over Triodia pungens		0.0	2185	2.0	109629
Gc-02a/Hi-06a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex Triodia pungens	12610	1.6	12826	1.6	786674
Gc-02a/Hi-08a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands, grass steppe; hard spinifex Triodia wiseana	719	1.2	719	1.2	59308
P-02a/kGl-02a	Mosaic: Shrublands, pindan; Acacia eripoda shrubland with scattered low bloodwood & Eucalyptus setosa over soft & curly spinifex / Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass		0.0		0.0	195955
Hl-06a/Hl-01c	Mosaic: Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges / Hummock grasslands, open low tree steppe; bloodwood (E. dichromophloia) over soft spinifex Triodia pungens		0.0		0.0	239866
Hl-03b/Hl-06a	Mosaic: Hummock grasslands, open low tree steppe; desert bloodwood and feathertop spinifex on sandhills / Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges		0.0		0.0	699

Table 9 continued

Hl-01d/Hl-02a	Mosaic: Hummock grasslands, open low tree steppe; bloodwood with sparse kanji shrubs over soft spinifex Triodia pungens / Hummock grasslands, open low tree steppe; snappy gum over Triodia wiseana lateritic crust		0.0		0.0	74226
Hl-03b/Hs-01e	Mosaic: Hummock grasslands, open low tree steppe; desert bloodwood and feathertop spinifex on sandhills / Hummock grasslands, shrub steppe; mixed shrubs over spinifex between sandhills	676020	3.7	676020	3.7	18266564
Hl-02a/Hs-02a	Mosaic: Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Hummock grasslands, shrub-steppe; kanji over Triodia pungens	105329	18.0	122604	20.9	586783
Hl-01a/Hi-09a	Mosaic:Hummock grasslands, open low tree steppe; snappy gum over soft spinifex Triodia pungens / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia on laterite		0.0		0.0	244772
Hl-02a/Li-02a	Mosaic: Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Low woodland; mulga in valleys		0.0		0.0	97659
Hi-04b/Hs-02j	Mosaic: Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia wiseana / Hummock grasslands, shrub-steppe; snakewood over Triodia pungens		0.0		0.0	700
Hs-02a/Hi-06c	Mosaic: Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. wiseana / Hummock grasslands, shrub-steppe; kanji over Triodia pungens in valleys		0.0		0.0	40263
Sp-01c/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma & A. victoriae scrub, barren /Succulent steppe; saltbush & bluebush		0.0		0.0	57121
Sp-01b/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma sparse scrub / Succulent steppe; saltbush & bluebush	347	0.1	347	0.1	444089
Sp-01f/Cp-01b	Mosaic: Shrublands; Acacia victoriae & snakewood scrub patches / Scattered groups of succulents		0.0		0.0	2688
Sp-02a/Ci-04a	Mosaic: Shrublands; melaleuca patchy scrub /Succulent steppe; samphire	518	2.9	518	2.9	17636
Ci-03a/Sp-01e	Mosaic: Succulent steppe; bluebush / Shrublands; Acacia sclerosperma, A. victoriae & snakewood scrub patches	134	0.2	134	0.2	69885

Summary: # Veg = 647, # BG = 5, # Moaics = 117 Total = 769

3.5 Poorly conserved types

Of the 769 Types (647 Vegetation Types, 117 Mosaics, 5 unvegetated Types) used in the analyses, 116 Types can be regarded as adequately reserved, with ≥10% of original extent in reserves in IUCN Categories I - IV (102 Vegetation Types, 13 mosaics, 1 unvegetated Type). If the other categories of the CALM-managed estate are included in the analyses, the number of Types that can be regarded as adequately reserved increases to 163 (141 Vegetation Types, 20 mosaics, 2 unvegetated Types) (Table 10a).

Four hundred and thirty-two Types are unrepresented in reserves in IUCN Categories I - IV reserves (363 Vegetation Types, 69 mosaics). This figure is reduced to 360 Types when all CALM-managed conservation reserves are included in the analyses (305 vegetation Types, 55 mosaics) (Table 10b).

Two hundred and twenty-one Types are represented in reserves in IUCN Categories I - IV but that level of representation is with < 10% of the original areal extent of each of those types (182 vegetation Types, 35 mosaics, 4 unvegetated Types). If the analyses include all CALM-managed conservation reserves, the number of Types present but with < 10% of original areal extent in those reserves is 246 (201 vegetation Types, 42 mosaics, 3 unvegetated Types) (Table 10c). The number of Types increases with this change of land base because there are fewer Types in the unrepresented category.

Table 10d lists those Types that are represented in conservation reserves but where the total area in reserves is < 2000 ha. One hundred and sixty-five Types are present but < 2000 ha in reserves in IUCN Categories I - IV (134 vegetation Types, 31 mosaics). If the analyses include all CALM-managed conservation reserves, the number of Types present but with < 2000 ha in those reserves is 174 (141 vegetation Types, 53 mosaics. Again, the number of Types increases with this change of land base because there are fewer Types in the unrepresented category.

The vegetation Types which are unrepresented or poorly represented in reserves in IUCN Categories I - IV are distributed throughout the Sate, but large numbers occur in the Avon Wheatbelt, Murchison, Carnarvon, Coolgardie, Pilbara, Dampierland, and Ord-Victoria Plains Biogeographic Regions (Tables 11, 12). The most unreserved Types occur in the Murchison (73), Dampierland (57), Ord-Victoria Plains (56), Carnarvon (52), Pilbara (51) and Central Kimberley Regions (49). The most poorly reserved Types occur in the Avon Wheatbelt (90), Mallee (49), Coolgardie (48) and Carnarvon Regions (44). Vegetation Types in Warren and Hampton are relatively well represented in the conservation reserve system.

When considered in proportional terms, IBRA Regions with the best level of reservation of vegetation types are Warren, Hampton, Esperance Plains, Geraldton Sandplains, Swan Coastal Plain and Jarrah Forest. All other Regions are seriously under-reserved, with more than 90% of vegetation types under-represented in conservation reserves in Tanami, Central Ranges, Nullarbor, Ord-Victoria Plains, Central Kimberley, Great Sandy Desert and Murchison. However, all but the above-mentioned six IBRA Regions are seriously under-reserved.

Table 10a. Vegetation types with ≥10% of the original areal extent included in conservation reserves in IUCN categories I - IV.

H Code	Vegetation Description	Area in IUCN (I)-(IV) Reserves	%	Area in all CALM Conservation Reserves	%	Total Area of Veg. unit in W.A.
Mi-01a	Medium woodland; jarrah & marri	7553	52.8	7581	53	14316
Mi-01j	Medium woodland; marri,wandoo, powderbark	467	26.5	628	35.7	1761
Mi-03a	Medium woodland; yate	472	25	472	25	1888
Mi-03b	Medium woodland; marri & yate	1815	100	1815	100	1815
Mi-05o	Medium woodland; salmon gum, morrel, gimlet & blackbutt	1566	20.4	1566	20.4	7695
Mi-06p	Medium woodland mixed; salmon gum with, merrit & red mallee	521	72.9	521	72.9	715
Mi-06q	Medium woodland mixed; salmon gum with, merrit & desert bloodwood Eucalyptus sp.	2532	97.6	2532	97.6	2595
Mi-06s	Medium woodland; salmon gum, redwood, merrit, gimlet & E. sheathiana	758	100	758	100	758
Mi-08a	Medium woodland; river gum	117	10.4	117	10.4	1125
Mi-08c	Medium woodland; York gum & river gum	2310	97.4	2310	97.4	2372
Mi-09e	Medium woodland; yate & teatree	3682	15.9	4173	18	23181
Mi-11c	Medium woodland; York gum, salmon gum & Allocasuarina cristata	15789	34.3	15789	34.3	46005
Mr-02a	Medium open woodland; tuart	260	20.6	260	20.6	1264
ML-01a	Medium-Low woodland; York gum & Callitris columellaris (cypress pine)	78230	33.1	78678	33.3	236393
Lc-06b	Low forest; jarrah & Eucalyptus decipiens	1392	100	1392	100	1392
Li-01a	Low woodland; jarrah-banksia	35609	44	36071	44.6	80866
Li-05g	Low woodland; York gum, and callitris (pine)	60740	58.1	60740	58.1	104466
Li-07a	Low Woodland; jarrah	11568	85.8	11622	86.2	13487
Li-07e	Low woodland; Eucalyptus decipiens	561	35.3	561	35.3	1591
Li-08a	Low woodland; Agonis flexuosa	10874	30.7	12292	34.7	35417
Li-09c	Low woodland; Banksia prionotes	14131	16.4	14493	16.8	86041
Li-13a	Low woodland; paperbark, melaleuca	24725	27.3	25571	28.2	90696
Lr-02b	Open low woodland; bowgada	5830	95.7	5830	95.7	6093
A-01a	Low forest; mangroves (Kimberley), / Scrub; mangroves (Pilbara)	23047	11.6	25187	12.7	197944
Sm-01d	Shrublands; Melaleuca thyoides thicket with scattered river gum	135	39.6	135	39.6	340
Sm-05a	Shublands; mallee with scattered York gum	1096	53.8	1096	53.8	2036
SL-01c	Low woodland over scrub; Allocasuarina cristata over bowgada scrub	809	99.5	809	99.5	813
SL-01d	Low woodland over scrub; Allocasuarina heugelliana over jam scrub	16595	51.7	16595	51.7	32095
Sl-01a	Shrublands; Melaleuca thyoides thicket with scattered casuarina	3982	78.8	4142	82	5052
Sl-02b	Shrublands; bowgada scrub with scattered mulga	36632	12.4	36632	12.4	295100
Sl-03c	Shrublands; bowgada scrub with scattered York gum	46055	65	46254	65.3	70846

Table 10a continued

SI-03e	Shrublands; bowgada scrub with scattered eucalyptus sp.& callitris sp.or casuarina	162884	30	162884	30	542252
SI-03f	Shrublands; bowgada scrub with scattered callitris sp.or casuarina	188687	76.1	188687	76.1	248012
Sc-02a	Shrublands; Acacia cyperophylla thicket	60688	15.2	69758	17.5	398714
Sc-02d	Shrublands;Acacia ligulata x rostellifera thicket	9903	62.8	10335	65.5	15777
Sc-02g	Shrublands; Acacia decipiens	7890	53.1	7896	53.1	14862
Sc-03b	Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket	3597	17.8	3597	17.8	20215
Sc-08a	Shrublands; Melaeuca uncinata thicket	510	18.9	510	18.9	2693
Sc-09a	Shrublands; Acacia-Lamarchea thicket	17503	102	17503	102	17167
Sc-09b	Shrublands; Tamma & Dryandra thicket	182	12.6	585	40.6	1441
Sc-09d	Shrublands; Mt Ragged heath	2460	78.8	3122	100	3122
Si-01g	Shrublands; mulga & minnieritchie scrub	29951	14.9	29951	14.9	200725
Si-04b	Shrublands; bowgada & grevillea scrub	10430	47.9	10430	47.9	21763
Si-05a	Shrublands; peppermint scrub, Agonis flexuosa	20670	69.2	20745	69.5	29859
Si-08a	Shrublands; mallee & acacia scrub on coastal dunes	70121	49.2	72414	50.9	142401
Si-08b	Shrublands; mallee & acacia scrub on coastal dunes	66230	36.5	70918	39.1	181323
Si-09a	Shrublands; York gum mallee scrub	2818	100	2818	100	2818
Si-10a	Shrublands; mallee Eucalyptus longicornis & E.sheathiana scrub	6	40.8	6	40.8	14
Si-12a	Shrublands; mallee scrub Eucalyptus eudesmoides	40589	90	42882	95.1	45075
Si-13a	Shrublands; mallee scrub, black marlock	144775	11.9	164333	13.5	1213588
Si-13b	Shrublands; mallee scrub, black marlock & Eucalyptus decipiens	1227	33.5	1456	39.8	3661
Si-13c	Shrublands; mallee scrub, black marlock & Eucalyptus decipiens	76	22.4	76	22.4	339
Si-15b	Shrublands; mallee scrub, blue mallee Eucalyptus socialis	172073	23.6	172073	23.6	728386
Si-15c	Shrublands; mallee scrub, white mallee Eucalyptus cooperana	115674	79.8	120827	83.3	144999
Si-15d	Shrublands; mallee scrub, bushy yate & Bald I. marlock	934	27.7	2090	61.9	3377
Si-15e	Shrublands; mallee scrub, Eucalyptus dongarrensis	1480	47.6	1480	47.6	3113
Si-15h	Shrublands; mallee scrub (Nullabor)	44482	90	44482	90	49410
SZ-01a	Shrublands; jarrah mallee-heath	41009	24	41009	24	171129
SZ-01b	Shrublands; tallerack mallee-heath	187997	16.6	197027	17.4	1129402
SZ-01d	Shrublands; Albany blackbutt mallee-heath	1966	21.6	2001	22	9106
SZ-01e	Shrublands; mallee-heath	7602	31.3	8258	34	24269
SZ-01f	Shrublands; mallee-heath	34409	96.5	34409	96.5	35654
SZ-02a	Shrublands; Acacia ligulata scrub-heath	1948	16.8	1948	16.8	11588
SZ-02b	Shrublands; Acacia rostellifera scrub-heath	2404	18.1	2404	18.1	13296
SZ-03a	Shrublands; scrub-heath on coastal association	91616	27.5	92760	27.8	333647
SZ-03b	Shrublands; scrub-heath on sandplain	66306	13.5	84520	17.2	491503

Table 10a continued

SZ-03g	Shrublands; scrub-heath on lateritic sandhills	13252	14.1	13252	14.1	94052
SZ-03h	Shrublands; scrub-heath on sandplain	30487	15.4	30658	15.5	197810
SZ-03i	Shrublands; scrub-heath	10273	17.1	17624	29.4	59951
Zc-01a	Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath	7657	75.3	7657	75.3	10171
Zc-01b	Shrublands; melaleuca heath	773	26.6	773	26.6	2904
Zc-01c	Shrublands; Jacksonia horrida heath	5975	56.9	5975	56.9	10494
Zc-01d	Shrublands; heath on coastal limestone	7628	18	7628	18	42391
Zc-01e	Shrublands; mixed heath	4626	17.8	7187	27.7	25929
KGM-02f	Grasslands, high grass savanna woodland; strinybark & woolybutt over upland tall grass & curly spinifex	142211	15.6	142211	15.6	914020
KGM-02g	Grasslands, high grass savanna woodland; strinybark & woolybutt over upland tall grass & curly spinifex	759317	26.2	759317	26.2	2895393
KGM-03c	Grasslands, high grass savanna woodland; ghost gum & bloodwood (E. polycarpa) over triodia &tall upland grass	2222	15.9	2222	15.9	14002
kGl-01e	Grasslands, tall bunch grass savanna low tree; grey box & bloodwood (E. terminalis) over aristida & ribbon grass on sandy plain	107526	95	107526	95	113193
Kg-01a	Grasslands, short bunch grass savanna, grass; annual grasses (Enneapogon) on dry plains	52016	19.7	52016	19.7	263545
GM-01a	Sedgeland; sedges with medium woodland; sedges with coolabah over various sedges	64897	30.6	65491	30.9	211940
Gc-01a	Sedgeland; reed swamps, occasionally with heath	16833	21.1	21701	27.3	79597
Hl-04a	Hummock grasslands, open low tree-steppe; snappy gum & bloodwood over T. pungens & T. wiseana	15102	12.5	15102	12.5	120693
Hms-01a	Hummock grasslands, open meduim tree & mallee steppe; marble gum & mallee (E. youngiana) over hard spinifex Triodia basedowii	189152	10.3	189152	10.3	1827880
HS-01a	Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa	17060	27.7	23492	38.2	61504
Hs-01a	Hummock grasslands, shrub steppe; Acacia coriacea & hakea over hard spinifex Triodia basedowii	283831	40.7	283831	40.7	696734
Hs-01e	Hummock grasslands, shrub steppe; mixed shrubs over spinifex between sandhills	121049	11.5	121049	11.5	1053504
Hs-02d	Hummock grasslands, shrub-steppe; waterwood over Triodia pungens	6627	21.8	6627	21.8	30334
Hs-08c	Hummock grasslands, shrub-steppe; mulga & kanji over Triodia pungens & T. basedowii	174831	22.6	176406	22.8	772863
Hs-08d	Hummock grasslands, shrub-steppe; mulga over Triodia pungens & T. basedowii	23520	26.4	23520	26.4	89244
Hi-02c	Hummock grasslands, sparse tree steppe; snappy gum over spinifex Triodia pungens& T. intermedia on high SST ridges & plateau	81080	88.3	81080	88.3	91817
Hi-03b	Hummock grasslands, sparse tree-steppe; scattered bloodwood over T. pungens & T. sp. indet. aff. angusta	35331	42.1	35331	42.1	83991
Hi-05b	Hummock grasslands, patchy shrub steppe; scattered groups of mulga over Triodia basedowii	951627	13.4	951627	13.4	7105655
Hi-06a	Hummock grasslands, grass steppe; soft spinifex Triodia pungens	105084	12.1	105850	12.1	871476
Hi-08a	Hummock grasslands, grass steppe; hard spinifex Triodia wiseana	86406	17.4	86406	17.4	495694
Hi-09c	Hummock grasslands, grass steppe; spinifex Triodia plurinervata	421	100	421	100	421
HX-05a	Hummock grassland; shrub steppe; mixed scrub, hard spinifex (T. basedowii) with dwarf shrubs	80303	69.8	80303	69.8	115069
Cm-01d	Succulent steppe; samphire, scattered salmon gum & sparse teatree scrub	4666	58.4	4666	58.4	7984
SCm-01b	Succulent steppe; wandoo & Allocasuarina obesa open woodland, teatree thicket & samphire	1992	40.9	2399	49.2	4875
CL-01a	Succulent steppe; myoporum low woodland over samphire	445	10.3	453	10.5	4331

Table 10a continued

CS-01f	Succulent steppe; saltbush & samphire with acacia species	253	14.1	279	15.6	1795
Cs-01a	Succulent steppe; saltbush with scattered mulga shrubs	7813	15.4	17022	33.6	50726
Cs-02i	Succulent steppe; saltbush,with scattered wattles	2535	12.1	20246	96.6	20962
ds	Bare areas; drift sand	44193	52.9	45300	54.2	83522
Mi-01j/Zc-02a	Mosaic: Medium woodland; marri,wandoo, powderbark / Shrublands; dryandra heath	5267	63.4	5309	63.9	8310
Mr-02c/Ci-02a	Mosaic: Medium open woodland; salmon gum & morrel / Succulent steppe; saltbush	412	11.1	2329	62.5	3729
LS-01a/SZ-03j	Mosaic: Shrublands tree-heath between sandhills / Shrublands; scrub-heath	8779	45.7	8779	45.7	19198
Si-02m/HX-02a	Mosaic:Shrublands; bowgada scrub / Hummock grasslands, mixed sandplain - open red mallee mallee over sparse dwarf shrubs with spinifex	21388	72.1	21388	72.1	29669
Si-13a/SZ-01b	Mosaic: Shrublands; mallee scrub, black marlock / Shrublands; tallerack mallee-heath	52307	19.6	52572	19.7	266960
SZ-03f/Li-07f	Mosaic: Shrublands; scrub-heath / Low woodland; illyarrie	9470	10.4	12551	13.8	90806
SZ-03j/SZ-01b	Mosaic: Shrublands; scrub-heath / Shrublands; tallerack mallee-heath	4223	15.1	4223	15.1	27925
SZ-03j/SZ-01c	Mosaic: Shrublands; scrub-heath / Shrublands; Eucalyptus incrassata mallee-heath	203549	64.8	203566	64.8	314282
Zc-01a/Sc-03b	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket	29114	45.1	32805	50.8	64596
Zc-01a/Sc-02i	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia cyclops thicket	602	100	602	100	602
Zc-02a/SZ-04a	Mosaic: Shrublands; dryandra heath / Shrublands; hakea scrub-heath	29603	11	37291	13.8	269300
Gc-02a/Li-06a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Low woodland; kanji	21412	42.9	21412	42.9	49936
Hi-02a/Hs-02a	Mosaic: Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Hummock grasslands, shrub-steppe; kanji over Triodia pungens	105329	18	122604	20.9	586783

Summary; # Veg. = 103, # BG = 1, # Mosaics = 14, Total 118

Table 10b. Vegetation types not represented in conservation reserves in IUCN categories I - IV.

H Code	Vegetation Description	Area in IUCN (I)-(IV) Reserves	%	Area in all CALM Conservation Reserves	%	Total Area of Veg. Unit in W.A.
Mi-04c	Medium woodland; mallet		0		0.0	1746
Mi-05e	Medium woodland; morrel		0		0.0	702
Mi-05h	Medium woodland;York gum, salmon gum & morrel		0		0.0	7220
Mi-05k	Medium woodland; morrell & blackbutt		0	1378	6.9	19973
Mi-05l	Medium woodland; morrel & Dundas blackbutt		0		0.0	62160
Mi-05q	Medium woodland; blackbutt on greenstone hills		0		0.0	17921
Mi-06b	Medium woodland; redwood & red mallee		0	111154	22.3	498529
Mi-06f	Medium woodland; salmon gum & goldfields blackbutt		0	4249	0.9	475267
Mi-06h	Medium woodland; goldfields blackbutt		0		0.0	47496
Mi-06j	Medium woodland; goldfields blackbutt & red mallee		0		0.0	46226
Mi-06k	Medium woodland; Dundas blackbutt & red mallee		0	150117	43.9	341680
Mi-06l	Medium woodland; red mallee on calcarious earths (also e10,11,13,14)		0	3065	2.4	127011
Mi-06t	Medium woodland; salmon gum, morrel, redwood, merrit, gimlet & E. sheathiana		0		0.0	32
Mi-07a	Medium woodland; coolabah		0		0.0	35834
Mi-07b	Medium woodland; river gum		0	245	0.2	102286
Mi-07c	Medium woodland; river gum & terminalia		0		0.0	11192
Mi-07d	Medium woodland-mixed; river gum & terminalia with coolabah & ghost gum		0		0.0	2694
Mi-08b	Medium woodland; jarrah & river gum		0	43	1.8	2437
Mi-09b	Medium woodland; wandoo,York gum & yate		0		0.0	10539
Mi-09f	Medium woodland; yate & salmon gum		0		0.0	354
Mi-09g	Medium woodland; York gum, yate & salmon gum		0		0.0	1220
Mi-10a	Medium woodland-tropical messmate; stringybark & woolybutt		0		0.0	8543
Mi-11a	Medium woodland; York gum & Allocasuarina huegeliana		0		0.0	2110
Mi-11b	Medium woodland; York gum & Casuarina obesa		0	10	0.4	2827
Mi-12a	Medium woodland; Casuarina obesa		0	107	21.4	501
Mr-01a	Medium open woodland; jarrah		0		0.0	315
Mr-01b	Medium open woodland; marri		0	9	0.2	4500
Mr-02b	Medium open woodland; marri & tuart		0		0.0	1213
Mr-03a	Medium woodland; marri & river gum		0		0.0	7466
Mr-03b	Medium woodland; York gum & river gum		0	0	0.0	1438
Mp-01a	Medium sparse woodland; jarrah & marri		0		0.0	790

Table 10b continued

Lm-01a	Medium open woodland; jarrah & marri, with low woodland; banksia		0		0.0	5818
Lm-01b	Medium open woodland; eucalypt with low woodland; Banksia attenuata & B. menziesii		0		0.0	1710
Lc-02a	Low forest; callitris (cypress pine)		0		0.0	2353
Lc-03a	Low forest; teatree		0	113	20.1	561
Lc-03b	Low forest; teatree & casuarina		0		0.0	1100
Lc-05b	Low forest; moort		0		0.0	4725
Li-02b	Low woodland; mulga on dolerite		0		0.0	17904
Li-02c	Low woodland; mulga (with spinifex) on rises		0		0.0	156332
Li-04b	Low woodland; mulga & Acacia victoriae		0		0.0	205547
Li-04d	Low woodland; mulga Acacia victoriae & snakewood		0		0.0	280268
Li-04e	Low woodland; mulga, bowgada, Acaia quadrimarginea & minnieritchie (A. grasbyi)		0		0.0	10333
Li-05c	Low woodland; mulga & Allocasuarina cristata		0	119786	67.9	176405
Li-05d	Low woodland; mulga & callitris		0	2832	1.9	146457
Li-05e	Low open woodland; mulga & Allocasuarina cristata		0	6045	11.3	53740
Li-05f	Low woodland; mulga & red mallee		0		0.0	40134
Li-06b	Low woodland; waterwood		0		0.0	197179
Li-06d	Low woodland; A.. sclerosperma & A. victoriae		0		0.0	20885
Li-06e	Low woodland; bowgada & A. subtressarogona		0		0.0	476643
Li-07b	Low woodland; York gum		0		0.0	3562
Li-07d	Low woodland; Eucalyptus sp. aff. aspera		0		0.0	474
Li-11b	Low woodland; Allocasuarina huegelliana		0		0.0	780
Li-11c	Low woodland; Casuarina obesa salt lake		0		0.0	164
Li-11f	Low woodland; Allocasuarina fraseriana & jam		0		0.0	2269
Li-12b	Low woodland; jarrah or jarrah-casuarina		0		0.0	156
Li-12c	Low woodland; casuarina & eucalypts		0		0.0	7838
Li-12e	Low woodland; Acacia huegeliana & York gum		0	15	0.2	8622
Lr-01a	Open low woodland; Eucalypus sp. aff. aspera		0		0.0	721
Lr-01b	Open low woodland; Eucalyptus oraria		0		0.0	703
Lr-02a	Open low woodland; mulga		0		0.0	311829
Lp-01b	Sparse low woodland; mulga & Acacia victoriae, discontinuous in scattered groups		0		0.0	226885
Lp-01c	Sparse low woodland; Acacia victoriae & snakewood, discontinuous in scatttered groups		0		0.0	52832
LS-01a	Shrublands tree-heath between sandhills		0		0.0	35667
LS-01b	Shrublands low trees & scrub; teatree		0	31	1.2	2664
SM-01a	Medium woodland over scrub; York gum over bowgada & jam scrub		0		0.0	10566
SM-01b	Medium woodland over scrub; coolabah over bowgada scrub		0		0.0	3233

Table 10b continued

Sm-01a	Shrublands; teatree thicket with scattered wandoo & yate		0	312	2.2	14508
Sm-01b	Shrublands; Melaleuca uncinata thicket with scattered York gum		0	14	0.1	12687
Sm-02b	Shrublands; bowgada & jam scrub with scattered York gum		0	31	0.1	43709
Sm-02d	Shrublands; jam and Acacia rostellifera or hakea scrub with scattered York gum		0	910	1.0	91819
Sm-03c	Shrublands; Acacia quadrimarginea thicket with casuarina & goldfields blackbutt woodland		0		0.0	36931
Sm-04b	Shrublands; mallee & acacia scrub with scattered York gum & red mallee		0	30	0.2	17461
SL-01a	Low woodland over scrub; mulga over bowgada & minnieritchie scrub		0		0.0	990260
SL-01b	Low woodland over scrub; mulga over bowgada scrub		0		0.0	83671
Sl-01b	Shrublands; Melaleuca uncinata thicket with scattered powderbark wandoo mallee		0		0.0	361
Sl-02a	Shrublands; scrub with scattered mulga		0		0.0	24008
Sl-02c	Shrublands; bowgada & minnieritchie scrub with scattered mulga		0		0.0	237955
Sl-03a	Shrublands; bowgada scrub with scattered red mallee & Eucalypts		0		0.0	37406
Sl-03b	Shrublands; bowgada & jam scrub with scattered York gum & red mallee		0		0.0	59285
Sl-03d	Shrublands; bowgada scrub with scattered eucalypts & callitris		0		0.0	2963
Sl-03g	Shrublands; Acacia quadrimarginea & jam scrub with scattered York gum & Allocasuarina huegelliana		0		0.0	1386
Sc-01a	Shrublands; acacia & Allocasuarina campestris thicket		0	694	3.3	20851
Sc-01b	Shrublands; jam & Allocasuarina acutivalvis thicket on ironstone		0		0.0	8517
Sc-03a	Shrublands; bowgada, jam and Melaleuca uncinata thicket		0		0.0	329351
Sc-04b	Shrublands; Allocasuarina campestris scrub		0		0.0	660
Sc-07a	Shrublands; casuarina-melaleuca thicket		0	64	1.9	3328
Sc-08c	Shrublands; Melaleuca cardiophylla thicket		0		0.0	13544
Si-01b	Shrublands; mulga & Acacia sclerosperma scrub		0		0.0	35833
Si-01c	Shrublands; mulga & bowgada scrub		0		0.0	136645
Si-01d	Shrublands; mulga, Acacia victoriae & snakewood scrub		0		0.0	38189
Si-01h	Shrublands; mulga, bowgada, Acacia quadrimarginea & minnieritchie scrub		0		0.0	18664
Si-02b	Shrublands; Acacia bivenosa		0		0.0	130199
Si-02d	Shrublands; Acacia sclerosperma, bowgada & A. victoriae scrub		0		0.0	71214
Si-02f	Shrublands; Acacia sclerosperma, bowgada & snakewood scrub		0		0.0	5652
Si-02g	Shrublands; Acacia sclerosperma, bowgada & jam scrub		0		0.0	6359
Si-02h	Shrublands; Acacia sclerosperma & A. victoriae scrub		0		0.0	89065
Si-02k	Shrublands; Acacia sclerosperma & snakewood scrub		0		0.0	353423
Si-02n	Shrublands; bowgada & Acacia victoriae scrub		0		0.0	11010
Si-02o	Shrublands; bowgada & Acacia quadrimarginea on stony ridges		0	880	1.6	56426
Si-02p	Shrublands; bowgada & minnieritchie scrub		0		0.0	118276
Si-02r	Shrublands; bowgada & Acacia murrayana scrub		0		0.0	89115

Table 10b continued

Si-02s	Shrublands; Acacia victoriae scrub		0		0.0	16752
Si-02v	Shrublands; snakewood & minnieritchie scrub		0		0.0	9861
Si-02x	Shrublands; acacia species, general or numerous scrub		0	770	5.3	14475
Si-03a	Shrublands; Acacia cyperophylla scrub		0		0.0	15071
Si-03b	Shrublands; Acacia quadrimarginea scrub		0		0.0	10840
Si-04a	Shrublands; acacia & banksia scrub		0		0.0	56110
Si-08c	Shrublands; mallee & acacia thicket on dunes		0		0.0	3962
Si-09b	Shrublands; York gum & Eucalyptus gonglocarpa mallee scrub		0		0.0	9345
Si-15a	Shrublands; mallee scrub, red mallee		0		0.0	5159
Si-15f	Shrublands; mallee scrub between sand ridges (Great Victoria Desert)		0		0.0	446571
Si-15g	Shrublands; mallee scrub (Great Victoria Desert)		0	7432	2.1	351517
Sr-01a	Shrublands; mulga open scrub		0		0.0	447400
Sr-01b	Shrublands; mulga & bowgada open scrub		0		0.0	793
Sr-02a	Shrublands; Acacia sclerosperma & A.. victoriae open scrub		0		0.0	20947
Sr-02b	Shrublands; Acacia victoriae & snakewood open scrub		0		0.0	190018
Sr-02d	Shrublands; Acacia rostellifera open scrub		0	54	1.3	4313
Sp-01c	Shrublands; Acacia sclerosperma & A.. victoriae sparse scrub (barren)		0		0.0	12043
Zi-01a	Shrublands; eremophila and cassia dwarf scrub		0		0.0	701715
Zi-01c	Shrublands; dwarf scrub (Dirk Hartog I)		0		0.0	5581
P-01a	Shrublands, pindan; Acacia tumida shrubland with woolybutt & cabbage gum medium woodland over ribbon grass & curly spinifex		0		0.0	185854
P-01c	Shrublands, pindan; Acacia tumida shrubland with ghost gum & E. setosa medium woodland over curly spinifex		0		0.0	35649
P-01d	Shrublands, pindan; acacia shrubland with eucalypt medium woodland over Plectrachne pungens		0		0.0	268
P-02a	Shrublands, pindan; Acacia eripoda shrubland with scattered low bloodwood & Eucalyptus setosa over soft & curly spinifex		0		0.0	2590696
P-02b	Shrublands, pindan; Acacia tumida shrubland with scattered low bloodwood & Eucalyptus setosa over curly spinifex		0		0.0	36227
P-02c	Shrublands, pindan; Acacia tumida shrubland with scattered low bloodwood & E. setosa over ribbon & curly spinifex		0		0.0	3234
P-02e	Shrublands, pindan; Acacia eripoda & A. tumida shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex		0		0.0	53657
P-02f	Shrublands, pindan; Acacia tumida & A.impressa shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex		0		0.0	464010
P-02g	Shrublands, pindan; Acacia tumida & A.impressa shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex		0		0.0	16050
P-02h	Shrublands, pindan; Acacia eripoda & A. tumida shrubland with scattered low Eucalyptus confertifolia over ribbon & curly spinifex		0		0.0	12711
P-02i	Shrublands, pindan; Acacia pachycarpa & A. eripoda shrubland with sparse low bauhinia & bloodwood over ribbon & curly spinifex		0		0.0	21315

Table 10b continued

P-02j	Shrublands, pindan; Acacia pachycarpa & A. eripoda shrubland with sparse low bauhinia & grevillea over Triodia pungens & T. intermedia		0		0.0	15850
P-02l	Shrublands, pindan; acacia shrubland with scattered low trees over spinifex		0		0.0	663389
KGM-01c	Grasslands, high grass savanna woodland; grey box & cabbage gum over mixed/white grass		0		0.0	44035
KGM-01d	Grasslands, high grass savanna woodland; grey box & cabbage gum over mixed/white grass on basalt and dolerite		0	6340	0.8	811888
KGM-01f	Grasslands, high grass savanna woodland; white grass		0		0.0	74
KGM-02c	Grasslands, high grass savanna woodland; bloodwood & stringybark over upland tall grass, mitchell grass & curly spx		0		0.0	34390
KGM-02i	Grasslands, high grass savanna woodland; cabbage gum & E. foelscheana over upland tall grass & curly spinifex		0		0.0	40711
KGM-03d	Grasslands, high grass savanna woodland; ghost gum & bloodwood (E. polycarpa) over ribbon &tall upland grass		0		0.0	10023
KGM-03e	Grasslands, high grass savanna woodland; eucalypts over ribbon &tall upland grass		0		0.0	68
KGl-01a	Grasslands, high grass savanna low tree; terminalia over upland tall grass & blue grass		0		0.0	5953
KGl-01c	Grasslands, high grass savanna low tree; melaeuca over upland tall grass		0		0.0	2619
KGl-01d	Grasslands, high grass savanna sparse low tree; snappy gum over upland tall grass & curly spinifex on granite		0		0.0	59904
KGl-02a	Grasslands, high grass savanna low tree; bloodwood (E. dichromophloia) & grey box over white grass &/or upl tall grs		0		0.0	10166
KGl-02b	Grasslands, high grass savanna low woodland; grey box & cabbage gum over white grass &/or upland tall grass.		0		0.0	115088
KGl-02c	Grasslands, high grass savanna low tree; Mt House box & bloodwood (E. terminalis) over upland tall grass.		0		0.0	8952
KGl-02d	Grasslands, high grass savanna low tree; Mt House box & bloodwood (E. terminalis) over white grass		0		0.0	90765
KG-01b	Grasslands, high grass savanna sparse tree; bauhinia & coolabah over blue & tall upland grasses on black soil plain		0		0.0	10144
kGM-01a	Grasslands, tall bunch grass savanna woodland, grey box & cabbage gum over ribbon grass		0		0.0	174719
kGM-01b	Grasslands, tall bunch grass savanna woodland, grey box & cabbage gum over ribbon & blue grass		0		0.0	67519
kGm-01b	Grasslands, tall bunch grass savanna woodland, coolebah over ribbon/blue grass		0		0.0	126558
kGm-01d	Grasslands, tall bunch grass savanna woodland, bloodwood (E. polycarpa) over aristida grass riverine		0		0.0	11842
kGL-01a	Grasslands, tall bunch grass savanna low woodland, grey box & cabbage gum over ribbon grass		0		0.0	159909
kGl-01a	Grasslands, tall bunch grass savanna low tree; snappy gum over ribbon grass		0		0.0	10366
kGl-01b	Grasslands, tall bunch grass savanna low tree; bloodwood (E. dichromophloia) over ribbon grass		0		0.0	17630
kGl-01c	Grasslands, tall bunch grass savanna low tree; snappy gum & bloodwood (E. dichromophloia) over ribbon grass		0		0.0	47940
kGl-01d	Grasslands, tall bunch grass savanna low tree; bloodwood (E. dichromophloia) & cabbage gum over ribbon grass		0		0.0	73962
kGl-01f	Grasslands, tall bunch grass savanna low tree; cabbage gum & silverleaved box over aristida & ribbon grass		0		0.0	59213
kGl-01g	Grasslands, tall bunch grass savanna low tree; cabbage gum & bloodwood (E. polycarpa) over ribbon & blue grass		0		0.0	42962
kGl-02a	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass		0		0.0	435144
kGl-02b	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon & blue grass		0		0.0	57316
kGl-02d	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass & spinifex		0		0.0	25571
kGl-03a	Grasslands, tall bunch grass savanna, sparse low tree; ribbon grass & paperbarks		0		0.0	27273
kG-01b	Grasslands, tall bunch grass savanna, sparse low tree,terminalia; mitchell & blue grass on basalt		0		0.0	48680
kG-02b	Grasslands, tall bunch grass savanna low tree; bauhinia over mitchell & ribbon/blue grass on black soil		0	46	0.1	71977

Table 10b continued

kG-02c	Grasslands, tall bunch grass savanna sparse low tree; trees over mitchell & ribbon/blue grass on black soil		0		0.0	4209
kG-02d	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa over mitchell grass on black soil		0		0.0	35261
kG-02e	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa & bauhinia over ribbon/blue grass		0		0.0	30516
kG-02f	Grasslands, tall bunch grass savanna sparse low tree; bauhinia & coolabah over ribbon/blue grass on black soil		0		0.0	271042
kG-02g	Grasslands, tall bunch grass savanna sparse low tree; bauhinia & coolabah over ribbon grass on black soil		0		0.0	27160
kG-02h	Grasslands, tall bunch grass savanna low tree; bauhinia & coolabah over ribbon grass on black soil		0		0.0	9799
kG-02i	Grasslands, tall bunch grass savanna sparse low tree; trees over ribbon/blue grass on black soil		0		0.0	3461
kG-02j	Grasslands, tall bunch grass savanna sparse low tree; acacia over grass on black soil		0		0.0	13901
kG-03a	Grasslands, tall bunch grass savanna, mitchell & ribbon/blue grass		0	289	0.1	287557
kG-03b	Grasslands, tall bunch grass savanna, mitchell & mitchell/blue grass		0	22	0.1	42367
kG-03c	Grasslands, tall bunch grass savanna, mitchell & blue grass		0		0.0	316017
kG-03d	Grasslands, tall bunch grass savanna, ribbon/blue grass		0		0.0	37287
Kgl-01a	Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass		0		0.0	134073
Kgl-02a	Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains		0		0.0	170651
Kgl-02b	Grasslands, short bunch grass savanna sparse low tree; scattered snappy gum over enneapogon short grass		0		0.0	38800
Kgl-02c	Grasslands, short bunch grass savanna low tree; snappy gum & bloodwood (E. terminalis) over enneapogon short grs		0		0.0	6513
Kgl-03a	Grasslands, short bunch grass savanna low tree; bauhinia over Aristida prunosa short grasses on plains		0		0.0	65290
Kgl-03b	Grasslands, short bunch grass savanna low tree & sparse shrubs; bauhinia & Acacia eriopoda & A. impressa over Aristida brownii short grasses on river flats		0		0.0	62836
Kgl-03c	Grasslands, short bunch grass savanna low tree & acacia thicket; bauhinia & Acacia & A. impressa over aristida short grasses on river flats shrublands		0		0.0	8747
Kg-02a	Grasslands, short bunch grass savanna, grass; salt water grassland; Sporobous virginicus		0		0.0	247200
kgM-01a	Grasslands, curly spinifex, tree savanna woodland; snappy gum & bloodwood over curly spinifex on limestone plateau		0		0.0	95426
kgM-01b	Grasslands, curly spinifex, tree savanna woodland; snappy gum & bloodwood over curly spinifex on limestone plateau		0		0.0	6075
kgL-01a	Grasslands, curly spinifex, low tree savanna woodland; gnainger & Eucalyptus ferrruginea over Plectrachne pungens		0		0.0	1647519
kgl-01a	Grasslands, curly spinifex, low tree savanna; snappy gum over curly spinifex		0		0.0	1324414
kgl-01b	Grasslands, curly spinifex, low tree savanna; snappy gum & bloodwood (E.dichromophloia) over curly spinifex		0		0.0	504838
kgl-01c	Grasslands, curly spinifex, low tree savanna; snappy gum & E. perfoliata over Plectrachne pungens		0		0.0	78397
kgl-01d	Grasslands, curly spinifex, low tree savanna; bloodwood (E. dichromophloia) over curly spinifex		0		0.0	27417
kgl-01f	Grasslands, curly spinifex, low tree savanna; bauhinia over Plectrachne sp.		0		0.0	24237
kgl-02a	Grasslands, curly spinifex & short grass low tree savanna; snappy gum over enneapogon & curly spinifex		0		0.0	393201
kgl-02b	Grasslands, curly spinifex & short grass low tree savanna; snappy gum & bloodwood (E.dichromophloia) over enneapogon & curly spinifex on granite		0		0.0	246491
Gm-01a	Sedgeland; sedges with scattered medium trees; coolabah over various sedges		0		0.0	61073
Gm-01b	Sedgeland; sedges with scattered medium trees; coolabah & river gum over various sedges		0		0.0	17443
GL-01b	Sedgeland; sedges with low tree savanna woodland; coolabah & grey box over & various sedges		0		0.0	42583

Table 10b continued

Gl-01b	Sedgeland; sedges with open low tree sananna; Eucalyptus sp. aff aspera over various sedges		0	974	3.5	27862
Gc-02b	Grass savanna on clay plains (Tanami)		0		0.0	82801
Gc-02c	Sedgeland; Various sedges with very sparse snakewood		0		0.0	2042
HM-01a	Hummock grasslands, tree steppe; desert oak medium woodland (with spinifex)		0		0.0	103023
HM-01b	Hummock grasslands, tree steppe; desert oak & soft spinifex between sandhills		0		0.0	84414
Hm-01a	Hummock grasslands, open tree steppe; Casuarina decaisneana & hard spinifex between sandhills		0		0.0	59047
Hl-01a	Hummock grasslands, open low tree steppe; snappy gum over soft spinifex Triodia pungens		0		0.0	67756
Hl-01c	Hummock grasslands, open low tree steppe; bloodwood over soft spinifex Triodia pungens		0		0.0	97661
Hl-01e	Hummock grasslands, open low tree steppe; eucalypts over soft spinifex Triodia pungens		0		0.0	702143
Hl-02b	Hummock grasslands, open low tree steppe; bloodwood over Triodia wiseana		0	10144	12.4	81560
Hl-02c	Hummock grasslands, open low tree steppe; terminalia over Triodia wiseana on limestone		0		0.0	87435
Hl-03a	Hummock grasslands, open low tree steppe; snappy gum over curly spinifex		0		0.0	12096
Hl-03c	Hummock grasslands, open low tree steppe; bloodwood Eucalyptus dichromophloia and spinifex		0		0.0	8685
Hl-03d	Hummock grasslands, open low tree steppe; eucalypts and feathertop spinifex in sandy valleys (often with aSptiHi)		0		0.0	439
Hl-03e	Hummock grasslands, open low tree steppe; eucalypts over spinifex on laterite sand plains		0		0.0	227328
Hl-03f	Hummock grasslands, open low tree steppe; scattered low rare eucs in spinifex		0		0.0	3330
Hl-03g	Hummock grasslands, open low tree steppe; eucalypts(e23) over soft (t1) & feather spinifex between sandhills		0		0.0	875885
Hl-04c	Hummock grasslands, open low tree-steppe; snappy gum over Triodia pungens & T. intermedia		0		0.0	181524
Hl-04e	Hummock grasslands, open low tree-steppe; snappy gum over Triodia intermedia		0	7957	7.4	106918
Hl-04f	Hummock grasslands, sparse low tree-steppe; snappy gum over Triodia inutilis		0		0.0	33489
Hl-04g	Hummock grasslands, open low tree-steppe; snappy gum over Triodia pungens & T. briziodes		0		0.0	251580
Hl-04h	Hummock grasslands, open low tree-steppe; Eucalyptus dongarraensis & E. foecunda over Triodia plurinervata		0		0.0	14450
Hl-04i	Hummock grasslands, open low tree-steppe; snappy gum & Mt House box over soft spinifex on shale plains		0		0.0	138937
Hl-04j	Hummock grasslands, open low tree-steppe; eucalypts over soft and feathertop spinifex between sandhills		0		0.0	5072097
Hl-04k	Hummock grasslands, open low tree-steppe; snappy gum over curly & spinifex (t14=)		0		0.0	1436
Hl-05a	Hummock grasslands, open low tree steppe; bauhinia & Grevillea stiata over soft spinifex		0		0.0	15408
Hl-06a	Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges		0	7264	0.2	3456914
Hl-06b	Hummock grasslands, open low tree steppe; desert walnut over spinifex/plectrachne on sandplain		0		0.0	203168
Hl-07a	Hummock grasslands, open low tree steppe; mulga, Allocasuarina cristata & hard spinifex between sand ridges		0	1160	2.1	54572
Hl-08a	Hummock grasslands, open low tree steppe; mulga over Triodia scariosa		0	4426	39.3	11251
Hl-08b	Hummock grasslands, open low tree steppe; mulga & snakewood over Triodia pungens & T. basedowii		0		0.0	27045
Hls-01a	Hummock grasslands, low open tree & shrub steppe; bloodwood, kanji over soft spinifex		0		0.0	120653
Hls-01b	Hummock grasslands, low open tree & shrub steppe; scattered eucalypts, Acacia pachycarpa over Triodia basedowii		0		0.0	63000
Hls-01c	Hummock grasslands, low open tree & shrub steppe; sparse snappy gum, Acacia pachycarpa & A. victoria over Triodia pungens & T. briziodesi on chert		0		0.0	34175

Table 10b continued

Hls-01d	Hummock grasslands, low open tree & shrub steppe; sparse snappy gum, A. pachycarpa & A. victoria over T. briziodesi		0		0.0	286507
Hls-02c	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. kinsmillii) over hard spinifex Triodia basedowii		0	55	0.6	9129
Hs-01b	Hummock grasslands, shrub steppe; bowgada & snakewood over Triodia basedowii		0		0.0	3244
Hs-01c	Hummock grasslands, shrub steppe; Acacia pachycarpa & grevillea over Triodia pungens & T. intermedia on sandy plateau		0		0.0	108761
Hs-01d	Hummock grasslands, shrub steppe; acacia, grevillea, hakea over soft spinifex Triodia pungens on basalt		0		0.0	1189012
Hs-01f	Hummock grasslands, shrub steppe; acacia species over Plectrachne melvillei		0		0.0	40982
Hs-02b	Hummock grasslands, shrub-steppe; kanji over Triodia pungens (+grevillea) between sand ridges		0		0.0	8910
Hs-02c	Hummock grasslands, shrub-steppe; kanji & snakewood over Triodia pungens		0	187	1.2	15681
Hs-02e	Hummock grasslands, shrub-steppe; Acacia delibrata over Triodia pungens		0		0.0	58062
Hs-02f	Hummock grasslands, shrub-steppe; Acacia pachycarpa over Triodia pungens		0		0.0	2266108
Hs-02g	Hummock grasslands, shrub-steppe; Acacia pachycarpa & waterwood over Triodia pungens		0		0.0	99816
Hs-02h	Hummock grasslands, shrub-steppe; Acacia pachycarpa & A. tumida. over Triodia pungens		0		0.0	124731
Hs-02i	Hummock grasslands, shrub-steppe; Acacia victoriae & snakewood over Triodia pungens		0		0.0	32170
Hs-02j	Hummock grasslands, shrub-steppe; snakewood over Triodia pungens		0		0.0	39943
Hs-02k	Hummock grasslands, shrub-steppe; Acacia eripodaover Triodia pungens		0		0.0	7524
Hs-02l	Hummock grasslands, shrub-steppe; mixed acacia over Triodia pungens (Tanami)		0		0.0	101844
Hs-03b	Hummock grasslands, shrub steppe; Acacia pachycarpa over Triodia basedowii		0		0.0	941537
Hs-03g	Hummock grasslands, shrub-steppe; scattered shrubs over Triodia basedowii		0		0.0	147944
Hs-04b	Hummock grasslands, shrub-steppe; acacia & spinifex on sandplain + laterite		0	146	32.4	449
Hs-05b	Hummock grasslands, shrub-steppe; kanji & snakewood over T. pungens & T. wiseana		0		0.0	79342
Hs-05c	Hummock grasslands, shrub-steppe; Acacia pachycarpa & A. victoriae over T. pungens & T. wiseana		0		0.0	74995
Hs-05d	Hummock grasslands, shrub-steppe; snakewood over T. pungens & T. wiseana		0		0.0	593926
Hs-06a	Hummock grasslands, shrub steppe; kanji over Triodia pulchella & T. briziodes on basalt		0		0.0	53364
Hs-06c	Hummock grasslands, shrub steppe; Acacia impressa over Triodia pulchella & T. intermedia		0		0.0	1307
Hs-06d	Hummock grasslands, shrub steppe; Acacia pachycarpa & A. tumida over Triodia pulchella & T. intermedia sandplain		0		0.0	53453
Hs-06e	Hummock grasslands, shrub steppe; Acacia eriopoda & A. tumida over Triodia pulchella & T. intermedia sandplain		0		0.0	25709
Hs-06f	Hummock grasslands, shrub steppe; Acacia tumida over Triodia intermedia		0		0.0	6838
Hs-06g	Hummock grasslands, shrub steppe; Acacia impressa over Triodia intermedia on stony lateritic country		0	1006	2.1	48156
Hs-06h	Hummock grasslands, shrub steppe; Acacia pachycarpa & A. impressa over Triodia intermedia		0		0.0	12373
Hs-07a	Hummock grasslands, shrub steppe; Grevillea refracta & hakea over soft spinifex Triodia pungens		0		0.0	90248
Hs-07b	Hummock grasslands, shrub steppe; Grevillea refracta over soft spinifex Triodia pungens		0		0.0	566
Hs-07c	Hummock grasslands, shrub steppe; corkwood (Hakea suberea) & acacia species over soft spinifex Triodia pungens		0		0.0	1808973
Hs-07d	Hummock grasslands, shrub steppe; hakea over soft spinifex Triodia pungens		0		0.0	436842

Table 10b continued

Hs-08a	Hummock grasslands, shrub steppe; mulga over soft spinifex		0		0.0	506639
Hs-08b	Hummock grasslands, shrub steppe; mulga over soft spinifex Triodia basedowii		0		0.0	62563
Hs-08e	Hummock grasslands, shrub-steppe; mulga & snakewood over Triodia. wiseana		0		0.0	33884
Hs-09a	Hummock grasslands, shrub steppe; mulga and mallee over soft spinifex		0		0.0	110201
Hs-09b	Hummock grasslands, shrub steppe; mulga and Eucalyptus kingsmillii over hard spinifex Triodia basedowii		0	47990	1.9	2493438
Hs-09c	Hummock grasslands, shrub steppe; mulga and red mallee over hard spinifex Triodia basedowii		0		0.0	997
Hs-09d	Hummock grasslands, shrub steppe; mulga and mallee(sp) over hard spinifex Triodia basedowii		0		0.0	1991941
Hs-10a	Hummock grasslands, shrub steppe; silverleaved box over soft spinifex Triodia pungens		0		0.0	8143
Hs-10b	Hummock grasslands, shrub steppe; Eucalyptus youngiana over hard spinifex Triodia basedowii		0	107888	12.1	894550
Hs-10c	Hummock grasslands, shrub steppe; red mallee over hard spinifex Triodia basedowii		0		0.0	42835
Hs-10d	Hummock grasslands, shrub steppe; red mallee over spinifex Triodia scariosa		0	115650	22.0	525766
Hi-01a	Hummock grasslands,sparse low tree-steppe; mulga over T. basedowii		0		0.0	80426
Hi-02d	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. dichromophloia) over spinifex Triodia pungens& T. intermedia		0		0.0	64808
Hi-02e	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. dichromophloia)& E. setosa over spinifex Triodia pungens& T. intermedia		0		0.0	102504
Hi-03a	Hummock grasslands, sparse tree steppe; bloodwood over hard spinifex Triodia basedowii		0		0.0	153157
Hi-03c	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia wiseana & T. intermedia on rocky ranges		0		0.0	3383
Hi-03d	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. terminalis) overhard spinifex Triodia wiseana & T. intermedia on basalt and dolerite		0		0.0	110513
Hi-03e	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia intermedia		0		0.0	35712
Hi-03g	Hummock grasslands, sparse tree steppe; eucalypt & bauhinia over hard spinifex Triodia intermedia		0		0.0	51974
Hi-04a	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia basedowii		0		0.0	5980
Hi-04b	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia wiseana		0		0.0	56665
Hi-04c	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia briziodes		0		0.0	169878
Hi-04d	Hummock grasslands, sparse shrub steppe; kanji & Acacia bivenosa over hard spinifex Triodia basedowii & T.wiseana		0		0.0	242395
Hi-04e	Hummock grasslands, sparse shrub steppe; Acacia bivenosa & A. trachycarpa over hard spinifex T. wiseana		0		0.0	169190
Hi-04f	Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. brizoides		0	18413	15.8	116507
Hi-04g	Hummock grasslands, shrub-steppe; scattered shrubs over Triodia wiseana & T. sp. indet. aff. angusta		0		0.0	22806
Hi-05a	Hummock grasslands, patchy shrub steppe; Acacia pachycarpa over soft spinifex on ironstone plateau		0		0.0	754432
Hz-01a	Hummock grasslands, dwarf-shrub steppe; Acacia translucens over soft spinifex Triodia pungens		0		0.0	181518
Hi-06b	Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. basedowii		0		0.0	59486
Hi-08b	Hummock grasslands, grass steppe; hard spinifex Triodia wiseana & T. basedowii		0		0.0	71685
Hi-09a	Hummock grasslands, grass steppe; hard spinifex Triodia intermedia		0		0.0	25200

Table 10b continued

Hi-09b	Hummock grasslands, grass steppe; spinifex Triodia inutilis		0		0.0	28769
Hi-09d	Hummock grasslands, grass steppe; spinifex Triodia wiseana & T. basedowii /Plectrchne pungens		0		0.0	323
Hi-09e	Hummock grasslands, grass steppe; spinifex Plectrachne pungens on shale		0		0.0	21476
HX-01a	Hummock grassland, mixed sandplain - scattered low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with T. basedowii		0	12639	5.7	222451
HX-01b	Hummock grassland, mixed sandplain - scattered low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with Triodia scariosa & T.sp		0		0.0	61315
HX-01c	Hummock grassland, mixed sandplain - sparse low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with Triodia scariosa & T.sp		0	4086	3.3	125318
HX-01d	Hummock grassland, mixed sandplain - sparse low trees over sparse dwarf shrubs with spinifex; marble gum & red mallee mixed dwarf shrubs with Triodia scariosa & T.sp		0		0.0	21482
HX-03a	Hummock grasslands, mixed sandplain; bowgada, sugarbrother, mallee, Triodia basedowii & T. sp		0		0.0	98139
HX-03b	Hummock grasslands, mixed sandplain; bowgada, sugarbrother, mallee, Triodia scariosa & T. sp		0		0.0	17640
HX-03c	Hummock grasslands, mixed sandplain; bowgada, mallee, heath and spinifex		0		0.0	20727
HX-06b	Hummock grassland; shrub steppe; wattle scrub & heath Acacia ligulata x rostellifera		0		0.0	52973
HG-01a	Hummock grassland; Spinifex, mitchell grass & kangaroo grass		0		0.0	2675
HG-01b	Hummock grassland; mixed short grass and spinifex		0		0.0	45763
HG-01c	Hummock grassland; mixed short grass and spinifex with scattered coolebah		0		0.0	22304
CM-01b	Succulent steppe; salmon gum woodland & saltbush		0		0.0	5786
CM-01c	Succulent steppe; salmon gum woodland & bluebush		0		0.0	100208
CM-01d	Succulent steppe; gimlet woodland & saltbush		0	16404	11.3	145818
CM-01e	Succulent steppe; eucalypt woodland & saltflats		0		0.0	451
CM-01g	Succulent steppe; york gum woodland, sparse Melaleuca thyoides scrub & samphire		0	351	3.0	11792
CM-01h	Succulent steppe; Casuarina obesa woodland & samphire		0		0.0	1319
SCm-01a	Succulent steppe; york gum open woodland, Melaleuca thyiodes thicket & samphire		0	2285	17.8	12852
SCm-01d	Succulent steppe; eucalypts & Allocasuarina obesa open woodland, teatree scrub & samphire		0		0.0	57
SC-01c	Succulent steppe; salmon gum & morrell sparse woodland, teatree scrub & samphire		0		0.0	3214
CL-02a	Succulent steppe with low woodland; mulga over saltbush		0		0.0	9113
CL-02c	Succulent steppe with low woodland; mulga over samphire		0		0.0	10518
CL-03a	Succulent steppe with low woodland; Acacia papyrocarpa over bluebush		0		0.0	2430
CL-03b	Succulent steppe with low woodland; snakewood over saltbush & bluebush		0		0.0	85345
CL-04a	Succulent steppe with low woodland; sheoak over samphire		0		0.0	269
CL-04b	Succulent steppe with low woodland; sheoak over bluebush		0		0.0	4566
CL-05a	Succulent steppe with low woodland; mulga & sheoak with bluebush		0	296538	13.1	2263570
CL-05b	Succulent steppe with low woodland; mulga & sheoak		0	447638	95.4	469219
Cl-01a	Succulent steppe with open low woodland; sheoak over saltbush		0	188	0.2	96873

Table 10b continued

Cl-01b	Succulent steppe with open low woodland; sheoak over saltbush & bluebush		0		0.0	9152
Cl-02b	Succulent steppe with open low woodland; mulga over bluebush		0		0.0	191095
Cl-02c	Succulent steppe with open low woodland; mulga over bluebush & saltbush		0		0.0	77547
Cl-02d	Succulent steppe with open low woodland; mulga & Acacia sclerosperma over saltbush & bluebush		0		0.0	577
Cl-03a	Succulent steppe with open low woodland; mulga & sheoak over salt bush		0	7697	5.1	149848
Cl-03b	Succulent steppe with open low woodland; mulga & sheoak over bluebush		0	943	2.2	42679
Cl-04a	Succulent steppe with open low woodland; Acacia. papyrocarpa over bluebush		0		0.0	837423
SC-02c	Succulent steppe with scrub; teatree scrub over samphire		0		0.0	7929
CS-01a	Succulent steppe with scrub; waterwood & A. sclerosperma scrub over saltbush & samphire		0		0.0	10234
CS-01b	Succulent steppe with scrub; snakewood over saltbush		0		0.0	2373
CS-01c	Succulent steppe with scrub; with mulga over various species of succulents		0	4687	1.8	260046
CS-01d	Succulent steppe with scrub; bowgada scrub over heterogeneous species		0		0.0	1451
Cs-01b	Succulent steppe with scattered shrubs; mulga over saltbush & bluebush		0		0.0	2612
Cs-01c	Succulent steppe with scattered shrubs; mulga & A. sclerosperma over saltbush & bluebush		0		0.0	210907
Cs-01d	Succulent steppe with scattered shrubs; mulga & other wattle(s) over saltbush & bluebush		0		0.0	103845
Cs-02a	Succulent steppe with scattered shrubs; bowgada & jam over saltbush		0		0.0	45184
Cs-02b	Succulent steppe with scattered shrubs; Acaica sclerosperma & A. victoriae over bluebush,		0		0.0	66290
Cs-02c	Succulent steppe with scattered shrubs; Acaica sclerosperma & A. victoriae over saltbush & bluebush,		0		0.0	20569
Cs-02d	Succulent steppe with scatteredshrubs; Acaica sclerosperma & bowgadaover saltbush & bluebush		0		0.0	161101
Cs-02e	Succulent steppe with scattered shrubs; Acacia sclerosperma over saltbush & bluebush,		0		0.0	16737
Cs-02f	Succulent steppe with scattered shrubs; bowgada & jamover saltbush & bluebush		0		0.0	35318
Cs-02g	Succulent steppe with scattered shrubs; Acacia victoriae & snakewood over succulents		0		0.0	4318
Cs-02h	Succulent steppe with scattered shrubs; Acacia sclerosperma & snakewood over succulents		0		0.0	5808
Cs-02j	Succulent steppe with scattered wattles over succulents		0		0.0	43290
Cs-02k	Succulent steppe with scattered shrubs; snakewood over succulents		0		0.0	58232
Ci-01b	Succulent steppe; heterogeneous spp k1,3,or3		0		0.0	8671
Ci-01c	Succulent steppe; heterogeneous spp		0		0.0	82045
Ci-02b	Succulent steppe; saltbush & bluebush		0		0.0	2336
Ci-02c	Succulent steppe; saltbush & bluebush with very sparse mulga and A. sclerosperma		0		0.0	41402
Ci-02d	Succulent steppe; saltbush & samphire		0		0.0	96363
Ci-03c	Succulent steppe; bluebush with grassy depressions		0		0.0	961676
Ci-03d	Succulent steppe; bluebush with saltbush in depressions		0	2748	1.9	148383
Cr-01a	Sparse succulent steppe; bluebush with very sparse snakewood shrubs		0		0.0	104283
Mc-01a/Li-09a/Li-13a	Mosaic:Medium forest; jarrah-marri / Low woodland; banksia / Low woodland; paperbark,		0		0.0	39396
Mi-01a/Li-09a/Lc-	Mosaic:Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; Casuarina obesa		0	109	0.8	14085

Table 10b continued

03a/Li-11d						
Mi-05f/Sc-06a	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance		0		0.0	1100
Mi-05f/Sc-08c	Mosaic: Medium woodland; merrit & red mallee / Shrublands; Melaleuca cardiophylla thicket		0	11	0.8	1442
Mi-05h/Ci-02d	Mosaic: Medium woodland;York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire		0		0.0	251
Mi-05j/Mi-06e	Mosaic: Medium woodland; salmon gum & gimlet / Medium woodland; merrit & red mallee		0		0.0	235314
Mi-05j/HS-01a	Mosaic: Medium woodland; salmon gum & gimlet / Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa		0		0.0	282509
Mi-06e/Si-06a	Mosaic: Medium woodland; merrit (or a11) & red mallee / Shrublands; dryandra scrub		0	978	1.0	98812
Mi-06i/Si-06a	Mosaic: Medium woodland; goldfields blackbutt & Dundas blackbutt / Shrublands; dryandra scrub		0		0.0	76688
Mi-06m/HS-01a	Mosaic: Medium woodland; salmon gum & red mallee / Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa		0	42113	5.1	819567
Mr-01b/Zc-02a	Mosaic: Medium open woodland; marri / Shrublands; dryandra heath		0	14	0.3	4993
Mr-01c/Zc-02a	Mosaic: Medium open woodland; wandoo / Shrublands; dryandra heath		0		0.0	1245
Mr-01d/Zc-02a	Mosaic: Medium open woodland; wandoo & powderbark wandoo / Shrublands; dryandra heath		0		0.0	3788
Mr-01c/Zc-01e	Mosaic: Medium open woodland; wandoo / Shrublands; mixed heath		0	7	0.1	9755
Mr-01b/Sc-08d	Mosaic: Medium open woodland; marri / Shrublands; teatree thicket		0		0.0	466
Mp-01b/Ci-04b	Mosaic: Medium sparse woodland; salmon gum & morrel / Succulent steppe; samphire		0	2246	34.5	6517
Ld-01a/Hl-03f	Mosaic: Low dense forest-mixed tropical deciduous forest / Hummock grasslands, open low tree steppe; scattered low rare eucs in spinifex		0		0.0	10525
Li-02a/Ci-02b	Mosaic: Low woodland; mulga / Succulent steppe; saltbush & bluebush		0		0.0	1928
Li-04a/Ci-04a	Mosiac: Low woodland; mulga & bowgada / Succulent steppe; samphire		0		0.0	39451
Li-06b/Si-02c	Mosaic: Low woodland; waterwood / Shrublands; Acacia sclerosperma & bowgada scrub		0		0.0	295656
Li-06b/Si-02i	Mosaic: Low woodland; waterwood / Shrublands; Acacia sclerosperma, A. victoriae & A. subtressarogona scrub		0		0.0	222359
Li-09a/Mr-02a	Mosaic: Low woodland; banksia / Medium open woodland; tuart		0		0.0	509
Li-09a/Zc-02a	Mosaic: Low woodland; banksia / Shrublands; dryandra heath		0		0.0	1527
Lr-02a/Ci-02b	Mosaic: Open low woodland; mulga / Succulent steppe; saltbush & bluebush on greenstone		0		0.0	107156
Lr-02a/Ci-01b	Mosaic: Open low woodland; mulga / Succulent steppe; heterogeneous species on greenstone		0		0.0	17157
Lp 01a/Cp-01b	Mosaic: Sparse low woodland; mulga in scattered groups / Scattered groups of succulents		0		0.0	6065
SL-01b/Si-04b	Mosaic: Low woodland over scrub; mulga over bowgada scrub / Shrublands; bowgada & grevillea scrub on sandhills		0		0.0	2304
SL-02b/Si-04b	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; bowgada scrub with scattered mulga		0		0.0	129529
Sc-04a/SL-02a	Mosaic: Shrublands; Allocasuarina campestris thicket / Shrublands; mallee & acacia scrub with wandoo low woodland		0		0.0	1575
Si-02c/Ci-04a	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Succulent steppe; samphire		0		0.0	6087
Si-02c/Si-02t	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Shrublands; snakewood & A. victoria scrub		0		0.0	50287
Si-04b/Si-02m	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; bowgada scrub		0		0.0	6424
Si-04b/Si-02c	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; Acacia sclerosperma & bowgada scrub		0		0.0	28514

Table 10b continued

Si-02t/HS-04a	Mosiac: Shrublands; snakewood & A. victoria scrub / Hummock grasslands, shrub-steppe; kanji over T. pungens & T. basedowii		0		0.0	145532
Si-02p/Ci-02b	Mosaic: Shrublands; bowgada & minnieritchie scrub / Succulent steppe; saltbush & bluebush		0		0.0	2175
Si-02m/Ci-02b	Mosaic: Shrublands; bowgada scrub / Succulent steppe; saltbush & bluebush		0		0.0	141034
Si-02m/Ci-04a	Mosaic: Shrublands; bowgada scrub / Succulent steppe; samphire		0		0.0	83367
Si-02c/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Succulent steppe; saltbush & bluebush		0		0.0	149660
Si-9c/Mi-05i	Mosaic: Shrublands; York gum & E.sheathiana mallee scrub / Medium woodland; wandoo & gimlet		0	332	4.0	8303
Si-10a/Mi-05j	Mosaic: Shrublands; mallee Eucalyptus longicornis & E.sheathiana scrub/ Medium woodland; salmon gum & gimlet		0		0.0	2256
Si-11a/Mi-06g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila /Medium woodland; salmon gum & Dundas blackbutt		0	5745	36.1	15927
Si-11a/Mi-06o	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila / Medium woodland; gimlet		0		0.0	38016
Si-11c/Mi-05g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & bloodwood E. dichromophloia / Medium woodland; salmon gum & morrel		0	11	100.5	11
Sp-01f/Gc-02a	Mosaic: Shrublands; Acacia victoriae & snakewood scrub patches / Short bunch grassland - savanna /grass plain		0		0.0	313487
SZ-03j/Sc-03b	Mosaic: Shrublands; scrub-heath / Shrublands; acacia-melaleuca thickets m3 & a23		0		0.0	13059
Zc-01e/Sp-01g	Mosaic:Shrublands; mixed heath / Shrublands; acacia patchy scrub		0		0.0	12931
Zi-01a/Hi-08a	Mosaic: Shrublands; eremophila and cassia dwarf scrub / Hummock grasslands, grass steppe; Triodia wiseana		0		0.0	24884
kGl-02a/Hl-04c	Mosaic: Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass / Hummock grasslands, open low tree-steppe; snappy gum over T. pungens & T. intermedia		0		0.0	9048
Kgl-01a/KG-02a	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Grasslands; high grass savanna, white grass		0		0.0	11998
Kgl-01a/Hl-02a/KG-02a	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Grasslands; white grass savanna		0		0.0	143843
Kgl-02a/Hi-06d	Mosaic: Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains / Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. intermedia		0		0.0	68810
Kgl-02a/Hi-09a	Mosaic: Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia		0		0.0	47935
kgL-01a/kgL-01b	Mosaic: Grasslands, curly spinifex, low tree savanna woodland; gnainger & Eucalyptus ferruginea over Plectrachne pungens / Grasslands, curly spinifex, low tree savanna woodland; snappy gum over curly spinifex on sandstone		0		0.0	305472
kgl-01a/Hi-09a	Mosaic: Grasslands, curly spinifex, low tree savanna; snappy gum over curly spinifex / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia		0		0.0	233173
kgl-01c/ kg-01a	Mosaic: Grasslands, curly spinifex, low tree savanna; snappy gum & E. perfoliata over Plectrachne pungens /Grasslands; sparse low tree savanna; Andersonia gregorii over Plectrachne bynoei		0		0.0	605447
GL-01a/Hi-06a/Ci-01a	Mosaic: Sedgeland; sedges with low tree savanna woodland; coolabah over various sedges / Hummock grasslands, grass steppe; soft spinifex Triodia pungens / Succulent steppe; heterogeneous spp		0		0.0	21335
Gc-02c/Hs-02a	Mosaic: Sedgeland; various sedges with very sparse snakewood / Hummock grasslands, shrub-steppe; kanji over Triodia pungens		0	2185	2.0	109629
P-02a/kGl-02a	Mosaic: Shrublands, pindan; Acacia eripoda shrubland with scattered low bloodwood & Eucalyptus setosa over soft & curly spinifex / Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass		0		0.0	195955
Hl-06a/Hl-01c	Mosaic: Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges / Hummock grasslands, open low tree steppe; bloodwood (E. dichromophloia) over soft spinifex Triodia pungens		0		0.0	239866

Table 10b continued

Hl-03b/Hl-06a	Mosaic: Hummock grasslands, open low tree steppe; desert bloodwood and feathertop spinifex on sandhills / Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges		0		0.0	699
Hl-01d/Hl-02a	Mosaic: Hummock grasslands, open low tree steppe; bloodwood with sparse kanji shrubs over soft spinifex Triodia pungens / Hummock grasslands, open low tree steppe; snappy gum over Triodia wiseana lateritic crust		0		0.0	74226
Hl-01a/Hi-09a	Mosaic: Hummock grasslands, open low tree steppe; snappy gum over soft spinifex Triodia pungens / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia on laterite		0		0.0	244772
Hl-02a/Li-02a	Mosaic: Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Low woodland; mulga in valleys		0		0.0	97659
Hi-04b/Hs-02j	Mosaic: Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia wiseana / Hummock grasslands, shrub-steppe; snakewood over Triodia pungens		0		0.0	700
Hs-02a/Hi-06c	Mosaic: Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. wiseana / Hummock grasslands, shrub-steppe; kanji over Triodia pungens in valleys		0		0.0	40263
Sp-01c/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma & A. victoriae sparse scrub / Succulent steppe; saltbush & bluebush		0		0.0	57121
Sp-01f/Cp-01b	Mosaic: Shrublands; Acacia victoriae & snakewood scrub patches / Scattered groups of succulents		0		0.0	2688

Summary: #Veg = 362, # BG = 0, # Mosaics = 69, Total = 431

Table 10c. Vegetation types represented in conservation reserves in IUCN categories I - IV but with < 10% of original areal extent in those reserves.

H Code	Vegetation Description	Area in IUCN (I)-(IV) Reserves	%	Area in all CALM Conservation Reserves	%	Total Area of Veg unit in W.A.
Ti-01a	Tall woodland; tuart	793	8.4	800	8.5	9425
Mc-01b	Medium forest; jarrah-wandoo	1400	3.3	1910	4.5	42523
Mc-01c	Medium forest; jarrah-marri-wandoo	1648	5.9	2454	8.8	28035
Mi-01b	Medium woodland; jarrah & marri-wandoo	9243	6.2	13616	9.1	149089
Mi-01c	Medium woodland; marri-wandoo	12985	1.2	19176	1.7	1123447
Mi-01d	Medium woodland; jarrah-wandoo	62	2.1	62	2.1	2918
Mi-01e	Medium woodland; jarrah-wandoo-powderbark	155	0.6	394	1.6	24405
Mi-01f	Medium woodland; marri	1171	0.6	1588	0.8	206137
Mi-01h	Medium woodland; jarrah & marri-wandoo-yate	398	1.7	517	2.2	23372
Mi-01k	Medium woodland, wandoo	84	0.5	182	1.0	17773
Mi-01l	Medium woodland; small wandoo patches surrounded by e2, 5 Mi & e5, 7Mi	150	8.2	150	8.2	1841
Mi-02a	Medium woodland; tuart	5356	8.9	5900	9.8	60395
Mi-02b	Medium woodland; tuart & tuart-jarrah	2118	3.7	2330	4.1	57507
Mi-04a	Medium woodland; wandoo-powderbark	264	0.5	8027	15.3	52339
Mi-04b	Medium woodland; powderbark & mallet	1709	5.3	2167	6.7	32201
Mi-04d	Medium woodland; wandoo & mallet	541	3.1	857	4.9	17528
Mi-04e	Medium woodland; wandoo & blue mallet	33	0.1	33	0.1	51795
Mi-04f	Medium woodland; wandoo, morrell & blue mallet	17	2.3	69	9.1	753
Mi-05a	Medium woodland; York gum & wandoo	242	0.1	658	0.3	247210
Mi-05b	Medium woodland; York gum,wandoo & salmon gum	2726	0.6	4395	0.9	498875
Mi-05c	Medium woodland; York gum	6001	0.4	8712	0.5	1627704
Mi-05d	Medium woodland; salmon gum	11551	1.3	23441	2.6	896293
Mi-05f	Medium woodland; York gum & salmon gum	22796	2.3	31220	3.1	1010690
Mi-05g	Medium woodland; salmon gum & morrel	11886	3.1	43419	11.2	387814
Mi-05j	Medium woodland; salmon gum & gimlet	56616	5.1	229997	20.7	1109611
Mi-05m	Medium woodland; York gum, salmon gum & gimlet	10699	1.8	11827	2.0	599338
Mi-05n	Medium woodland; wandoo,York gum, salmon gum, morrel & gimlet	2337	0.4	3033	0.5	638653
Mi-05p	Medium woodland; wandoo,salmon gum, morrel, gimlet & blackbutt	13807	2.8	111762	22.8	490191
Mi-05r	Medium woodland; wandoo, York gum & morrell	184	0.2	295	0.4	78061
Mi-06a	Medium woodland; redwood & merrit	5398	0.8	8021	1.2	698546
Mi-06c	Medium woodland; coral gum & goldfields blackbutt (also some e10,11)	1654	0.5	11833	3.9	304202

Table 10c continued

Mi-06e	Medium woodland; merrit & red mallee	41930	2.9	133391	9.3	1433513
Mi-06m	Medium woodland; York gum & red mallee	574	4.4	574	4.4	12964
Mi-06n	Medium woodland; salmon gum & red mallee	12168	6.6	18095	9.8	184760
Mi-06o	Medium woodland; gimlet	525	2.3	525	2.3	23007
Mi-06r	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana	1911	0.8	9263	3.7	249503
Mi-07e	Medium woodland; coolabah & river gum	1071	3.0	1071	3.0	35845
Mi-09a	Medium woodland; yate	1305	4.8	1447	5.3	27184
Mi-09c	Medium woodland; wandoo & yate	1000	0.4	1391	0.6	240510
Mi-09d	Medium woodland; York gum & yate	1219	1.7	1311	1.8	71105
Mi-10b	Medium woodland-tropical messmate; stringybark & woolybutt with understory of palms	5951	6.0	5951	6.0	99934
Mr-01c	Medium open woodland; wandoo	264	4.0	264	4.0	6527
Lm-01d	Medium very sparse woodland over low woodland, jarrah over banksia & casuarina	498	0.9	829	1.4	57990
Lc-01a	Low forest; Acacia rostellifera	15	0.0	141	0.4	35344
Lc-04a	Low forest; mixed tropical deciduous forest.	117	1.0	117	1.0	11788
Lc-06a	Low forest; jarrah	4463	4.0	5076	4.5	113026
Lc-06c	Low forest; jarrah & casuarina	1500	8.8	1577	9.3	16973
Li-02a	Low woodland; mulga	230498	1.0	416981	1.7	24252102
Li-03a	Low woodland; mulga between sandridges	354	0.0	23167	0.8	2976838
Li-04a	Low woodland; mulga & bowgada	3329	3.5	3329	3.5	95983
Li-04c	Low woodland; mulga & snakewood	25	0.0	25	0.0	684727
Li-05a	Low woodland; mulga mixed with Allocasuarina cristata, & Eucalyptus sp (e6?)	54783	4.5	226724	18.4	1230987
Li-05b	Low woodland; mulga mixed with cypress pine, & york gum	18215	4.5	18215	4.5	403385
Li-06c	Low woodland; Acacia victoriae & snakewood	882	0.1	882	0.1	635276
Li-07c	Low woodland; salmon gum	23	0.3	23	0.3	8258
Li-09a	Low woodland; banksia	18122	8.4	28336	13.2	215129
Li-09b	Low woodland; Banksia attenuata & B. menziesii	6273	4.5	8264	5.9	139955
Li-10b	Low woodland; Banksia prionotes& Allocasuarina huegellianna	14	2.0	23	3.2	719
Li-11a	Low woodland; Allocasuarina cristata	820	0.3	2709	1.0	269668
Li-12d	Low woodland; jarrah, Eucalyptus decipiens & Allocasuarina fraseriana	1483	2.2	3597	5.4	66576
Lp-01a	Sparse low woodland; mulga, discontinuous in scattered groups	21873	0.3	22811	0.3	6952783
Sm-01c	Shrublands; Melaleuca thyoides thicket with scattered York gum	1267	3.4	2353	6.3	37091
Sm-01f	Shrublands; thicket with scattered wandoo	642	2.6	883	3.5	25151
Sm-02c	Shrublands; jam scrub with scattered York gum	239	0.1	607	0.3	188003
Sm-02e	Shrublands; bowgada & jam scrub with scattered York gum & red mallee	61	0.1	276	0.5	55738
Sm-03a	Shrublands; jam scrub with scattered casuarina & York gum	824	2.1	1050	2.7	38841

Table 10c continued

Sm-03b	Shrublands; bowgada & jam scrub with scattered casuarina & York gum	2855	5.1	2897	5.2	55531
Sm-04a	Shrublands; mallee & acacia scrub with scattered York gum	60	0.1	745	0.9	86754
Sl-01c	Shrublands; casuarina & dryandra thicket with scattered wandoo and powderbark wandoo on laterite	257	8.4	321	10.5	3052
Sc-01c	Shrublands; thicket, jam & Allocasuarina huegelliana	496	6.0	580	7.0	8296
Sc-01d	Shrublands; thicket, acacia-casuarina alliance species	1869	0.6	20036	6.3	316796
Sc-02b	Shrublands; Acacia quadrimarginea thicket	510	1.4	4609	13.0	35372
Sc-02c	Shrublands; jam thicket	362	0.5	1902	2.7	70532
Sc-02e	Shrublands; Acacia rostellifera thicket	6136	8.0	6140	8.0	76738
Sc-02j	Shrublands; Acacia neurophylla & other acacia thicket	17	0.2	17	0.2	8652
Sc-02l	Shrublands; Acacia neurophylla, A. beauverdiana & A. resinomarginea thicket	47562	4.1	114556	10.0	1150396
Sc-04a	Shrublands; Allocasuarina campestris thicket	16185	2.6	17660	2.8	629996
Sc-05a	Shrublands; mallee & casuarina thicket	3761	0.5	6474	0.9	732523
Sc-06a	Shrublands; thicket, acacia-casuarina-melaleuca alliance	115138	6.8	175036	10.4	1685896
Sc-08b	Shrublands; Melaeuca thyioides thicket	286	7.8	286	7.8	3694
Sc-08d	Shrublands; teatree thicket	1998	5.9	3184	9.3	34120
Sc-09c	Shrublands; casuarina - calothamus thicket	777	2.5	777	2.5	31475
Sc-09e	Shrublands; Dryandra quercifolia & Eucalytpus species thicket	2108	9.1	2108	9.1	23142
Sc-09f	Shrublands; mixed thicket	348	0.1	371	0.1	390311
Sc-09g	Shrublands; acacia, casuarina, Eucalyptus eudesmoides, Banksia ashbyi & other mixed species thicket	13247	8.7	13247	8.7	153004
Sc-09h	Shrublands; thicket other spp	2376	5.0	2502	5.3	47192
Si-01a	Shrublands; mulga scrub	260323	5.9	260506	5.9	4392268
Si-01e	Shrublands; mulga & snakewood scrub	34075	1.9	34075	1.9	1822535
Si-01f	Shrublands; mulga & Acacia quadrimarginea scrub	25	0.0	3945	1.3	309889
Si-02a	Shrublands; waterwood & Acacia victoriae scrub	58	0.1	58	0.1	82857
Si-02c	Shrublands; Acacia sclerosperma & bowgada scrub	2298	0.8	2298	0.8	298504
Si-02l	Shrublands; Acacia sclerosperma & minnieritchie scrub	155	0.4	155	0.4	44040
Si-02q	Shrublands; bowgada & jam scrub	447	0.1	447	0.1	638648
Si-02t	Shrublands; snakewood & Acacia victoria scrub	49574	4.3	49574	4.3	1163124
Si-02u	Shrublands; snakewood scrub	13036	2.2	13036	2.2	595647
Si-02w	Shrublands; bowgada & other acacia scrub	188789	8.3	196464	8.7	2270559
Si-02y	Shrublands; acacia various species scrub	1413	5.6	1432	5.7	25190
Si-03c	Shrublands; Acacia quadrimarginea & jam scrub on greenstone	405	1.0	405	1.0	40743
Si-03d	Shrublands; Acacia brachystachya scrub	8740	6.5	34468	25.6	134622
Si-07a	Shrublands; teatree scrub	2446	1.7	15939	10.9	146136
Si-09c	Shrublands; York gum & Eucalyptus sheathiana mallee scrub	642	0.5	1093	0.9	127745

Table 10c continued

Si-11a	Shrublands; mallee scrub Eucalyptus eremophila	200937	9.8	253777	12.3	2056155
Si-11b	Shrublands; mallee scrub Eucalyptus eremophila & red mallee	109	0.4	109	0.4	28954
Si-11d	Shrublands; mallee scrub Eucalyptus eremophila & black marlock	2234	0.6	5376	1.5	357661
Si-11e	Shrublands; mallee scrub Eucalyptus eremophila & Forrests marlock	2487	1.1	5818	2.5	237872
Si-13d	Shrublands; mallee scrub, redwood & black marlock	1361	0.9	4335	2.7	158388
Si-14a	Shrublands; mallee scrub Eucalyptus nutans	981	1.4	1158	1.7	69338
Sr-02c	Shrublands; Acacia ligulata open scrub	70	1.3	70	1.3	5308
Sp-01a	Shrublands; mulga & minnieritchie scattered groups	1007	6.2	1007	6.2	16163
SZ-02c	Shrublands; acacia scrub-heath	4657	7.3	8686	13.6	63725
SZ-03c	Shrublands; scrub-heath on lateritic sandplain	27478	5.0	27605	5.0	549846
SZ-03d	Shrublands; scrub-heath on deep sandy flats	0	0.0	0	0.0	4264
SZ-03j	Shrublands; scrub-heath	88979	8.7	116027	11.3	1027801
Zc-02a	Shrublands; dryandra heath	3119	5.2	3898	6.4	60529
Zi-01b	Shrublands; dwarf scrub on granite (South coast)	182	0.8	186	0.9	22001
Zi-01d	Shrublands; dwarf waterwood (Acacia coriacea) shrubs on recent dunes	172	0.6	172	0.6	29992
Zr-01a	Shrublands; open dwarf scrub, waterwood (Acacia coriacea) on recent dunes (Pilbara coast)	240	4.0	240	4.0	6032
P-01b	Shrublands, pindan; Acacia tumida shrubland with grey box & cabbage gum medium woodland over ribbon grass & curly spinifex	28186	2.3	28205	2.3	1230858
P-02k	Shrublands, pindan; acacia shrubland with scattered low trees over spinifex	1037	0.4	1066	0.4	249795
KGM-01a	Grasslands, high grass savanna woodland; bloodwood,stringybark & woolybutt over white grass on sandstone	107	1.3	107	1.3	8093
KGM-01b	Grasslands, high grass savanna woodland; grey box & cabbage gum over white grass	82714	7.7	82714	7.7	1078971
KGM-01e	Grasslands, high grass savanna woodland; cabbage gum & ghost gum over mixed/white grass, riverain	3637	6.6	3637	6.6	55520
KGM-02a	Grasslands, high grass savanna woodland; bloodwood over upland tall grass & curly spinifex	17	0.0	17	0.0	41303
KGM-02b	Grasslands, high grass savanna woodland; bloodwood & stringybark over upland tall grass & curly spinifex	16165	1.6	44703	4.5	1001558
KGM-02d	Grasslands, high grass savanna woodland; bloodwood & woolybutt over upland tall grass & curly spinifex	36	0.0	36	0.0	242794
KGM-02e	Grasslands, high grass savanna woodland; bloodwood, strinybark & woolybutt over upland tall grass & curly spinifex	1296	0.5	1296	0.5	272166
KGM-02h	Grasslands, high grass savanna woodland; ghost gum & E. foelscheana over upland tall grass & curly spinifex on basalt	924	1.0	924	1.0	93751
KGM-03a	Grasslands, high grass savanna woodland; grey box, E.confertifolia & E. foelscheana over kangaroo, white & tall upland grass on sandy plain on limestone	101	0.1	101	0.1	75444
KGM-03b	Grasslands, high grass savanna woodland; grey box & E. foelscheana over kangaroo &white grass	3642	3.2	3642	3.2	114978
KGl-01b	Grasslands, high grass savanna low tree; terminalia & bauhinia over upland tall grass	24	0.3	24	0.3	8071
KG-01a	Grasslands, high grass savanna sparse tree; bauhinia & coolabah over mitchell, blue & tall upland grasses	24276	8.8	24276	8.8	275692
kGm-01a	Grasslands, tall bunch grass savanna woodland; coolebah over ribbon grass	496	0.5	552	0.6	96994
kGm-01c	Grasslands, tall bunch grass savanna woodland; coolebah & ghost gum over ribbon grass	40	0.1	264	0.5	49745
kG-01a	Grasslands, tall bunch grass savanna, sparse low tree; terminalia over mitchell grass	102	0.2	102	0.2	70516

Table 10c continued

kG-02a	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa & bauhinia over mitchell & ribbon/blue grass on black soil	19	0.0	1457	1.0	140621
kgl-01e	Grasslands, curly spinifex, low tree savanna; bloodwood (E.dichromophloia) & woolybutt over Plectrachne pungens on islands	16	0.0	16	0.0	239102
Gl-01a	Sedgeland; sedges with open low trees; coolabah over various sedges (Millstream)	6442	3.7	6442	3.7	173391
Gc-02a	Short bunch grassland - savanna /grass plain (Pilbara)	2	0.0	344	0.1	517889
HL-01a	Hummock grasslands, low tree steppe; silver-leaved box & melaleuca over plectrachne	893	0.5	893	0.5	179103
Hl-01b	Hummock grasslands, open low tree steppe; snappy gum & bloodwood over soft spinifex Triodia pungens	1469	0.3	1469	0.3	484691
Hl-02a	Hummock grasslands, open low tree steppe; snappy gum over Triodia wiseana	241511	9.2	241614	9.2	2633332
Hl-04b	Hummock grasslands, open low tree-steppe; bloodwood over T. pungens & T. wiseana	91	0.1	2470	2.1	119498
Hls-02b	Hummock grasslands, open low tree & mallee steppe; marble gum & E. youngiana over hard spinifex T.basedowii	222450	4.1	778833	14.5	5374573
Hls-02d	Hummock grasslands, open low tree & mallee steppe; marble gum & E. youngiana over spinifex T. scariosa	150134	3.5	395540	9.1	4327991
Hs-02a	Hummock grasslands, shrub-steppe; kanji over Triodia pungens	10787	0.3	13598	0.4	3920687
Hs-03a	Hummock grasslands, shrub-steppe; kanji over Triodia basedowii	857	0.5	857	0.5	161776
Hs-03c	Hummock grasslands, shrub steppe; Acacia bivenosa over Triodia basedowii	2830	3.1	2830	3.1	90455
Hs-03d	Hummock grasslands, shrub-steppe; snakewood over Triodia basedowii	657	1.4	657	1.4	47623
Hs-03e	Hummock grasslands, shrub-steppe; acacia species over Triodia basedowii	46250	0.9	46250	0.9	4968707
Hs-03f	Hummock grasslands, shrub-steppe; acacia & grevillea over Triodia basedowii	1637	0.1	1637	0.1	3400600
Hs-04a	Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. basedowii	3477	1.2	3477	1.2	284451
Hs-05a	Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. wiseana	62468	3.6	130467	7.6	1718087
Hs-06b	Hummock grasslands, shrub-steppe; kanji over Triodia wiseana	1299	1.5	1299	1.5	87429
Hs-06i	Hummock grasslands, shrub steppe; Acacia ligulata over Triodia plurinervata	856	3.1	856	3.1	27682
Hs-10e	Hummock grasslands, shrub steppe; Eucalyptus gamophylla over hard spinifex Triodia basedowii	6756	0.9	6756	0.9	734612
Hi-01b	Hummock grasslands, sparse low tree steppe; scattered low trees over Triodia wiseana	2125	4.5	9948	21.2	46824
Hi-01c	Hummock grasslands, sparse meduim tree steppe; Andersonia gregorii over open Triodia wiseana on limestone	1118	2.8	19570	48.8	40067
Hi-02a	Hummock grasslands, sparse tree steppe; snappy gum over soft spinifex Triodia pungens	254	0.1	254	0.1	439910
Hi-02b	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. terminalis) over soft spinifex T.pungens	31	0.0	31	0.0	71252
Hi-03f	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia intermedia & T. inutilis	2	0.0	2	0.0	384141
Hi-06c	Hummock grasslands, grass steppe; soft & hard spinifex, Triodia pungens & T. wiseana	4928	1.1	4928	1.1	436174
Hi-07a	Hummock grasslands, grass steppe; hard spinifex Triodia basedowii	1797	0.3	1797	0.3	540602
HX-02a	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex; red mallee & mixed sparse dwarf shrubs over Triodia basedowii	673	0.3	10135	4.4	230515
HX-04a	Hummock grassland; shrub steppe; mixed acacia scrub & dwarf scrub with Triodia pungens & T. basedowii	4898	2.3	4898	2.3	216459
HX-06a	Hummock grassland, dwarf shrub steppe; mixed ericoid shrubs & spinfex,	3451	6.8	3451	6.8	51150
CM-01f	Succulent steppe; York gum woodland, sparse teatree scrub & samphire	20293	0.0	20293	0.0	111046637
Cm-01a	Succulent steppe; saltbush & scattered york gum	436	3.7	1558	13.3	11711

Table 10c continued

Cm-01b	Succulent steppe; bluebush & scattered salmon gum & gimlet	202	0.1	5235	3.2	164161
Cm-01c	Succulent steppe; saltbush & scattered eucalypts	134	3.1	136	3.1	4335
SCM-01a	Succulent steppe; york gum woodland over Melaleuca thyoides thicket & samphire	3027	2.0	3486	2.3	151138
SCm-01c	Succulent steppe; wandoo, salmon gum & Allocasuarina obesa open woodland over teatree scrub & samphire	819	7.8	946	9.0	10574
SC-01a	Succulent steppe; yorrell & Kondinin blackbutt sparse woodland over teatree scrub & samphire	1012	7.7	2768	21.1	13143
SC-01b	Succulent steppe; york gum & Kondinin blackbutt sparse woodland, teatree scrub & samphire	1673	4.3	4497	11.6	38878
Ci-02a	Succulent steppe; saltbush with open low mulga	2035	0.3	67913	11.1	612069
CI-04b	Succulent steppe; saltbush & bluebush, with open low woodland, A.acia papyrocarpa	273	0.0	796824	29.5	2702923
SC-02a	Succulent steppe; Melaleuca thyiodes thicket over samphire	590	1.0	944	1.5	61932
SC-02b	Succulent steppe; teatree thicket over samphire m5?	345	3.6	657	6.9	9558
SC-02d	Succulent steppe; teatree scrub over saltflats	11551	2.7	11551	2.7	432554
CS-01g	Succulent steppe; saltbush with acacia species	1782	5.8	1788	5.8	30791
Ci-01a	Succulent steppe; heterogeneous spp	16578	1.4	71796	5.9	1221318
Ci-02a	Succulent steppe; saltbush (& desert oak)	19	0.0	2349	1.6	146257
Ci-03a	Succulent steppe; bluebush	3805	0.1	393765	8.0	4901295
Ci-03b	Succulent steppe; bluebush (in dongas)	10422	1.7	10422	1.7	598583
Ci-04a	Succulent steppe; samphire	29051	5.4	30120	5.6	538478
fl	Bare areas; freshwater lakes	8556	3.6	9172	3.9	234818
cl/md	Bare areas; clatpans, mudflats	48163	4.9	76936	7.8	984853
r	Bare areas; rock outcrops	24038	6.6	40976	11.3	362979
sl	Bare areas; salt lakes	133092	3.5	248806	6.6	3788466
Mi-01a/Li-09a/Lc-03a	Mosaic:Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree	1186	2.3	1189	2.3	52413
Mi-06u/Cl-05a	Mosaic: Medium woodland; goldfield eucalypts / Succulent steppe; saltbush, with open low woodland; myoporum	4977	1.0	4977	1.0	505210
Mp-01c/Ci-02d	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire	519	1.7	712	2.4	30314
Mp-01d/ Hi-07a	Mosaic: Medium sparse woodland; desert oak between sand dunes / Hummock grasslands, grass steppe; hard spinifex Triodia basedowii	18055	1.1	18055	1.1	1594927
LM-01a/Mp-01a	Mosaic: Medium open woodland; jarrah & marri with low woodland; banksia / Medium sparse wdl; jarrah & marri	0	0.0	6910	17.4	39792
Li-09a/Sc-08d	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	91	0.2	8216	20.0	41154
Lr-02a/Si-02p/Cp-01a	Mosaic: Open low woodland; mulga / Shrublands; bowgada & minnieritchie scrub / Succulent steppe; scattered groups of saltbush/bluebush	416	1.0	416	1.0	39995
Sc-03b/Lp-01d	Mosaic: Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket / Sparse low woodland; illyarrie	1619	5.0	1619	5.0	32499
Sc-04a/SM-02c	Mosaic: Shrublands; Allocasuarina campestris thicket / Shrublands; jam scrub with scattered York gum in the valeys	253	0.2	324	0.3	126656
Sc-01d/SZ-03d	Mosaic: Shrublands; thicket, acacia-casuarina alliance / Shrublands; scrub-heath on deep sandy flats	1605	1.9	24694	28.7	86030
Si-02m/Si-02d	Mosaic: Shrublands; bowgada scrub / Shrublands; Acacia sclerosperma, bowgada & A. victoriae scrub	63	0.0	63	0.0	225015
Si-02j/Zp-01a	Mosaic: Shrublands; A.. sclerosperma, A.. victoriae & snakewood scrub / Shrublands; patches of low mixed scrub	322	0.5	322	0.5	61541

Table 10c continued

Si-04c/Ci-02a	Mosaic: Shrublands; acacia & melaleuca scrub / Succulent steppe; saltbush	1201	6.0	1201	6.0	20162
Si-09c/Mi-05j	Mosaic: Shrublands; York gum & Eucalyptussheathiana mallee scrub / Medium woodland; salmon gum & gimlet	956	0.6	3284	2.1	159889
Si-11a/Mi-06d	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila / Medium woodland; merrit & coral gum	0	0.0	370723	40.6	914248
Si-11a/Mi-06n	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila / Medium woodland; salmon gum & red mallee	10101	2.6	21091	5.4	392836
Si-11d/Mi-05f	Mosaic: Shrublands; mallee scrub, E. eremophila & black marlock / Medium woodland; York gum & salmon gum	111	0.1	114	0.1	129509
Si-11d/Mi-05g	Mosaic: Shrublands; mallee scrub, Eucalyptus eremophila & black marlock / Medium woodland; salmon gum & morrel	280	0.5	1592	2.5	62859
Si-13d/Mi-05i	Mosaic: Shrublands; mallee scrub, redwood & black marlock / Medium woodland; wandoo & gimlet	168	0.1	1686	0.9	197226
Si-13a/Mi-09a	Mosaic: Shrublands; mallee scrub, black marlock / Medium woodland; yate	146	1.1	146	1.1	12916
Si-13e/Mi-05g	Mosaic: Shrublands; mallee scrub, redwood / Medium woodland; salmon gum & morrel	2073	6.0	3389	9.9	34350
Si-13d/Mi-05d	Mosaic: Shrublands; mallee scrub, redwood & black marlock / Medium woodland; salmon gum	2664	1.4	3874	2.1	184813
SZ-03i/Lp-01e	Mosaic: Shrublands; scrub-heath / Sparse low woodland; wandoo & powderbark wandoo	73	0.6	73	0.6	11357
SZ-03j/Sc-04a	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	616	0.5	1070	0.8	135911
SZ-03j/Sc-04b	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	619	3.2	1136	5.9	19108
SZ-03j/Si-02y	Mosaic: Shrublands; scrub-heath / Shrublands; acacia, various species scrub	12	0.4	12	0.4	2845
SZ-03a/Sp-01g	Mosaic: Shrublands; scrub-heath on coastal association / Shrublands; acacia patchy scrub	283	0.9	283	0.9	32671
SZ-03j/Zc-02a	Mosaic: Shrublands; scrub-heath / Shrublands; dryandra heath	53	0.3	120	0.6	19512
Zc-01a/Sc-02h	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; A. rostellifera & A. cyclops thicket	85	0.3	85	0.3	26236
Kgl-01a/Hl-04d	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Hummock grasslands, open low tree-steppe; snappy gum over Triodia wiseana & T. intermedia	4291	1.1	4291	1.1	375143
Gc-02a/Hi-06a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex Triodia pungens	12610	1.6	12826	1.6	786674
Gc-02a/Hi-08a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands, grass steppe; hard spinifex Triodia wiseana	719	1.2	719	1.2	59308
Hl-03b/Hs-01e	Mosaic: Hummock grasslands, open low tree steppe; desert bloodwood and feathertop spinifex on sandhills / Hummock grasslands, shrub steppe; mixed shrubs over spinifex between sandhills	676020	3.7	676020	3.7	18266564
Sp-01b/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma sparse scrub / Succulent steppe; saltbush & bluebush	347	0.1	347	0.1	444089
Sp-02a/Ci-04a	Mosaic: Shrublands; melaleuca patchy scrub / Succulent steppe; samphire	518	2.9	518	2.9	17636
Ci-03a/Sp-01e	Mosaic: Succulent steppe; bluebush / Shrublands; Acacia sclerosperma, A. victoriae & snakewood scrub patches	134	0.2	134	0.2	69885

Summary; #Veg = 185, # BG = 4, # Mosaics = 47, Total = 226

Table 10d. Vegetation types represented in reserves in IUCN categories I - IV but with a total area of <2000 ha in those reserves.

H Code	Vegetation Description	Area IUCN (I-IV) Reserves	%	Area CALM Conservation Reserves	%	Total area of Veg. Unit in W.A.
Ti-01a	Tall woodland; tuart	793	8.4	800	8.5	9425
Mc-01b	Medium forest; jarrah-wandoo	1400	3.3	1910	4.5	42523
Mc-01c	Medium forest; jarrah-marri-wandoo	1648	5.9	2454	8.8	28035
Mi-01d	Medium woodland; jarrah-wandoo	62	2.1	62	2.1	2918
Mi-01e	Medium woodland; jarrah-wandoo-powderbark	155	0.6	394	1.6	24405
Mi-01f	Medium woodland; marri	1171	0.6	1588	0.8	206137
Mi-01h	Medium woodland; jarrah & marri-wandoo-yate	398	1.7	517	2.2	23372
Mi-01j	Medium woodland; marri,wandoo, powderbark	467	26.5	628	35.7	1761
Mi-01k	Medium woodland, wandoo	84	0.5	182	1	17773
Mi-01l	Medium woodland; small wandoo patches surrounded by e2, 5 Mr; e5, 7Mi	150	8.2	150	8.2	1841
Mi-03a	Medium woodland; yate	472	25	472	25	1888
Mi-03b	Medium woodland; marri & yate	1815	100	1815	100	1815
Mi-04a	Medium woodland; wandoo-powderbark	264	0.5	8027	15.3	52339
Mi-04b	Medium woodland; powderbark & malletP	1709	5.3	2167	6.7	32201
Mi-04d	Medium woodland; wandoo & mallet	541	3.1	857	4.9	17528
Mi-04e	Medium woodland; wandoo & blue mallet	33	0.1	33	0.1	51795
Mi-04f	Medium woodland; wandoo, morrell & blue mallet	17	2.2	69	9.1	753
Mi-05a	Medium woodland; York gum & wandoo	242	0.1	658	0.3	247210
Mi-05o	Medium woodland; salmon gum, morrel, gimlet & blackbutt	1566	20.4	1566	20.4	7695
Mi-05r	Medium woodland; wandoo, York gum & morrell	184	0.2	295	0.4	78061
Mi-06c	Medium woodland; coral gum & goldfields blackbutt	1654	0.5	11833	3.9	304202
Mi-06m	Medium woodland; York gum & red mallee	574	4.4	574	4.4	12964
Mi-06o	Medium woodland; gimlet	525	2.3	525	2.3	23007
Mi-06p	Medium woodland mixed; salmon gum with, merrit & red mallee	521	72.9	521	72.9	715
Mi-06r	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana	1911	0.8	9263	3.7	249503
Mi-06s	Medium woodland; salmon gum, redwood, merrit, gimlet & Eucalyptus sheathiana	758	100	758	100	758
Mi-07e	Medium woodland; coolabah & river gum	1071	3	1071	3	35845
Mi-08a	Medium woodland; river gum	117	10.4	117	10.4	1125
Mi-09a	Medium woodland; yate	1305	4.8	1447	5.3	27184
Mi-09c	Medium woodland; wandoo & yate	1000	0.4	1391	0.6	240510
Mi-09d	Medium woodland; York gum & yate	1219	1.7	1311	1.8	71105

Table 10d continued

Mr-01c	Medium open woodland; wandoo	264	4	264	4	6527
Mr-02a	Medium open woodland; tuart	260	20.6	260	20.6	1264
Lm-01d	Medium very sparse woodland; jarrah, with low woodland; banksia & casuarina	498	0.9	829	1.4	57990
Lc-01a	Low forest; Acacia rostellifera	15	0	141	0.4	35344
Lc-04a	Low forest; mixed tropical deciduous forest.	117	1	117	1	11788
Lc-06b	Low forest; jarrah & Eucalyptus decipiens	1392	100	1392	100	1392
Lc-06c	Low forest; jarrah & casuarina	1500	8.8	1577	9.3	16973
Li-03a	Low woodland; mulga between sandridges	354	0	23167	0.8	2976838
Li-04c	Low woodland; mulga & snakewood	25	0	25	0	684727
Li-06c	Low woodland; Acacia victoriae & snakewood	882	0.1	882	0.1	635276
Li-07c	Low woodland; salmon gum	23	0.3	23	0.3	8258
Li-07e	Low woodland; Eucalyptus decipiens	561	35.3	561	35.3	1591
Li-10b	Low woodland; Banksia prionotes & Allocasuarina huegellianna	14	2	23	3.2	719
Li-11a	Low woodland; Allocasuarina cristata	820	0.3	2709	1	269668
Li-12d	Low woodland; jarrah, Eucalyptus decipiens & Allocasuarina fraseriana	1483	2.2	3597	5.4	66576
Sm-01c	Shrublands; Melaleuca thyoides thicket with scattered York gum	1267	3.4	2353	6.3	37091
Sm-01d	Shrublands; Melaleuca thyoides thicket with scattered river gum	135	39.6	135	39.6	340
Sm-01f	Shrublands; thicket with scattered wandoo	642	2.6	883	3.5	25151
Sm-02c	Shrublands; jam scrub with scattered York gum	239	0.1	607	0.3	188003
Sm-02e	Shrublands; bowgada & jam scrub with scattered York gum & red mallee	61	0.1	276	0.5	55738
Sm-03a	Shrublands; jam scrub with scattered casuarina & York gum	824	2.1	1050	2.7	38841
Sm-04a	Shrublands; mallee & acacia scrub with scattered York gum	60	0.1	745	0.9	86754
Sm-05a	Shublands; mallee with scattered York gum	1096	53.8	1096	53.8	2036
SL-01c	Low woodland over scrub; Allocasuarina cristata over bowgada scrub	809	99.5	809	99.5	813
Si-01c	Shrublands; casuarina & dryandra thicket with scattered wandoo and powderbark wandoo on laterite	257	8.4	321	10.5	3052
Sc-01c	Shrublands; thicket, Jam & Allocasuarina huegelliana	496	6	580	7	8296
Sc-01d	Shrublands; thicket, acacia-casuarina alliance	1869	0.6	20036	6.3	316796
Sc-02b	Shrublands; Acacia quadrimarginea thicket	510	1.4	4609	13	35372
Sc-02c	Shrublands; jam thicket	362	0.5	1902	2.7	70532
Sc-02j	Shrublands; Acacia neurophylla & other acacia thicket	17	0.2	17	0.2	8652
Sc-08a	Shrublands; Melaeuca uncinata thicket	510	18.9	510	18.9	2693
Sc-08b	Shrublands; Melaeuca thyioides thicket	286	7.8	286	7.8	3694
Sc-08d	Shrublands; teatree thicket	1998	5.9	3184	9.3	34120
Sc-09b	Shrublands; tamma & dryandra thicket	182	12.6	585	40.6	1441
Sc-09c	Shrublands; casuarina - calothamus thicket	777	2.5	777	2.5	31475

Table 10d continued

Sc-09f	Shrublands; mixed thicket	348	0.1	371	0.1	390311
Si-01f	Shrublands; mulga & Acacia quadrimarginea scrub	25	0	3945	1.3	309889
Si-02a	Shrublands; waterwood & A. victoriae scrub	58	0.1	58	0.1	82857
Si-02l	Shrublands; Acacia sclerosperma & minnieritchie scrub	155	0.4	155	0.4	44040
Si-02q	Shrublands; bowgada & jam scrub	447	0.1	447	0.1	638648
Si-02y	Shrublands; acacia various species scrub	1413	5.6	1432	5.7	25190
Si-03c	Shrublands; Acacia quadrimarginea & jam scrub on greenstone	405	1	405	1	40743
Si-09c	Shrublands; York gum & Eucalyptus sheathiana mallee scrub	642	0.5	1093	0.9	127745
Si-10a	Shrublands; mallee Eucalyptus longicornis & E.sheathiana scrub	6	40.8	6	40.8	14
Si-11b	Shrublands; mallee scrub Eucalyptus eremophila & red mallee	109	0.4	109	0.4	28954
Si-13b	Shrublands; mallee scrub, black marlock & Eucalyptus decipiens	1227	33.5	1456	39.8	3661
Si-13c	Shrublands; mallee scrub, black marlock & Eucalyptus decipiens	76	22.4	76	22.4	339
Si-13d	Shrublands; mallee scrub, redwood & black marlock	1361	0.9	4335	2.7	158388
Si-14a	Shrublands; mallee scrub Eucalyptus nutans	981	1.4	1158	1.7	69338
Si-15d	Shrublands; mallee scrub, bushy yate & Bald I. marlock	934	27.7	2090	61.9	3377
Si-15e	Shrublands; mallee scrub, Eucalyptus dongarrensis	1480	47.6	1480	47.6	3113
Sr-02c	Shrublands; Acacia ligulata open scrub	70	1.3	70	1.3	5308
Sp-01a	Shrublands; mulga & minnieritchie scattered groups	1007	6.2	1007	6.2	16163
SZ-01d	Shrublands; Albany blackbutt mallee-heath	1966	21.6	2001	22	9106
SZ-02a	Shrublands; Acacia ligulata scrub-heath	1948	16.8	1948	16.8	11588
SZ-03d	Shrublands; scrub-heath on deep sandy flats	0	0	0	0	4264
Zc-01b	Shrublands; melaleuca heath	773	26.6	773	26.6	2904
Zi-01b	Shrublands; dwarf scrub on granite (South coast)	182	0.8	186	0.8	22001
Zi-01d	Shrublands; dwarf waterwood (Acacia coriacea) shrubs on recent dunes	172	0.6	172	0.6	29992
Zr-01a	Shrublands; open dwarf scrub, waterwood (Acacia coriacea) on recent dunes (Pilbara coast)	240	4	240	4	6032
P-02k	Shrublands, pindan; acacia shrubland with scattered low trees over spinifex	1037	0.4	1066	0.4	249795
KGM-01a	Grasslands, high grass savanna woodland; bloodwood,stringybark & woolybutt over white grass on sandstone	107	1.3	107	1.3	8093
KGM-02a	Grasslands, high grass savanna woodland; bloodwood over upland tall grass & curly spinifex	17	0	17	0	41303
KGM-02d	Grasslands, high grass savanna woodland; bloodwood & woolybutt over upland tall grass & curly spinifex	36	0	36	0	242794
KGM-02e	Grasslands, high grass savanna woodland; bloodwood, strinybark & woolybutt over upland tall grass & curly spinifex	1296	0.5	1296	0.5	272166
KGM-02h	Grasslands, high grass savanna woodland; ghost gum & E. foelscheana over upland tall grass & curly spinifex on basalt	924	1	924	1	93751
KGM-03a	Grasslands, high grass savanna woodland; grey box, E.confertifolia & E. foelscheana over kangaroo, white & tall upland grass on sandy plain on limestone	101	0.1	101	0.1	75444
KGl-01b	Grasslands, high grass savanna low tree; terminalia & bauhinia over upland tall grass	24	0.3	24	0.3	8071

Table 10d continued

kGm-01a	Grasslands, tall bunch grass savanna woodland, coolebah over ribbon grass	496	0.5	552	0.6	96994
kGm-01c	Grasslands, tall bunch grass savanna woodland, coolebah & ghost gum over ribbon grass	40	0.1	264	0.5	49745
kG-01a	Grasslands, tall bunch grass savanna, sparse low tree,terminalia; mitchell grass	102	0.1	102	0.1	70516
kG-02a	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa & bauhinia over mitchell & ribbon/blue grass on black soil	19	0	1457	1	140621
kgl-01e	Grasslands, curly spinifex, low tree savanna; bloodwood (E.dichromophloia)& woolybutt over Plectrachne pungens on islands	16	0	16	0	239102
Gc-02a	Short bunch grassland - savanna /grass plain (Pilbara)	2	0	344	0.1	517889
HL-01a	Hummock grasslands, low tree steppe; silver-leaved box & melaleuca over plectrachne	893	0.5	893	0.5	179103
Hl-01b	Hummock grasslands, open low tree steppe; snappy gum & bloodwood over soft spinifex Triodia pungens	1469	0.3	1469	0.3	484691
Hl-04b	Hummock grasslands, open low tree-steppe; bloodwood over T. pungens & T. wiseana	91	0.1	2470	2.1	119498
Hs-03a	Hummock grasslands, shrub-steppe; kanji over Triodia basedowii	857	0.5	857	0.5	161776
Hs-03d	Hummock grasslands, shrub-steppe; snakewood over Triodia basedowii	657	1.4	657	1.4	47623
Hs-03f	Hummock grasslands, shrub-steppe; acacia & grevillea over Triodia basedowii	1637	0	1637	0	3400600
Hs-06b	Hummock grasslands, shrub-steppe; kanji over Triodia wiseana	1299	1.5	1299	1.5	87429
Hs-06i	Hummock grasslands, shrub steppe; Acacia ligulata over Triodia plurinervata	856	3.1	856	3.1	27682
Hi-01c	Hummock grasslands, sparse meduim tree steppe; Andersonia gregorii over open T. wiseana on LST	1118	2.8	19570	48.8	40067
Hi-02a	Hummock grasslands, sparse tree steppe; snappy gum over soft spinifex Triodia pungens	254	0.1	254	0.1	439910
Hi-02b	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. terminalis) over soft spinifex Triodia pungens	31	0	31	0	71252
Hi-03f	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia intermedia & T. inutilis	2	0	2	0	384141
Hi-07a	Hummock grasslands, grass steppe; hard spinifex Triodia basedowii	1797	0.3	1797	0.3	540602
Hi-09c	Hummock grasslands, grass steppe; spinifex Triodia plurinervata	421	100	421	100	421
HX-02a	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex ; red mallee mallee & mixed sparse dwarf shrubs over T. basedowii	673	0.3	10135	4.4	230515
Cm-01a	Succulent steppe; saltbush & scattered york gum	436	3.7	1558	13.3	11711
Cm-01b	Succulent steppe; bluebush & scattered salmon gum & gimlet	202	0.1	5235	3.2	164161
Cm-01c	Succulent steppe; saltbush & scattered eucalypts	134	3.1	136	3.1	4335
SCm-01b	Succulent steppe; wandoo & Allocasuarina obesa open woodland, teatree thicket & samphire	1992	40.9	2399	49.2	4875
SCm-01c	Succulent steppe; wandoo, salmon gum & Allocasuarina obesa open woodland, teatree scrub & samphire	819	7.7	946	8.9	10574
SC-01a	Succulent steppe; yorrell & Kondinin blackbutt sparse woodland, teatree scrub & samphire	1012	7.7	2768	21.1	13143
SC-01b	Succulent steppe; york gum & Kondinin blackbutt sparse woodland, teatree scrub & samphire	1673	4.3	4497	11.6	38878
CL-01a	Succulent steppe; myoporum low woodland over samphire	445	10.3	453	10.5	4331
Cl-04b	Succulent steppe; saltbush & bluebush, with open low woodland; Acacia papyrocarpa	273	0	796824	29.5	2702923
SC-02a	Succulent steppe; Melaleuca thyiodes thicket over samphire	590	1	944	1.5	61932
SC-02b	Succulent steppe; teatree thicket over samphire	345	3.6	657	6.9	9558

Table 10d continued

CS-01f	Succulent steppe; saltbush & samphire with acacia species	253	14.1	279	15.6	1795
CS-01g	Succulent steppe; saltbush with acacia species	1782	5.8	1788	5.8	30791
Ci-02a	Succulent steppe; saltbush (& desert oak)	19	0	2349	1.6	146257
Mi-01a/Li-09a/Lc-03a	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree	1186	2.3	1189	2.3	52413
Mr-02c/Ci-02a	Mosaic: Medium open woodland; salmon gum & morrel / Succulent steppe; saltbush	412	11.1	2329	62.5	3729
Mp-01c/Ci-02d	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire	519	1.7	712	2.3	30314
LM-01a/Mp-01a	Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri	0	0	6910	17.4	39792
Li-09a/Sc-08d	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	91	0.2	8216	20	41154
Lr-02a/Si-02p/Cp-01a	Mosaic: Open low woodland; mulga / Shrublands; bowgada & minnieritchie scrub / Scattered groups of saltbush/bluebush	416	1	416	1	39995
Sc-03b/Lp-01d	Mosaic: Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket / Sparse low woodland; illyarrie	1619	5	1619	5	32499
Sc-04a/SM-02c	Mosaic: Shrublands; Allocasuarina campestris thicket / Shrublands; jam scrub with scattered York gum in the valeys	253	0.2	324	0.3	126656
Sc-01d/SZ-03d	Mosaic: Shrublands; thicket, acacia-casuarina alliance / Shrublands; scrub-heath on deep sandy flats	1605	1.9	24694	28.7	86030
Si-02m/Si-02d	Mosaic: Shrublands; bowgada scrub / Shrublands; Acacia sclerosperma, bowgada & A. victoriae scrub	63	0	63	0	225015
Si-02j/Zp-01a	Mosaic: Shrublands; Acacia sclerosperma, A. victoriae & snakewood scrub / Shrublands; patches of low mixed scrub	322	0.5	322	0.5	61541
Si-04c/Ci-02a	Mosaic: Shrublands; acacia & melaleuca scrub / Succulent steppe; saltbush	1201	6	1201	6	20162
Si-9c/Mi-05j	Mosaic: Shrublands; York gum & Eucalyptus sheathiana mallee scrub / Medium woodland; salmon gum & gimlet	956	0.6	3284	2.1	159889
Si-11a/Mi-06d	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila / Medium woodland; merrit & coral gum	0	0	370723	40.5	914248
Si-11d/Mi-05f	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & black marlock / Medium woodland; York gum & salmon gum	111	0.1	114	0.1	129509
Si-11d/Mi-05g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & black marlock / Medium woodland; salmon gum & morrel	280	0.4	1592	2.5	62859
Si-13d/Mi-05i	Mosaic: Shrublands; mallee scrub, redwood & black marlock / Medium woodland; wandoo & gimlet	168	0.1	1686	0.9	197226
Si-13a/Mi-09a	Mosaic: Shrublands; mallee scrub, black marlock / Medium woodland; yate	146	1.1	146	1.1	12916
SZ-03i/Lp-01e	Mosaic: Shrublands; scrub-heath / Sparse low woodland; wandoo & powderbark wandoo	73	0.6	73	0.6	11357
SZ-03j/Sc-04a	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	616	0.5	1070	0.8	135911
SZ-03j/Sc-04b	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	619	3.2	1136	5.9	19108
SZ-03j/Si-02y	Mosaic: Shrublands; scrub-heath / Shrublands; acacia various species scrub	12	0.4	12	0.4	2845
SZ-03a/Sp-01g	Mosaic: Shrublands; scrub-heath on coastal association / Shrublands; acacia patchy scrub	283	0.9	283	0.9	32671
SZ-03j/Zc-02a	Mosaic: Shrublands; scrub-heath / Shrublands; dryandra heath	53	0.3	120	0.6	19512
Zc-01a/Sc-02h	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia rostellifera & Acacia cyclops thicket	85	0.3	85	0.3	26236
Zc-01a/Sc-02i	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia cyclops thicket	602	100	602	100	602
Gc-02a/Hi-08a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands, grass steppe; hard spinifex Triodia wiseana	719	1.2	719	1.2	59308
Sp-01b/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma sparse scrub / Succulent steppe; saltbush & bluebush	347	0.1	347	0.1	444089

Table 10d continued

Sp-02a/Ci-04a	Mosaic: Shrublands; melaleuca patchy scrub / Succulent steppe; samphire	518	2.9	518	2.9	17636
Ci-03a/Sp-01e	Mosaic: Succulent steppe; bluebush / Shrublands; Acacia sclerosperma, A. victoriae & snakewood scrub patches	134	0.2	134	0.2	69885

Table 11a. Distribution of vegetation types not represented in conservation reserves, by IBRA Region. IBRA Region codes are AW = Avon Wheatbelt, CAR = Carnarvon, CK = Central Kimberley, CR = Central Ranges, COO = Coolgardie, DL = Dampierland, ESP = Esperance Plains, GAS = Gascoyne, GS = Geraldton Sandplains, GD = Gibson Desert, GSD = Great Sandy Desert, GVD = Great Victoria Desert, HAM = Hampton, JF = Jarrah Forest, LSD = Little Sandy Desert, MAL = Mallee, MUR = Murchison, NK = Northern Kimberley, NUL = Nullarbor, OVP = Ord-Victoria Plains, PIL = Pilbara, SWA = Swan Coastal Plain, TAN = Tanami, VB = Victoria Bonaparte, WAR = Warren, YAL = Yalgoo (A map of IBRA Regions appears as Figure 6).

H Code	Vegetation Description	IBRA Region
Mi-04c	Medium woodland; mallet	AW MAL
Mi-05e	Medium woodland; morrel	COO
Mi-05h	Medium woodland; York gum, salmon gum & morrel	MAL
Mi-05k	Medium woodland; morrell & blackbutt	AW COO
Mi-05l	Medium woodland; morrel & Dundas blackbutt	COO
Mi-05q	Medium woodland; blackbutt on greenstone hills	COO
Mi-06b	Medium woodland; redwood & red mallee	COO
Mi-06f	Medium woodland; salmon gum & goldfields blackbutt	COO MUR
Mi-06h	Medium woodland; goldfields blackbutt	COO MAL MUR
Mi-06j	Medium woodland; goldfields blackbutt & red mallee	COO MUR
Mi-06k	Medium woodland; Dundas blackbutt & red mallee	AW COO MAL YAL
Mi-06l	Medium woodland; red mallee group	COO MAL MUR YAL
Mi-06t	Medium woodland; salmon gum, morrel, redwood, merrit, gimlet & Eucalyptus sheathiana	COO
Mi-07a	Medium woodland; coolabah	CAR GAS MUR PIL
Mi-07b	Medium woodland; river gum	GS PIL
Mi-07c	Medium woodland; river gum & terminalia	CK DL
Mi-07d	Medium woodland; river gum & terminalia mixed with coolabah & ghost gum	DL
Mi-08b	Medium woodland; jarrah & river gum	AW JF
Mi-09c	Medium woodland; wandoo & yate	AW MAL
Mi-09f	Medium woodland; yate & salmon gum	MAL
Mi-10a	Medium woodland-tropical messmate; stringybark & woolybutt	CK NK
Mi-11a	Medium woodland; York gum & Allocasuarina huegelliana	MAL
Mi-11b	Medium woodland; York gum & Casuarina obesa	AW SWA
Mi-12a	Medium woodland; Casuarina obesa	AW
Mr-01a	Medium open woodland; jarrah	JF
Mr-01b	Medium open woodland; marri	SWA
Mr-02b	Medium open woodland; marri & tuart	SWA

Table 11a continued

Mr-03a	Medium woodland; marri & river gum	SWA
Mr-03b	Medium woodland; York gum & river gum (add to e6,18Mi?)	AW
Mp-01a	Medium sparse woodland; jarrah & marri	SWA
Lc-02a	Low forest; callitris (cypress pine)	SWA
Lc-03a	Low forest; teatree	JF
Lc-03b	Low forest; teatree & casuarina	WAR
Lc-05b	Low forest; moort	ESP MAL
Lm-01a	Medium open woodland; jarrah & marri, with low woodland; banksia	SWA
Lm-01b	Medium open woodland; eucalypt (e2?), with low woodland; Banksia attenuata & B. menziesii	SWA
Li-02b	Low woodland; mulga on dolerite	LSD
Li-02c	Low woodland; mulga (?with spinifex) on rises	GAS PIL
Li-04b	Low woodland; mulga & Acacia victoriae	CAR GAS
Li-04c	Low woodland; mulga & snakewood	CAR GAS MUR
Li-04d	Low woodland; mulga, Acacia victoriae & snakewood	GAS
Li-04e	Low woodland; mulga, bowgada, Acacia quadrimarginea & minnieritchie (A. grasbyi)	MUR
Li-05c	Low woodland; mulga & Allocasuarina cristata	NUL
Li-05d	Low woodland; mulga & callitris	MUR YAL
Li-05e	Low open woodland; mulga & Allocasuarina cristata	NUL
Li-05f	Low woodland; mulga & red maliee	COO
Li-06b	Low woodland; waterwood	CAR GAS MUR
Li-06d	Low woodland; Acacia sclerosperma & A. victoriae	CAR
Li-06e	Low woodland; bowgada & Acacia subtressarogona	CAR
Li-07b	Low woodland; York gum	AW GS
Li-07d	Low woodland; Eucalyptus sp. aff. aspera	PIL
Li-11b	Low woodland; Allocasuarina huegelliana	JF MAL
Li-11c	Low woodland; Casuarina ?obesa salt lake	MUR
Li-11f	Low woodland; Allocasuarina ?fraseriana & Jam	AW
Li-12b	Low woodland; jarrah or jarrah-casuarina	AW
Li-12c	Low woodland; casuarina & eucalypts	COO
Li-12e	Low woodland; Allocasuarina huegeliana& York gum	AW JF MAL
Lr-01a	Open low woodland; Eucalypus sp. aff. aspera	PIL

Table 11a continued

Lr-01b	Open low woodland; Eucalyptus oraria	GS
Lr-02a	Open low woodland; mulga	GAS MUR PIL
Lp-01a	Sparse low woodland; mulga, discontinuous in scattered groups	CAR GAS LSD MUR PIL
Lp-01b	Sparse low woodland; mulga & Acacia victoriae in scattered groups	GAS
Lp-01c	Sparse low woodland; Acacia victoriae & snakewood) in scatttered groups	CAR PIL
LS-01a	Shrublands tree-heath between sandhills	GS
LS-01b	Shrublands low trees & scrub; teatree	JF
SM-01a	Medium woodland over scrub; York gum over bowgada & jam scrub	AW YAL
SM-01b	Medium woodland over scrub; coolabah over bowgada scrub	MUR
Sm-01a	Shrublands; teatree thicket with scattered wandoo & yate	AW JF
Sm-01b	Shrublands; Melaleuca uncinata thicket with scattered York gum	AW
Sm-02b	Shrublands; bowgada & jam scrub with scattered York gum	AW GS MUR YAL
Sm-02d	Shrublands; jam and ?Acacia rostellifera or ?hakea scrub with scattered York gum	AW GS
Sm-03c	Shrublands; Acacia quadrimarginea thicket with casuarina & goldfields blackbutt woodland	COO MUR
SL-01a	Low woodland over scrub; mulga over bowgada & minnieritchie scrub	CAR MUR YAL
SL-01b	Low woodland over scrub; mulga over bowgada scrub	CAR
Sl-02a	Shrublands; acacia scrub with scattered mulga	MUR
Sl-02c	Shrublands; bowgada & minnieritchie scrub with scattered mulga	MUR YAL
Sl-03a	Shrublands; bowgada scrub with scattered red mallee & Eucalyptus sp.	CAR
Sl-03b	Shrublands; bowgada & jam scrub with scattered York gum & red mallee	AW YAL
Sl-03d	Shrublands; bowgada scrub with scattered eucalypts.& callitris	GS
Sl-03g	Shrublands; Acacia quadrimarginea & jam scrub with scattered York gum & Allocasuarina huegelliana	YAL
Sl-01b	Shrublands; Melaleuca uncinata thicket with scattered powderbark wandoo mallee	GAS MUR YAL
Sm-04b	Shrublands; mallee & acacia scrub with scattered York gum & red mallee	GS
Sc-01a	Shrublands; thicket, acacia & Allocasuarina campestris	AW
Sc-01b	Shrublands; thicket, Jam & Allocasuarina acutivalvis on ironstone	AW
Sc-03a	Shrublands; bowgada, jam and Melaleuca uncinata thicket	AW YAL
Sc-04b	Shrublands; Allocasuarina campestris scrub (add to c3Sc?)	AW
Sc-07a	Shrublands; thicket, casuarina-melaleuca alliance	AW
Sc-08c	Shrublands; Melaleuca cardiophylla thicket	GS
Si-01b	Shrublands; mulga & Acacia sclerosperma scrub	GAS MUR PIL

Table 11a continued

Si-01c	Shrublands; mulga & bowgada scrub	CAR GAS MUR
Si-01d	Shrublands; mulga, Acacia victoriae & snakewood scrub	GAS
Si-01h	Shrublands; mulga, bowgada, Acacia quadrimarginea & minnieritchie scrub	MUR
Si-02b	Shrublands; Acacia bivenosa	CR GSD
Si-02d	Shrublands; Acacia sclerosperma, bowgada & A. victoriae scrub	CAR
Si-02f	Shrublands; Acacia sclerosperma, bowgada & snakewood scrub	CAR
Si-02g	Shrublands; Acacia sclerosperma, bowgada & jam scrub	CAR
Si-02h	Shrublands; Acacia sclerosperma & A. victoriae scrub	CAR
Si-02k	Shrublands; Acacia sclerosperma & snakewood scrub	CAR YAL
Si-02n	Shrublands; bowgada & A. victoriae scrub	CAR
Si-02o	Shrublands; bowgada & Acacia quadrimarginea on stony ridges	AW MUR YAL
Si-02p	Shrublands; bowgada & minnieritchie scrub	CAR YAL
Si-02r	Shrublands; bowgada & A. murrayana scrub	AW UR YAL
Si-02s	Shrublands; Acacia victoriae scrub	GAS
Si-02v	Shrublands; snakewood & minnieritchie scrub	GAS
Si-02x	Shrublands; acacia scrub, various species	AW GS YAL
Si-03a	Shrublands; Acacia ?cyperophyllascrub	CR
Si-03b	Shrublands; Acacia quadrimarginea scrub	GAS MUR YAL
Si-04a	Shrublands; acacia & banksia scrub	GS
Si-08c	Shrublands; mallee & acacia thicket on ?coastal dunes	GS
Si-09b	Shrublands; York gum & Eucalyptus gonglocarpa mallee scrub	AW
Si-15a	Shrublands; mallee scrub, red mallee	MAL
Si-15f	Shrublands; mallee scrub (Great Victoria Desert)	GVD
Si-15g	Shrublands; mallee scrub (Nullabor) e30,31,36	CR GVD GSD
Sr-01a	Shrublands; mulga open scrub	CAR GAS
Sr-01b	Shrublands; mulga & bowgada open scrub	CAR
Sr-02a	Shrublands; Acacia sclerosperma & A. victoriae open scrub	CAR GAS
Sr-02b	Shrublands; Acacia victoriae & snakewood open scrub	CAR GAS MUR
Sr-02d	Shrublands; Acacia rostellifera open scrub	GS
Sp-01c	Shrublands; Acacia sclerosperma & A. victoriae scrub, barren	CAR
SZ-03d	Shrublands; scrub-heath on deep sandy flats	GS

Table 11a continued

Zi-01a	Shrublands; eremophila and cassia dwarf scrub	CAR GAS PIL
Zi-01c	Shrublands; dwarf scrub (Dirk Hartog I)	CAR
P-01a	Shrublands, pindan; Acacia tumida shrubland with woolybutt & cabbage gum medium woodland over ribbon grass & ?curly spinifex	CK DL NK
P-01c	Shrublands, pindan; Acacia tumida shrubland with ghost gum & E. setosa medium woodland over curly spinifex	DL
P-01d	Shrublands, pindan; acacia shrubland with eucalypt medium woodland over Plectrachne pungens	DL
P-02a	Shrublands, pindan; Acacia eripoda shrubland with scattered low bloodwood & Eucalyptus setosa over soft & ?curly spinifex	CK DL GSD OVP
P-02b	Shrublands, pindan; Acacia tumida shrubland with scattered low bloodwood & Eucalyptus setosa over curly spinifex	DL
P-02c	Shrublands, pindan; Acacia tumida shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex	DL
P-02e	Shrublands, pindan; Acacia eripoda & A. tumida shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex	DL
P-02f	Shrublands, pindan; Acacia tumida & A.impressa shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex	DL
P-02g	Shrublands, pindan; Acacia tumida & A.impressa shrubland with scattered low bloodwood & Eucalyptus setosa over ribbon & curly spinifex	DL
P-02h	Shrublands, pindan; Acacia eripoda & A. tumida shrubland with scattered low Eucalyptus confertifolia over ribbon & curly spinifex	DL
P-02i	Shrublands, pindan; Acacia pachycarpa & A. eripoda shrubland with sparse low ?bauhinia & bloodwood over ribbon & curly spinifex	DL OVP
P-02j	Shrublands, pindan; Acacia pachycarpa & A. eripoda shrubland with sparse low ?bauhinia & grevillea over Triodia pungens & T. intermedia	OVP
P-02l	Shrublands, pindan; acacia shrubland with scattered low trees over spinifex	DL
KGM-01c	Grasslands, high grass savanna woodland; grey box & cabbage gum over mixed/white grass	CK
KGM-01d	Grasslands, high grass savanna woodland; grey box & cabbage gum over mixed/white grass on basalt and dolerite	CK DL NK OVP VB
KGM-02c	Grasslands, high grass savanna woodland; bloodwood & stringybark over ?upland tall grass, mitchell grass & curly spinifex	VB
KGM-02i	Grasslands, high grass savanna woodland; cabbage gum & E. foelscheana over upland tall grass & curly spinifex on basalt	VB
KGM-03d	Grasslands, high grass savanna woodland; ghost gum & bloodwood (E. polycarpa) over ribbon &tall upland grass	NK
KGl-01a	Grasslands, high grass savanna low tree; terminalia over upland tall grass & blue grass	VB
KGl-01c	Grasslands, high grass savanna low tree; melaeuca over upland tall grass	OVP
KGl-01d	Grasslands, high grass savanna sparse low tree; snappy gum over upland tall grass & curly spinifex on granite	CK OVP VB
KGl-02a	Grasslands, high grass savanna low tree; bloodwood (E. dichromophloia) & grey box over white grass &/or upland tall grass.	NK
KGl-02b	Grasslands, high grass savanna low woodland; grey box & cabbage gum over white grass &/or upland tall grass.	CK DL
KGl-02c	Grasslands, high grass savanna low tree; Mt House box & bloodwood (E. terminalis) over upland tall grass.	CK
KGl-02d	Grasslands, high grass savanna low tree; Mt House box & bloodwood (E. terminalis) over white grass on rolling basalt country	CK VB
KG-01b	Grasslands, high grass savanna sparse tree; bauhinia & coolabah over blue & tall upland grasses on black soil plain	VB
kGM-01a	Grasslands, tall bunch grass savanna woodland, grey box & cabbage gum over ribbon grass (add to kGM-01b?)	CK DL NK

Table 11a continued

kGM-01b	Grasslands, tall bunch grass savanna woodland, grey box & cabbage gum over ribbon & blue grass	CK DL
kGm-01b	Grasslands, tall bunch grass savanna woodland, coolebah over ribbon/blue grass	DL
kGm-01d	Grasslands, tall bunch grass savanna woodland, bloodwood (E. polycarpa) over aristida grass riverine	CK
kGL-01a	Grasslands, tall bunch grass savanna low woodland, grey box & cabbage gum over ribbon grass	CK DL
kGl-01a	Grasslands, tall bunch grass savanna low tree; snappy gum over ribbon grass	CK
kGl-01b	Grasslands, tall bunch grass savanna low tree; bloodwood (E. dichromophloia) over ribbon grass	CK DL
kGl-01c	Grasslands, tall bunch grass savanna low tree; snappy gum & bloodwood (E. dichromophloia) over ribbon grass	CK
kGl-01d	Grasslands, tall bunch grass savanna low tree; bloodwood (E. dichromophloia) & cabbage gum over ribbon grass	CK
kGl-01f	Grasslands, tall bunch grass savanna low tree; cabbage gum & silverleaved box over aristida & ribbon grass on sandy plains	OVP VB
kGl-01g	Grasslands, tall bunch grass savanna low tree; cabbage gum & bloodwood (E. polycarpa)over ribbon & blue grass on sandy plains	CK
kGl-02a	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass	DL
kGl-02b	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon & blue grass	CK DL
kGl-02d	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass &spinifex	DL
kGl-03a	Grasslands, tall bunch grass savanna, sparse low tree; ribbon grass & paperbarks	OVP
kG-01b	Grasslands, tall bunch grass savanna, sparse low tree; terminalia over mitchell and blue grass on basalt	OVP
kG-02b	Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over mitchell & ribbon/blue grass on black soil	CK DL OVP
kG-02c	Grasslands, tall bunch grass savanna low tree; x? over mitchell & ribbon/blue grass on black soil	CK
kG-02d	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa over mitchell grass on black soil	CK NK
kG-02e	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa & bauhinia over ribbon/blue grass on black soil	CK DL
kG-02f	Grasslands, tall bunch grass savanna sparse low tree; bauhinia & coolabah over ribbon/blue grass on black soil	DL OVP
kG-02g	Grasslands, tall bunch grass savanna sparse low tree; bauhinia & coolabah over ribbon grass on black soil	CK DL
kG-02h	Grasslands, tall bunch grass savanna low tree; bauhinia & coolabah over ribbon grass on black soil	CK
kG-02i	Grasslands, tall bunch grass savanna low tree; x? over ribbon/blue grass on black soil	CK
kG-02j	Grasslands, tall bunch grass savanna sparse low tree; acacia over ?grass on black soil	CK
kG-03a	Grasslands, tall bunch grass savanna, mitchell & ribbon/blue grass	DL OVP
kG-03b	Grasslands, tall bunch grass savanna, mitchell & mitchell/blue grass	CK DL OVP
kG-03c	Grasslands, tall bunch grass savanna, mitchell & blue grass	OVP
kG-03d	Grasslands, tall bunch grass savanna, ribbon/blue grass	CK DL
Kgl-01a	Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass	OVP VB
Kgl-02a	Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains	CK OVP
Kgl-02b	Grasslands, short bunch grass savanna sparse low tree; scattered snappy gum over enneapogon short grass on plains	OVP

Table 11a continued

Kgl-02c	Grasslands, short bunch grass savanna low tree; snappy gum & bloodwood (E. terminalis) over enneapogon short grass on plains	CK
KgL-03a2	Grasslands, short bunch grass savanna low tree; bauhinia over Aristida prunosa short grasses on plains	DL
Kgl-03b	Grasslands, short bunch grass savanna low tree & sparse shrubs; bauhinia & Acacia eriopoda & A. impressa over Aristida brownii short grasses on river flats	DL
Kgl-03c	Grasslands, short bunch grass savanna low tree & acacia thicket; bauhinia & Acacia ? & A. impressa over aristida short grasses on river flats (?shrublands)	OVP
Kg-02a	Grasslands, short bunch grass savanna, grass; salt water grassland Sporobous virginicus	DL VB
kgM-01a	Grasslands, curly spinifex, tree savanna woodland; snappy gum & bloodwood over curly spinifex on limestone plateau	CK
kgM-01b	Grasslands, curly spinifex, tree savanna woodland; snappy gum & bloodwood over curly spinifex on limestone plateau	CK
kgL-01a	Grasslands, curly spinifex, low tree savanna woodland; gnainger & Eucalyptus ferrruginea over Plectrachne pungens	CK DL NK VB
kgl-01a	Grasslands, curly spinifex, low tree savanna; snappy gum over curly spinifex	CK NK OVP VB
kgl-01b	Grasslands, curly spinifex, low tree savanna; snappy gum & bloodwood (E.dichromophloia) over curly spinifex	CK NK
kgl-01c	Grasslands, curly spinifex, low tree savanna; snappy gum & E. perfoliata over Plectrachne pungens	CK
kgl-01d	Grasslands, curly spinifex, low tree savanna; bloodwood (E.dichromophloia) over curly spinifex	CK DL OVP
kgl-01f	Grasslands, curly spinifex, low tree savanna; bauhinia over Plectrachne sp.	OVP
kgl-02a	Grasslands, curly spinifex & short grass low tree savanna; snappy gum over enneapogon & Plectrachne pungens	CK OVP
kgl-02b	Grasslands, curly spinifex & short grass low tree savanna; snappy gum & bloodwood (E.dichromophloia) over enneapogon & curly spinifex on granite	CK OVP
Gm-01a	Sedgeland; sedges with scattered medium trees; coolabah over various sedges & forbes	GAS LSD PIL
Gm-01b	Sedgeland; sedges with scattered medium trees; coolabah & river gum over various sedges	PIL
GL-01b	Sedgeland; sedges with low tree savanna woodland; coolabah & grey box over & various sedges	PIL
Gl-01b	Sedgeland; sedges with open low tree sananna; Eucalyptus sp. aff aspera over various sedges	OVP
Gc-02a	Short bunch grassland - savanna /grass plain (Pilbara)	CR DL GAS PIL
Gc-02b	Grass savanna on clay plains (Tanami)	GSD TAN
Gc-02c	Sedgeland; Various sedges with very sparse snakewood	PIL
HM-01a	Hummock grasslands, tree steppe; desert oak & soft spinifex (Casuarina decaisneana, Triodia pungens)	GD GSD TAN
HM-01b	Hummock grasslands, tree steppe; desert oak & soft spinifex between sandhills	CR GD GSD
Hm-01a	Hummock grasslands, open tree steppe; Casuarina decaisneana & hard spinifex between sandhills	LSD
HL-01a	Hummock grasslands, low tree steppe; silver-leaved box & melaleuca over plectrachne	GSD OVP
Hl-01c	Hummock grasslands, open low tree steppe; bloodwood over soft spinifex Triodia pungens	OVP PIL
Hl-01e	Hummock grasslands, open low tree steppe; eucalypts over soft spinifex Triodia pungens	GSD OVP TAN
Hl-02b	Hummock grasslands, open low tree steppe; bloodwood over Triodia wiseana	DL OVP

Table 11a continued

HI-02c	Hummock grasslands, open low tree steppe; terminalia over Triodia wiseana on limestone	OVP
Hi-03a	Hummock grasslands, open low tree steppe; snappy gum over curly spinifex	VB
HI-03c	Hummock grasslands, open low tree steppe; bloodwood Eucalyptus dichromophloia and spinifex	OVP
HI-03d	Hummock grasslands, open low tree steppe; eucalypts and feathertop spinifex in sandy valleys (often with aSp t1Hi)	GSD
HI-03e	Hummock grasslands, open low tree steppe; eucalypts over spinifex on laterite sand plains	OVP TAN
HI-03f	Hummock grasslands, open low tree steppe; scattered low rare eucs in spinifex	NK
HI-03g	Hummock grasslands, open low tree steppe; eucalypts(e23) over soft (t1?) & feather spinifex between sandhills	GSD OVP TAN
HI-04c	Hummock grasslands, open low tree-steppe; snappy gum over Triodia pungens & T. intermedia	OVP
HI-04e	Hummock grasslands, open low tree-steppe; snappy gum over Triodia intermedia	DL GSD OVP
HI-04f	Hummock grasslands, open low tree-steppe; snappy gum over Triodia inutilis	OVP
HI-04g	Hummock grasslands, open low tree-steppe; snappy gum over Triodia pungens & T. briziodes	PIL
HI-04h	Hummock grasslands, open low tree-steppe; Eucalyptus dongarraensis & E. foecunda over T. plurinervata	CAR
HI-04i	Hummock grasslands, open low tree-steppe; snappy gum & Mt House box over soft spinifex on shale plains	CK
HI-04j	Hummock grasslands, open low tree-steppe; eucalypts over soft and feathertop spinifex between sandhills	GSD TAN
HI-04k	Hummock grasslands, open low tree-steppe; snappy gum over curly & ? spinifex (t14=?)	VB
HI-05a	Hummock grasslands, open low tree steppe; ?bauhinia & Grevillea ?stiata over soft spinifex	DL OVP
HI-06a	Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges	GSD
HI-06b	Hummock grasslands, open low tree steppe; desert walnut over spinifex/plectrachne on sandplain	GSD
HI-07a	Hummock grasslands, open low tree steppe; mulga, Allocasuarina cristata & hard spinifex between sand ridges	GVD
HI-08a	Hummock grasslands, open low tree steppe; mulga over T. scariosa	GVD
HI-08b	Hummock grasslands, open low tree steppe; mulga & snakewood over T. pungens & T. basedowii	PIL
HIs-01a	Hummock grasslands, low open tree & shrub steppe; bloodwood, kanji over soft spinifex	OVP
HIs-01b	Hummock grasslands, low open tree & shrub steppe;scattered eucalypts, Acacia pachycarpa over triodia basedowii	GAS
HIs-01c	Hummock grasslands, low open tree & shrub steppe; sparse snappy gum, Acacia pachycarpa & A. victoria over T.pungens & T. briziodesi on chert	PIL
HIs-01d	Hummock grasslands, low open tree & shrub steppe; sparse snappy gum, Acacia pachycarpa & A. victoria over T. briziodesi on chert	PIL
HIs-02c	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. kinsmillii) over hard spinifex Triodia basedowii	CK DL
Hs-01b	Hummock grasslands, shrub steppe; bowgada & snakewood over T. basedowii	PIL
Hs-01c	Hummock grasslands, shrub steppe; Acacia pachycarpa & grevillea over Triodia pungens & T. intermedia on sandy plateau	DL
Hs-01d	Hummock grasslands, shrub steppe; mixed shrubs over soft spinifex Triodia pungens	GSD LSD PIL TAN
Hs-01f	Hummock grasslands, shrub steppe; acacia species over Plectrachne melvillei	GAS

Table 11a continued

Hs-02b	Hummock grasslands, shrub-steppe; kanji over Triodia pungens (+?grevillea) between sand ridges	PIL
Hs-02c	Hummock grasslands, shrub-steppe; kanji & snakewood over Triodia pungens	PIL
Hs-02e	Hummock grasslands, shrub-steppe; Acacia delibrata over Triodia pungens	GSD TAN
Hs-02f	Hummock grasslands, shrub-steppe; Acacia pachycarpa over Triodia pungens	GSD OVP TAN
Hs-02g	Hummock grasslands, shrub-steppe; Acacia pachycarpa & waterwood over Triodia pungens	PIL
Hs-02h	Hummock grasslands, shrub-steppe; Acacia pachycarpa & A. tumida over Triodia pungens	OVP
Hs-02i	Hummock grasslands, shrub-steppe; Acacia victoriae & snakewood over Triodia pungens	PIL
Hs-02j	Hummock grasslands, shrub-steppe; snakewood over Triodia pungens	PIL
Hs-02k	Hummock grasslands, shrub-steppe; Acacia eripodaover Triodia pungens	DL
Hs-02l	Hummock grasslands, shrub-steppe; mixed acacia over Triodia pungens (Tanami)	OVP TAN
Hs-03b	Hummock grasslands, shrub steppe; Acacia pachycarpa over Triodia basedowii	GD GSD
Hs-03g	Hummock grasslands, shrub-steppe; scattered shrubs over Triodia basedowii	CAR
Hs-04b	Hummock grasslands, shrub-steppe; acacia & spinifex on sandplain + laterite	DL
Hs-05b	Hummock grasslands, shrub-steppe; kanji & snakewood over T. pungens & T. wiseana	PIL
Hs-05c	Hummock grasslands, shrub-steppe; Acacia pachycarpa & A. victoriae over T. pungens & T. wiseana	PIL
Hs-05d	Hummock grasslands, shrub-steppe; snakewood over T. pungens & T. wiseana	CAR PIL
Hs-06a	Hummock grasslands, shrub steppe; kanji over Triodia pulchella & T. briziodes on basalt	PIL
Hs-06c	Hummock grasslands, shrub steppe; Acacia impressa over Triodia pulchella & T. intermedia	DL
Hs-06d	Hummock grasslands, shrub steppe; Acacia pachycarpa & A. tumida over Triodia pulchella & T. intermedia sandplain	DL OVP
Hs-06e	Hummock grasslands, shrub steppe; Acacia eriopoda & A. tumida over Triodia pulchella & T. intermedia sandplain	DL
Hs-06f	Hummock grasslands, shrub steppe; Acacia tumida over Triodia intermedia	DL
Hs-06g	Hummock grasslands, shrub steppe; Acacia impressa over Triodia intermedia on stony laterite	CK DL OVP
Hs-06h	Hummock grasslands, shrub steppe; Acacia pachycarpa & A. impressa over Triodia intermedia	DL OVP
Hs-07a	Hummock grasslands, shrub steppe; Grevillea refracta & hakea over soft spinifex Triodia pungens	DL GSD
Hs-07b	Hummock grasslands, shrub steppe; Grevillea refracta over soft spinifex Triodia pungens	DL
Hs-07c	Hummock grasslands, shrub steppe; corkwood (Hakea suberea) & acacia species over soft spinifex Triodia pungens	VP TAN
Hs-07d	Hummock grasslands, shrub steppe; hakea over soft spinifex Triodia pungens	GSD TAN
Hs-08a	Hummock grasslands, shrub steppe; mulga over soft spinifex	MUR
Hs-08b	Hummock grasslands, shrub steppe; mulga over soft spinifex Triodia on rises	GAS LSD PIL
Hs-08e	Hummock grasslands, shrub-steppe; mulga & snakewood over Triodia. wiseana	PIL
Hs-09a	Hummock grasslands, shrub steppe; mulga and mallee over soft spinifex	CR

Table 11a continued

Hs-09b	Hummock grasslands, shrub steppe; mulga and Eucalyptus kingsmillii over hard spinifex Triodia basedowii	GAS MUR
Hs-09c	Hummock grasslands, shrub steppe; mulga and red mallee over hard spinifex Triodia basedowii	MUR
Hs-09d	Hummock grasslands, shrub steppe; mulga and mallee(?sp) over hard spinifex Triodia basedowii	CR GD GVD
Hs-10a	Hummock grasslands, shrub steppe; silverleaved box over soft spinifex Triodia pungens	OVP
Hs-10b	Hummock grasslands, shrub steppe; Eucalyptus youngiana over hard spinifex Triodia basedowii	COO GVD MUR
Hs-10c	Hummock grasslands, shrub steppe; red mallee over hard spinifex Triodia basedowii	GAS MUR
Hs-10d	Hummock grasslands, shrub steppe; red mallee over spinifex Triodia scariosa	COO GVD MUR NUL
Hz-01a	Hummock grasslands, dwarf-shrub steppe; Acacia translucens over soft spinifex Triodia pungens	PIL
Hi-01a	Hummock grasslands,sparse low tree-steppe; mulga over T. basedowii	GAS LSD
Hi-02d	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. dichromophloia) over spinifex Triodia pungens & T. intermedia	OVP
Hi-02e	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. dichromophloia) & E. setosa over spinifex Triodia pungens & T. intermedia	DL OVP PIL
Hi-03a	Hummock grasslands, sparse tree steppe; bloodwood over hard spinifex Triodia basedowii	CR
Hi-03c	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia wiseana & T. intermedia on rocky ranges	OVP
Hi-03d	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. terminalis) overhard spinifex Triodia wiseana & T. intermedia on basalt and dolerite	CK OVP
Hi-03e	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia intermedia	OVP
Hi-03f	Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex Triodia intermedia & T. inutilis	CK OVP
Hi-03g	Hummock grasslands, sparse tree steppe; eucalypt & ?bauhinia over hard spinifex Triodia intermedia	DL
Hi-04a	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia basedowii	CAR
Hi-04b	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia wiseana	PIL
Hi-04c	Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia briziodes	PIL
Hi-04d	Hummock grasslands, sparse shrub steppe; kanji & Acacia bivenosa over hard spinifex Triodia basedowii & T.wiseana	PIL
Hi-04e	Hummock grasslands, sparse shrub steppe; Acacia bivenosa & A. trachycarpa over hard spinifex T. wiseana Very poor rocky country on gneiss	PIL
Hi-04f	Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. brizoides	PIL
Hi-04g	Hummock grasslands, shrub-steppe; scattered shrubs over Triodia wiseana & T. sp. indet. aff. angusta	PIL
Hi-05a	Hummock grasslands, patchy shrub steppe; Acacia pachycarpa over soft spinifex on ironstone plateau	GSD
Hi-06b	Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. basedowii	CR GD GSD
Hi-08b	Hummock grasslands, grass steppe; hard spinifex Triodia wiseana & T. basedowii	CAR GAS PIL
Hi-09a	Hummock grasslands, grass steppe; hard spinifex Triodia intermedia	DL
Hi-09b	Hummock grasslands, grass steppe; spinifex Triodia inutilis	GSD

Table 11a continued

Hi-09d	Hummock grasslands, grass steppe; spinifex Triodia wiseana & T. basedowii /Plectrchne pungens	PIL
Hi-09e	Hummock grasslands, grass steppe; spinifex Plectrachne pungens on shale (t11=p3)	OVP
HX-01a	Hummock grassland, mixed sandplain - scattered low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with Triodia basedowii	MUR
HX-01b	Hummock grassland, mixed sandplain - scattered low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with Triodia scariosa & T.?sp	MUR
HX-01c	Hummock grassland, mixed sandplain - sparse low trees over sparse dwarf shrubs with spinifex; red mallee over mixed dwarf shrubs with Triodia scariosa & T.?sp	MUR YAL
HX-01d	Hummock grassland, mixed sandplain - sparse low trees over sparse dwarf shrubs with spinifex; ?marble gum & red mallee mixed dwarf shrubs with Triodia scariosa & T.?sp	MUR
HX-03a	Hummock grasslands, mixed sandplain; bowgada, sugarbrother, mallee, Triodia basedowii & T. ?sp	MUR
HX-03b	Hummock grasslands, mixed sandplain; bowgada, sugarbrother, mallee, Triodia scariosa & T. ?sp	MUR
HX-03c	Hummock grasslands, mixed sandplain; bowgada ,mallee, heath and spinifex	MUR YAL
HX-06b	Hummock grassland; shrub steppe; wattle scrub & heath Acacia ligulata x rostellifera	CAR
HG-01a	Spinifex, mitchell grass & kangaroo grass (mapped as akGc, joins xHGi)	TAN
HG-01b	Mixed short grass and spinifex	TAN
HG-01c	Mixed short grass and spinifex with scattered coolebah	GSD TAN
SCm-01a	Succulent steppe; york gum open woodland, Melaleuca thyiodes thicket & samphire	AW
SCm-01d	Succulent steppe; eucalypts & Allocasuarina obesa open woodland, teatree scrub & samphire	MAL
SC-01c	Succulent steppe; sal;mon gum & morrell sparse woodland, teatree scrub & samphire	MAL
CM-01a	Succulent steppe; york gum woodland & samphire	AW
CM-01e	Succulent steppe; eucalypt woodland & saltflats e?	MAL
CM-01g	Succulent steppe; yorkgum woodland, sparse Melaleuca thyoides scrub & samphire	AW
CM-01h	Succulent steppe; Casuarina obesa woodland & samphire	AW
Cm-01b	Succulent steppe; bluebush & scattered salmon gum & gimlet	COO
Cm-01c	Succulent steppe; saltbush & scattered eucalypts e?	COO
Cm-01d	Succulent steppe; samphire, scattered salmon gum & sparse teatree scrub	COO
Cl-01a	Succulent steppe; myoporum low woodland over samphire	COO MUR
Cl-02c	Succulent steppe; samphire with low woodland; mulga	MUR
CL-03a	Succulent steppe; bluebush with low woodland; Acacia papyrocarpa	NUL
CL-03b	Succulent steppe; saltbush & bluebush with low woodland; snakewood	MUR
CL-04a	Succulent steppe; samphire with low woodland; sheoak	AW

Table 11a continued

CL-05a	Succulent steppe; bluebush with open low woodland; mulga & sheoak	COO
CL-05b	Succulent steppe with open low woodland; mulga & sheoak	NUL YAL
Cl-01b	Succulent steppe; saltbush & bluebush with open low woodland; sheoak	COO
CL-02a	Succulent steppe; saltbush with open low mulga	GAS
Cl-02b	Succulent steppe; bluebush with open low mulga	MUR
CL-02c	Succulent steppe with open low mulga	GAS
Cl-02d	Succulent steppe; saltbush & bluebush with open low mulga & A. sclerosperma	MUR
Cl-03a	Succulent steppe; salt bush, with open low woodland; mulga & sheoak	COO MUR
Cl-03b	Succulent steppe; bluebush, with open low woodland; mulga & sheoak	COO MUR
Cl-04a	Succulent steppe; bluebush, with open low woodland; A. papyrocarpa	COO NUL
Cl-04b	Succulent steppe; saltbush & bluebush, with open low woodland; A. papyrocarpa	NULL
SC-02c	Succulent steppe; teatree scrub over samphire m5?	AW GS YAL
CS-01a	Succulent steppe; saltbush & samphire with waterwood & Acacia sclerosperma	CAR
CS-01b	Succulent steppe; saltbush with snakewood	MUR
CS-01c	Succulent steppe; various species with mulga	GAS MUR YAL
CS-01d	Succulent steppe; heterogeneous species with bowgada scrub	MUR
Cs-01b	Succulent steppe; saltbush & bluebush with scattered mulga shrubs	CAR
Cs-01c	Succulent steppe; saltbush & bluebush with scattered mulga & Acacia sclerosperma	GAS GVD MUR
Cs-01d	Succulent steppe; saltbush & bluebush with scattered mulga & other wattle(s)	MUR YAL
Cs-02a	Succulent steppe; saltbush,with scattered bowgada & jam	MUR YAL
Cs-02b	Succulent steppe; bluebush,with scattered Acaica sclerosperma & A. victoriae	MUR
Cs-02c	Succulent steppe; saltbush & bluebush,with scattered Acaica sclerosperma & A. victoriae	CAR MUR
Cs-02d	Succulent steppe; saltbush & bluebush,with scattered Acaica sclerosperma & bowgada	MUR YAL
Cs-02e	Succulent steppe; saltbush & bluebush, with scattered Acacia sclerosperma	MUR YAL
Cs-02f	Succulent steppe; saltbush & bluebush,with scattered bowgada & jam	YAL
Cs-02g	Succulent steppe with scattered Acacia victoriae & snakewood	MUR
Cs-02h	Succulent steppe with scattered Acacia sclerosperma & snakewood	CAR YAL
Cs-02j	Succulent steppe with scattered wattles	MUR YAL
Cs-02k	Succulent steppe; bluebush,with scattered snakewood	CAR
Ci-01b	Succulent steppe; heterogeneous spp k1,3,or3?	COO GAS LSD
Ci-01c	Succulent steppe; heterogeneous spp	PIL

Table 11a continued

Ci-02b	Succulent steppe; saltbush & bluebush	MUR
Ci-02c	Succulent steppe; saltbush & bluebush with very sparse mulga and A. sclerosperma	MUR
Ci-02d	Succulent steppe; saltbush & samphire	AW CAR GS GVD MUR
Ci-03c	Succulent steppe; bluebush with grassy depressions	NUL
Ci-03d	Succulent steppe; bluebush with saltbush in depressions	COO MUR NUL
Cr-01a	Sparse succulent steppe; bluebush with very sparse snakewood shrubs	CAR
Mc-01a/Li-09a/Li-13a	Mosaic:Medium forest; jarrah-marri / Low woodland; banksia / Low woodland; paperbark,	SWA
Mi-01a/Li-09a/Lc-03a/Li-11d	Mosaic:Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; Casuarina obesa	SWA
Mi-05j/Mi-06e	Mosaic: Medium woodland; salmon gum & gimlet / Medium woodland; merrit & red mallee	COO
Mi-05f/Sc-06a	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance	AW
Mr-01b/Zc-02a	Mosaic: Medium open woodland; marri / Shrublands; dryandra heath	GS SWA
Mr-01c/Zc-02a	Mosaic: Medium open woodland; wandoo / Shrublands; dryandra heath	JF
Mr-01d/Zc-02a	Mosaic: Medium open woodland; wandoo & powderbark wandoo / Shrublands; dryandra heath	JF
Mr-01c/Zc-01e	Mosaic: Medium open woodland; wandoo / Shrublands; mixed heath	AW JF
Mi-05h/Ci-02d	Mosaic: Medium woodland;York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire	AW
Mi-05f/Sc-08c	Mosaic: Medium woodland; merrit & red mallee / Shrublands; Melaleuca cardiophylla thicket	AW GS
Mr-01b/Sc-08d	Mosaic: Medium open woodland; marri / Shrublands; teatree thicket	SWA
Mi-06e/Si-06a	Mosaic: Medium woodland; merrit (or a11?) & red mallee / Shrublands; dryandra scrub	COO
Mi-06i/Si-06a	Mosaic: Medium woodland; goldfields blackbutt & Dundas blackbutt / Shrublands; dryandra scrub	COO MAL
Mi-06m/HS-01a	Mosaic: Medium woodland; salmon gum & red mallee / Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa	COO
Mi-05j/HS-01a	Mosaic: Medium woodland; salmon gum & gimlet / Hummock grasslands, mallee steppe; red mallee over spinifex Triodia scariosa	COO MUR
Mp-01b/Ci-04b	Mosaic: Medium sparse woodland; salmon gum & morrel / Succulent steppe; samphire	MAL
LM-01a/Mp-01a	Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri	SWA
Ld-01a/Hl-03f	Mosaic: Low dense forest-mixed tropical deciduous forest / Hummock grasslands, open low tree steppe; scattered low rare eucs in spinifex	NK
Li-04a/Ci-04a	Mosiac: Low woodland; mulga & bowgada / Succulent steppe; samphire	GAS MUR
Lr-02a/Ci-02b	Mosaic: Open low woodland; mulga / Succulent steppe; saltbush & bluebush on greenstone	MUR
Li-02a/Ci-02b	Mosaic: Low woodland; mulga / Succulent steppe; saltbush & bluebush	MUR
Lr-02a/Ci-01b	Mosaic: Open low woodland; mulga / Succulent steppe; heterogeneous species on greenstone	MUR
Ll-09a/Mr-02a	Mosaic: Low woodland; banksia / Medium open woodland; tuart	SWA
Li-06b/Si-02c	Mosaic: Low woodland; waterwood / Shrublands; Acacia sclerosperma & bowgada scrub	CAR

Table 11a continued

Li-06b/Si-02i	Mosaic: Low woodland; waterwood / Shrublands; Acacia sclerosperma, A. victoriae & A. subtressarogona scrub	CAR
Li-09a/Zc-02a	Mosaic: Low woodland; banksia / Shrublands; dryandra heath	SWA
SL-01b/Si-04b	Mosaic: Low woodland over scrub; mulga over bowgada scrub / Shrublands; bowgada & grevillea scrub on sandhills	GS
Sl-02b/Si-04b	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; bowgada scrub with scattered mulga	CAR GS
Sc-04a/SL-02a	Mosaic: Shrublands; Allocasuarina campestris thicket / Shrublands; mallee & acacia scrub with wandoo low woodland	AW
Si-02c/Ci-04a	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Succulent steppe; samphire	CAR
Si-02c/Si-02t	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Shrublands; snakewood & A. victoria scrub	CAR
Si-04b/Si-02m	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; bowgada scrub	CAR
Si-04b/Si-02c	Mosaic: Shrublands; bowgada & grevillea scrub / Shrublands; Acacia sclerosperma & bowgada scrub	CAR
Si-02t/HS-04a	Mosiac: Shrublands; snakewood & A. victoria scrub / Hummock grasslands, shrub-steppe; kanji over Triodia pungens & T. basedowii	PIL
Si-02p/Ci-02b	Mosaic: Shrublands; bowgada & minnieritchie scrub / Succulent steppe; saltbush & bluebush	CAR
Si-02m/Ci-02b	Mosaic: Shrublands; bowgada scrub / Succulent steppe; saltbush & bluebush	CAR MUR YAL
Si-02m/Ci-04a	Mosaic: Shrublands; bowgada scrub / Succulent steppe; samphire	MUR
Si-02c/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma & bowgada scrub / Succulent steppe; saltbush & bluebush	CAR YAL
Si-9c/Mi-05i	Mosaic: Shrublands; York gum & Eucalyptus sheathiana mallee scrub / Medium woodland; wandoo & gimlet	AW
Si-10a/Mi-05j	Mosaic: Shrublands; mallee Eucalyptus longicornis & E.sheathiana scrub/ Medium woodland; salmon gum & gimlet	AW
Si-11a/Mi-06d	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila / Medium woodland; merrit & coral gum	MAL
Si-11a/Mi-06g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila /Medium woodland; salmon gum & Dundas blackbutt	COO
Si-11a/Mi-06o	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila / Medium woodland; gimlet	COO
Si-11c/Mi-05g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & ?bloodwood E. dichromophloia / Medium woodland; salmon gum & morrel	MAL
Sp-01f/Gc-02a	Mosaic: Shrublands; Acacia victoriae & snakewood scrub patches / Short bunch grassland - savanna /grass plain (Pilbara)	CAR PIL
SZ-03j/Sc-03b	Mosaic: Shrublands; scrub-heath / Shrublands; acacia-melaleuca thickets ? m3 & a23	CAR
Zc-01e/Sp-01g	Mosaic:Shrublands; mixed heath / Shrublands; acacia patchy scrub	CAR GS
Zi-01a/Hi-08a	Mosaic: Shrublands; eremophila and cassia dwarf scrub / Hummock grasslands, grass steppe; hard spinifex Triodia wiseana	GAS PIL
kGl-02a/Hl-04c	Mosaic: Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass / Hummock grasslands, open low tree-steppe; ?snappy gum over T. pungens & T. intermedia	DL
Kgl-01a/KG-02a	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Grasslands; high grass savanna, white grass	CK
Kgl-01a/Hi-02a/KG-02a	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Grasslands; high grass savanna, white grass	OVP
Kgl-02a/Hi-06d	Mosaic: Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains / Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. intermedia	OVP
Kgl-02a/Hi-09a	Mosaic: Grasslands, short bunch grass savanna low tree; snappy gum over enneapogon short grass on plains / Hummock grasslands,	OVP

Table 11a continued

	grass steppe; hard spinifex Triodia intermedia	
kgL-01a/kgL-01b	Mosaic: Grasslands, curly spinifex, low tree savanna woodland; gnainger & Eucalyptus ferrruginea over Plectrachne pungens / Grasslands, curly spinifex, low tree savanna woodland; snappy gum over curly spinifex on sandstone	CK
kgl-01a/Hi-09a	Mosaic: Grasslands, curly spinifex, low tree savanna; snappy gum over curly spinifex / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia	CK OVP
kgl-01c/kg-01a	Mosaic: Grasslands, curly spinifex, low tree savanna; snappy gum & E. perfoliata over Plectrachne pungens /Grasslands; sparse low tree savanna; ?Andersonia gregorii over Plectrachne bynoei	CK NK
GL-01a/Hi-06a/Ci-01a	Mosaic: Sedgeland; sedges with low tree savanna woodland; coolabah over various sedges /Hummock grasslands, grass steppe; soft spinifex Triodia pungens / Succulent steppe; heterogeneous spp	OVP TAN
Gc-02c/Hs-02a	Mosaic: Sedgeland; various sedges with very sparse snakewood/ Hummock grasslands, shrub-steppe; kanji over Triodia pungens	PIL
P-02a/kGl-02a	Mosaic: Shrublands, pindan; Acacia eripoda shrubland with scattered low bloodwood & Eucalyptus setosa over soft & ?curly spinifex / Grasslands, tall bunch grass savanna low tree; baobabs, bauhinia & beefwood over ribbon grass	DL GSD
Hl-06a/Hl-01c	Mosaic: Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges / Hummock grasslands, open low tree steppe; bloodwood (E. dichromophloia) over soft spinifex Triodia pungens	GSD
Hl-03b/Hl-06a	Mosaic: Hummock grasslands, open low tree steppe; desert bloodwood and feathertop spinifex (on) sandhills / Hummock grasslands, open low tree steppe; desert walnut over soft spinifex between sandridges	MAL
Hl-01d/Hl-02a	Mosaic: Hummock grasslands, open low tree steppe; bloodwood with sparse kanji shrubs over soft spinifex Triodia pungens / Hummock grasslands, open low tree steppe; snappy gum over Triodia wiseana lateritic crust	PIL
Hl-01a/Hi-09a	Mosaic: Hummock grasslands, open low tree steppe; snappy gum over soft spinifex Triodia pungens / Hummock grasslands, grass steppe; hard spinifex Triodia intermedia on laterite	CK OVP
Hl-02a/Li-02a	Mosaic: Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana / Low woodland; mulga in valleys	PIL
Hi-04b/Hs-02j	Mosaic: Hummock grasslands, sparse shrub steppe; Acacia bivenosa over hard spinifex Triodia wiseana / Hummock grasslands, shrub-steppe; snakewood over Triodia pungens	PIL
Hs-02a/Hi-06c	Mosaic: Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. wiseana / Hummock grasslands, shrub-steppe; kanji over Triodia pungens in valleys	PIL
Sp-01c/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma & A. victoriae scrub, barren / Succulent steppe; saltbush & bluebush	CAR
Sp-01f/Cp-01b	Mosaic: Shrublands; Acacia victoriae & snakewood scrub patches / Scattered groups of succulents	GAS

Table 11b. Distribution of vegetation types poorly represented in conservation reserves, by IBRA Region. IBRA Region codes are AW = Avon Wheatbelt, CAR = Carnarvon, CK = Central Kimberley, CR = Central Ranges, COO = Coolgardie, DL = Dampierland, ESP = Esperance Plains, GAS = Gascoyne, GS = Geraldton Sandplains, GD = Gibson Desert, GSD = Great Sandy Desert, GVD = Great Victoria Desert, HAM = Hampton, JF = Jarrah Forest, LSD = Little Sandy Desert, MAL = Mallee, MUR = Murchison, NK = Northern Kimberley, NUL = Nullarbor, OVP = Ord-Victoria Plains, PIL = Pilbara, SWA = Swan Coastal Plain, TAN = Tanami, VB = Victoria Bonaparte, WAR = Warren, YAL = Yalgoo (A map of IBRA Regions appears as Figure 6).

H Code	Vegetation Description	IBRA Regions
Ti-01a	Tall woodland; tuart	AW SWA
Mc-01b	Medium forest; jarrah-wandoo	JF WAR
Mc-01c	Medium forest; jarrah-marri-wandoo	JF
Mi-01b	Medium woodland; jarrah & marri-wandoo	AW JF
Mi-01c	Medium woodland; marri-wandoo	AW GS JF SWA
Mi-01d	Medium woodland; jarrah-wandoo	ESP JF SWA
Mi-01e	Medium woodland; jarrah-wandoo-powderbark	JF
Mi-01f	Medium woodland; marri	GS JF SWA
Mi-01h	Medium woodland; jarrah & marri-wandoo-yate	JF
Mi-01k	Medium woodland; wandoo	AW COO GS
Mi-01l	Medium woodland; small wandoo patches surrounded by e2, 5Mi; e5, 7Mi	AW ESP JF
Mi-02a	Medium woodland; tuart	AW SWA
Mi-02b	Medium woodland; tuart & tuart-jarrah	SWA
Mi-04a	Medium woodland; wandoo-powderbark	AW JF
Mi-04b	Medium woodland; powderbark & mallet	AW JF
Mi-04d	Medium woodland; wandoo & mallet	AW JF
Mi-04e	Medium woodland; wandoo & blue mallet	AW
Mi-04f	Medium woodland; wandoo, morrell & blue mallet	AW
Mi-05a	Medium woodland; York gum & wandoo	AW GS JF MAL
Mi-05b	Medium woodland; York gum, wandoo & salmon gum	AW JF MAL
Mi-05c	Medium woodland; York gum	AW COO ESP GS JF MAL MUR SWA YAL
Mi-05d	Medium woodland; salmon gum	AW COO ESP GS GVD JF MAL MUR YAL
Mi-05f	Medium woodland; York gum & salmon gum	AW COO ESP GS JF MAL MUR SWA YAL
Mi-05g	Medium woodland; salmon gum & morrel	AW COO MAL
Mi-05j	Medium woodland; salmon gum & gimlet	AW COO ESP JF MAL MUR
Mi-05m	Medium woodland; York gum, salmon gum & gimlet	AW COO GAS MAL MUR YAL

Table 11b continued

Mi-05n	Medium woodland; wandoo,York gum, salmon gum, morrel & gimlet	AW
Mi-05p	Medium woodland; wandoo,salmon gum, morrel, gimlet & blackbutt	COO MAL
Mi-05r	Medium woodland; wandoo, York gum & morrell	AW
Mi-06a	Medium woodland; redwood & merrit	COO MAL
Mi-06c	Medium woodland; coral gum & goldfields blackbutt (also some e10,11,)	AW COO MUR
Mi-06e	Medium woodland; merrit & red mallee	COO MAL
Mi-06m	Medium woodland; York gum & red mallee	AW
Mi-06n	Medium woodland; salmon gum & red mallee	COO MAL MUR
Mi-06o	Medium woodland; gimlet	COO
Mi-06r	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana	AW COO MAL
Mi-07e	Medium woodland; coolabah & river gum	CAR PIL
Mi-09b	Medium woodland; wandoo,York gum & yate	ESP JF MAL
Mi-09d	Medium woodland; York gum & yate	AW ESP JF MAL
Mi-09g	Medium woodland; York gum, yate & salmon gum	ESP MAL
Mi-10b	Medium woodland-tropical messmate; stringybark & woolybutt with understory of palms	NK
Mr-01c	Medium open woodland; wandoo	AW JF
Lc-01a	Low forest; Acacia rostellifera	GS
Lc-04a	Low forest; mixed tropical deciduous forest.	CK DL NK
Lc-06a	Low forest; jarrah	JF WAR
Lc-06c	Low forest; jarrah & casuarina	JF
Lm-01d	Medium very sparse woodland; jarrah, with low woodland; banksia & casuarina	SWA
Li-02a	Low woodland; mulga	AW CAR CR COO GAS GD GVD GSD LSD MUR NUL PIL YAL
Li-03a	Low woodland; mulga between sandridges	AW COO GD GVD LSD MUR YAL
Li-04a	Low woodland; mulga & bowgada	CAR GAS GS MUR YAL
Li-05a	Low woodland; mulga mixed with Allocasuarina cristata & Eucalyptus sp (e6?)	COO GVD MUR NUL
Li-05b	Low woodland; mulga mixed with cypress pine & york gum	COO GVD MUR YAL
Li-06c	Low woodland; Acacia victoriae & snakewood	CAR GAS PIL
Li-07c	Low woodland; salmon gum	CAR
Li-09a	Low woodland; banksia	AW JF SWA

Table 11b continued

Li-09b	Low woodland; Banksia attenuata & B. menziesii	GS SWA
Li-10b	Low woodland; Banksia prionotes& Allocasuarina huegellianna?	AW
Li-11a	Low woodland; Allocasuarina cristata	COO GVD MUR
Li-12d	Low woodland; jarrah, Eucalyptus decipiens & Allocasuarina ?fraseriana	JF
Sm-01c	Shrublands; Melaleuca thyoides thicket with scattered York gum	AW ESP JF SWA
Sm-01f	Shrublands; thicket (?species) with scattered wandoo	AW
Sm-02c	Shrublands; jam scrub with scattered York gum	AW GS
Sm-02e	Shrublands; bowgada & jam scrub with scattered York gum & red mallee	AW GS YAL
Sm-03a	Shrublands; jam scrub with scattered casuarina & York gum	AW GS
Sm-03b	Shrublands; bowgada & jam scrub with scattered casuarina & York gum	AW GS YAL
Sl-01c	Shrublands; casuarina & dryandra thicket with scattered wandoo and powderbark wandoo	AW GS
Sm-04a	Shrublands; mallee & acacia scrub with scattered York gum	AW GS
Sc-01c	Shrublands; thicket, Jam & Allocasuarina huegelliana	AW
Sc-01d	Shrublands; thicket, acacia-casuarina alliance ?species	AW CAR COO DL GS
Sc-02b	Shrublands; Acacia quadrimarginea thicket	COO MUR
Sc-02c	Shrublands; jam thicket	COO MUR
Sc-02e	Shrublands; Acacia rostellifera thicket	GS
Sc-02j	Shrublands; Acacia neurophylla & A. species thicket	AW GS MAL
Sc-02l	Shrublands; Acacia neurophylla, A. beauverdiana & A. resinomarginea thicket	AW COO
Sc-04a	Shrublands; Allocasuarina campestris thicket	AW COO ESP GS MAL YAL
Sc-05a	Shrublands; mallee & casuarina thicket	AW COO
Sc-06a	Shrublands; thicket, acacia-casuarina-melaleuca alliance	AW COO MAL
Sc-08b	Shrublands; Melaeuca thyioides thicket	AW GS
Sc-08d	Shrublands; teatree thicket	AW DL ESP JF MAL SWA
Sc-09c	Shrublands; Allocasuarina - Calothamus thicket	AW COO MAL
Sc-09e	Shrublands; Dryandra quercifolia & Eucalytpus spp. thicket	AW ESP
Sc-09f	Shrublands; mixed thicket	CAR GS
Sc-09g	Shrublands; acacia,casuarina, E. eudesmoides, Banksia ashbyi & other mixed species thicket	GS
Sc-09h	Shrublands; thicket, mixed	AW ESP
Si-01a	Shrublands; mulga scrub	CAR CR COO GAS GD GSD GVD LSD MUR PIL YAL

Table 11b continued

Si-01e	Shrublands; mulga & snakewood scrub	
Si-01f	Shrublands; mulga & Acacia quadrimarginea scrub	GAS PIL
Si-02a	Shrublands; waterwood & A. victoriae scrub	COO GAS MUR YAL
Si-02c	Shrublands; Acacia sclerosperma & bowgada scrub	CAR
Si-02l	Shrublands; Acacia sclerosperma & minnieritchie scrub	CAR MUR
Si-02q	Shrublands; bowgada & jam scrub	CAR
Si-02t	Shrublands; snakewood & A. victoria scrub	AW CAR GS MUR YAL
Si-02u	Shrublands; snakewood scrub	CAR GAS PIL
Si-02y	Shrublands; acacia scrub,general	CAR GAS MUR PIL
Si-02w	Shrublands; bowgada & other acacia scrub	COO GAS MUR WAR
Si-03c	Shrublands; Acacia quadrimarginea & jam scrub on greenstone	AW CAR GAS GD GVD LSD MAL MUR YAL
Si-03d	Shrublands; Acacia brachystachya scrub	CAR
Si-07a	Shrublands; teatree scrub	AW COO MUR
Si-09c	Shrublands; York gum & Eucalyptus sheathiana mallee scrub	DL ESP GSD MAL OVP
Si-11a	Shrublands; mallee scrub, Eucalyptus eremophila	AW
Si-11b	Shrublands; mallee scrub, Eucalyptus eremophila & red mallee	AW COO ESP GSD MAL
Si-11d	Shrublands; mallee scrub, Eucalyptus eremophila & black marlock	COO MAL
Si-11e	Shrublands; mallee scrub, Eucalyptus eremophila & Forrest's marlock	AW ESP JF MAL
Si-13d	Shrublands; mallee scrub, redwood & black marlock	MAL
Si-14a	Shrublands; mallee scrub Eucalyptus nutans	AW MAL
Sr-02c	Shrublands; Acacia ligulata open scrub	AW ESP MAL
Sp-01a	Shrublands; mulga & minnieritchie scattered groups	GS
SZ-02c	Shrublands; Acacia scrub-heath a?	PIL
SZ-03c	Shrublands; scrub-heath on lateritic sandplain	CAR ESP JF MAL WAR
SZ-03j	Shrublands; scrub-heath	GS
Zc-02a	Shrublands; dryandra heath	AW COO ESP GS MAL SWA
Zi-01b	Shrublands; dwarf scrub on granite (South coast)	AW JF MAL SWA
Zi-01d	Shrublands; dwarf waterwood (Acacia coriacea) shrubs on recent dunes	ESP MAL
Zr-01a	Shrublands; open dwarf scrub, waterwood (Acacia coriacea) on recent dunes (Pilbara coast)	CAR WAR
P-01b	Shrublands, pindan; Acacia tumida shrubland with grey box & cabbage gum medium woodland over ribbon grass & ?curly spinifex	CAR DL

Table 11b continued

P-02k	Shrublands, pindan; acacia shrubland with scattered low trees over spinifex	CK DL
KGM-01a	Grasslands, high grass savanna woodland; bloodwood,stringybark & woolybutt over white grass on sandstone (usually with t11)	CK VB
KGM-01b	Grasslands, high grass savanna woodland; grey box & cabbage gum over white grass	CK DL NK
KGM-01e	Grasslands, high grass savanna woodland; cabbage gum & ghost gum over mixed/white grass, riverain	CK NK
KGM-02a	Grasslands, high grass savanna woodland; bloodwood over upland tall grass & curly spinifex	VB
KGM-02b	Grasslands, high grass savanna woodland; bloodwood & stringybark over upland tall grass & curly spinifex	CK NK VB
KGM-02d	Grasslands, high grass savanna woodland; bloodwood & woolybutt over upland tall grass & curly spinifex	OVP VB
KGM-02e	Grasslands, high grass savanna woodland; bloodwood, strinybark & woolybutt over upland tall grass & curly spinifex on sandplain	VB
KGM-02h	Grasslands, high grass savanna woodland; ghost gum & E. foelscheana over upland tall grass & curly spinifex on basalt	VB
KGM-03a	Grasslands, high grass savanna woodland; grey box, E.confertifolia & E. foelscheana over kangaroo, white & tall upland grass on sandy plain on limestone	VB
KGM-03b	Grasslands, high grass savanna woodland; grey box & E. foelscheana over kangaroo &white grass	CK NK VB
KGl-01b	Grasslands, high grass savanna low tree; terminalia & ?bauhinia over upland tall grass	VB
KG-01a	Grasslands, high grass savanna sparse tree; bauhinia & coolabah over mitchell, blue & tall upland grasses	VB
kGm-01a	Grasslands, tall bunch grass savanna woodland, coolebah over ribbon grass	CK DL NK OVP VB
kGm-01c2	Grasslands, tall bunch grass savanna woodland, coolebah & ghost gum over ribbon grass	DL
kG-02a	Grasslands, tall bunch grass savanna sparse low tree; Acacia suberosa & ?bauhinia over mitchell & ribbon/blue grass on black soil	CK DL NK
Kg-01a	Grasslands, short bunch grass savanna, grass; annual grasses (Enneapogon species)on dry plains	OVP VB
kgl-01e	Grasslands, curly spinifex, low tree savanna; bloodwood (E.dichromophloia)& woolybutt over Plectrachne pungens on islands	DL NK
Gl-01a	Sedgeland; sedges with open low trees; coolabah over various sedges	CAR GD GSD LSD PIL TAN
Hl-01a	Hummock grasslands, open low tree steppe; snappy gum over soft spinifex Triodia pungens	CK NK VB
Hl-01b	Hummock grasslands, open low tree steppe; snappy gum & bloodwood over soft spinifex Triodia pungens	GSD OVP TAN
Hl-02a	Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana	GAS PIL
Hi-04b	Hummock grasslands, open low tree-steppe; bloodwood over Triodia pungens & T. wiseana	DL OVP PIL
Hls-02b	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. youngiana) over hard spinifex Triodia basedowii	GD GVD NUL
Hls-02d	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (E. youngiana) over spinifex Triodia scariosa	GD GVD MUR
Hs-02a	Hummock grasslands, shrub-steppe; kanji over Triodia pungens (+?grevillea)	COO DL GSD PIL
Hs-03a	Hummock grasslands, shrub-steppe; kanji over Triodia basedowii	CAR LSD PIL
Hs-03c	Hummock grasslands, shrub steppe; Acacia bivenosa over Triodia basedowii	CAR YAL
Hs-03d	Hummock grasslands, shrub-steppe; snakewood over Triodia basedowii	PIL
Hs-03e	Hummock grasslands, shrub-steppe; acacia species over Triodia basedowii between sandridges	CR COO GAS GD GVD LSD

Table 11b continued

Hs-03f	Hummock grasslands, shrub-steppe; acacia & grevillea over Triodia basedowii	CAR CR GAS GD GSD LSD PIL
Hs-04a	Hummock grasslands, shrub-steppe; kanji over T. pungens & T. basedowii	CAR COO ESP GAS PIL
Hs-05a	Hummock grasslands, shrub-steppe; kanji over T. pungens & T. wiseana on basalt	PIL
Hs-06b	Hummock grasslands, shrub-steppe; kanji over Triodia wiseana on hills of dolerite and shale	PIL
Hs-06i	Hummock grasslands, shrub steppe; Acacia ligulata over Triodia plurinervata	CAR HAM
Hs-10e	Hummock grasslands, shrub steppe; Eucalyptus gamophyllaover hard spinifex Triodia basedowii	GAS PIL
Hi-01b	Hummock grasslands, sparse low tree steppe; x over T. wiseana	DL OVP
Hi-01c	Hummock grasslands, sparse meduim tree steppe; ?Andersonia gregorii over open T. wiseana on limestone	CK DL
Hi-02a	Hummock grasslands, sparse tree steppe; snappy gum over soft spinifex Triodia pungens	GSD OVP TAN
Hi-02b	Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (E. terminalis) over soft spinifex Triodia pungens	OVP
Hi-06c	Hummock grasslands, grass steppe; soft & hard spinifex Triodia pungens & T. wiseana	CAR GAS GSD LSD PIL
Hi-07a	Hummock grasslands, grass steppe; hard spinifex Triodia basedowii	CAR GAS GSD LSD PIL
HX-02a	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex ; red mallee mallee & mixed sparse dwarf shrubs over Triodia basedowii	MUR YAL
HX-04a	Hummock grassland; shrub steppe; mixed acacia scrub & dwarf scrub with Triodia pungens & T. basedowii	CAR
HX-06a	Hummock grassland; shrub Steppe; mixed ericoid Hummock grassland; shrubs & spinfex,	CAR
SCM-01a	Succulent steppe; york gum woodland, Melaleuca thyoides thicket & samphire	AW GS YAL
SCm-01c	Succulent steppe; wandoo, salmon gum & Allocasuarina obesa open woodland, teatree scrub & samphire	AW
SC-01a	Succulent steppe; yorrell & Kondinin blackbutt sparse woodland, teatree scrub & samphire	AW MAL
SC-01b	Succulent steppe; york gum & Kondinin blackbutt sparse woodland, teatree scrub & samphire	AW MAL
CM-01b	Succulent steppe; salmon gum woodland & saltbush	COO NUL
CM-01c	Succulent steppe; salmon gum woodland & bluebush	AW
CM-01f	Succulent steppe; yorkgum woodland, sparse teatree scrub & samphire	AW
Cm-01a	Succulent steppe; saltbush & scattered york gum	AW COO YAL
Cl-02a	Succulent steppe; saltbush with low woodland; mulga	GVD MUR NUL SWA YAL
CL-04b	Succulent steppe; bluebush with low woodland; sheoak	HAM MAL NUL
SC-02a	Succulent steppe; Melaleuca thyiodes thicket over samphire	AW JF SWA
SC-02b	Succulent steppe; teatree thicket over samphire m5?	AW MAL
SC-02d	Succulent steppe; teatree scrub over saltflats	CR DL GD GSD LSD
CS-01g	Succulent steppe; saltbush with acacia species	AW
Ci-01a	Succulent steppe; heterogeneous spp	AW CAR CR COO DL GAS

Table 11b continued

		GD GSD GVD JF LSD MUR NUL YAL
Ci-02a	Succulent steppe; saltbush	AW CAR COO GVD HAM LSD MUR NUL YAL
Ci-03a	Succulent steppe; bluebush	CAR COO GS MUR NUL
Ci-03b	Succulent steppe; bluebush (in dongas)	NUL
Ci-04a	Succulent steppe; samphire	AW CAR ESP GAS GSD MAL MUR PIL
sl	Bare areas; salt lakes	AW CAR CR COO DL ESP GAS GS GD GSD GVD HAM JF LSD MAL MUR NK NUL SWA TAN WAR YAL
fl	Bare areas; freshwater lakes	AW DL ESP GS JF MAL OVP SWA VB
cl/md	Bare areas; clatpans, mudflats	AW CAR CK COO DL ESP GAS GD GSD MAL MUR NK PIL TAN VB
r	Bare areas; rock outcrops	AW COO ESP GAS GS JF MAL MUR WAR YAL
Mi-01a/Li-09a/Lc-03a	Mosaic:Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree	SWA
Mp-01c/Ci-02d	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire	AW
Mp-01d/Hi-07a	Mosaic: Medium sparse woodland; desert oak between sand dunes / Hummock grasslands, grass steppe; hard spinifex Triodia basedowii	CR GD GSD
Lr-02a/Si-02p/Cp-01a	Mosaic: Open low woodland; mulga / Shrublands; bowgada & minnieritchie scrub / Scattered groups of saltbush/bluebush	CAR MUR YAL
Lp-01a/Cp-01b	Mosaic: Sparse low woodland; mulga in scattered groups /Scattered groups of succulents	MUR
Li-09a/Sc-08d	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	SWA
Sc-03b/Lp-01d	Mosaic: Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket / Sparse low woodland; illyarrie	GS
Sc-04a/Sm-02c	Mosaic: Shrublands; Allocasuarina campestris thicket / Shrublands; jam scrub with scattered York gum in the valeys	AW GS
Sc-01d/SZ-03d	Mosaic: Shrublands; thicket, acacia-casuarina alliance / Shrublands; scrub-heath on deep sandy flats	GS
Si-02m/Si-02d	Mosaic: Shrublands; bowgada scrub / Shrublands; Acacia sclerosperma, bowgada & A. victoriae scrub	CAR
Si-02j/Zp-01a	Mosaic: Shrublands; Acacia sclerosperma, A. victoriae & snakewood scrub / Shrublands; patches of low mixed scrub	CAR
Si-04c/Ci-02a	Mosaic: Shrublands; acacia & melaleuca scrub / Succulent steppe; saltbush	AW CAR
Si-9c/Mi-05j	Mosaic: Shrublands; York gum & Eucalyptus sheathiana mallee scrub / Medium woodland; salmon gum & gimlet	AW
Si-11a/Mi-06n	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila /Medium woodland; salmon gum & red mallee	COO MAL
Si-11d/Mi-05f	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & black marlock / Medium woodland; York gum & salmon gum	AW MAL
Si-11d/Mi-05g	Mosaic: Shrublands; mallee scrub Eucalyptus eremophila & black marlock / Medium woodland; salmon gum & morrel	MAL

Table 11b continued

Si-13d/Mi-05i	Mosaic: Shrublands; mallee scrub, redwood & black marlock / Medium woodland; wandoo & gimlet	AW MAL
Si-13a/Mi-09a	Mosaic: Shrublands; mallee scrub, black marlock / Medium woodland; yate	ESP
Si-13e/Mi-05g	Mosaic: Shrublands; mallee scrub, redwood / Medium woodland; salmon gum & morrel	MAL
Si-13d/Mi-05d	Mosaic: Shrublands; mallee scrub, redwood & black marlock / Medium woodland; salmon gum	AW MAL
SZ-03i/Lp-01e	Mosaic: Shrublands; scrub-heath / Sparse low woodland; wandoo & powderbark wandoo	AW
SZ-03j/Sc-04a	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	AW MAL
SZ-03j/Sc-04b	Mosaic: Shrublands; scrub-heath / Shrublands; Allocasuarina campestris thicket	AW MAL
SZ-03j/Si-02y	Mosaic: Shrublands; scrub-heath / Shrublands; acacia various species scrub	CAR
SZ-03a/Sp-01g	Mosaic: Shrublands; scrub-heath on coastal association / Shrublands; acacia patchy scrub	GS
SZ-03j/Zc-02a	Mosaic: Shrublands; scrub-heath / Shrublands; dryandra heath	SWA
Zc-01a/Sc-02h	Mosaic: Shrublands; Acacia lasiocarpa & Melaleuca acerosa heath / Shrublands; Acacia rostellifera & Acacia cyclops thicket	SWA
Kgl-01a/Hl-04d	Mosaic: Grasslands, short bunch grass savanna, low tree, Mt House box & bloodwood over enneapogon short grass / Hummock grasslands, open low tree-steppe; snappy gum over T. wiseana & T. intermedia	CK OVP
Gc-02a/Hi-06a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex Triodia pungens	CAR DL NK PIL
Gc-02a/Hi-08a	Mosaic: Short bunch grassland - savanna /grass plain (Pilbara) / Hummock grasslands, grass steppe; hard spinifex Triodia wiseana	PIL
Hl-03b/Hs-01e	Mosaic: Hummock grasslands, open low tree steppe; desert bloodwood and feathertop spinifex (on) sandhills / Hummock grasslands, shrub steppe; mixed shrubs over spinifex between sandhills	CR GD GSD LSD TAN
Mi-06u/Ci-05a	Mosaic: Medium woodland; goldfield eucalypts / Succulent steppe; saltbush, with open low woodland; myoporum	COO NUL
Sp-01b/Ci-02b	Mosaic: Shrublands; Acacia sclerosperma sparse scrub / Succulent steppe; saltbush & bluebush	CAR
Ci-03a/Sp-01e	Mosaic: Succulent steppe; bluebush / Shrublands; Acacia sclerosperma, A. victoriae & snakewood scrub patches	CAR
Sp-02a/Ci-04a	Mosaic: Shrublands; melaleuca patchy scrub /Succulent steppe; samphire	AW

Table 12. Summary of the distribution of vegetation types that are under-represented in the conservation reserve system. Distribution is in terms of occurrence in IBRA Regions (see Figure 6) ordered by absolute number of poorly conserved vegetation types (column 4).

IBRA Region		Types <10% reserved	Types Unreserved	Total of Types under-represented in reserves	% Types under-represented of Total in Region	Total of Types in Region
Avon Wheatbelt	AW	90	38	128	84	152
Murchison	MUR	36	73	109	93	117
Carnarvon	CAR	44	52	96	86	112
Coolgardie	COO	48	33	81	87	93
Pilbara	PIL	26	51	77	88	87
Mallee	MAL	49	20	69	78	88
Dampierland	DL	21	57	68	84	81
Ord-Victoria Plains	OVP	11	56	67	94	71
Central Kimberley	CK	13	49	62	94	66
Gascoyne	GAS	23	36	59	88	67
Yalgoo	YAL	26	31	57	89	64
Geraldton Sandplains	GS	36	19	55	65	85
Jarrah Forest	JF	Data incomplete				
Great Sandy Desert	GSD	17	26	43	94	46
Swan Coastal Plain	SWA	25	14	39	68	57
Esperance Plains	ESP	29	1	30	60	50
Victoria Bonaparte	VB	15	12	27	84	32
North Kimberley	NK	13	12	25	86	29
Great Victoria Desert	GVD	15	9	24	86	28
Little Sandy Desert	LSD	16	7	23	82	28
Tanami	TAN	6	16	22	96	23
Nullarbor	NUL	12	9	21	95	22
Tanami	TAN	6	16	22	96	23
Gibson Desert	GD	13	5	18	86	21
Central Ranges	CR	9	9	18	95	19
Warren	WAR	Data incomplete				
Hampton	HAM	4	0	4	57	7

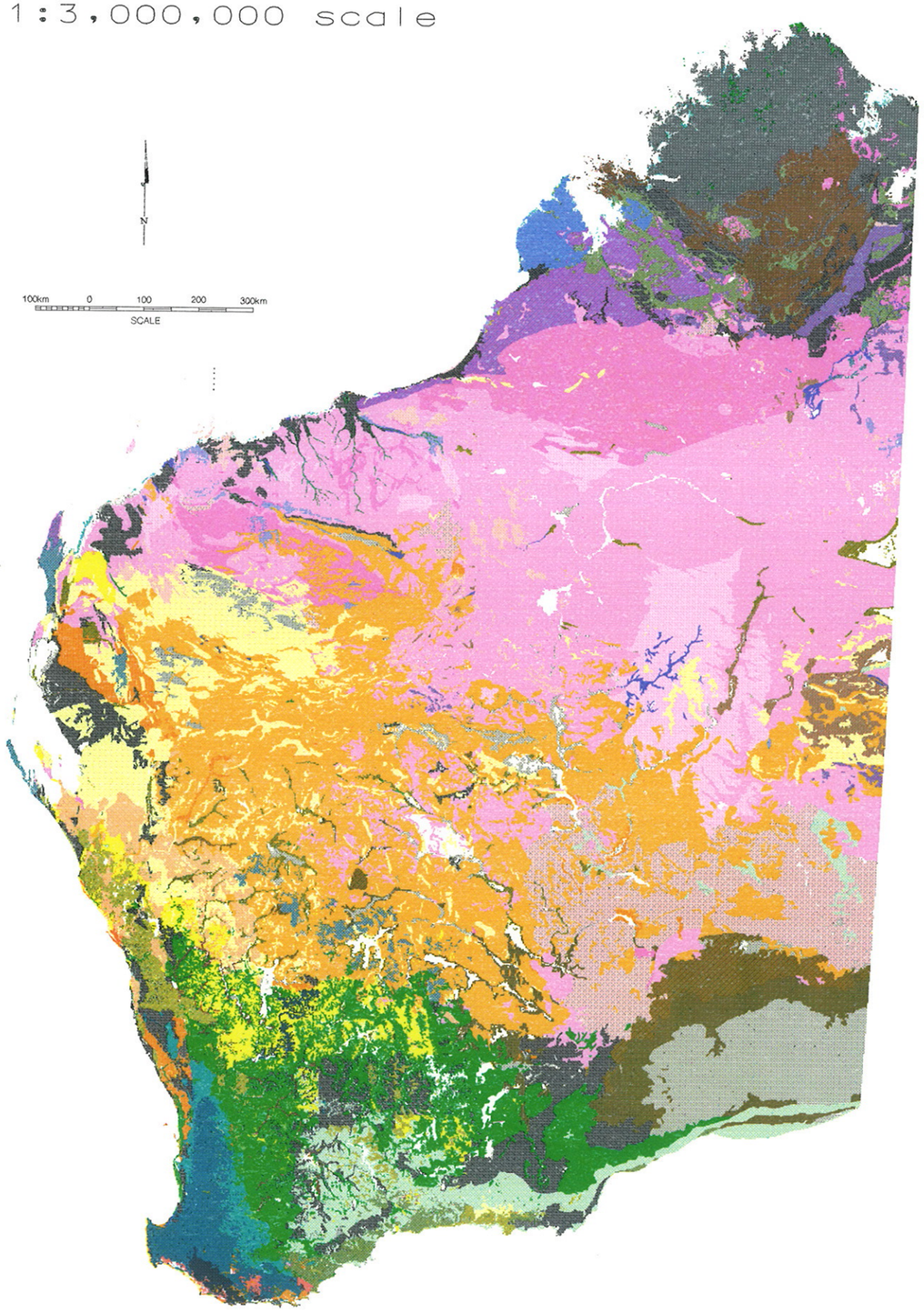
3.6 Vegetation Map of Western Australia

The new colour vegetation map for Western Australia has been developed at a level of detail appropriate for publishing at the 1:3,000,000 scale (Figure 5). The key on the version included in this report shows 48 colours, but the final map will show 49 colours — one fewer than the number of Supergroups derived in the vegetation taxonomy discussed earlier because there are no polygons for the Herbfield Supergroup. When published, each mosaic unit will be striped with the colours of the component Supergroups.

3.7 Interim Biogeographic Regionalisation for Western Australia

The spatially corrected version of the Western Australian portion of the Interim Biogeographic Regionalisation for Australia is shown in Figure 6. The digital version is being supplied to Environmental Resources Information Network (ERIN) with this report.

Figure 5. Coloured map of the vegetation of Western Australia at the level of detail appropriate for publication at the 1:3,000,000 scale



Legend

- Tall forest; mainly karri
- Tall woodland; tuart
- Forest; jarrah-marri-wandoo
- Woodland; jarrah-marri-wandoo
- Woodland; other
- Open woodland
- Medium-Low woodland
- Low dense forest & Low forest
- Low forest & woodland; mainly jarrah
- Low woodland; mulga
- Low woodland; other
- Thicket with scattered trees
- Low forest/thicket mangrove
- Tree heath
- Acacia scrub with scattered trees
- Mallee scattered trees
- Scrub acacia & other spp
- Thicket
- Mallee
- Open scrub
- Mallee heath
- Scrub-heath
- Heath
- Dwarf scrub
- Grasslands, high grass savanna
- Grasslands, tallbunch grass savanna
- Grasslands, short bunch grass savanna
- Grasslands, curley spinifex savanna
- Sedgeland with trees
- Sedgeland (mainly in the south west)
- Short grassland (north)
- Pindan with medium trees
- Pindan with low trees
- Tree steppe
- Low tree steppe
- Sparse tree steppe
- Tree & shrub steppe
- Shrub steppe
- Sparse shrub steepe
- Grass steppe
- Spinifex complexes
- Succulent steppe with scattered trees
- Succulent steppe with thicket & scattered trees
- Succulent steppe with sparse low trees
- Succulent steppe with scrub
- Succulent steppe
- Mosaics
- Bare areas, rocks, salt lakes, mudflats

Reference

Projection: Universal Transverse Mercator.
Grid: AMG zone 50.

Acknowledgements

This map has been derived from the original Beards vegetation linework, with a 1000 metre grid spacing, created by the Intergraph Grid Analyst software. GIS by J. Coker. Produced by the Spatial Resource Information Group.

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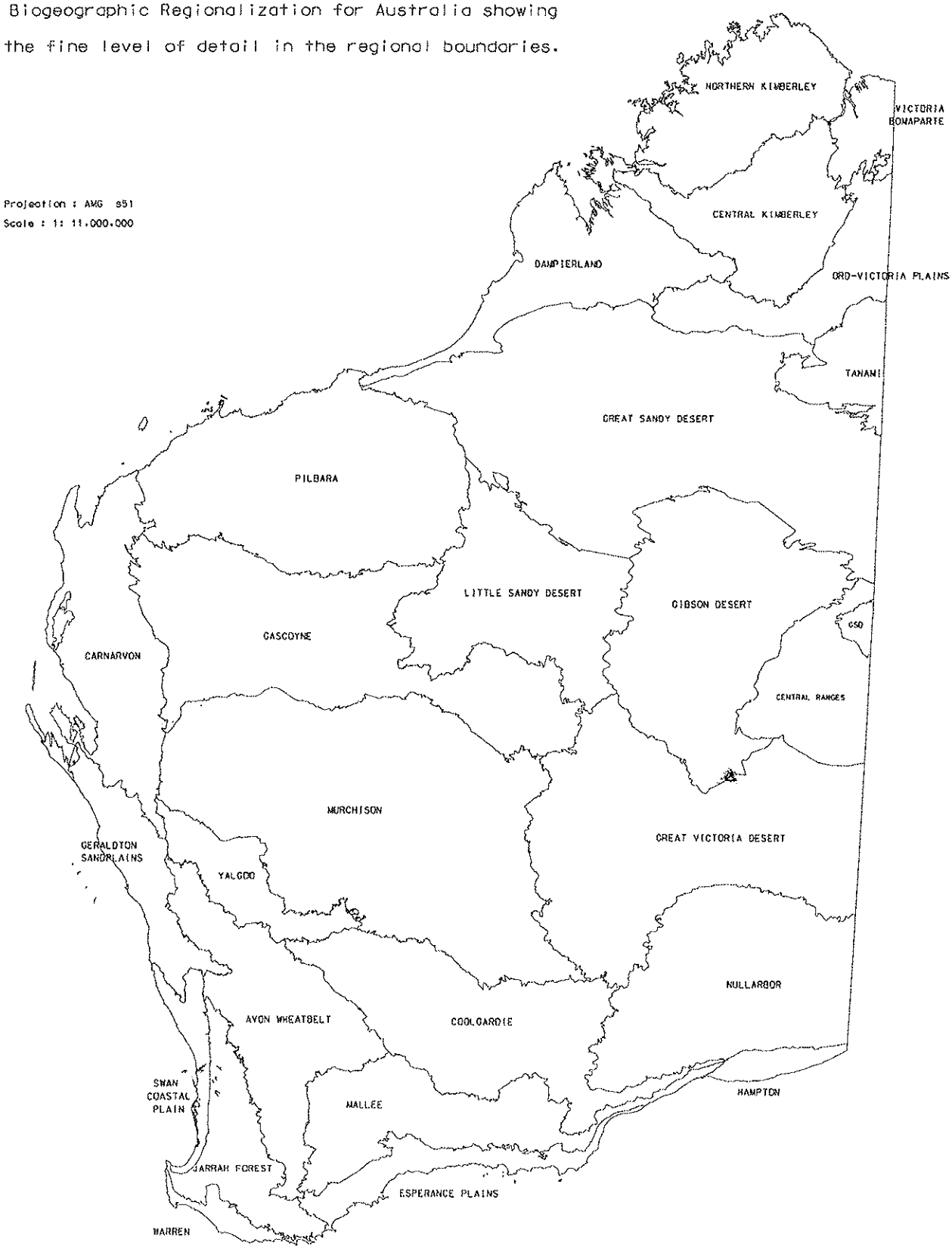
WESTERN AUSTRALIA

Figure 6. Spatially corrected version of the Interim Biogeographic Regionalization for Australia showing the fine level of detail in the regional boundaries.



4. Discussion

This project has identified major gaps in the existing conservation reserve system with about half the Types defined in the vegetation taxonomy being unrepresented and a further 200 plus being represented but at $<10\%$ of their original areal extent. The gaps are distributed throughout the State but they are most numerous in the Avon Wheatbelt, Murchison, and Carnarvon IBRA regions with substantial numbers in Colgardie and Pilbara regions. In proportional terms, Tanami, Central Ranges, Nullarbor, Ord-Victoria Plains, Central Kimberley, Great Sandy Desert and Murchison regions are poorly reserved.

The finding that the reserve system is incomplete is not new: the point has been made through the reviews conducted by Specht *et al.* (1995) and Thackway and Cresswell (1995) and it is also tacitly acknowledged by the fact that there is an on-going reserve acquisition program within the Department of Conservation and Land Management and the State Government as a whole (DCALM 1992a). The terrestrial component of the reserve system for the whole State includes only 6.7% of the total land area, whereas the notional target which has been applied to date is 10%.

The locations of the gaps in the reserve system identified in this study can be compared with gaps previously identified (Thackway and Cresswell 1995). IBRA regions with few or no reserves, Tanami and Central Ranges, or with a very low proportion of area in reserves, Murchison, Avon Wheatbelt, Pilbara, Great Sandy Desert, Dampierland, Gascoyne and Central Kimberley, are consistently identified (cf Yalgoo). However, this study highlights gaps in Carnarvon, Nullarbor, Ord-Victoria Plains, Yalgoo, Gibson Desert, Great Victoria Desert, Northern Kimberley and Coolgardie that were not prominent in Thackway and Cresswell's (1995) analysis.

Reserve proposals for the Kimberley (Burbuidge *et al.* 1991), and the Department of Conservation and Land Management's Central Forest, Goldfields, South Coast, Southern Forest and Swan Regions (DCALM 1987a,b,c, 1992b, 1994; LFC 1994), and recent purchases of pastoral properties, address some of the inadequacies identified in the analyses reported here.

Detailed interrogation of the database developed through this project will be required to refine knowledge of the critical areas for conservation.

5. Conclusions

This project has provided the impetus and the opportunity to integrate the database on vegetation of the State and to commit substantial time and resources to validating the data. This has involved not only checking the digital data with original map data: it has necessitated development of a new vegetation taxonomy. As a consequence of this background work, we now consider the database to be consistent and reliable, and suitable for the conservation assessment that has been undertaken.

Developments in, and improved availability of, computing and Geographic Information Systems technology now allow analysis of large and complex spatial

data sets. These sophisticated tools have been used in this project to bring together two discrete data sets, pre-European vegetation and up-to-date conservation reserve cadastral data, and to overlay them in order to provide a comlpete description of vegetation types within each reserve as well as an assessment of reservation status of each vegetation type in relation to its occurrence throughout the State. The project is a valuable demonstration of the power of these analytical tools and it has provided results which are of great significance for the design and management of the nature conservation reserve system in the future.

The finding of this study that the reserve system is incomplete is not new. What is new, and a consequence of this project, is the level of discrimination that can now be applied to the identification of the gaps. The data enable Western Australia to advance beyond consideration of issues of comprehensiveness to dealing with issues of adequacy and representativeness and to develop a truly Comprehensive, Adequate and Representative reserve system.

Proposals for additional reserves that have already been made public (eg. DCALM 1987a,b,c, 1992, 1994; LFC 1994) will address some of the gaps identified in this study. Further proposals will flow from a more detailed analysis of our results. But perhaps more importantly, it is now possible to model reserve selection options prior to making land-use decisions anywhere in the State. As opportunities for acquisition of land for nature conservation diminish so there will be an increasing need to chose the best options.

The vegetation database and the results of this project also makes it possible to assign priorities for deployment of scarce resources for managing existing reserves. At the first level of generalisation, vegetation types that are of very limited extent and/or are poorly represented in the reserve system should be the focus of management attention ahead of those that are well reserved.

On-going development of the vegetation database is planned. Maps and tables given in Appendix 2 will be provided to CALM Regional staff and other interested parties for comment and refinement. Other vegetation data sets will be examined and their use in improving this database will be tested. The database has been designed to permit incremental improvement as data at better levels of discrimination become available.

6. Acknowledgements

This project could never have been contemplated, let alone carried out, were it not for the dedication and energy of John Beard in mapping the vegetation of the State of Western Australia in the first instance. John has continued his interest in the vegetation mapping by providing support and encouragement for this project.

The project was funded by the Commonwealth Government through the National Reserves System Cooperative Program which is administered by the Australian Nature Conservation Agency. The Western Australian Departments of Agriculture, Conservation and Land Management and Land Administration have provided the facilities to undertake the work.

Many people have provided welcome advice, technical support, data and/or editorial comment during the project. We thank, in particular, Greg Mlodawski, Les Heinrich, Joe Gentilli, Ric How, John Dunn, Jack Bradshaw, Grant Wardell-Johnson, Allan Burbidge, Andrew Burbidge, Norm McKenzie, Keiran McNamara, Richard Thackway and Ian Cresswell.

Finally we acknowledge the very considerable patience and tolerance that has been displayed by our families during this project.

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