

# The Biodiversity of the Avon NRM Region: Towards Prioritisation for Conservation DRAFT



By

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## Note to Readers and Reviewers of the DRAFT Document:

This is a draft document. It contains most of the analyses and interpretations that will be shown in the final document, but not all

This draft has been released:

- to promote discussion on, and critical review, the data, analyses and interpretations included in this document; and,
  - to inform groups requesting these analyses; and,
- as a plea for information about knowledge and/or programs that have not been included in this draft.

If you have found any omissions or would like to make suggestions, please contact the senior author at [jeff.richardson@dec.wa.gov.au](mailto:jeff.richardson@dec.wa.gov.au) or (08) 9334 0548. The final draft for this document will be submitted by February 2008, comments will be accepted until November 9<sup>th</sup> 2007.

Cover photo: Gimlet (*Eucalyptus salubris*) a distinctive WA Wheatbelt species (Photo by Jeff Richardson).

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## Acronyms

ANDA	Avon Natural Diversity Alliance
ANRMR	Avon Natural Resource Management Region
BHVA	Beard's and Hopkins' Vegetation Associations
CALM	Dept. of Conservation and Land Management (now DEC)
CR	Critically Endangered as per IUCN definitions (see Appendix 1)
DAFWA	Department of Agriculture and Food Western Australia
DEC	Dept. of Environment and Conservation (formerly CALM)
DRF	Declared Rare Flora
DRPF	Declared Rare and Priority Flora
EN	Endangered as per IUCN definitions (see Appendix 1)
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FCO	Flora Conservation Officer
IBRA	Interim Bio-Regionalisation of Australia
IRP	Interim Recovery Plan
LfW	Land for Wildlife
P1-4	Priority Fauna or Flora (see Appendix 1)
PEC	Priority Ecological Community (see Appendix 1.1)
RP	Recovery Plan
RVPS	Remnant Vegetation Protection Scheme
SAP	Salinity Action Plan
TEC	Threatened Ecological Community (see Appendix 1.1)
VU	Vulnerable as per IUCN definitions (see Appendix 1)
WAM	Western Australian Museum
WONS	Weeds of National Significance

## Summary and Recommendations

This study aims to collate, interpret and present biodiversity related data in order to inform and improve biodiversity conservation planning within the Avon Natural Resource Management Region (ANRMR). It does this by:

- a) Collating an inventory of biodiversity assets within the ANRMR.
- b) Determining the condition and trend of these assets, and
- c) Examining current biodiversity conservation practices and programs in context of the assets, their condition and trend.

Recommendations highlight identified shortcomings in existing data and/or in current biodiversity conservation programs to aid in future planning across the ANRMR.

General comments emerging from the study are:

- While we have a general knowledge of the species of the ANRMR, we usually have little knowledge of their status or trend and, particularly for fauna their present distribution.
- There is little knowledge of the type and extent and condition of vegetation communities within the region.
- There are opportunities for synergies between projects for biodiversity conservation in the ANRMR that, as yet, have not been utilised.
- Some projects may need to be reconfigured using the results from this study.
- The analyses/results outlined in this document can be applied at two levels of biodiversity conservation planning: 1) At the asset level the analyses are principally aimed at prioritisation of on-ground works within each asset class, for example rare flora. 2) At the landscape scale, the analyses aim to collating assets spatially to allow for landscape scale conservation planning.

Results of some of the analyses described in this document are already being integrated into biodiversity conservation programs within the ANRMR. For instance:

- The priority Beard and Hopkins Vegetation Associations identified by an expert panel using our analyses of current extent and level of reservation is now being used by the Healthy Ecosystem and Ecoscapes projects.
- A database synthesising the extent/range, threats and associated relevant current biodiversity programs for Declared Rare and Priority Flora has been developed and will soon be used to establish work-program priorities for these assets within the Species and Communities project.

### Findings & Recommendations for each Asset Class

#### *Remnant Vegetation*

There is 16% vegetation cover left in the agricultural zone of the ANRMR represented by 110,000 patches; most of these (nearly 70 000) patches are  $\leq 1$  ha, only 1,189 are more than 100 ha.



*Recommendation: Programs aimed at biodiversity revegetation should engage with existing similar programs such as the Roadside Vegetation Conservation Committee and Land for Wildlife and be cognisant of older programs such as the Remnant Vegetation Protection Scheme. The output from the analyses described in this document are typically spatial simplifying these links.*

#### *Beard's and Hopkins' Vegetation Associations (BHVA)*

The ANRMR contain 137 BHVA of which:

- 42 have 100% of their current extent remnant within the ANRMR; another four BHVA have more than 95% of their current remnant extent within the ANRMR.
- 17 of these have  $\leq 10\%$  of their original WA extent remaining.
- 53 are limited in extent ( $< 2000$  hectares in the ANRMR or WA); however, 14 of these always had a limited extent. Twenty-nine have  $< 2000$  hectares in WA.
- 31 are not represented and another 76 have  $< 15\%$  of their pre-European extent represented within the IUCN reserve categories I-IV within the State.
- 56 are limited in extent *and* poorly reserved. These are limited in present extent ( $< 2000$  ha and/or  $\leq 10\%$  of pre-European extent remaining in NAR or the State) and are poorly reserved (unreserved or  $< 15\%$  of pre-European extent reserved in NAR or the State).

A workshop aimed at prioritising BHVA of concern identified 33 high priority BHVA. From this workshop came a suite of recommendations aimed at improving our knowledge of the extent and types of BHVA.

*Recommendation: That the recommendations from the BHVA workshop be implemented.*

#### *Threatened Ecological Communities and Communities at Risk*

- There are 11 known Threatened Ecological Communities (TEC) and 34 known Priority Ecological Communities (PEC) within the ANRMR.
- Two of the TEC (Perth to Gingin Ironstone Association and Lake Bryde) are endemic to the ANRMR.
- All five of the Critically Endangered TEC in the ANRMR have recovery plans, one (Lake Bryde) is not recognised under Commonwealth EPBC legislation.
- Two of the three Endangered TEC have recovery plans, only one is recognised under Commonwealth EPBC legislation.
- None of the three Vulnerable TEC have recovery plans or are recognised under Commonwealth EPBC legislation.

There is no consistent monitoring of the condition and trend of TEC or PEC of the ANRMR, thus we cannot report specifically on condition and trend of these communities.

#### *Recommendations:*

- *That a prioritisation process be developed to investigate the need for recovery actions (starting with a recovery plan and subsequent listing under the EPBC Act) for these communities.*
- *That the conservation status of TEC and PEC communities be reviewed.*

- *That condition indices are developed and trend monitoring of these communities be established.*
- *That the descriptions of TEC and PEC are given to field based staff to aid them in identifying new occurrences of these communities.*

#### *Plants and allied taxa*

- The region has 4983 current taxa, including 4267 formally recognised species and 307 undescribed species.
- A full 37% of Western Australia's dicotyledon plants are found within the ANRMR.
- 8% of the ANRMR vascular taxa are Declared Rare or Priority Flora (DRPF)

#### *Endemic flora*

- 416 taxa are endemic to the ANRMR;
- Over ½ of these are threatened or priority taxa, and two are considered extinct.
- 64 of the endemic taxa are known from a single voucher; this includes 2 species of DRF and 41 other taxa that are not considered Rare or Priority.

#### *Declared Rare or Priority*

- There are 2556 populations of 394 taxa of DRPF within the ANRMR; all of these are vascular plants.
- The ANRMR has a relatively high number of Western Australia's Declared Rare and Priority Flora (DRPF) taxa and populations: 34% and 24% respectively.
- 26 of these are only known from a single population; 20 of these are Priority taxa.
- Of the remaining taxa (those with greater than one population), 16 are known from an extent of <1 kilometre.
- 19 DRPF taxa have not been fully described (having manuscript names only). One of these is Critically Endangered.
- 11% of ANRMR DRF and 16% of Priority flora populations are on road verges.

While there is regular monitoring of DRPF, this information does not readily convert into measures of status, trend or condition.

#### *General DRPF flora recommendations:*

- *That DRPF prioritisation database developed as part of this document be employed in prioritising recovery actions and for reviewing the conservation status of taxa.*
- *That monitoring protocols be established that identify thresholds for action for DRPF taxa.*
- *Reviewing the conservation status of, in particular, those priority taxa considering with few known populations. We also recommend that the number of populations be used in a prioritisation across all DRPF.*
- *It is recommended that the taxonomy of those species be resolved that are not fully described (i.e. have manuscript names only) is resolved.*

## Fauna

NB: The fauna results presented here should be considered as preliminary only.

There are 1197 fauna species considered to be extant in the ANRMR; this consists of: 22 species amphibian, 165 species of birds, 19 species of fish, 56 species of mammal, 121 species of reptile and 814 invertebrates.

For some species we have an indication on their trend:

- 68% of the amphibians have decreased, the condition for 27% is unknown and 1 species is considered stable.
- 26% of the birds are increasing, 48% are, or have, decreased, and 10% are considered stable.
- 67% of mammals are, or have, decreased, 13% are stable and 14% are increasing (most of these increasers are introduced herbivores).
- 60% of the reptiles are, or have, decreased, 29% are considered stable, and 2% are considered increasing.

There are 66 species of Threatened, Priority and Specially Protected fauna in the Avon NRM Region.

Four of these species are considered extinct (all mammals), 25 species are Threatened with extinction, 34 are Priority species and three are Specially Protected.

The mammals constitute the greatest number of Threatened and Priority species in the ANRMR, 11 and 9 species respectively.

Specific recommendations for fauna are:

- *Improve collation of Threatened and Priority fauna records through the development and enforcement of protocols of reporting for consultants and researchers.*
- *It is recommended that the current locations of Tammars and Quendas across the ANRMR be resolved.*
- *The remaining Water-rat records for the ANRMR (near the town of York) be re-confirmed.*
- *Need further investigation into a number of species to improve currency of information such as the bees. For instance, the Endangered bee, *Leioproctus douglasiellus* is only known from a single 1954 record. We should assume that this species may still be extant within the region but recommend some work to confirm this.*
- *Some bird species (such as the Australian Painted Snipe) have been only recorded recently and/or occasionally within the ANRMR. These records highlight the informal nature of bird survey and limited understanding of some birds across the wheatbelt. Because of this we recommend the engaging with the community to do regular bird surveys across this large area.*
- *There is only one post-1980 record of the Bilby (*Macrotis lagotis*) in the ANRMR: a 2003 record 5.5 kilometres from Chiddarcooping Nature Reserve. This record may warrant further investigation, as previous records are all quite old.*
- *Need to review Numbat recovery actions to determine the status of the species in the ANRMR.*

## 1. Introduction

The South West Botanical Province of Western Australia is one of the world's biodiversity hotspots. The region earned this appellation through its high species diversity, its high level of endemism and the high level of threat to these values (Myers *et al.*, 2000). The area is known to have over 5000 plant species, of which over 4000 are endemic and it has a diverse range of vertebrate and invertebrate fauna that are found nowhere else (Myers *et al.*, 2000). These biodiversity values, though, are under substantial threat. The region has endured considerable clearing of vegetation, a subsequent rising of the water table, and the introduction of vertebrate pests has led to declines and, in some cases, regional and national extinctions of fauna. The south-west of Western Australia is also one of the six most vulnerable of the world's biodiversity hotspots to climate change (Malcolm *et al.* 2006). Thus, we have a globally significant area under numerous pressures and threats. The Avon Natural Resource Management Region (ANRMR) is centred on the central/southern Wheatbelt and straddles this globally significant area (Map 1).

Acknowledging the global significance of the region the Avon Catchment Council (ACC) has provided substantial investment through the State and Australian Governments Natural Heritage Trust and the National Action Plan for Salinity and Water Quality for biodiversity conservation. These funds are devolved through a consortium of government and non-government organisations that have joined forces to improve conservation across the ANRMR. This consortium is called the Avon Natural Diversity Alliance (ANDA) and includes the Department of Environment and Conservation, the Department of Water, WWF Australia and Greening Australia WA. ANDA is charged with improving nature conservation outcomes across the region. It aims to achieve this by developing and managing a range of projects that operate at the species, biological community, ecosystem and landscape levels of biodiversity organisation. To inform these projects a Baseline Project was developed.

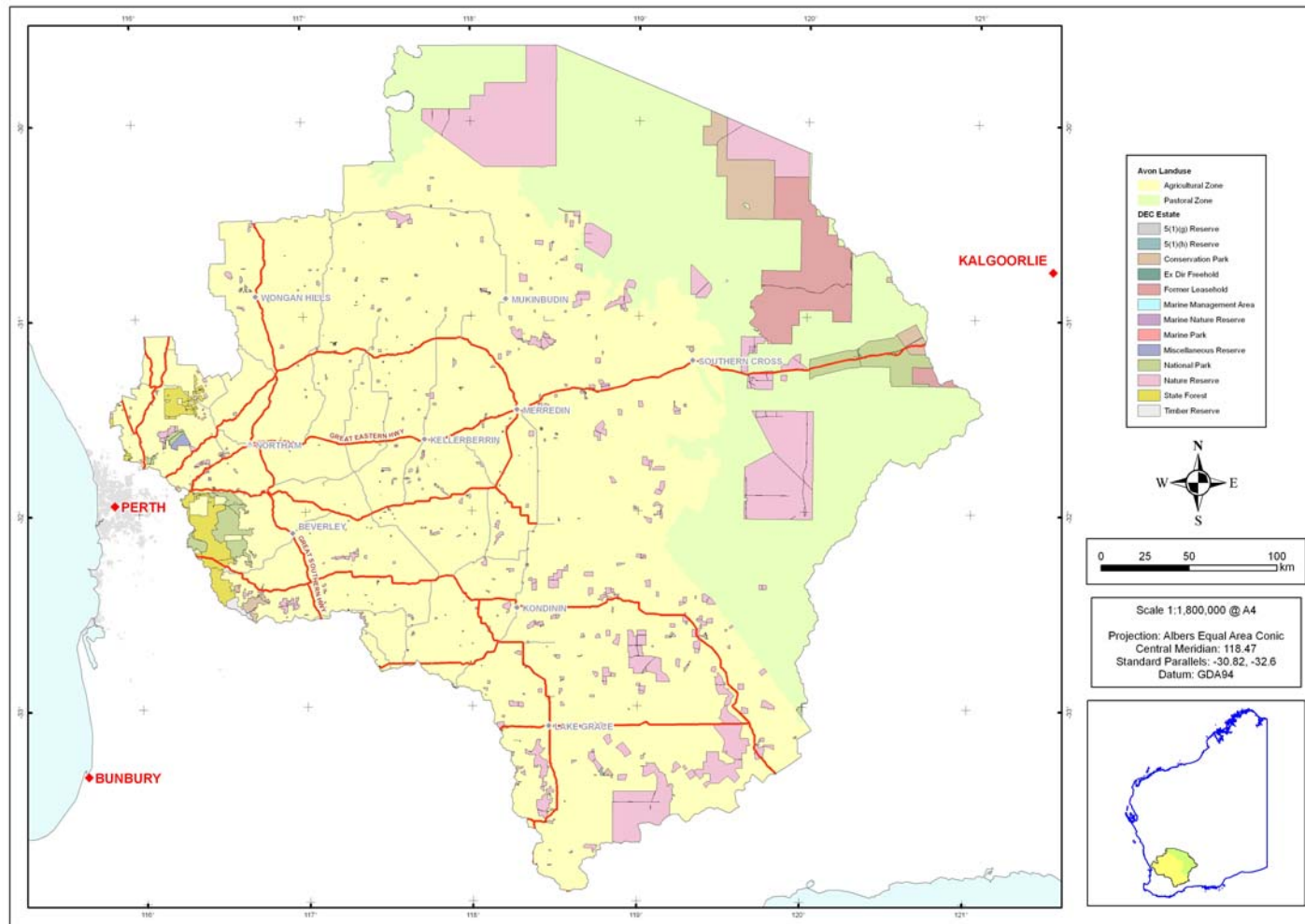
One of the major tasks for Baseline is to inform other projects within ANDA of biodiversity assets, threats and existing biodiversity related programs within the ANRMR; and this represents the primary intent of this document. Specifically, this document focuses on collating and interpreting existing biodiversity-relevant-information in such a way that these other groups can prioritise their works programs.

This document does not intend to review all the known threats across the region. Rather it collates those knowledge and data that are useful for a landscape scale biodiversity prioritisation planning program. Within that framework, this document has several intents. It aims to present summary statistics of the regional biodiversity assets, the threats operative on these assets and the in-place and historic programs aimed to preserve these assets. Specifically, this document will:

- Collate and summarise existing knowledge of the location and status and trend of biodiversity assets across the ANRMR.
- Identify those assets known to be of-concern identified by their current conservation status, the literature and from analyses done as part of this project.
- Map extent of assets and the intensity of threats to these assets.
- Identify historic and existing programs aimed at conserving these assets.

- Where appropriate make recommendations on further actions to conserve these assets.

As the data used here are updated regularly the results and interpretation presented here should be seen as a snapshot in time. However, we acknowledge that to retain biodiversity assets of the ANRMR is a long-term challenge. Thus, we attempted to explain our data sources and analyses as clearly as possible so that they can be repeated at a later time.



Map 1: The Avon Natural Resource Management Region.



## 2. Methods and Data Sets

This section identifies the custodian and provenance of data and the analyses used in this report. The date attributed to the dataset follows the dataset name in parentheses.

### 2.1 Relevant Existing and Historic works

This section identifies programs (whether extant or historic) that do or aimed to contribute to biodiversity conservation within the ANRMR. Not mentioned specifically in this section but incorporated within the Assets Section (Section 2.3) is some of DEC's core business: flora and fauna conservation programs.

#### 2.1.1 Land for Wildlife

Land for Wildlife (LfW) locations data was sourced from Avril Baxter on 14/05/07. This not the full data set for the ANRMR but should be seen as an interim list of locations. It is thought that the full data set will be available for the final version of this document. Custodian of this data is Penny Hussey at DEC's Species and Communities Branch.

#### 2.1.2 Remnant Vegetation Protection Scheme

The Remnant Vegetation Protection Scheme was started *c.* 1988 and aimed at getting covenants under the *Soil and Land Conservation Act 1945*. The custodian for these data is DAFWA.

#### 2.1.3 Roadside Vegetation

Of the 43 Shires wholly or partially within the ANRMR, 21 have had the roadside vegetation wholly or partially surveyed. Of these 11 are provided to identify the summary statistics available from the data. These 11 Shires are those that are both 100% within the ANRMR boundary and have a published report with summary tables from the RCC.

Those Shires excluded are: Brookton, Bruce Rock, Corrigin, Cunderdin, Kellerberrin, Kondinin, Koorda, Lake Grace, Merredin, Narembene, Northam, Quairading, Tammin, Westonia, Yilgarn, Chittering, Kulin, Pingelly, Kent, Swan, Wickipin, Mundaring, Coolgardie, Dumbleyung, Wandering, Gnowangerup, Cuballing, Ravensthorpe, Gingin, Wanneroo, Dundas, Jerramungup.

The methods used for assessing conservation value of roadside vegetation are outlined in Jackson (2002). This methods defines 12 value categories based on weediness, width of vegetation, number of strata and species richness. These categories are typically grouped into four categorical classes of conservation value: conservation value rating 1 to 4, is considered low conservation value; rating 5-6 medium-low; rating 7-8 medium-high; rating 9-12 is high conservation value.

#### 2.1.4 Salinity Action Plan Sites

The Salinity Action Plan (SAP) sites are study sites from the Wheatbelt biological survey (Keighery *et al.*, 2004). Two types of sites are defined: aquatic and terrestrial. These data are retained by DEC.

### 2.1.5 ANDA Programs

The Avon Natural Diversity Alliance (ANDA) programs location are shown here for completeness; this does not constitute a review of the ANDA program.

The Terrestrial component of Healthy Ecosystems data was collated in July 2007, these are the location as measured by actual signed landholder agreements (VMAs or covenants) spanning the life of the Woodland Watch project and merging into the current project of Healthy Ecosystems: 2000-2007.

The Aquatic component of Healthy Ecosystems data was collated in June 2007. These are the locations of planning, baselining and on-ground actions since 1995.

The Ecoscapes project locations were collated in June 2007.

### 2.1.6 Vegetation Mapping

There are numerous vegetation maps across the ANRMR. These are presently being collated, digitised and attributed as part of the Baselining project.

### 2.1.7 Other Programs

Some programs such as the Save the Bush program data are not available. This program was a percussor to Bushcare and may identify locations where federal government money has been allocated for on ground works.

There are two nature conservation focused covenanting programs operative in the south-west of Western Australia: covenants through the Department of Environment and Conservation and those available through the National Trust. The number and location of these covenants were acquired through the Nature Conservation Branch of DEC in June 2007.

## 2.2 Landscape Scale Threats

The intent of this section is not to review all the known threats across the region. The intent of this document is not a review of all biodiversity related assets and processes but rather a pragmatic collation of data and information that is useful for a landscape scale biodiversity prioritisation planning program.

### 2.2.1 Salinity

Salinity mapping came from two datasets derived from the Landmonitor project (<http://www.landmonitor.wa.gov.au/index.html>). One is a derived at risk of salinity model using digital elevation modelling height above streamline as the index of salinity risk. It allocates pixels to fixed height intervals above streamlines namely <.5, <1m, <1.5m and <2m. The other dataset is the 'salinity monitoring product' which indicates the extent of salinity in the years 1987-1998.

### 2.2.2 Phytophthora Dieback

Dieback records are being collated as part of the dieback atlas that may be finished by the end of 2007.

## 2.3 Assets

### 2.3.1 Pre-European and Remnant Vegetation

Pre-European vegetation (September 2006) and Remnant Vegetation datasets (September 2006) were used to derive change in vegetation extent since European settlement (defined as pre-1750). These analyses are based on the vegetation association concept which has been spatially captured on Beard's and Hopkins' database (BVHA; Hopkins *et al.*, in prep.). Beard's Vegetation Associations were mapped by John Beard in the 1970s. This mapping is generally at the scale of 1:250000.

To separate the cleared from the uncleared areas the above analyses were performed on the intensive and extensive land use zones (i.e. on the cleared and uncleared parts of the ANRMR respectively). The boundary between these two zones is defined by the Department of Agriculture and Food's "Clearing Line - South Western Australia" dataset (October 2002).

To remove the potential impact of small areas the above areas were rounded down to the nearest whole number. Each vegetation association with a remaining extent of <10 ha was examined to see if the record was erroneous, otherwise all records were taken as correct.

Percentage of original remaining vegetation was calculated as current extent expressed as a percentage of pre-European extent in each area (agricultural, pastoral and total in WA).

To determine the reserve status for each vegetation association two types of data were used. Firstly, DEC Tenure with IUCN Categories I-IV (June 2006). These are terrestrial protected areas managed specifically for nature conservation as outlined in IUCN (1994); specifically they include National Parks, Nature Reserves, Conservation Parks and Forest Conservation Zones to be classified under section 62 of the CALM Act. The other tenure grouping used is DEC managed lands as per section 33(2) of the CALM Act; these are Unallocated Crown Lands managed by DEC.

In forests, it is considered that 15% of pre-1750 extent should be protected in a reserve system (JANIS, 1997). We defined vegetation associations with less than 15% of pre-European extent within the reserve system as poorly reserved. Thresholds of  $\leq 10\%$  and  $\leq 30\%$  of pre-1750 extent define endangered and of-concern vegetation associations respectively (EPA, 2000).

The amount of each vegetation association within IUCN I-IV reserves and DEC-managed estate were calculated as a percent of its pre-European extent. These results were rounded down to the nearest full number, thus associations with <1% in IUCN and DEC managed lands are recorded as having 0% reserved. These analyses were done separately for ANRMR and the State, the former using present vegetation association extent in reserves in ANRMR divided by ANRMR pre-European extent; the latter using State values.

In order to present a summary of vegetation associations status, a summary table was calculated using criteria of vegetation associations with limited extent ( $\leq 2000$

hectares remaining), endangered ( $\leq 10\%$  of original extent remaining) and poorly reserved ( $<15\%$  in reserves IUCN I-IV) at either the State or ANRMR level.

To develop an understanding of the perimeter/area relationship of patches of remnant vegetation a measure of compactness was derived for each patch of remnant vegetation. For our purposes using compactness was found to be the only consistent measure of shape of patches of remnant vegetation.

The formula for compactness is:

$$CF = (4 * \pi) * A / P^2$$

Where:

CF is compactness

A is area of patch ( $m^2$ )

P is perimeter of patch (m).

The values for Patch Compactness will be between 0.0 and 1.0. The most compact geometric shape being a perfect circle. A value close to 1.0 will have a large perimeter to area ratio, large core area and will be roughly square to circular in shape. Conversely a value closer to 0 will have a very small perimeter to area ratio and are either long thin patches or blockier polygons but with convoluted and/or highly corroded boundaries (see Appendix 2.1).

### 2.3.2 Threatened Ecological Communities and Communities at Risk

Data was sourced from DEC's Species and Communities Branch's Threatened Ecological Database on the 28<sup>th</sup> March 2007. These records are all the identified Threatened and Priority Ecological Communities across Western Australia.

To flag other TEC or PEC that may occur but are, as yet, unrecorded within the ANRMR a 20km buffer was used.

### 2.3.3 Plants and Allied Taxa

Flora data was acquired from two sources. Those taxa considered Threatened or Priority were accessed from DEC's Species and Communities Branch on 13<sup>th</sup> of December 2006. These data represent the known locations of Threatened and Priority plant species across the State. These data were clipped to the ANRMR boundary. The other source of plant data was from the WA Herbarium, these data were acquired from the Western Australian Herbarium on the 18<sup>th</sup> of September 2006.

The list of taxa from the ANRMR was derived from the WA Herbarium data.

The estimation of the range of taxa was derived to identify a further aspect of threat: a reduced range of a taxon implies higher extinction probability. For this analysis taxa with only a single record or population (as in DRFP) were excluded from the analysis. Using database query the maximum and minimum easting and northing for each taxon was identified. These co-ordinates created a bounding box for each taxon's distribution. The diagonal distance was then calculated using Pythagoras' Theorem namely: Extent = Square Root(((MaxX- MinX)\*(MaxX- MinX))+((MaxY-MinY)\*(MaxY-MinY))). The units for this calculation were in metres.

Endemics were derived using techniques outlined in Hopper and Gioia (in prep.). This analysis was run by Jack Green November 2006.

Density maps of WA Herbarium vouchers used only those vouchers with a precision of 1,2 or3. They were created in Arc-GIS by defining a neighbourhood of 10km around the centre point of a 100m square cell. The number of points that fall within the neighbourhood is totalled and divided by the area of the neighbourhood.

Weed data was derived from the Western Australian Herbarium data. That data contains a field identifying naturalised taxa. To identify weeds of concern the subset of these species that are considered environmental weeds as defined in Keighery and Longman (2004) have been identified.

#### 2.3.4 Fauna

Fauna data was derived from three principle sources. Firstly, those species that are considered threatened or priority (as identified in Schedule 1 of the Western Australian *Wildlife Conservation Act 1950*) is held within DEC's Threatened and Priority Fauna Database. These data are a collation of museum records, opportunistic sightings, published and unpublished records and reports returned by researchers and environmental consultants under scientific licence. This database attempts to retain contemporary location records of these species. These data were acquired on the 20th November 2006 for the ANRMR including a 20km buffer.

Within this data were 38 records of the White-tailed Black Cockatoo (*Calyptorhynchus* sp.). As these data were not attributed to species and could have been either Baudin's Black-Cockatoo or Carnaby's Black-Cockatoo (both resident within the region), these records were excluded from further analysis.

Secondly, bird data (for the ANRMR and a 50km buffer) was acquired from CSIRO at Floreat which is their Birdbank database. This database consists of bird data from:

- the literature since 1865
- CSIRO catchment surveys
- Birds Australia Atlas I (selected records with low locational accuracy)
- Birds Australia Atlas II (records for the SW corner of WA, most with GPS locations)
- unpublished lists of Arnold, Bougher, Brooker, Cale, Chapman, Davis, Garstone, McKenzie, Rowley, Russell, Secomb, Smith and others
- Museum records (for selected bird species)

Thirdly, the Western Australian Museum (WAM) fauna data was acquired for the ANRMR and a 50km buffer. These data are from the museum collections databases, and is across all taxonomic groups. These data were collated on 27/04/07.

Previous work in the ANRMR identified status of vertebrates within the ANRMR boundary; this was developed by a panel with specialist knowledge (see Safstrom *et al.* 2000). The results from this analysis are used here also (with the kind permission of Rod Safstrom) to identify other species of concern that have not been identified as threatened or priority.

Each of these datasets was used independently: Threatened and Priority fauna is derived from DEC's Fauna File data, the list of resident species for the ANRMR is taken from the WA Museum data and the CSIRO bird data.



### 3. Results and Discussion

#### 3.1 Relevant Existing and Historic works

##### 3.1.1 Land for Wildlife

The preliminary Land for Wildlife (LfW) shows that there are 448 members active within the LfW scheme across the ANRMR (Map 2).

##### 3.1.2 Remnant Vegetation Protection Scheme

The objective of the Remnant Vegetation Protection Scheme (RVPS) was to encourage land owners across the southwest of Western Australia to fence and protect areas of remnant vegetation (Hamilton *et al.*, 1991). The scheme ran from 1988-2000. Map 3 shows the generalised locations of the RVPS sites. Which patches of vegetation were given priority to preserve was partly defined by the classes of vegetation (synonymous with vegetation communities). For example, in the central Wheatbelt the very high priority vegetation classes include woodlands of Banksia or Salmon Gum, shrublands on sandy soils and Greenstone or Quartzite outcrops; thus the program has potentially preserved a substantial amount of important vegetation types.

There are a few caveats in using these data. Firstly, many of these sites may be moribund and fences may be down. The sites may be confidential. One of the appendices in an evaluation of RVPS (Hamilton *et al.*, 1991) presents a brief vegetation description of many of the patches protected under this scheme; Mollemans (1992) identifies the 962 bush remnants he surveyed in the southern Wheatbelt for the RVPS. These data would be an important contribution to the vegetation mapping collation presently being undertaken within the Baselineing project (see Section 3.1.6).

Because of the fencing component of this program it may be instructive to re-evaluate these sites to test the effectiveness of fencing and other management actions.

*We recommend that the issues of access to locations and confidentiality be resolved and, if possible, locations of these important sites identified for other projects such as LfW, as well as ANDA projects such as Ecoscapes and Healthy Ecosystems.*

##### 3.1.3 Roadside Vegetation

Because of the extensive clearing across the ANRMR roadside vegetation is often the last indication of what used to be in the region. This has been found useful as benchmark sites. Furthermore, roadside vegetation has been found to be critical for the retention of some birds including breeding sites for the Endangered Carnaby's Cockatoo (Lamont, 1998) and substantial numbers of Rare and Priority flora populations are found in these remnants (see Figure 4, Section 3.3.3.3).

Eleven of the 43 Shires within the ANRMR fitted the criteria for summarising here (see Section 2.1.3). Most surveys are quite recent, 9 of the 11 started on or after the year 2000. Over 8500 km roads surveyed within these 11 Shires. Forty-two percent of sampled roadsides in the selected Shires are considered of high conservation value (Table 1, Map 4). Nineteen Shires within the ANRMR boundary have not been surveyed.

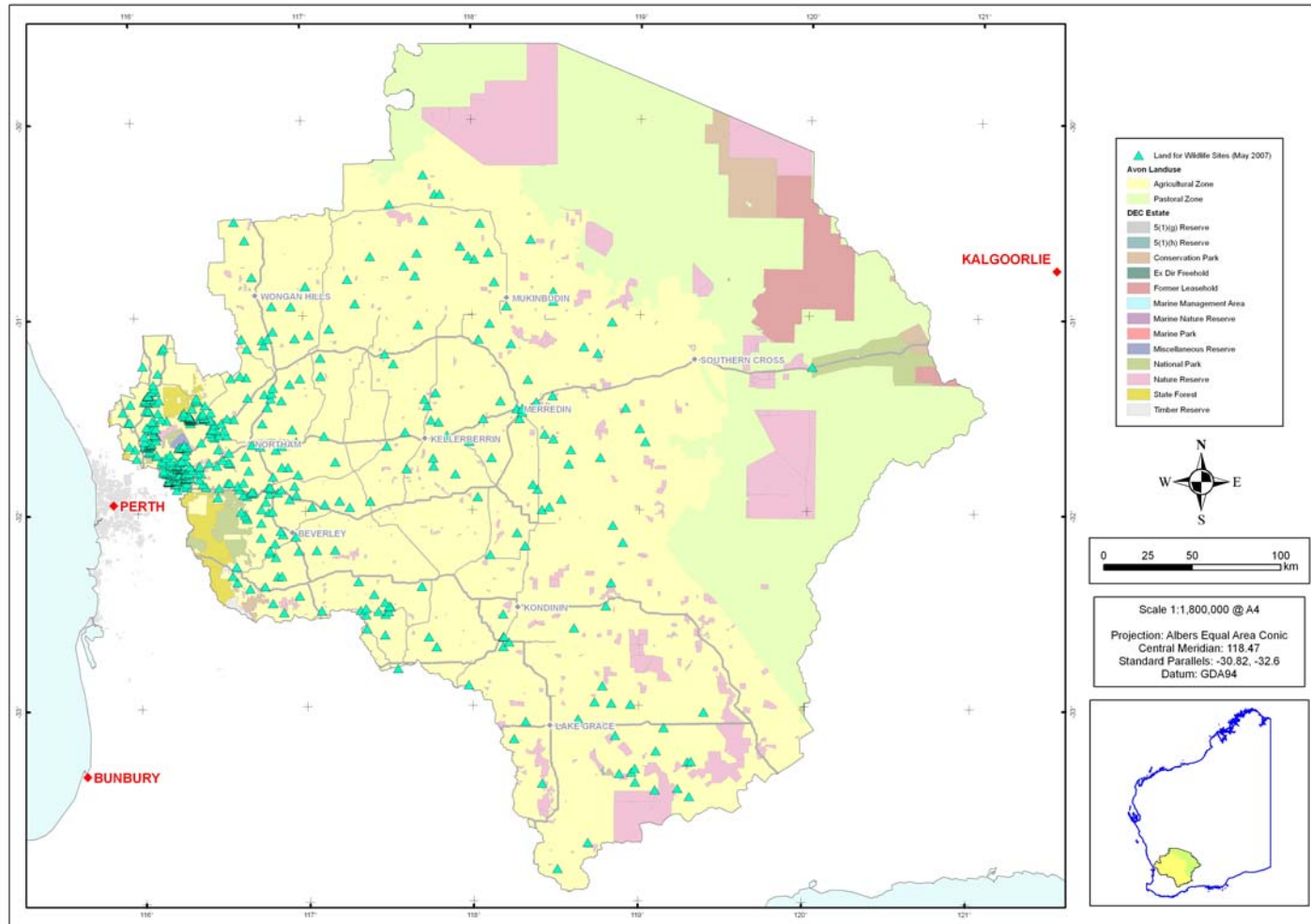
*It is recommended that:*

- *Road corridors are considered in landscape scale conservation planning particularly where they have the potential to link large patches of remnant vegetation.*
- *That the Shires that have not been surveyed are.*

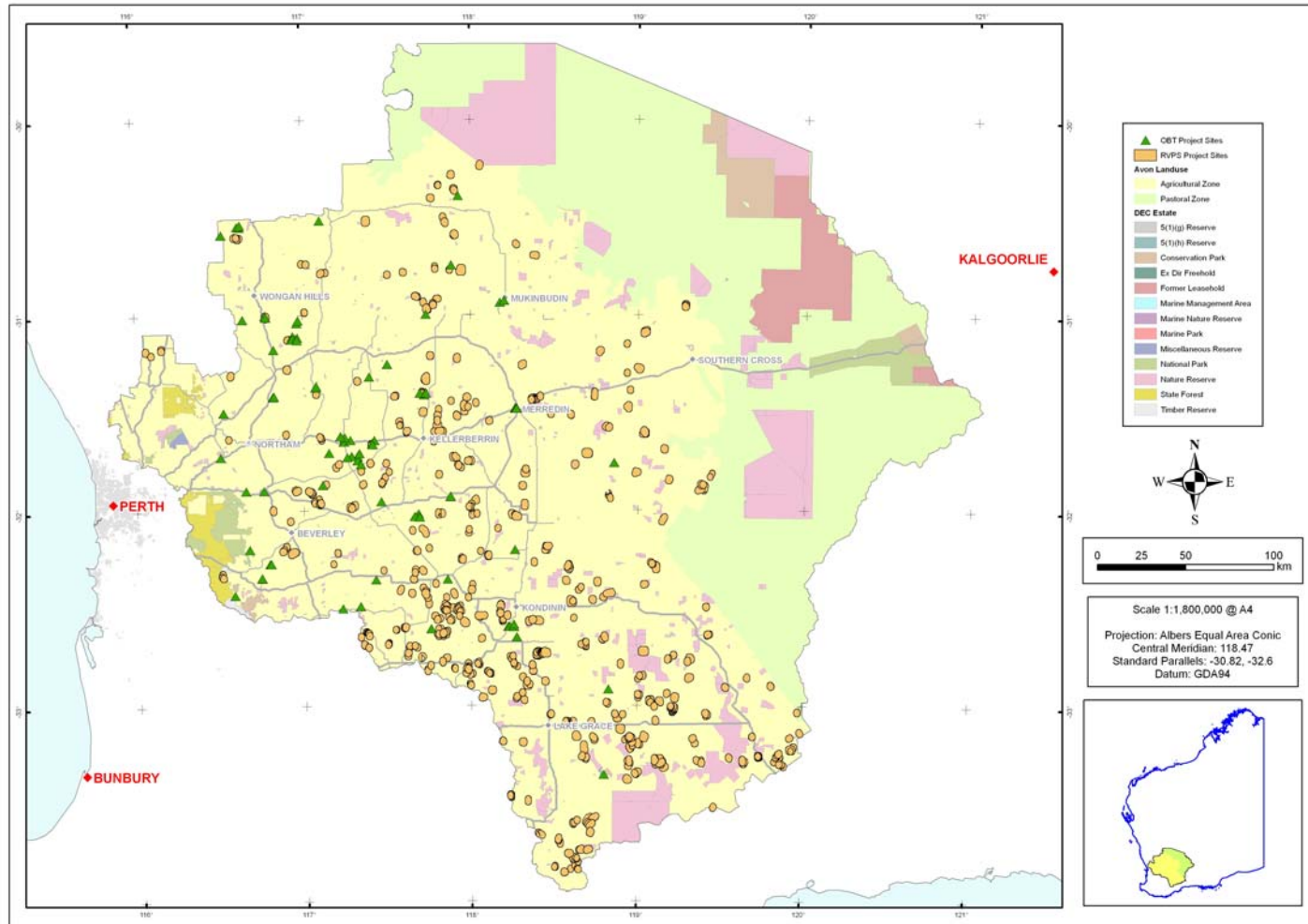
Table 1: Summary of conservation value categories of roadside vegetation in selected Shires within the ANRMR.

<sup>1</sup> CV stands for conservation value a relative measure of the conservation value of a particular section of road (see Section 2.1.2).

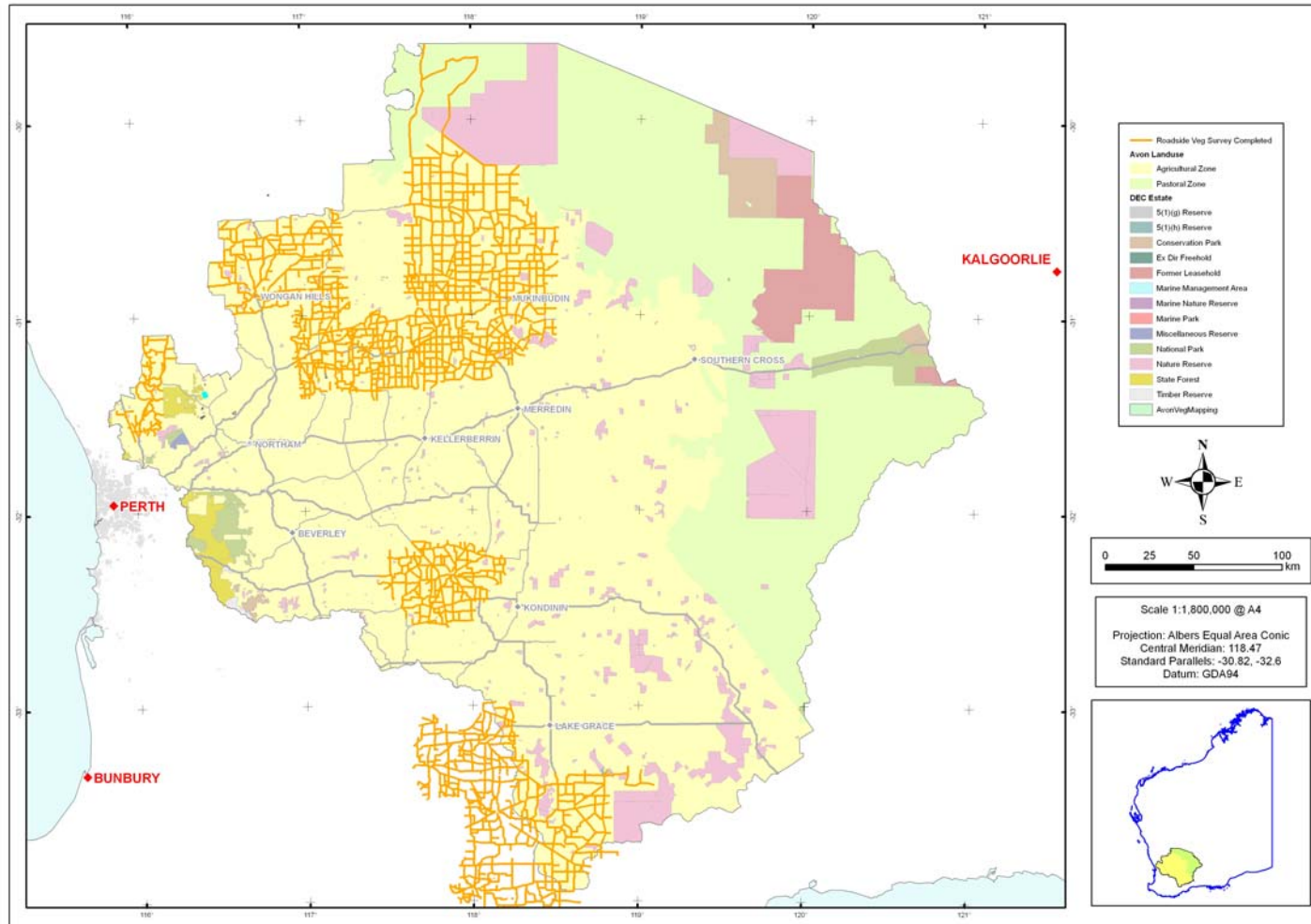
Shire	Low CV <sup>1</sup>	Med.-Low CV	Med.-High CV	High CV	Year Surveyed
Dowerin	28%	15%	15%	28%	2004
Goomalling	10%	27%	23%	33%	2005
Mount Marshall	2%	4%	26%	64%	2003 - 2004
Mukinbudin	2%	6%	32%	52%	2003
Nungarin	4%	4%	17%	49%	2003
Toodyay	24%	9%	9%	25%	1988 -1990
Trayning	21%	16%	23%	32%	2004-2005
Wongan-Ballidu	20%	16%	20%	21%	2004
Wyalkatchem	9%	31%	25%	22%	2003-2004
York	15%	33%	33%	12%	1988-1989
Beverley	10%	19%	24%	29%	2000-2003
Total	14%	17%	27%	42%	



Map 2: Properties that are involved in the Land for Wildlife scheme.



Map 3: The location of Remnant Vegetation Protection Scheme and One Billion Tree Sites.



Map 4: The extent of roadside vegetation assessment within the ANRMR.

### 3.1.4 Salinity Action Plan Sites

There are 101 aquatic and 725 terrestrial SAP sites within the ANRMR (Map 5).

### 3.1.5 ANDA Programs

A summary of the outcomes for the terrestrial component of Healthy Ecosystems is given in Table 2, they are shown visually in Map 6 . Two hundred and four participants have been involved with the program.

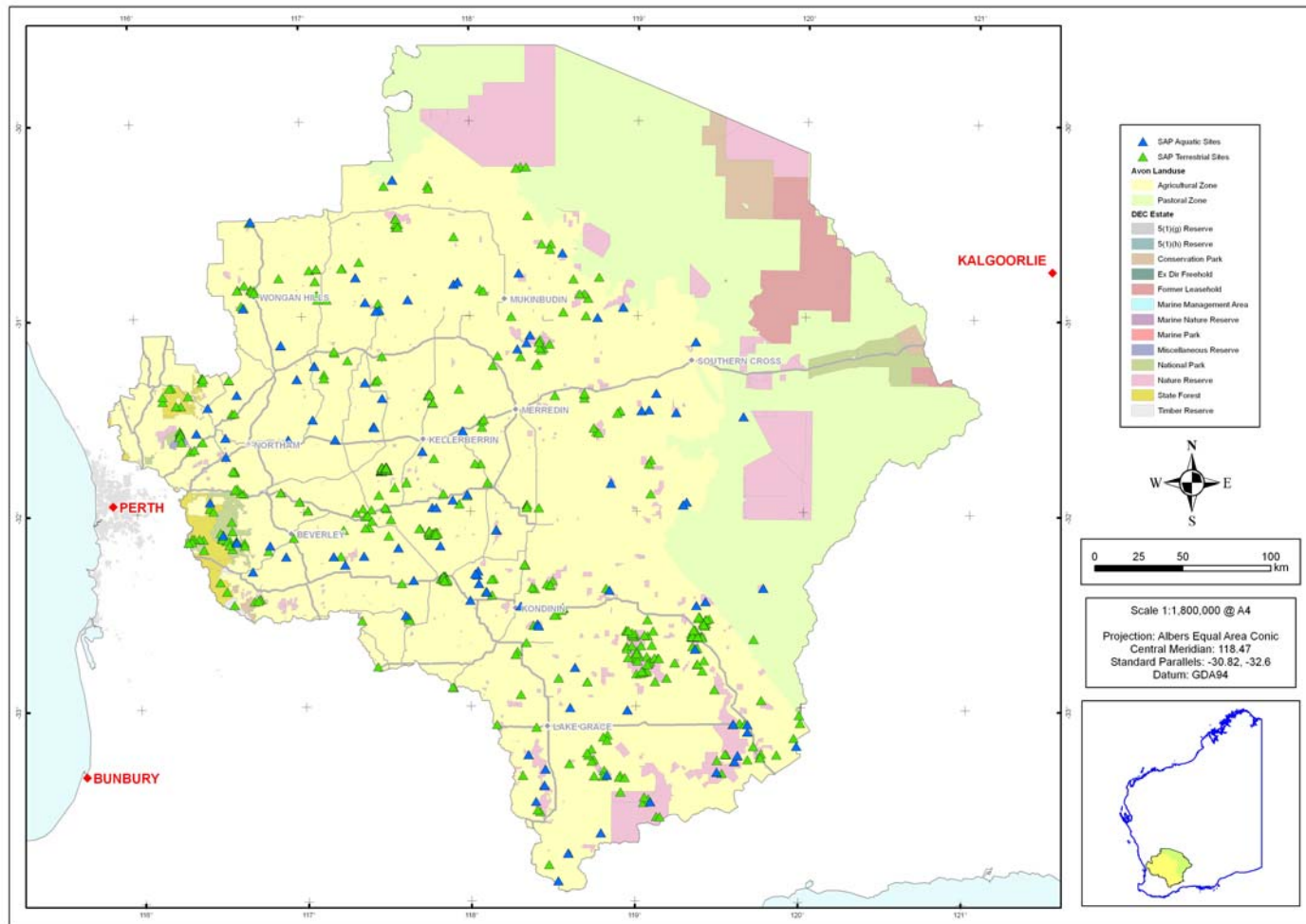
Table 2: A summary of outcomes from the terrestrial part of Healthy Ecosystems.  
VMA means Voluntary Management Agreement.

Description	Extent	Reporting Measure
Number of participant sites	ACC Total	204
Number of flora surveys conducted	ACC Total	158
Number of covenants facilitated	ACC Total	11
Area of covenants facilitated (ha)	ACC Total	1074.2
Area of covenants under negotiation (ha)	ACC Total	2010
Number of VMAs facilitated	ACC Total	47
Area of VMAs facilitated (ha)	ACC Total	4757
Area of VMAs under negotiation (ha)	ACC Total	2131
# species vouchered during flora surveys	ACC Total	6143
Area of woodland surveyed (ha)	ACC Total	5681
Area of bush fenced by facilitated fencing	ACC Total	5287.2
Area of target veg fenced by facilitated fencing	ACC Total	1283.1

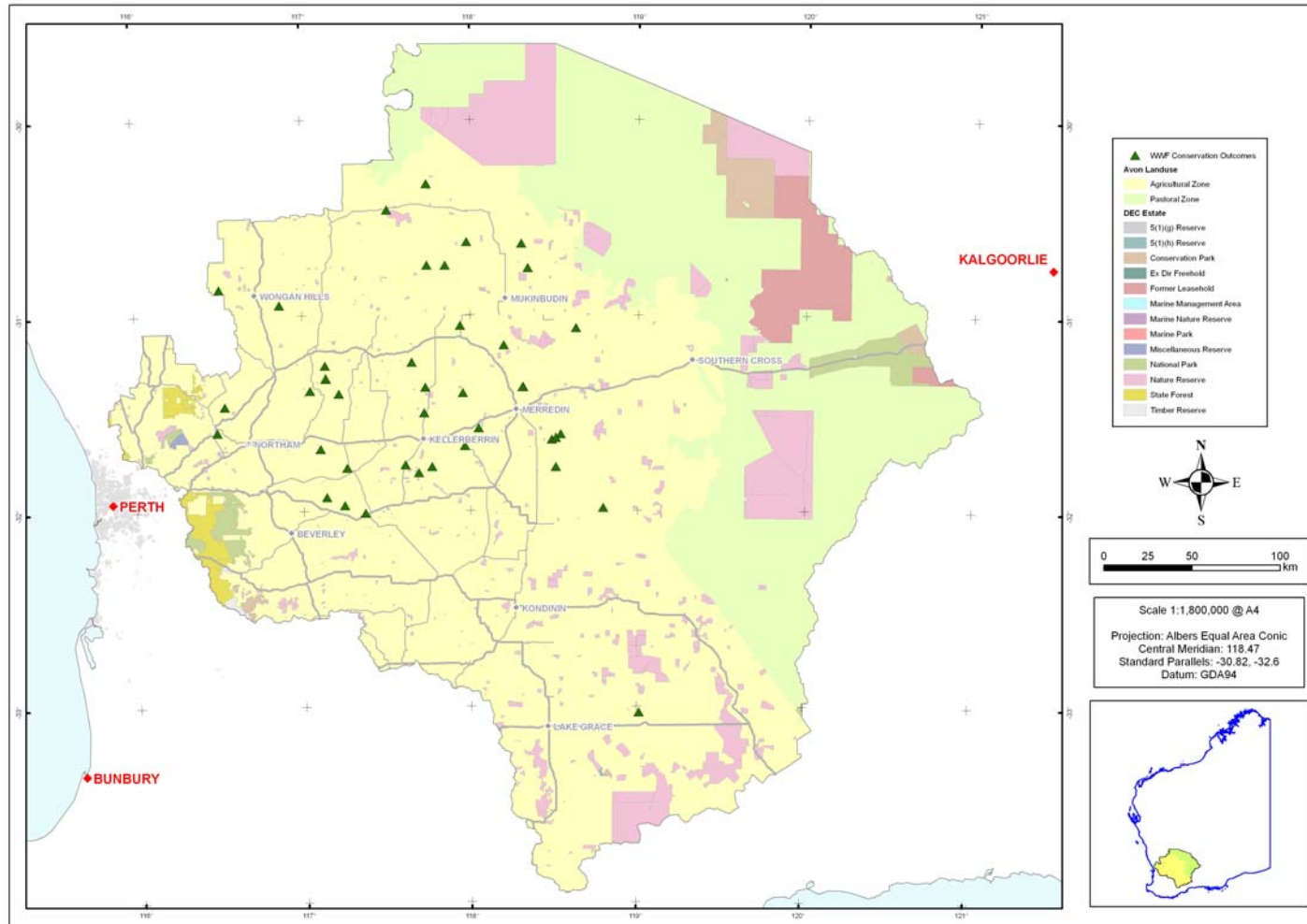
The outcomes of the aquatic part of Healthy Ecosystems are shown visually in Map 7. These are the river recovery actions including foreshore survey, river recovery plans and water assessment. Through this work the project has substantially contributed to riparian vegetation conservation and restoration with, for instance, over 35000 native plants being planted in riparian zones during 2006 and 2007.

The Ecoscapes project was developed to preserve the extant and integrity of selected landscapes; these landscapes were termed Ecoscapes (Walsh, 2006) as part of the ANDA program. The locations of the 13 selected Ecoscapes are shown in Map 8. Detail on the nature of the program is given in Avon Catchment Council (2005).

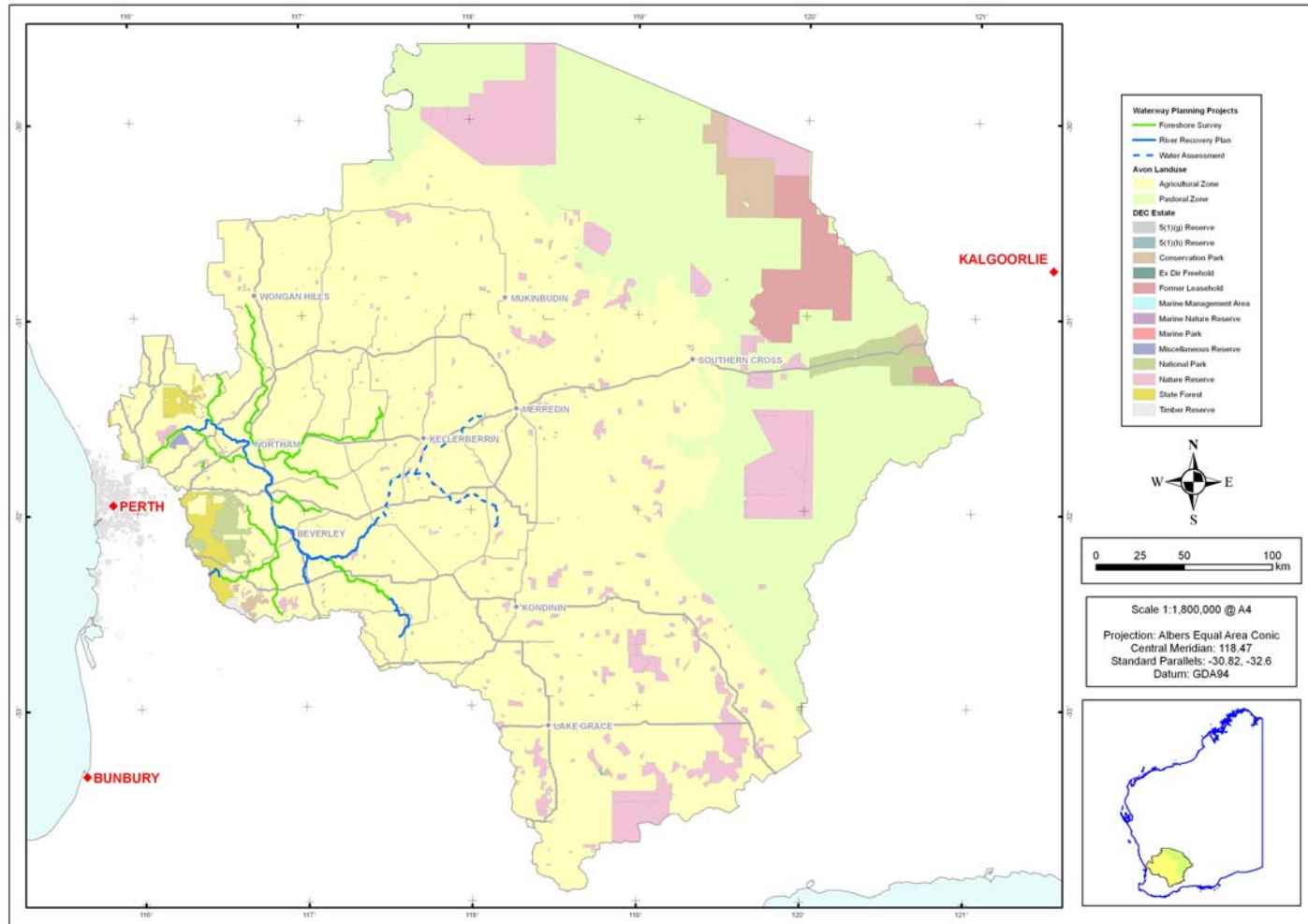




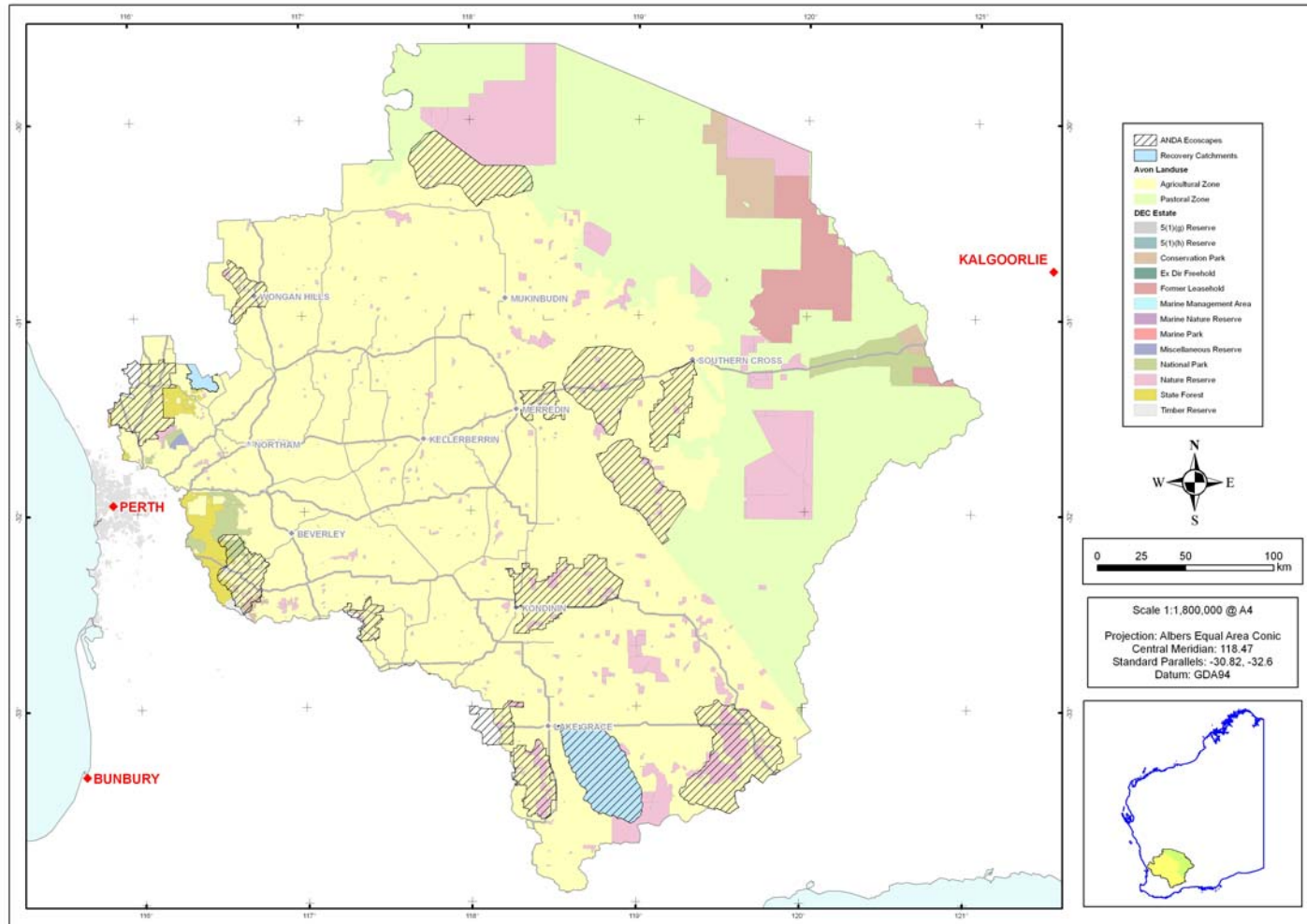
Map 5: The Salinity Action Plan study sites within the ANRMR.



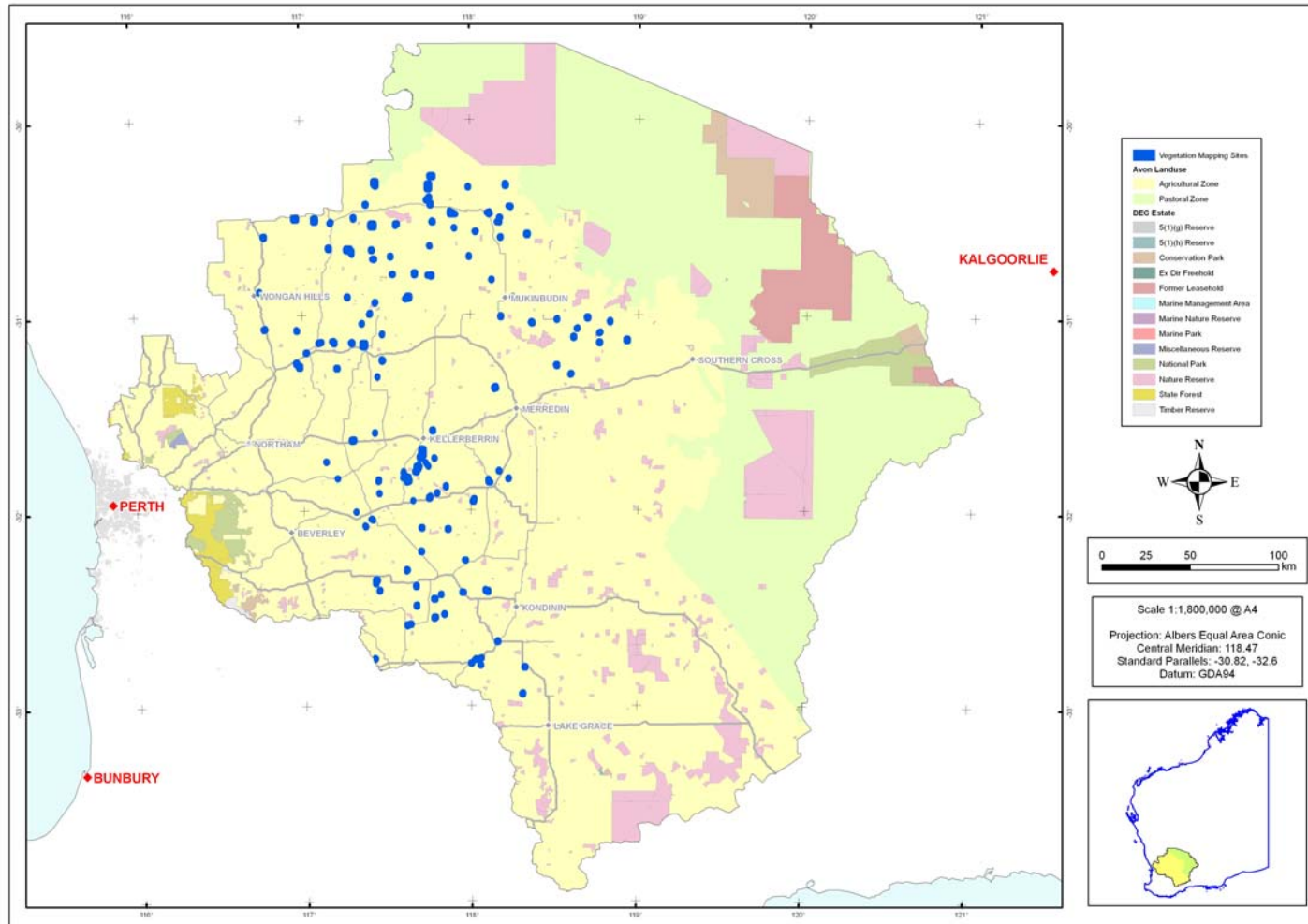
Map 6: The location of on-ground works by the terrestrial component of Healthy Ecosystems.



Map 7: The location of outputs from the aquatic component of Healthy Ecosystems.

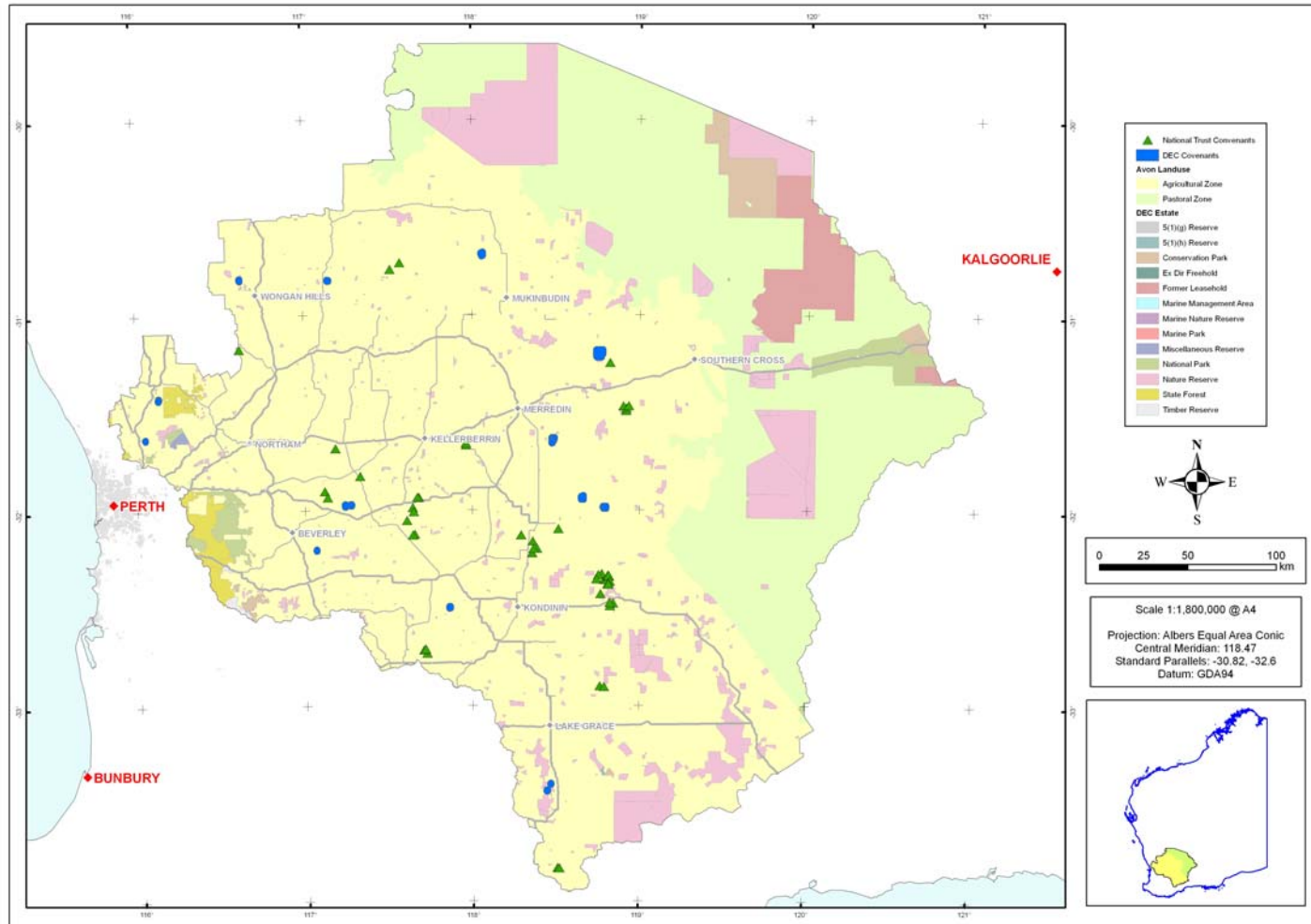


Map 8: The Ecoscapes and Recovery Catchments of the ANRMR.

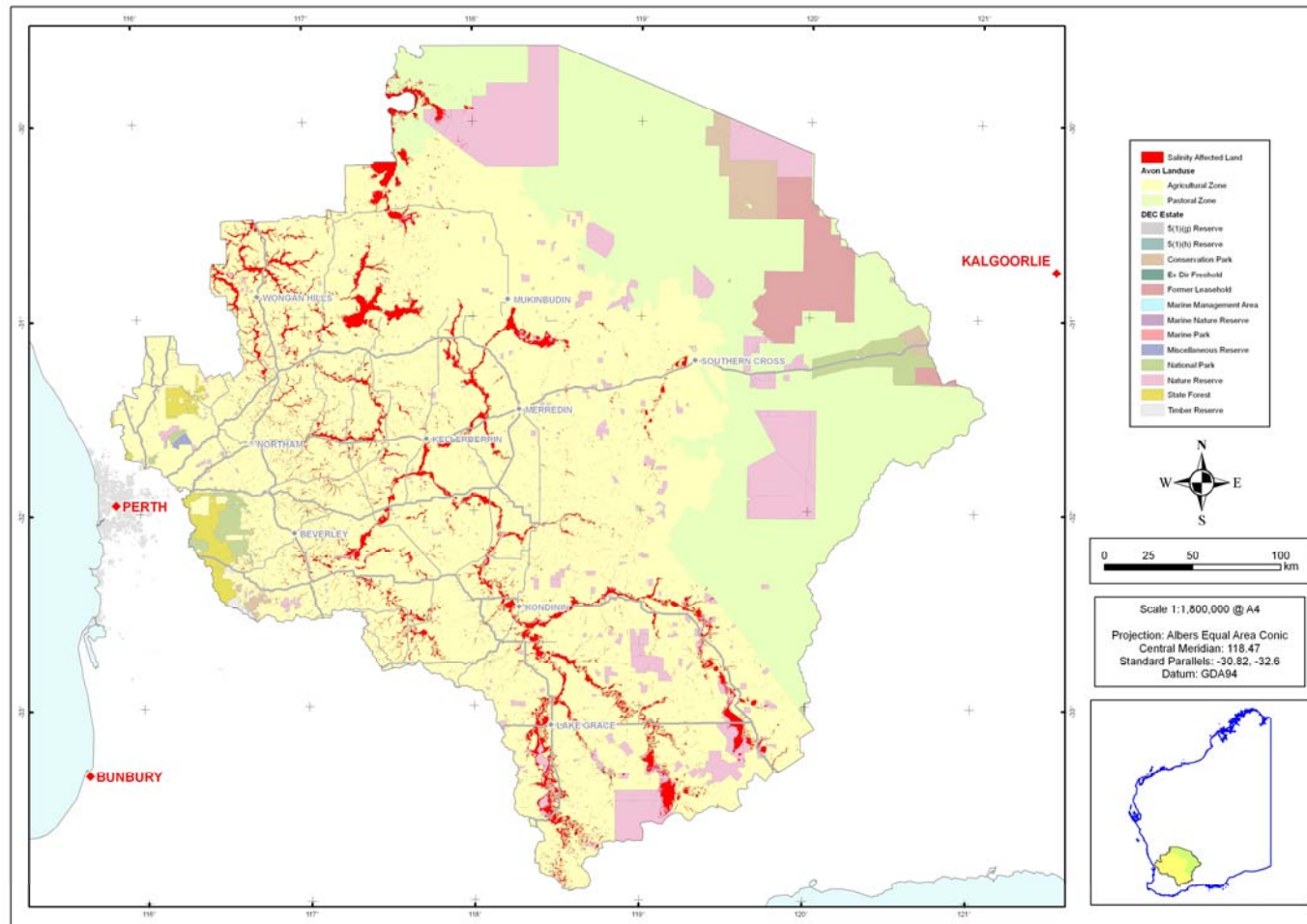


Map 9: The interim vegetation mapping within the ANRMR.



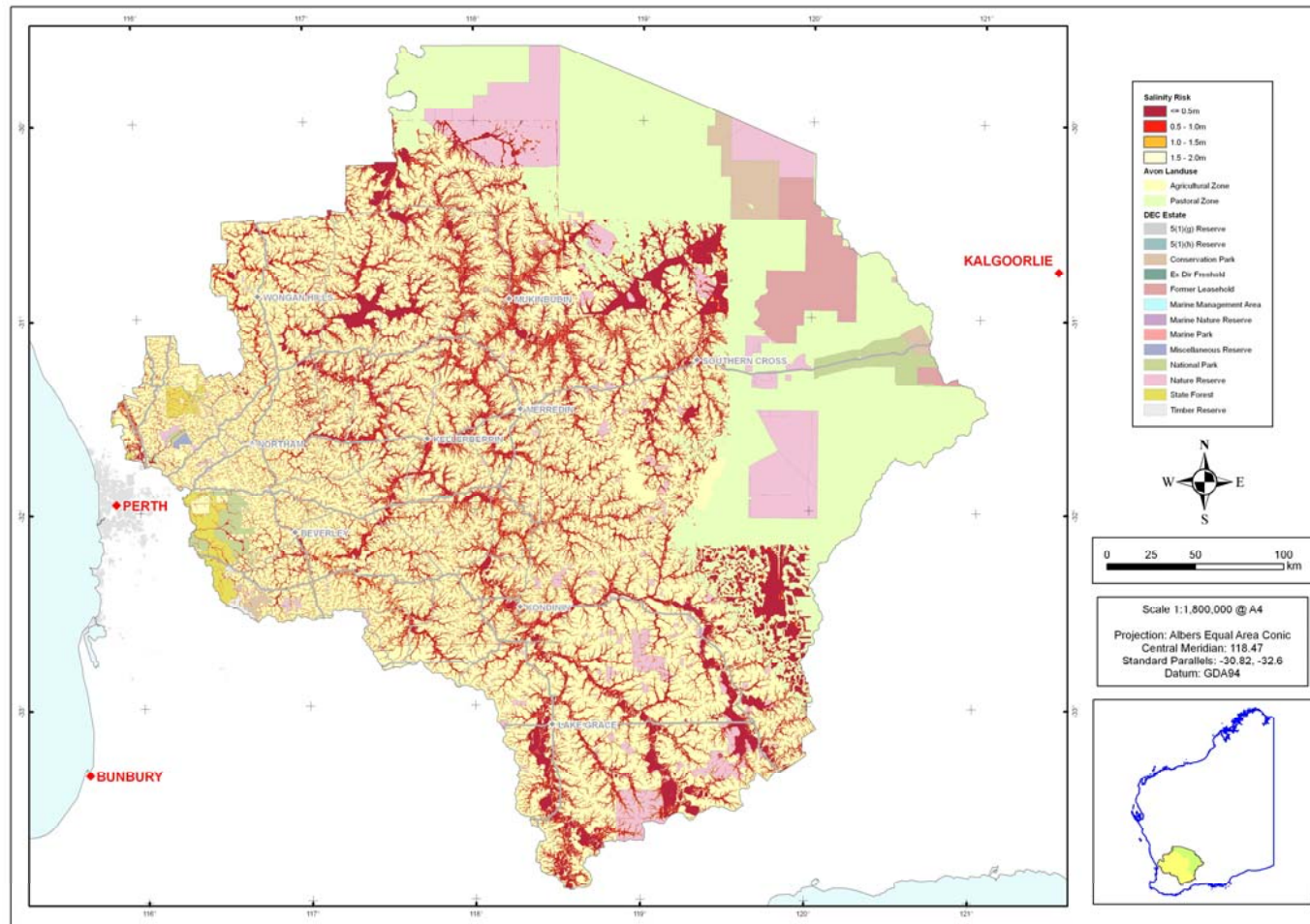


Map 10: The location of DEC and NT covenants.



Map 11: The mapped present extent of salinity within the ANRMR. See Section 2.2.1 for how these data were derived.





Map 12: The mapped area of salinity risk.  
 See Section 2.2.1 for how these data were derived.

### 3.1.6 Vegetation Mapping

There are approximately 300 existing vegetation community maps across the ANRMR; approximately ½ of these are on the conservation and the majority of the other ½ are ex-water reserves. Many of these maps are old (eg Muir's vegetation mapping of the Wheatbelt reserves in the 1970s). Map 9 shows the location of the 97 maps that have been digitised at the time of writing this report.

### 3.1.7 Other Programs

The Australian Wildlife Conservancy (AWC) has two properties, Karakamia and Paruna sanctuaries, within the ANRMR. These properties are part of AWC's 14 national properties portfolio. The intent of Paruna was to develop a wildlife corridor linking the Avon Valley and Walyunga National Parks. Both properties have at least some of their boundaries protected by predator proof fencing. Between them these properties retain a number of Threatened fauna including Woylies, Tammar wallabies, Black-flanked Rock-wallabies, Western Ringtail Possums, Quokkas, Quenda and Numbats. For some of these species (eg Quokka, Western Ringtail Possums) these represent the only populations of these species within the ANRMR.

The Recovery Catchment Program was established to provide landscape-scale biodiversity conservation. Lake Bryde Recovery Catchment and part of Drummond Recovery Catchment fall within the ANRMR boundary (Map 8).

There are two nature conservation focused covenanting programs operative in the south-west of Western Australia: covenants through the Department of Environment and Conservation and those available through the National Trust. The number and location of these covenants were acquired through the Nature Conservation Branch of DEC in June 2007.

The location of DEC and National Trust covenants is shown in Map 10. There are 51 NT and 20 DEC covenants in the ANRMR.

## 3.2 Landscape Scale Threats

### 3.2.1 Salinity

NB: salinity mapping (either present or risk) are derived products that need to be used carefully. Throughout this report they are used as indicative measures only.

Current salinity is shown in Map 11; salinity risk is shown in Map 12.

Salinity risk as derived from DEM mapping has 5 categories: between 0 to .5 metres above valley floor, between .5 and 1 metre above valley floor, between 1 and 1.5 metres above valley floor and between 1.5 and 2 metres above valley floor, and, above 2 metres above valley floor.

### 3.2.2 Phytophthora Dieback

DEC is currently developing a Dieback Atlas that will ultimately include the ANRMR (<http://www.naturebase.net/content/view/213/548/1/3/>). This atlas aims to give an accurate assessment of the extent of Dieback in the south-west Botanical

Province. Assessment has generally been in the highly susceptible coastal areas leading to only the western and southern edge of the ANRMR being assessed. This atlas may be ready by the end of 2007 (pers. comm. Greg Strelein<sup>1</sup>).

There are few positive records of *Phytophthora Dieback* within the ANRMR.

Areas that are prone to *Phytophthora dieback* are those that are wet from October to April and have susceptible species (pers. comm. Mike Stukely<sup>2</sup>). There are broad patterns of susceptibility to *Phytophthora die-back* and rainfall: in areas of >600 mm rainfall infestation is generally along roads; between 400-600mm infestation is along creek lines, below granite rocks and along drainage lines off roads (pers. comm. G. Strelein).

### 3.3 Assets

#### 3.3.1 Pre-European and Remnant Vegetation

##### *Remnant Vegetation*

The ANRMR has an area of nearly 13,000,000 ha. If divided into land-use categories 34% is extensively used (beyond the clearing line). In the agricultural zone which constitutes most-66%-of the ANRMR only 16% is still vegetated (Table 3).

Table 3: Remnant vegetation statistics for the ANRMR.

	Area (ha)	% of ANRM	Remaining Vegetation (ha)	% Remaining Veg
Pastoral	4459753	34	4459656	100
Agricultural	8810869	66	1385166	16
ANRMR Total	13270621	100	5844822	44

There are over 110 000 patches of remnant vegetation in the ANRMR; most of these (nearly 70 000) patches are  $\leq 1$  ha, only 1,189 are more than 100 ha (Figure 1). The interpretation of the remnant vegetation patch data for small and/or elongated patches is influenced by the digitising process of these data. Many road reserves, for instance, while ostensibly a single remnant were partitioned incorrectly by this process into a series of smaller patches. The extent that this biases the precision of our count/size data (and consequently shape, see below) is unknown however, because of the absolute number of patches and that it is the smaller, less ecologically viable patches influenced we don't believe that this influences our results in a substantial way.

<sup>1</sup> Greg Strelein, DEC, Bunbury

<sup>2</sup> Mike Stukely, DEC

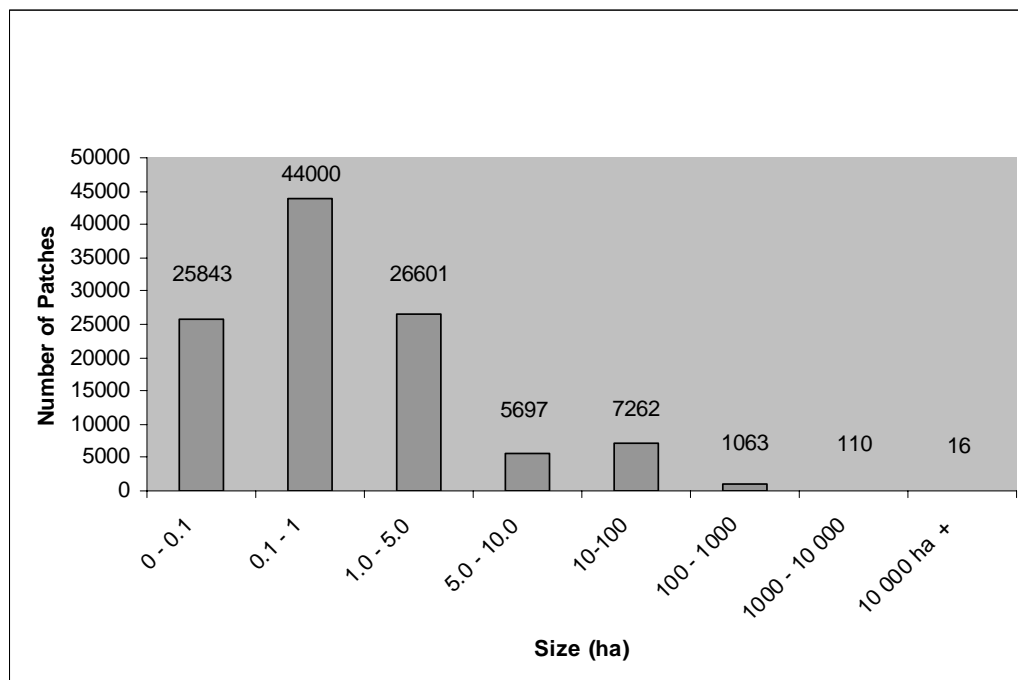


Figure 1: The number of remnant vegetation patches within each size class for the ANRMR.

Compactness is the measure being used for the perimeter/area relationship (see Section 2.3.1). Appendix 2 (Table A2.1) gives a visual representation of patch shape and compactness indices. Table 4 gives the compactness values for each of size classes of remnant vegetation within the ANRMR. The majority of small (0-1 ha) patches are generally in the .4-.8 compactness category. This may be an artefact of digitising (ie the digitising process has divided some small elongated shapes, those with a low compactness, into a series of smaller squarer polygons, those with a high compactness). There is a general trend that the larger patch area categories have a lower compactness i.e. they are more convoluted or more elongated.

Table 4: Compactness values for each of the size classes of patches of remnant vegetation in the ANRMR.

C Category is the compactness category (see text).

C Category	Patch Area Category (ha)								Total
	0.-0.1	0.1-1	1-5	5-10	10-100	100-1000	1000-10 000	>10 000	
0.0 - 0.2	265	224	2012	1266	2674	669	92	13	7215
0.2 - 0.4	359	4528	9892	2312	2663	272	15	0	20041
0.4 - 0.6	299	18805	8795	1305	1266	90	2	0	30562
0.6 - 0.8	20610	19321	5003	724	610	30	1	0	46299
0.8 - 1.0	4310	1122	899	90	49	2	0	0	6472
Total	25843	44000	26601	5697	7262	1063	110	13	110563

Little is known of the status and condition of these patches of vegetation though previous work may be of some guide. Beeston *et al.* (2002) believe that 40% of all remaining patches of vegetation across Western Australia show some level of

disturbance. In vegetation mapping/condition assessment of the Northern Agricultural Region Richardson *et al.* (2005) found 60% of the patches they examined were in good or better condition; 15%, however, were degraded. That study focused on large patches of remnant vegetation regardless of tenure and included many conservation reserves.

#### *Beard's and Hopkins' Vegetation Associations*

There are 145 attributed BHVA types within the ANRMR. Reviewing these identified a number of BHVA that should be excluded from further consideration due to a number of reasons. Firstly, initial examination of the data revealed a number of BHVA that have been attributed incorrectly. These were removed from further analysis. Secondly, as part of the process in identifying BHVA that are of high-importance, a workshop was convened (see Appendix 2.2). One of the outputs from this workshop was informing the significance of some of the small BHVA (the workshop only considered those BHVA that occurred in the agricultural zone of the ANRMR). This workshop also identified that the mapped distribution and description of some of the BHVA needs to be reviewed.

The BHVA removed due to this are described below:

- BHVA 40 has only seven hectares within the ANRMR, this particular Vegetation Association has a large remaining extent (347641 ha) outside the ANRMR, because of this it has been removed from further analysis.
- BHVA 59 is a northern Australian vegetation type; this was removed from later analysis. The polygon was only 3 hectares current extent (25 hectares in the ANRMR pre-European).
- BHVA 129 (described as bare areas drift sand) had a pre-European extent of 37 ha and a present extent of 2 ha, as the areas were small and seem to have little conservation significance this association was also removed from further analysis. This BHVA was also considered by the expert panel to be of very low importance.
- BHVA 169 (Shrublands; mulga & minnieritchie scrub) is included in the ANRMR pre-European dataset by a single sliver of .36 hectares; this BHVA has 100% of its 430533 hectares remaining elsewhere. This BHVA was excluded from further analysis.
- BHVA 516 (Shrublands; mallee scrub, black marlock) has a current extent of 5 hectares in the ANRMR but over 337 000 ha within Western Australia. The expert panel (see Appendix 2.2) thought that this was possibly a mapping artefact as this BVHA is generally found on the south coast. This BHVA has been excluded as an ANRMR BHVA. Though it is recommended that this BHVA be re-examined and the polygon reattributed.
- BHVA 942 (Mosaic: Medium woodland; yate / Shrublands; mallee scrub, black marlock) has only a 1 hectare left of a 36 hectare ANRMR pre-European extent (but 8343 hectares remaining in the South Coast NRM Region). This BHVA was excluded from further analysis.
- BHVA 1076 (described as Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub *Eucalyptus eremophila* & bloodwood; *E. dichromophloia*). *E. dichromophloia* is a Kimberley species, when reviewed it was found that this was a small (11 hectare polygon) that was attributed incorrectly.

- BHVA 1094 (Mosaic: Medium woodland; York gum & salmon gum / Shrublands; mallee scrub *Eucalyptus eremophila* & black marlock) has one hectare remaining within the ANRMR (of a 172 hectare pre-European extent), though 4059 ha left elsewhere. It was excluded from further analysis.

Some small BHVA have been retained. During the prioritisation workshop it was suggested that these are amalgamated into other BHVA (such as 962 and 1005). Other small present extent BHVA (such as 411 and 486) have been retained, these are in the extensive zone.

*It is recommended that the BHVA review identified in the BHVA prioritisation workshop be performed.*

With the above changes to the BHVA found within the ANRMR, 137 BHVA are considered to be extant. Appendix 2.3 contains three summary tables of statistics for BHVA in the ANRMR. The first considers pre-European and remnant extent for each BHVA. The second table is the result of analyses relating to the reservation status within the conservation estate. Finally, the third table identifies those BHVA which should be of concern due to limited or remaining extent and/or poorly represented in the conservation estate.

Summary statistics of the ANRMR BHVA extent include:

- Forty-two BHVA are endemic to the ANRMR; another four BHVA have more than 95% of their current remnant extent within the ANRMR.
- Seventy-seven are found exclusively within the agricultural (intensive) land use zone; 27 exclusively in the extensive land use zone and 33 occur in both.
- Twenty have  $\leq 10\%$  of their original extent remaining in either the ANRMR or WA. Seventeen of these have  $\leq 10\%$  of their original WA extent remaining.
- Thirty-nine are reduced in extent (i.e. have between 10 and 30% of their original extent remaining) in the ANRMR or WA.
- Fifty-three BHVA are limited in extent (<2000 hectares in the ANRMR or WA). However, 14 of these always had a limited extent. Twenty-nine are <2000 hectares of current extent in WA, 10 of these have 100% of their pre-European extent remaining in WA.
- Eighty-four have less than 10000 hectares of their original ANRMR extent remaining (including BHVA with < 2,000ha). Sixty of these always had <10000 hectares. Only 16 of these have 100% of their pre-European extent remaining.

Summary statistics of the ANRMR BHVA reservation include:

- There is a total of 1, 397, 491 hectares of ANRMR reserved within the IUCN reserve categories I-IV. Map 1 shows the extent of the DEC estate within the ANRMR.
- There is an average of 10% of the pre-European extent of each BHVA reserved in IUCN reserves I-IV within Western Australia; but 31 BHVA are not represented anywhere in the State and another 76 are poorly (some but <15% of their pre-European extent) represented within the IUCN reserve categories I-IV within the State. Of the 31 not represented, 13 have none of their pre-European extent under Section 16 agreements or within UCL.

Appendix 2, Table A2.4 summarises the present extent and reservation status for all vegetation associations within the ANRMR. Of the 137 BHVA, there are 56 that



are limited in extent *and* poorly reserved. These are limited in present extent (<2000 ha and/or ≤10% of pre-European extent remaining in ANRMR or the State) and are poorly reserved (unreserved and/or <15% of pre-European extent reserved in ANRMR or the State).

### 3.3.2 Threatened Ecological Communities and Communities at Risk

Descriptions of the terms and how they are applied can be found in Appendix 1.1. Summary data for TEC and PEC can be found in Appendix 3.

#### 3.3.2.1 Threatened Ecological Communities

There are 11 TEC types with 32 occurrences within the ANRMR (Table A3.1, Map 13); two of these are endemic types: Perth to Gingin Ironstone Association and Unwooded freshwater wetlands of the southern Wheatbelt dominated by *Muehlenbeckia horrida* subsp. *abdita* and *Tecticornia verrucosa* (see Appendix 3, Table A3.1). The majority of the TEC are found on the western side of the ANRMR, particularly on the Swan Coastal Plain (Map 13).

Table 5: The conservation status of the Threatened Ecological Communities of the ANRMR and the 20km buffer.

Conservation Status	Number of Communities	Number listed under EPBC Act	Number of Recovery Plans
CR	9	8	9
EN	4	1	4
VU	4	0	0
Total	17	9	12

There are six TEC community types within the 20km buffer that do not have occurrences within the ANRMR, three of these (Aquatic Root Mat Community Number 1 of Caves of the Swan Coastal Plain; Shrublands and woodlands of the eastern side of the Swan Coastal Plain and Herblands and Bunch Grasslands on gypsum lunette dunes alongside saline playa lakes) are endemic to the buffer. It is not expected that these communities will be found within the ANRMR (pers. comm. Val English<sup>3</sup>). The other three TEC communities have occurrences in the buffer and elsewhere but not in the ANRMR. These are:

- (i) Woodlands over sedgeland in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson *et al.* (1994).
- (ii) *Eucalyptus calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain.
- (iii) *Melaleuca huegelii* - *Melaleuca acerosa* (currently *M. systema*) shrublands on limestone ridges (Gibson *et al.* 1994 type 26a).

Only one of these (the *Eucalyptus calophylla* - *Kingia australis* woodland) is considered to be possibly in the ANRMR (pers. comm. Val English).

All of the nine State listed Critically Endangered TEC of the ANRMR and the 20km buffer have recovery plans, but one of them (Lake Bryde) is not listed under the EPBC Act (Table 5; Appendix 3). All of the four State listed EN communities have recovery plans but only one is recognised under the EPBC Act. None of the four

<sup>3</sup> Val English, Species and Communities Branch, DEC.



State listed VU communities are recognised within the EPBC Act or have recovery plans.

*It is recommended that a prioritisation process be developed to investigate the need for recovery actions (starting with a recovery plan and subsequent listing under the EPBC Act) for these communities.*

### 3.3.2.2 Priority Ecological Communities

There are 34 PEC types with 66 occurrences within the ANRMR (Table A3.2, Map 13); all but one of these (Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs) are endemic to the ANRMR. The buffer contains another four occurrences of this PEC.

There are two PEC that are found outside the ANRMR but are in the 20km buffer (these are Plant assemblages of the Bremer Range System and Thickets on the lower slopes of the Die Hardy Range) none of which are likely to be found within the ANRMR (pers. comm. Val English).

Thirty-two of the 36 PEC types in the ANRMR and the buffer are Priority 1 (see Appendix 1.1 for elaboration), two are Priority 2 and there is one each of Priority 3 and 4. None of the PEC have recovery plans or are recognised under the EPBC Act. There are four draft recovery plans in process, one each for: Claypans with shrub over herbs, Wandoo Woodland over dense low sedges, Mortlock flats and Low level sandplains.

*It is recommended that the descriptions of TEC and PEC are given to field based staff to aid them in identifying new occurrences of these communities.*

### 3.3.3 Plants and allied taxa

There are 81,124 vouchers from the ANRMR lodged in the WA Herbarium. The majority (85%) of these are dicotyledons (Table 6).

Table 6: A summary of the vouchers held in the WA Herbarium from the ANRMR.

Group	Total	% of total
Dicotyledons	68976	85
Monocot	10853	13
Lichen	722	1
Gymnosperms	345	<1
Fern	226	<1
Alga	2	<1
Total	81124	

The region has 4983 current taxa, including 4267 formally recognised species and 307 undescribed species. One-hundred and nine taxa are non-current names (Table 7).

*It is recommended that the 108 taxa with non-current names are reattributed with current taxonomy.*

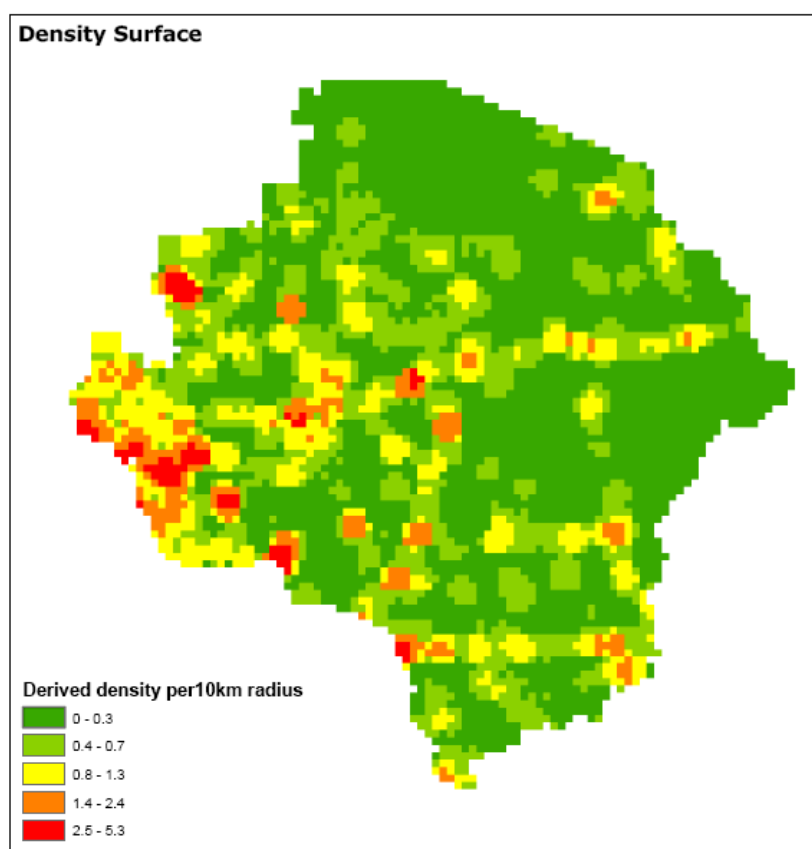


Figure 2: The hotpot areas for WA Herbarium vouchers.

Table 7: Summary statistics of the native plant taxa of the ANRMR.

	Dicots	Monocots	Lichen	Ferns	Gymnos	Alga	Total
Total taxa	3962	915	171	27	14	2	5091
Non-current taxa	80	25	1	0	2	1	108
All current taxa	3882	891	170	27	12	1	4983
Manuscript names	179	27					206
Phrase names	248	58	1				307
Formally recognised species	3262	793	169	27	14	2	4267
Subspecific taxa (subspecies, variety or forma)	790	115	8	1	0	0	914
Families represented	92	36	29	12	4	1	174
Genera represented	527	212	59	14	5	1	818
Species represented	3568	847	169	27	12	1	4624

The ANRMR contains a significant fraction of the West Australian flora. For instance, of the 10476<sup>4</sup> currently recognised dicot taxa of Western Australia 3882 (37%) are found in the ANRMR.

Herbarium vouchers have not been collected equally across the ANRMR with a tendency for higher collections in western part of the ANRMR and along the major roads traversing the region (Figure 2). Most of the region (particularly the eastern part) has less than 0.3 vouchers/10 km radius.

### 3.3.3.1 Flora of interest

This section uses the WA Herbarium data to develop an understanding of which plant taxa are considered of-interest. This includes endemics and those of restricted ranges.

#### *Endemics*

Four-hundred and sixteen plants and allied currently named taxa are considered endemic to the ANRMR (Table 8). The majority are dicotyledons, though all groups are represented. Over ½ of the taxa are considered threatened or priority taxa, and two are considered extinct.

A list of the endemic flora as well as the number of vouchers for each taxon is presented in Table A4.1.

Table 8: The endemic plant and allied taxa of the ANRMR within conservation categories.

	X	CR	EN	VU	P1	P2	P3	P4	None	Total
DICOT	2	25	15	21	71	56	23	25	120	358
FERN							1			1
LICHEN					3		1		16	20
MONOCOT		4		1	4	3	2	1	22	37
Total	2	29	15	20	78	59	27	26	150	416

Table 9: The number of geo-referenced vouchers in the WA Herbarium of the endemic plants and allied taxa of the ANRMR.

# Vouchers	Conservation Status									Total
	X	CR	EN	VU	P1	P2	P3	P4	None	
1			1	1	15	6			41	64
2 to 9	2	17	3	6	50	31	7	6	77	199
10 to 20		11	10	9	9	17	12	13	23	104
>20		1	1	6	4	5	8	7	17	49
Total	2	29	15	22	78	59	27	26	158	416

The number of WA Herbarium vouchers for the endemic taxa is shown in Table 9. Sixty-four endemic taxa are known from a single voucher, including two species of DRF and 41 other taxa that, even though they are only known from a single voucher, are not considered Rare or Priority.

<sup>4</sup> The WA Herbarium summary statistics come from <http://florabase.calm.wa.gov.au/statistics/> and were calculated in June 2006.

### *Poorly Collected and Restricted Range Taxa*

The final document will identify other species of interest. This analysis will be done using WA Herbarium vouchers reporting which species are poorly collected at both the State and ANRMR scale. In a similar way these data will be analysed for distance between vouchers to determine which species may have reduced extent.

### 3.3.3.2 Threatened and Priority Flora

In this discussion sub-populations are treated as populations in their own right. The list of all species of Threatened and Priority Flora is found in Appendix 4. The location of the DRF and Priority Flora of the ANRMR is presented in Map 14.

There are 2556 populations of 394 taxa of Threatened and Priority flora within the ANRMR (Table 10); this presents 8% of the regional vascular plant taxa. Two-hundred and two of these taxa (with a total of 1494 populations) are endemic to the ANRMR (see Appendix 4.2).

The ANRMR has a relatively high number of Western Australia's Threatened and Priority taxa and populations. For instance, 34% of Western Australia's CR plant taxa are found within the ANRMR (Table 11).

The addition of a 20km buffer has added 62 other taxa (with 310 populations) that may be found within the ANRMR; 19 of these taxa and 40 populations are exclusively found within the buffer.

Table 10: The Threatened and Priority taxa of the ANRMR.

	CR	EN	VU	P 1	P 2	P 3	P 4	Total
Number of Avon taxa	45	33	51	52	77	79	57	394
Number of Avon populations	232	378	561	193	332	346	514	2556

Table 11: The ANRMR Threatened and Priority flora in a Western Australian context.

	EX	CR	EN	VU	1	2	3	4	Total
Number of WA taxa	1	131	114	132	176	231	215	171	1171
Number of WA populations	1	1059	1468	1972	704	1169	1703	2704	10780
% Avon pops cf WA pops	0	22	26	28	27	28	20	19	24
% Avon taxa cf WA taxa	0	34	29	39	30	33	37	33	34

### *DRF and Priority populations*

Of the 394 DRF and Priority plant taxa within the ANRMR, 26 are only known from a single population across the State, this includes 20 taxa of Priority species (Table 12). Table A4.2 shows the number of populations for each taxon.

*We recommend reviewing the conservation status of, in particular, these priority taxa considering the few known populations. We also recommend that the number of populations be used in a prioritisation across all DRF and P.*

Table 12: Number of WA populations for taxa within each conservation class of DRF and Priority species found within the ANRMR.

For instance there are 5 CR taxa known from only a single population across WA.

	Number of populations											Total
	1	2	3	4	5	6	7	8	9	10	>10	
CR	5	7	4	5	6	3	1	1	1	3	9	45
EN		1	1	4	1	2	1		2	2	19	33
VU	1	1	4	3	1	4	2	3	2	4	26	51
P1	7	10	11	4	6	3	1	1	4		5	52
P2	6	9	8	9	7	8	5	4	5	4	12	77
P3	6	7	8	9	7	7	4	2	3	6	20	79
P4	1	2	4	4	1	2		4	1	3	35	57
Total	26	37	40	38	29	29	14	15	18	22	126	394

#### *DRF and Priority Population Extent*

The estimation of the extent of the range of species was derived to identify a further aspect of threat under the assumption that restricted range increases extinction probability. For this analysis taxa with only a single population from within the ANRMR were excluded from the analysis.

The number of taxa within each extent category for each conservation status for the 305 DRF and P taxa (with 1486 populations) that have more than one population in the ANRMR is shown in Table 13. Nine taxa have a range of 500 metres or less.

*We recommend that spatial extent of known populations of taxa be employed in any prioritisation process.*

Table 13: The number of taxa (within each conservation category) within each range category.

Range category	CR	EN	VU	1	2	3	4	Total
0m	1		1	2				4
0m-500m	2			1	2			5
500m-1000m	2		2	1	1		1	7
1km-2km	3	1		1	1			6
2km-5km	7	2	2	4	1	1		17
5km-10km	3	2	4		4	1	1	15
10km-20km	5	2	1	1	4	1	2	16
20km-100km	6	13	19	14	17	16	9	94
>100km	7	10	18	11	27	34	34	141
Total	36	30	47	35	57	53	47	305

#### *Recovery Plans*

Of the 394 Threatened and Priority flora within the ANRMR 46 have recovery or interim recovery plans written or in preparation (Table 14). Another 3 existing but outdated Interim Recovery Plans are being rewritten. There is a substantial gap between number of DRF taxa in the ANRMR (129) and number of recovery or interim recovery plans (47). *It is recommended that the DRF taxa are reviewed and prioritised for developing RPs/IRPs or other recovery planning documentation.*

Appendix 4, Table A4.3 shows the current status of recovery plans for DRF and P taxa within the ANRMR.

#### *Undescribed taxa*

Nineteen taxa of DRF and Priority flora have not been fully described (having manuscript names only). One of these (*Leucopogon* sp. Helena & Aurora Range (B.J. Lepschi 2077)) is Critically Endangered (Table 15).

*It is recommended that the taxonomy of these species be resolved.*

Table 14: Recovery and Interim Recovery Plans for Threatened and Priority plants within the ANRMR.

The numbers in parentheses are those plans that expired but are being rewritten. RP means Recovery Plans; IRP means Interim Recovery Plans.

Conservation Status	Number of taxa	# existing RP or IRP	# in prep.	Total # existing or in preparation
CR	45	21(3)	5	26(3)
EN	33	6	5	11
VU	51	3	4	7
1	52			
2	77			
3	79			
4	57	1	1	2
Total	394	31(3)	15	46(3)

Table 15: The undescribed threatened and priority flora of the ANRMR.

Manuscript Name	Conservation Status
<i>Leucopogon</i> sp. Helena & Aurora Range (B.J. Lepschi 2077)	CR
<i>Baeckea crispiflora</i> subsp. Ongerup (A.Scougall & C.Garawanta E35)	Priority 1
<i>Beyeria</i> sp. Jackson Range (R. Cranfield & P. Spencer 7751)	Priority 1
<i>Calandrinia</i> sp. Piawaning (A.C. Beauglehole 12257)	Priority 1
<i>Commersonia</i> sp. Bindoon (C. Wilkins & F. & J. Hort CW 2155)	Priority 1
<i>Darwinia</i> sp. Westdale (F.Hort 864)	Priority 2
<i>Dryandra nivea</i> subsp. Morangup (M. Pieroni 94/2)	Priority 2
<i>Goodenia</i> sp. Lake King (M.Gustafsson et K.Bremer 132)	Priority 2
<i>Lasiopetalum</i> sp. Northam (F.Hort 1196)	Priority 2
<i>Leucopogon</i> sp. Bindoon (F. Hort 2766)	Priority 2
<i>Leucopogon</i> sp. Flynn (F. Hort, J. Hort & A. Lowrie 859)	Priority 2
<i>Leucopogon</i> sp. Bungulla (R.D.Royce 3435)	Priority 2
<i>Verticordia serrata</i> var. Udumung (D.Hunter & B.Yarran 941006)	Priority 2
<i>Baeckea</i> sp. Hyden (J.M. Brown 141)	Priority 3
<i>Leucopogon</i> sp. Ironcaps (N.Gibson & K.Brown 3070)	Priority 3
<i>Pityrodia</i> sp. Yilgarn (A.P. Brown 2679)	Priority 3
<i>Astroloma</i> sp. Cataby (E.A.Griffin 1022)	Priority 4
<i>Baeckea</i> sp. Chittering (R.J.Cranfield 1983)	Priority 4
<i>Microcorys</i> sp. Forrestania (V.English 2004)	Priority 4

### 3.3.3.3 DRF and Priority Flora Threat Analyses

One of the data products to be developed by Baselineing is a database to aid in prioritisation of DRF and Priority Flora on-ground activities. This section identifies the datasets used in this spreadsheet and, for those not previously mentioned, drills down into them to give summary statistics on each. The fields for the spreadsheet of these combined datasets are outlined and described in Appendix 4.3.

#### *Land Vesting and Purpose*

Land is vested to a range of government bodies (both State and local) and also for private use. There can be several possible purposes of land within each tenure group, for instance land vested within a shire may be for the purpose of gravel pits or road reserves; at the State government level land could have the purpose of conservation or railway reserves. So the two need to be considered separately.

Appendix 4.2 and Table A4.4 and Table A4.5 give the complete analysis of number of populations within each of the vesting and purpose classes (respectively), what follows here is a summary of the most common vesting and purposes for threatened and priority flora across the ANRMR.

Of the 25 vesting classes, seven contain 46% and 54% of the threatened and priority populations respectively (Figure 3). In particular land vested to the Conservation Commission, Shires and Private has the most populations of DRF and Priority species. The vesting of 4% (106 populations) is unknown.

*It is recommended that the vesting of all populations of DRF and priority flora be resolved.*

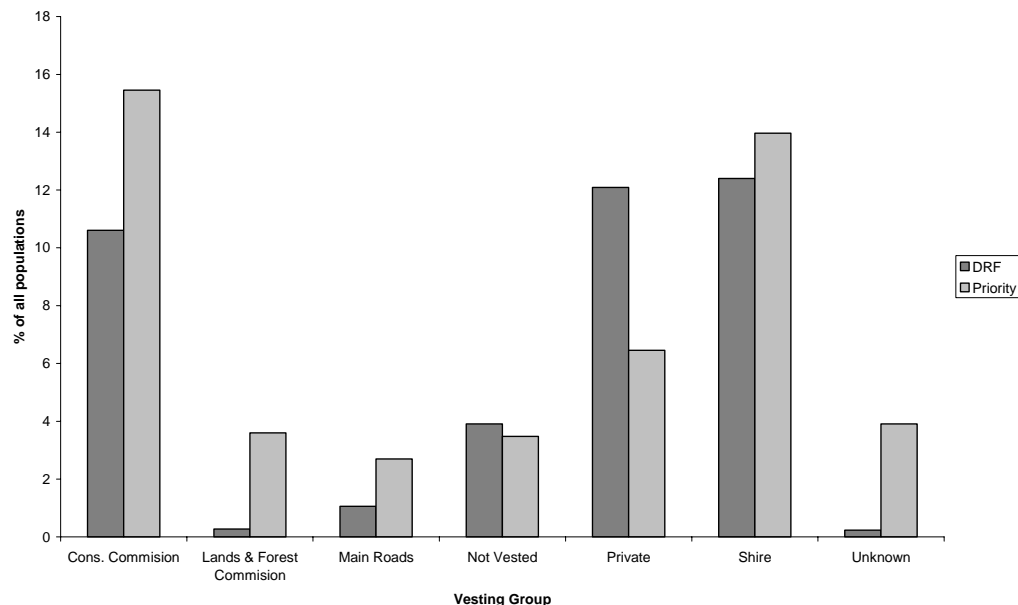


Figure 3: The land vesting classes with the most populations of threatened and priority flora.



Figure 4 shows the land purposes with the most populations of DRF and priority flora of the ANRMR. The unknowns within the figure not necessarily reflect a shortcoming of the data—all land vested as private property is annotated with a purpose of unknown.

Of the 51 listed land purposes the seven most common contain 46% of the threatened and 54% of the priority populations of flora. Eleven percent of the threatened and 16% of the priority flora are on road verges.

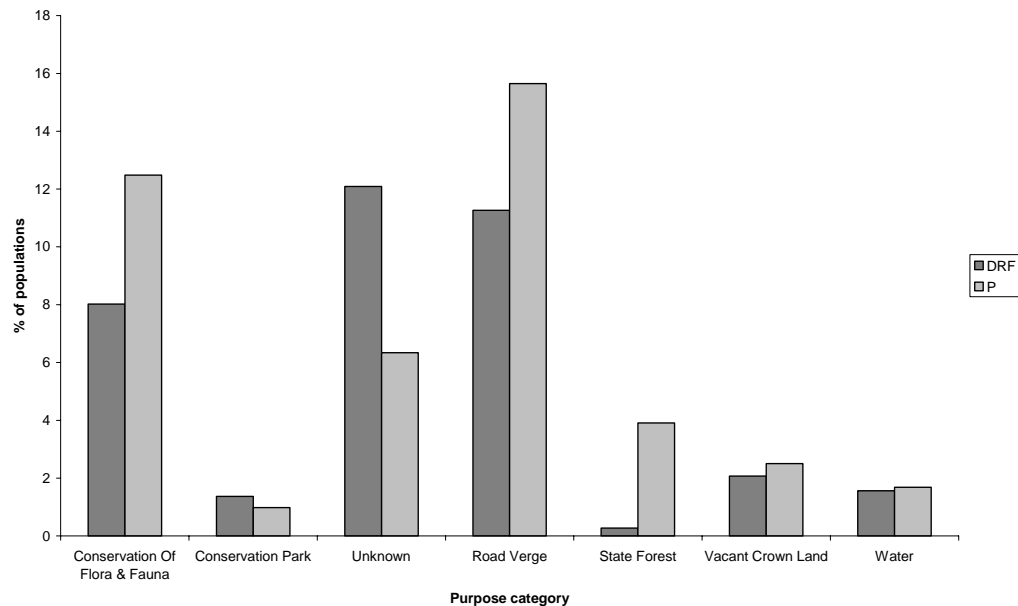


Figure 4: The land purposes with the most populations of threatened and priority flora.

*It is recommended that land vesting and purpose be considerations in any process aimed at prioritising DRF and P species recovery planning.*

### Salinity Threat

Figure 5 shows the number of DRF and P flora populations within each of four height classes above the valley floor. Most populations of DRF and P flora are 2 metres or more than 2 metres above the valley floor (1875 of the 2556 populations). The no data field relates to areas typically to the east of the clearing line (Map 1) where the ‘salinity risk’ and ‘salinity mapping product’ were not derived.

Twenty-nine taxa (including five of DRF) have all their populations within one half of one metre of the valley floor. Fifteen of these species are ANRMR endemics (see Appendix 4.2, Table A4.6).

Most (2030 of the 2556 populations) are not in an area considered salt positive (Figure 6), though there are some populations from each class that are considered to be in areas where salt has already expressed itself. Eleven species (including

two DRF) have all of their populations in areas that are considered to be already affected by salt, six of these are endemic to the ANRMR (see Appendix 4.2, Table A4.7)

*It is recommended that the height above valley floor analysis be used as indicative only as they may overestimate salinity risk high in the landscape and underestimate areas low in the valley floor.*

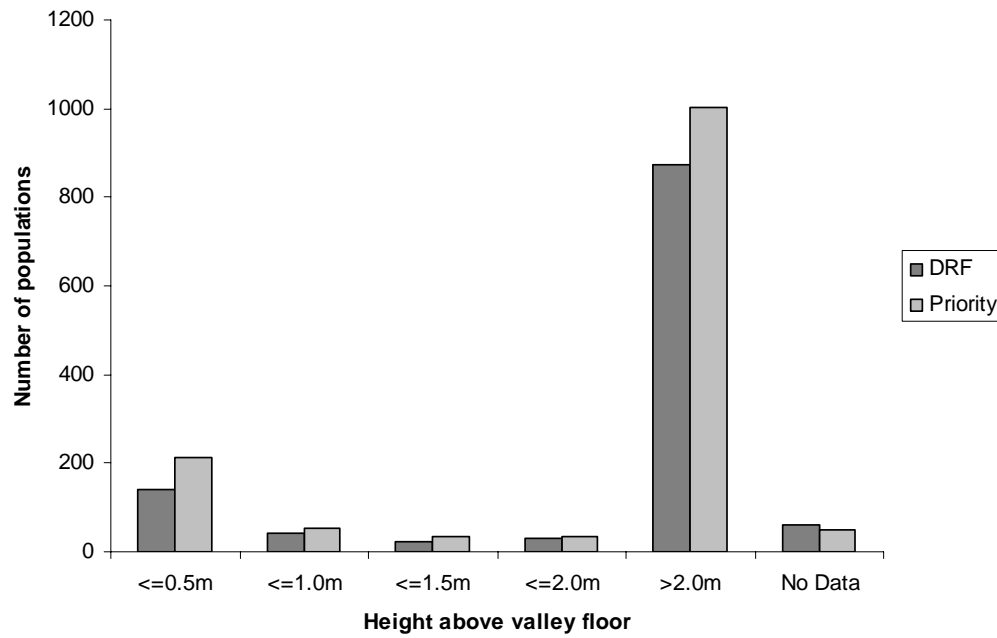


Figure 5: The number of populations of DRF and Priority flora within each height above valley floor category.

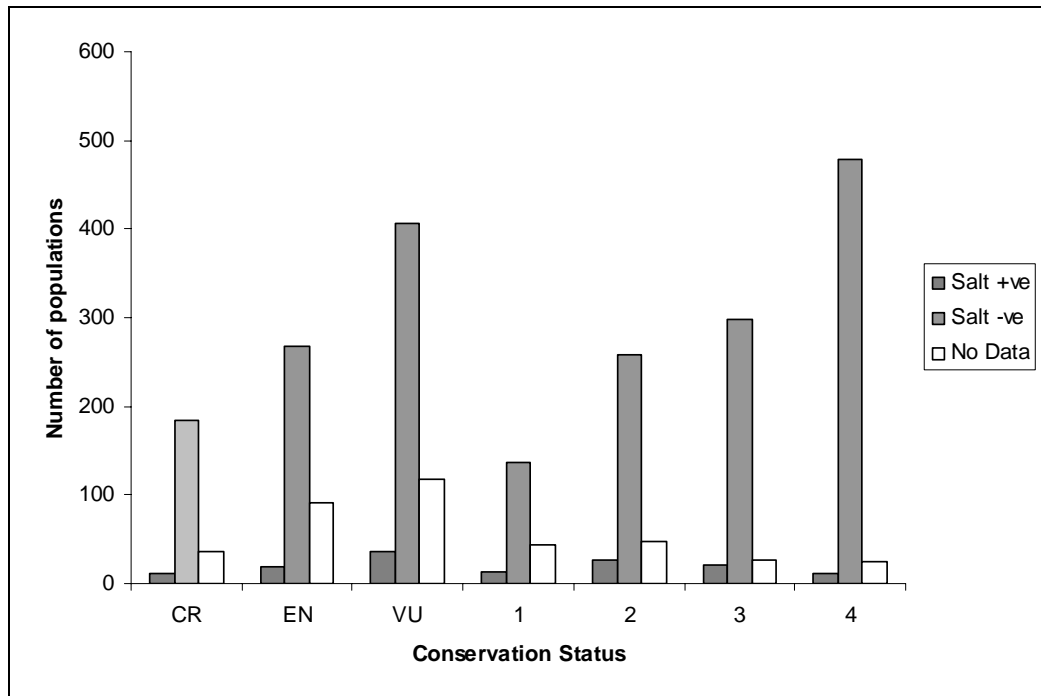


Figure 6: The number of pops of DRF and Priority flora within the present salinity extent classes.

#### *Phytophthora Die-Back*

DEC's Forest Management Branch is currently mapping *Phytophthora* die-back in the south-west and this project will extend to the ANRMR. DEC's DRPF database has a field to record if a population is considered to be threatened by dieback. Five populations of four species have been indicated in this way. This does not, however, imply that only four species of DRF or Priority species are susceptible to dieback, it is that only this many populations have been attributed in this way. The Dieback Atlas (DEC, 2006) states that 40% of all the taxa and 49% of the south-west's DRF and priority species are *Phytophthora* dieback susceptible.

#### 3.3.3.4 Weeds

There are 458 weed taxa in the ANRMR from the WA Herbarium records (Table 16). Two-hundred and sixty-eight of these are considered environmental weeds by Keighery and Longman (2004); three of these are Weeds of National Significance (WONS). The WONS in the ANRMR are *Tamarix aphylla* (Athel Pine), *Asparagus asparagoides* (Bridal Creeper) and *Chrysanthemoides monilifera* subsp *monilifera* (Bitou bush). A WONS that exists in the Avon NRM Region but is not present in the WA Herbarium Data is the Blackberry (*Rubus fruticosus*).

There are few records of the range of these weeds across the ANRMR and the few WA Herbarium records would not give a meaningful distribution of these weeds.

#### 3.3.3.5 Prioritising Flora on-ground works

There are two main groupings for flora for this discussion: Rare and Priority flora and those taxa that are considered 'of-concern' from the result of the analyses

above. These two groups are imposed by the type of data available. The former are described as typically discrete populations and because of a historical focus by DEC these populations can be described in terms of their land tenure and number of visits etc. In contrast, the 'of-concern' taxa are derived from WA Herbarium vouchers thus we have little but location. Thus, these of-concern taxa are prioritised in two ways only: either by the number of vouchers and/or the range of the taxa as derived from these taxa.

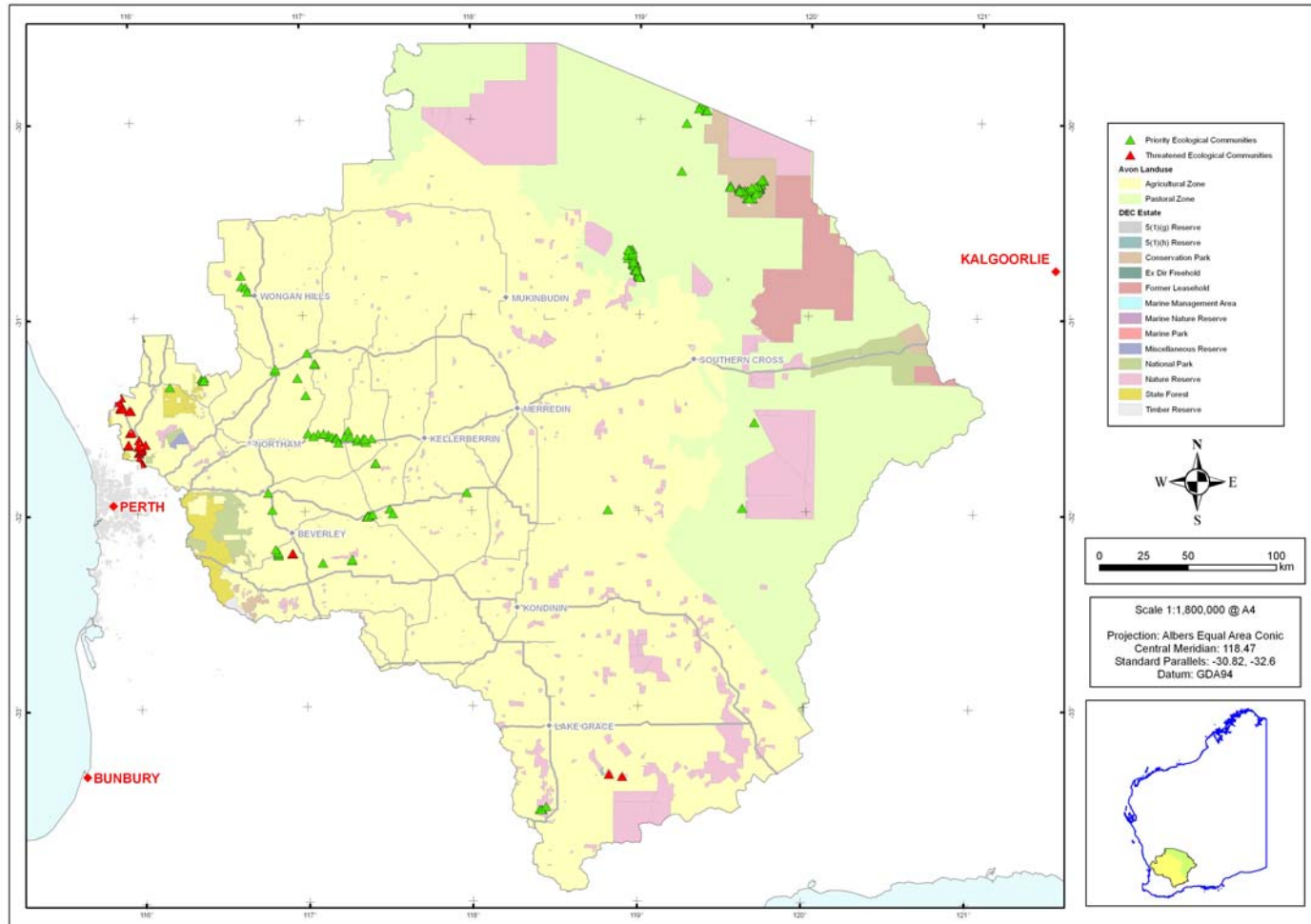
Table A4.8 (in Appendix A 4.3) shows the fields used in the DRF and P prioritisation database. These fields are a synthesis of the analyses from Section 3.3.3.2. Prioritisation can be done at two scales: the taxa or the population. At the taxa level the number of populations, the range of the taxa and present recovery actions can be used for prioritisation. At the population level, tenure, derived threat and the date of last visit can be used for this process.

The 'flora of interest' taxa (Section 3.3.3.1) prioritisation relies on WA Herbarium data alone. These analyses were restricted to number of vouchers and, from these results the extent of the taxa. Included in this are those taxa considered endemic to the ANRMR.

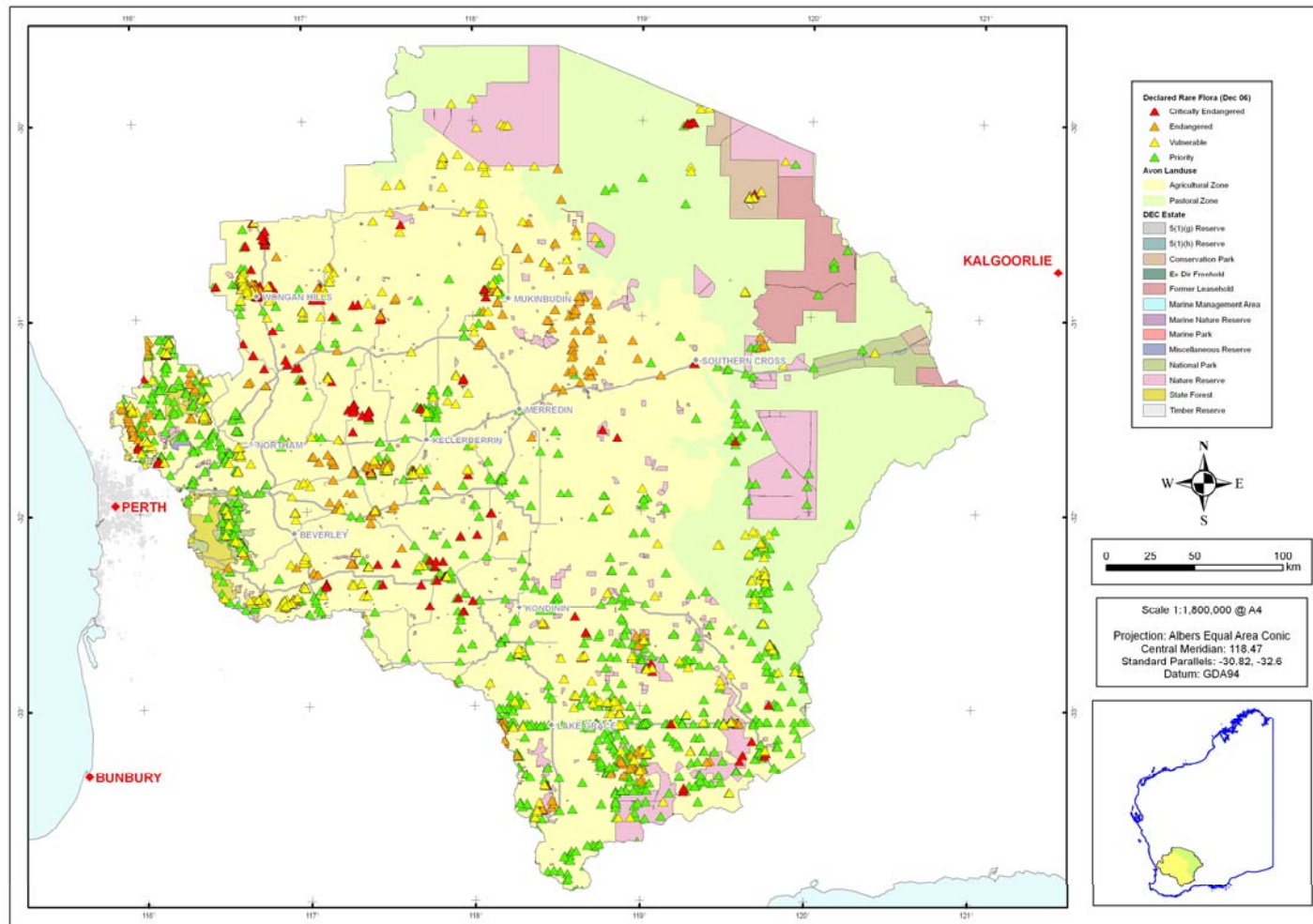
Table 16: Weeds of the ANRMR.

Group	# Species	# Environmental Weeds	# WONS*
Dicots	286	162	2
Ferns	2	2	
Gymnosperms	1		
Monocots	169	104	1
Total	458	268	3

\*WONS are Weeds of National Significance.



Map 13: The TEC and PEC of the ANRMR.



Map 14: The location of DRF and Priority plant populations across the ANRMR.

### 3.3.4 Fauna

NB The fauna data here is derived from two sources. The first is from *The Current State of Biodiversity in the Avon River Basin* (Safstrom *et al.*, 2000) which collated a list of the fauna for their Avon River Catchment and workshopped the status and trend for each of these species. Their study area was somewhat different to ours. Secondly, the WA Museum data for the ANRMR was acquired to give a comprehensive species list. There were some discrepancies between these two data sources; at the time of writing these discrepancies are being resolved.

#### 3.3.4.1 General Fauna

There are 1197 species from 81 orders and 210 families of fauna from the ANRMR (Table 17). Safstrom *et al.* (2000) divided their Avon Catchment boundary into three biogeographic regions: the Bassian, the Eremaean and the Bassian/Eremaean. The number of species within each of these areas is shown in Table 18. Safstrom *et al.* (2000) also derived the trend of all the taxa of their study area, this is summarised (with permission) in Table 19. Appendix 5.1 (and the tables therein) list the species, their extent (within Safstrom's three biogeographic regions) and their status.

Table 17: The fauna of the ANRMR.  
Derived from the WA Museum data.

Taxonomic Group	Number
Order	81
Family	210
Genus	520
Species	1197
Subspecies	111

Table 18: Summary statistics of the fauna of the ANRMR by taxonomic grouping and by region\*.

Category	Families	Genera	Species	Bassian	Bassian/Eremaean	Eremaean
Amphibians	2	8	22	12	10	2
Birds	48	106	165	89	98	65
Fish	15	19	19	4	1	
Invertebrates	121	302	814			
Mammals	15	34	56	28	1	55
Reptiles	9	51	121	26	41	51
Grand Total	210	520	1197	159	151	173

\*These results were derived from the WA Museum data and from Safstrom *et al.* (2000), but only those species found in the latter are allocated into one of the three regions. The three regional groupings come from the latter which did not include invertebrates consequently the total number of species (bottom of column 4) does not align with the totals from the last 3 columns.

#### 3.3.4.2 Threatened and Priority Fauna

The Threatened and Priority Fauna Database records for those species within the ANRMR and the 20 km buffer and not considered nationally extinct were examined to identify:



- The level of confidence of each species distribution and status, i.e. to determine whether the species is still extant in the ANRMR.
- Whether the species has an Interim Recovery Plan, Recovery Plan or is part of an existing management program.
- To identify any gaps in understanding of each species present distribution.

This discussion is in Appendix 5.3. The results of that discussion are a list of the threatened and priority fauna of the ANRMR and other conservation activities. What follows here is a summary of these results; Appendix 5.2 lists the Threatened and Priority species discussed here.

Table 19: The trend of the fauna of the ANRMR.

Category	Increasing*	Stable	Decreased	Decreasing	Insufficient information
Amphibians		1	15		
Birds	31	12	21	36	18
Fish			3		2
Invertebrates					
Mammals	8	7	21	8	
Reptiles	2	25	50	1	7
Grand Total	41	45	110	45	27

\*These trends were derived by a working group in 2000 (see Safstrom *et al.* 2000).

From DEC database records there are 1,885 records of 80 species of Threatened, Priority and Specially Protected fauna in the Avon NRM Region and the 20km buffer (Table 20). Five of these species are considered extinct, 30 species are Threatened with extinction and three species are Specially Protected (Schedule 4) under the *Western Australian Wildlife Conservation Act 1950*, 42 are considered Priority species within DEC's Priority Fauna listing (see Appendix 1.2).

Table 20: Number of species within each of the DEC Conservation Code categories for the buffered Avon NRM Region.

Those species in parentheses were only recorded from within the 20 km buffer.

Fauna Group	DEC Conservation Codes								Total
	Ex	T	P1	P2	P3	P4	P5	S	
Mammals	4(1)	11(1)			1	5	3		24(2)
Birds		7(2)		2	3	9(1)		2	23(3)
Reptiles		2	1			(1)		1	4(1)
Fish					(1)	(1)			(2)
Invertebrates		5(2)	7(1)		2(2)	1(1)			15(6)
Totals	4(1)	25(5)	8(1)	2	6(3)	15(4)	3	3	66(14)

See Appendix 1.2 for elaboration on the Western Australian conservation codes.

Most of the species that are considered Threatened under Western Australian legislation have IUCN rankings. The only exception is a native bee, *Leioproctus contraries* which is Endangered within IUCN categories but is Priority 3 in Western Australia. There are many differences between the Commonwealth's rankings and those of Western Australia (see Appendix 1.2), consequently, the WA list has 30 threatened species but there are 31 species listed within the IUCN equivalents of Critically Endangered, Endangered and Vulnerable and a further six are Conservation Dependent.

Map 15 shows the locations of Threatened and Priority fauna discussed in the text.

*It is recommended that the differences between Commonwealth conservation status and Western Australia conservation status are resolved.*

The breakdown of species within each IUCN conservation code is shown in Table 21.

Table 21: Number of species with IUCN conservation status within the buffered Avon NRM Region. Those species in parentheses were only recorded from within the 20 km buffer.

Fauna Group	IUCN CODES					Total
	EX	CR	EN	VU	CD	
Mammals	4(1)		2(1)	9	3	18(2)
Birds		(1)	2	5(1)		7(2)
Reptiles		1	1			2
Fish						
Invertebrates		2(1)	3(1)	1		6(2)
Totals	4(1)	3(2)	8(2)	15(1)	3	33(6)

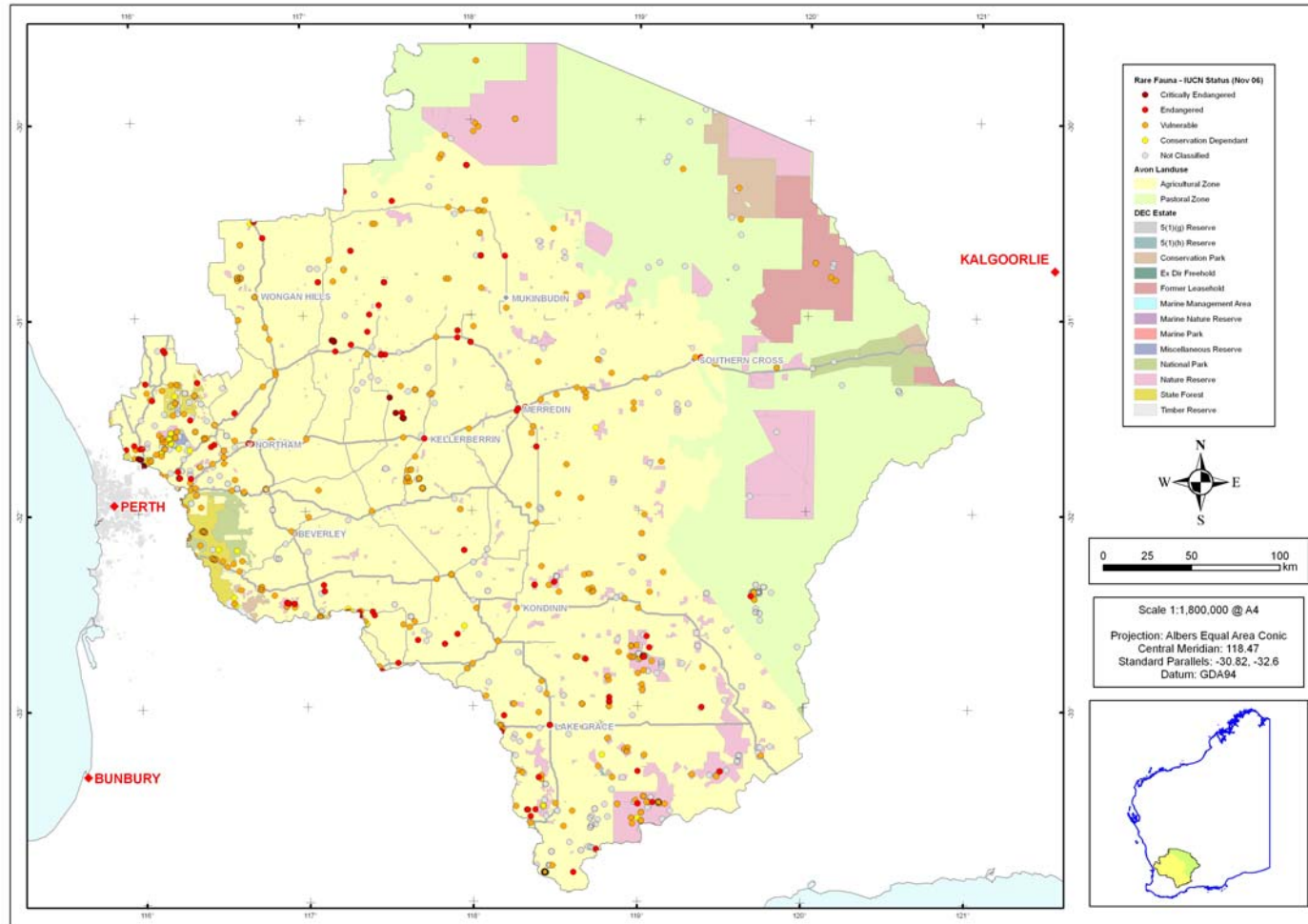
See Appendix 1.2 for elaboration on the IUCN conservation codes

#### *General Recommendation*

- *That the literature is examined for further occurrences of Threatened and Priority fauna*

#### *Species level recommendations*

- *That the current locations of Tammars and Quendas across the ANRMR be resolved.*
- *For example, the Endangered bee, *Leioproctus douglasiellus* is only known from a single 1954 record.*
- *The remaining Water-rat records for the ANRMR (near the town of York) be re-confirmed.*
- *The bee *Leioproctus contraries* has is considered a P3 under WA legislation but EN under IUCN categories this disparity should be resolved.*
- *There is only one post-1980 record of the Bilby (*Macrotis lagotis*) in the ANRMR: a 2003 record 5.5 kilometres from Chiddarcooping Nature Reserve. This record may warrant further investigation, as previous records are all quite old.*
- *Some bird species (such as the Australian Painted Snipe) have been only recorded recently and/or occasionally within the ANRMR. These records highlight the informal nature of bird survey and limited understanding of some birds across the wheatbelt. Because of this we recommend the engaging with the community to do regular bird surveys across this large area.*



Map 15: The Threatened and Priority Fauna of the ANRMR.

## 4. General Discussion

It has long been known that the Avon NRM Region is an area of high biodiversity conservation significance under high threat; the results of this study concur: the region has a very high percentage of Western Australia's plant species diversity. This study aimed at collating this information and analysing it in such a way as to allow prioritisation of each asset class. A brief review of existing or historic programs (Section 3.1), the data on known threats (Section 3.2) and the known assets (Section 3.3) is presented. In some instances linking the assets, threat and conservation programs was simple and meaningful, in these instances developing an understanding of which assets have existing conservation programs and the types and level of threat was easy to derive; and consequently analyses aimed at identifying those of concern species and/or populations were easy and meaningful. In many instances this was not the case and it will be instructive to examine why this is so.

Rare flora was one of the easiest asset classes. Rare flora management is performed by Flora Conservation Officers (FCO) which are based in each DEC District in the south-west of Western Australia. Rare flora information is held within a centralised database from which FCO identify population location and to which FCO submit standardised reports. Because of this centralising and standardisation it is comparatively easy to develop an understanding of what has been done and where for Rare and Priority flora. Section 3.3.3.2 describes these data; most of these analyses were only possible because of the existing database. Thus, we have an understanding of which ANRMR Rare and Priority species do not have any recovery actions, when they were last monitored and which threats are active. These results will support a prioritisation program in that they are a collation of the existing knowledge for each population of Rare and Priority species.

Threatened and Priority fauna was not so simplistic. Firstly, of course, fauna is mobile, but, while there is a centralised database for Threatened and Priority fauna it is not as comprehensive as the equivalent flora database. Part of the reason for this is that many people work on these fauna, not all of them for DEC, thus their data may not be recorded within this database; as such there are problems with present locations of these fauna. Indeed the review of the Threatened and Priority Fauna (Appendix 5.2) identifies many records of these species not on this database, consequently there needs to be considerable work to identify the extent of some species. Also, outside Western Shield monitoring, there are few long-term monitoring programs thus, in many cases, we don't know the locations of extant populations. Moreover, any discussion about status and trend of extant populations is also limited.

The location of historical work was also difficult to collate in a meaningful way. While we easily identified the large-scale on-ground revegetation programs it was considerably more difficult to identify where, for instance, biological survey had been performed. A bibliography that can be searched on both key terms and also by geographic location (for instance reserve or shire) would help. To resolve this issue with the flora we used vouchers lodged with the WA Herbarium as a surrogate for flora sampling intensity. While this is not the complete set of flora records from the ANRMR it is the most easily accessible and retains current taxonomy. Taking a similar approach with the fauna would not be as meaningful as many extant fauna are often not vouchered in the museum (for instance there are no

Carnaby's White-tailed Black-Cockatoo vouchers in the museum). In saying this though, the bird information was made simpler by the work from CSIRO (see Section 3.3.4). Unfortunately, for most fauna, we have limited information, and, where we do have records we are unsure whether or not the species is still extant in that location. For example, see the review on Quendas and Tammar Wallabies in Appendix 5.3.

The herbarium voucher density figure (Figure 2) is quite revealing: it identifies large areas that have few or no herbarium vouchers. In a region with such high plant species diversity, high endemism, high level of rare taxa and numerous restricted range taxa (Section 3.3), this is quite a concern. A prioritised sampling program should be established, though it is difficult to determine criteria on which to stratify this sampling. In their study of the Wheatbelt Gibson *et al.* (2004) defined 23 vegetation assemblages defined by a species classification from their sampling quadrats. These may be a useful way to start this stratification, however, this same study also found that >60% of their taxa were found in fewer than 5 quadrats.

Within the Baseline project we are collating the existing regional vegetation mapping and digitising these into GIS shape-files. Furthermore, we are attributing these mapped polygons with vegetation structural and floristic data using the National Vegetation Information System protocols (ESCAVI, 2003). While this in no way supposes that this information is all that is required for conservation planning and prioritisation it contributes to our knowledge in several ways:

- Many Threatened and Priority Ecological Communities (TECs and PECs) are described by vegetation characteristics (typically single or co-occurring species or vegetation structure).
- Vegetation community level is important for management of remnant vegetation, such as fire management
- Having knowledge of local vegetation communities for revegetation programs (such as the ANDA Ecoscapes project).

Part of the planning for this database was that it had a 'front-end' that was user friendly to the extent that other groups can add to this database with time. Early discussions with Land for Wildlife and others seem positive in this regard.

Beard's Vegetation Associations (BVA) are used as a landscape-scale vegetation community surrogate across Western Australia. This is 1:250000 scale vegetation mapping. There is considerable debate about the fidelity of these data and the use for conservation planning. Gibson *et al.* (2004) concluded that their quadrat based data from across the Wheatbelt was poorly correlated with BVA. Since then system-associations have been developed. These are BVA reattributed from Beard's memoirs, thus each BVA is subdivided into a number of smaller polygons which are each described in NVIS terms. It is untested if Gibson's conclusion applies at the system-association level.

It was acknowledged from the outset that we did not intend to review each of the threat classes operative across the region. We assumed that these are well understood. We did, however, intend to collate the meaningful threat based data that can be used for later prioritisation. Many threats are ubiquitous and/or not in a sphere of influence hence have not been mentioned. One of these is climate change; while we acknowledge its importance-and urge more research into its

affect of the values identified here—we felt that we can contribute little (besides making our data and analyses available if requested) to this discussion. Other threats like foxes are a known and wide-spread threat which, for our purposes we assume ubiquity. The two threats we have focused on (salinity and phytosphthora) are both landscape scale and, to some extent, have or are being mapped. Thus, we can use these data to inform threat to discrete assets (such as rare flora).

It should be acknowledged that there is already substantial biodiversity conservation related work occurring within the ANRMR (Section 3.1.1). The generation of this document gave the opportunity to collate and reflect on these projects and how they interact. One disconnect that came apparent was that between species level and management scale. DRF is typically dealt with *in situ* with FCO working to reduce threats through fencing or other activities. Other species of concern—such as limited range flora—may appear in discrete but scattered remnants on private land; there is no existing program focusing on these taxa. We suggest that the results of these analyses are given to those groups working with landholders, principally Land for Wildlife and the ANDA Healthy Ecosystem project. Roadside vegetation assessment also fits in this category. Roadside vegetation is considered important for corridors and DRF (See Section 3.3.3.3) but, there is not integration of these data within other programs such as corridor development. We recommend that these important areas for conservation are considered in conservation planning.

Historical programs are also useful for examining the effectiveness of programs. For instance, part of the Remnant Vegetation Protection Scheme (see Section 3.1.2) aimed at fencing selected patches of remnant vegetation. It would instructive to review the success of this scheme in the context of both land-holder involvement and the results of long-term grazer exclusion.

In overview we have collated the biodiversity knowledge from the ANRMR. We have analysed this information in ways that will be useful for biodiversity conservation planning and particularly in regards to prioritisation within ANDA programs. These analyses operated at three levels of biodiversity organisation (species, communities and ecosystems). At each of these levels we analysed available data to identify the status of each asset. At the ecosystem level, we used Beard's Vegetation Associations. From these data we can develop a measure of status as in amount remnant and amount within the conservation estate. At the community level of organisation existing Threatened and Priority Ecological Communities were used. In previous work with the Avon Catchment Council (Richardson, 2007) it was argued that English and Blyth's (1999) definition would be used but the application of this definition would be largely based on those as vegetation communities. This was applied as it is conceptually easy and that many of the Threatened and Priority Ecological Communities are vegetation communities. But, outside the known Threatened and Priority Ecological Communities, little is known of these communities. This is why the existing vegetation mapping is being collated. Because we don't know the location or extent of these communities we also have little information on their status or trend. Our vegetation mapping collation will start the process of informing about this level of asset. The species level also presented numerous challenges in developing an understanding of condition and trend. Even for those plant taxa that are acknowledged as rare, it is not easy to develop an understanding of these population parameters (Richardson and Yates, in prep.). It was even more difficult for fauna. Consequently, much of the analyses focused on two approaches: what

we have and what is being done to protect it. This information will form the baseline for prioritisation and conservation planning.

It is intended for the results and analyses to be used in two ways: in on-ground work prioritisation and landscape-scale biodiversity conservation planning. At present the outputs from this program are being used by Healthy Ecosystems and Ecoscape Projects (both part of ANDA). Biodiversity planning is essentially spatially (Pressey *et al.*, in prep.). As an acknowledgement of this our data is also available in GIS formats suitable for this next level of work within the ANRMR: identifying the areas of highest significance.



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## Appendix 1: Key Definitions

### Appendix 1.1 Threatened and Priority Ecological Communities

This information was taken (with kind permission) from DEC's Species and Communities Branches' *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities 2006*.

#### Ecological Community

A naturally occurring biological assemblage that occurs in a particular type of habitat.

A threatened ecological community (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to CALM's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

#### Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies ( A or B):

- A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or
- B) All occurrences recorded within the last 50 years have since been destroyed

#### Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the

best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

#### Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

#### Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

### 3. Definitions And Criteria For Priority Ecological Communities

#### Priority Ecological Community List

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

#### Priority One: Poorly-known ecological communities

Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

#### Priority Two: Poorly-known ecological communities

Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

#### Priority Three: Poorly known ecological communities

- (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:
- (ii) communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;
- (iii) communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.



Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

- (a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.
- (b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- (c) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

## Appendix 1.2 Fauna

This information was extracted (with kind permission) from DEC's Species and Communities Branches' *Fauna Management Manual*.

### IUCN RED LIST CATEGORIES

These categories and criteria have become widely recognised internationally and were last revised in 2001. They were adopted by the Commonwealth Government under the *Endangered Species Protection Act 1992* and are used to rank species under the *Environment Protection and Biodiversity Conservation Act 1999*. They have also been adopted by the Threatened Species Scientific Committee for the purposes of reviewing the status of WA species for listing under the *Wildlife Conservation Act 1950*.

The IUCN categories are defined as follows:

#### Extinct (EX)

A taxon is extinct when there is no reasonable doubt that the last individual has died.

#### Extinct in the Wild (EW)

A taxon is extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

#### Critically endangered (CR)

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.

#### Endangered (EN)

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.

#### Vulnerable (VU)

A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

#### Lower Risk (LR)

A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three groups;

- ❖ *Near Threatened* - taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
- ❖ *Least Concern* - taxa which do not qualify for Conservation Dependent or Near Threatened.

LISTINGS PURSUANT TO THE *WILDLIFE CONSERVATION ACT, 1950*

The Wildlife Conservation Act provides for species to be declared as 'likely to become extinct or rare, or otherwise in need of special protection', by Ministerial Notice in Government Gazette.

The Gazette Notice groups species into Schedules according to their status as follows.

#### Schedule 1 - Fauna that is rare or is likely to become extinct

These species are usually termed 'threatened' and can be defined as; native fauna which are

- well defined in taxonomic literature, or if undescribed, represented by a voucher specimen in a record collection,
- in imminent danger or threatened with extinction,
- dependent on/restricted to vulnerable habitats, and
- very uncommon, even if widespread.

Species in this schedule have been ranked as Extinct in the Wild, Critically Endangered, Endangered, or Vulnerable under the criteria for the IUCN Red List Categories described above.

#### Schedule 2 - Fauna presumed to be extinct

Species in this schedule have been ranked as Extinct under the criteria for IUCN Red List Categories.

#### Schedule 3 - Birds protected under an international agreement

#### Schedule 4 - Other specially protected fauna

Fauna under this category are also known as Specially Protected Fauna. Specially Protected Fauna are likely to be taken because of high commercial value or are uncommon, but not currently threatened, but are either of commercial or intrinsic value or are perceived to be damaging to a commercial or hobby enterprise and taking may lead to the species becoming threatened.

#### DEC PRIORITY FAUNA LIST

DEC manages fauna according to the Wildlife Conservation Act schedules. In addition DEC maintains a 'Priority Fauna List' that contains taxa that do not currently meet the criteria for the threatened categories but are of concern for various reasons. Taxa in this list would fall into the IUCN Red List Categories of Near Threatened, Conservation Dependent or Data Deficient. The list is not supported by legislation. Taxa are allocated to one of four priority categories as follows:

**Priority One**                      *Taxa with few, poorly known populations on threatened lands.*

Taxa which are known from few specimens or sight records from one or two localities on lands not managed for conservation, eg. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of status before consideration can be given to declaration as threatened fauna.

Priority Two *Taxa with few, poorly known populations on conservation lands.*

Taxa which are known from few specimens or sight records from one or two localities on lands not under immediate threat of habitat destruction or degradation, eg. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of status before consideration can be given to declaration as threatened fauna.

Priority Three *Taxa with several, poorly known populations, some on conservation lands*

Taxa which are known from few specimen or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority Four *Taxa in need of monitoring*

Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if current circumstances change. These taxa are usually represented on conservation lands.

Priority Five *Taxa in need of monitoring*

Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

LISTINGS PURSUANT TO THE (COMMONWEALTH) *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT, 1999*

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) provides for the listing of species as threatened. The following categories are used and are based on the IUCN Red List Categories:

- Extinct
- \*Extinct in the Wild
- \*Critically Endangered
- \*Endangered
- \*Vulnerable
- Conservation Dependant

Only those species in the categories marked \* are of national environmental significance under the EPBC Act.

## Appendix 1.3 Flora

This information was provided from DEC's Species and Communities Branch and has been presented verbatim.

### THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

#### DECLARED RARE AND PRIORITY FLORA LIST

for Western Australia

#### CONSERVATION CODES

**R:** Declared Rare Flora - Extant Taxa

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

**X:** Declared Rare Flora - Presumed Extinct Taxa

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.

**1:** Priority One - Poorly known Taxa

Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**2:** Priority Two - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**3:** Priority Three - Poorly Known Taxa

Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

**4:** Priority Four - Rare Taxa

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.




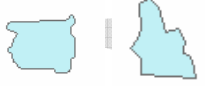

Note, the need for further survey of poorly known taxa is prioritised into the three categories depending on the perceived urgency for determining the conservation status of those taxa, as indicated by the apparent degree of threat to the taxa based on the current information.

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## Appendix 2: BHVA and Remnant Vegetation

### Appendix 2.1 Remnant Vegetation Compactness

Table A2.1: A visual representation of the relationship between compactness values and the shape of patches of vegetation that they represent. The final column indicates the number of ANRMR remnant vegetation patches within each compactness class, see Section 3.3.1.

Compactness Class	Examples of patch shapes from the Avon NRM Region	Number of Patches in the Avon NRM Region
0.0-0.2		7181
0.2-0.4		20 044
0.4-0.6		30 568
0.6-0.8		46301
0.8-1.0		6469
Total		110563



## Appendix 2.2 Prioritisation Workshop

The attached document is the outcome of a workshop aimed to prioritise the Beard's and Hopkins' Vegetation Association (BHVA). To identify the highest priority BHVA an expert panel used extent remaining compared to pre-European extent, percentage within the conservation estate as well as their own expert knowledge of each BHVA and the vegetation communities they contained.

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# Ecosystem Prioritisation Workshop Report



By Jeff Richardson DEC June 2007



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## Acronyms

ACC	Avon Catchment Council
ANRMR	Avon Natural Resource Management Region
BHVA	Beard's and Hopkins' Vegetation Associations
DEC	Department of Environment and Conservation
ND	Natural Diversity Program within the ACC investment
WWF	WWF-Australia (formerly World Wide Fund for Nature)

Cover photograph: Photo of the expert panel (front row) hard at work. Panel (left to right) Brett Beecham, Greg Keighery, Mike Lyons, Angas Hopkins, Ken Atkins. Sitting behind (left to right) Ben Bayliss, Tim Gamblin, Jeff Richardson, Paul Gioia, Richard McLellan. Photo courtesy Mick Davis (WWF).

## 1. Introduction

As part of the Avon Natural Resources Management Strategy the Avon Catchment Council (ACC), through the support of the State and Australian Governments Natural Heritage Trust and the National Action Plan for Salinity and Water Quality programs, has made a substantial investment into biodiversity conservation through the establishment of a Natural Diversity (ND) program. This program has the stated goal to “retain, restore and enhance the Avon Region’s natural biodiversity in ways that are consistent with the core values and sustainability goals of the region”. One of the ways in which the ND program is to achieve this goal is by delivering funding projects within the program. One of these projects is Baselineing which, amongst other things, is responsible for biodiversity relevant data collation, processing, interpretation and dissemination. One of the specific aims of the project is to support other projects within the ND program.

One of the projects that Baselineing is supporting is the ‘Healthy Ecosystems’ project which is being delivered by the Avon Catchment Council through a partnership between WWF and the Department of Water. The terrestrial part of this project is based on WWF’s ‘Woodland Watch’ program that operated in the Avon NRM Region (ANRMR) from 2000-2005 and still operates in the Northern Agricultural NRM Region. The Baselineing project has been asked to identify priority ecosystems within the ANRMR for Healthy Ecosystems.

On the 15<sup>th</sup> May 2007 at the ISA Seminar Room, Technology Park in Kensington a panel of botanists and ecologists with Wheatbelt experience was convened to identify priority ecosystems within the ANRMR. This document outlines the process and its results.

## 1.1 Attendees and Agenda

Workshop to identify priority Beard's Vegetation Associations within the Avon NRM Region.

### Attendees and roles

#### *Facilitator*

Jeff Richardson (DEC)

#### *Panel*

Greg Keighery (DEC), Angas Hopkins (DEC), Ken Atkins (DEC), Brett Beecham (DEC), Mike Lyons (DEC).

#### *Observers*

Wayne Elliot (DEC), Chris Curnow (WWF), Richard McLellan (WWF), Helena Mills (WWF), Mike Griffiths (WWF), Mick Davis (WWF), Rebecca Palumbo (ACC), Paul Gioia (DEC)

#### *Support*

Jane Hogden (DEC), Brett Glossop (DEC), Tim Gamblin (DEC), Ben Bayliss (DEC)

### Agenda

Date: 15<sup>th</sup> May 2007

Location: ISA Seminar Room, Technology Park

Start Time: 8:30 am.

Time	Item	Who
8:30	Introduction to using the lecture theatre	TBA
8:50	Personal Introductions (30 seconds each)	All
9:00	Outline of Healthy Ecosystems	Chris Curnow
9:10	Background of Beards Vegetation Associations	Angas Hopkins
9:20	Outline of the process to define priority ecosystems	Jeff Richardson
9:30	Start Prioritisation	Panel
10:00	Morning Tea	
10:30	Prioritisation continues	Panel
12:30	Lunch	
1:30	Prioritisation continues	Panel
3:00	Afternoon Tea	
3:30	Where to next? Followed by questions	Jeff Richardson and others
4:30	Close	

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## 2. Data and Data analysis

Beard's and Hopkins' Vegetation Associations (BHVA) are used as the surrogate for ecosystems for this process. BHVA are biologically based and are currently mapped. These data are the work of John Beard who mapped the vegetation of Western Australia at, approximately, the scale of 1:250,000. His line-work was subsequently digitised and attributed into a GIS. Having these data spatially represented (as polygons) allows for analysis for not only extent of clearing but also extent of reservation within the conservation estate.

BHVA data for the ANRMR was clipped from the Western Australia dataset. For the purposes of this prioritisation, those BHVA that were exclusively found beyond the agricultural zone were excluded from this analysis<sup>5</sup>: of the 145 BHVAs, 114 have some or all of their extent within the agricultural area. These data were analysed to determine current (remnant) extent and extent of reservation within the conservation estate. The raw data for this process will be available in the forthcoming Biodiversity Assessment, also being delivered under ACC funding.

## 3. Workshop Process and Results

To set the stage and frame the panel's thinking two presentations were given prior to the prioritisation process. The first of these was from Chris Curnow (WWF) who gave a brief introduction to the work done by the Healthy Ecosystems team. Angus Hopkins (DEC) gave an overview of BHVA history and application, highlighting issues of scale.

The results of the analyses described above (i.e. current extent and percentage reservation for each BHVA) were collated and projected on screens during the prioritisation workshop. BHVA were grouped by structural characteristics (i.e. Shrublands, Woodlands etc). Structural-floristic descriptions for each BHVA as described in accordance with the National Vegetation Information System standard (essentially vegetation structure and dominant species), were also projected to aid the panel in their deliberations. To give spatial context, the location of each BHVA within the ANRMR was displayed from another projector.

The panel was asked to prioritise the BHVA using the criteria of extent remaining compared to pre-European extent, percentage within the conservation estate as well as their own expert knowledge of each BHVA and the vegetation communities they contained.

With the above data on the screen in front of the panel, they collectively discussed the raw data and their experiences. Some of the observers (who have very good localised knowledge of Wheatbelt vegetation communities) contributed to this discussion.

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<sup>5</sup> The nature and focus of the work of the Healthy Ecosystems project is within the agricultural zone.



The panel went through the data twice. On the first pass they removed those BHVA that they believed were of low priority and identified some that required further clarification (through on-ground survey or desk top review). There was general consensus in this process as the statistics of extent remaining were primarily used. At the end of this process 53 BHVA were considered to be of low priority and were not considered further. These were all attributed with a priority ranking of five (a score of '1' being highest priority and '5' being the lowest). Four BHVA (516, 934, 962 and 1058) were considered to require further work in describing them, or, due to their small size, were considered to be either an artefact of mapping and/or may require some further desktop examination of extent and condition (see Appendix).

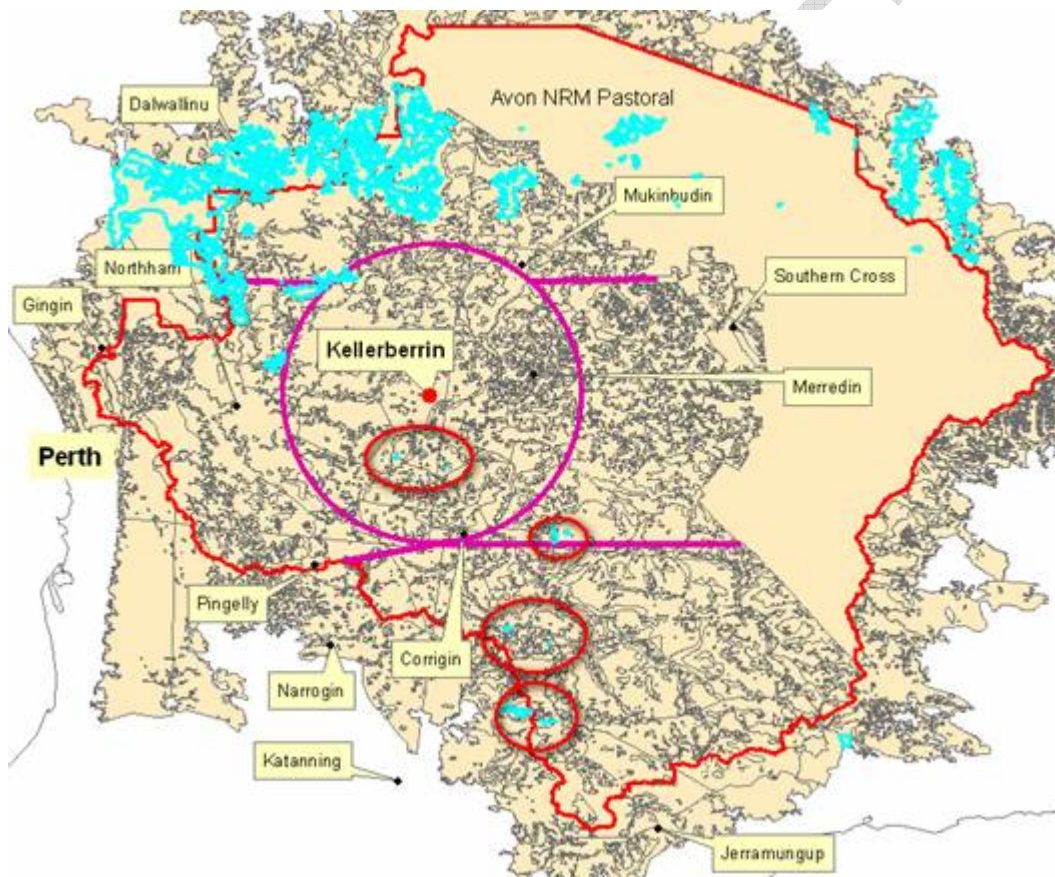


Figure 1: BHVA 142 (blue polygons) within the ANRMR (reddish boundary). Purple was used to segregate the ANRMR into central, north, south etc. Red ovals are used to indicate small patches of BHVA 142. See text for details.

On the second pass, the remaining 57 BHVA were reviewed again, this time being grouped by soil type and/or position within the landscape. It was thought that these groups would inform the decision making process as they are also indicative of the level of threat from altered hydrology. For instance, BHVAs that occur on laterite would be under less risk from salinity from rising groundwater than those low in the



landscape. Seven such groups were defined: clay, freshwater, granite, laterite, saline, sand, and valley floor. For some BHVA it was difficult to allocate to a single group, so two other 'combined' groups (valley floor/sand and laterite/sand) were also defined.

Using these categories and through discussion the panel scored each of these BHVA from 1 (high priority) to 5 (low priority). The panel also considered the variation in biological assemblage within BHVA across their range and, in five instances, divided up a BHVA into different areas and prioritised these differently. For instance, BHVA # 142 (Medium woodland of York gum & salmon gum) consists of numerous polygons from north of the ANRMR boundary, within the ANRMR but in the pastoral zone and some small discrete patches in the central and southern parts of the ANRMR (see Figure 1). The panel considered the southern patches (due to their isolation and size) as high priority (score of 1), whereas the northern patches were a low priority (score of 5).

During the prioritisation and review the panel also made the following suggestions:

- BHVA 128 (bare rocks) -requires determination as to whether this BHVA contains all granites. The panel acknowledged the importance of granite rocks but expressed concern that this BHVA may not contain all rocks and, even if it did, this would be a project unto itself. It was thought that Healthy Ecosystems should involve property owners in granite rock conservation where granites are thought to be in good condition.
- *Allocasuarina huegeliana* communities around granite should be considered as a single entity when prioritising (though BHVA 1005 excluded from this as it is largely on the southern margins of the ANRMR).
- Consideration is required as to whether the York gum/various York/morrel/salmon gum BHVA are substantially different or should be combined. These include: 8, 131, 141, 145, 511, 537, 936, 941, and 945. Note that only three of these (145, 537, 945) are considered highest priority.
- That for some small discrete BHVAs there may need to be some desktop and/or field work to confirm status (this is elaborated on in Section 4)

The prioritisation process identified 41 high priority BHVAs within the ANRMR (see Appendix for full list and details).

#### 4. Where now?

At the end of the prioritisation process a conversation involving all participants on how to use the outputs followed.

This conversation focused on how to do this via desktop using mapped remnant vegetation within each of the identified BHVA polygons. It was suggested that within each of the priority BHVAs the focus should be on large patches of remnant vegetation, with near neighbours in good condition. The process also needs to be cognisant of where other work has been done (for instance Land for Wildlife and existing WWF flora and structure surveys of priority woodlands) and if it is in the conservation estate or not.

There was some discussion regarding those identified priority BHVAs annotated as being in saline areas (see Appendix). The Healthy Ecosystem project has little capacity to influence salinity risk to these but, it was thought, there may be parts of these BHVA that are sufficiently above salinity risk (for instance on dunes) that may still be in good condition and viable in the long term. The group thought that aerial photograph interpretation may aid in this.

It was suggested that Jeff Richardson and Brett Beecham along with some of the Healthy Ecosystem team engage with Ian Steward (GIS Analyst, Northam) to establish protocols to perform this work.

It was also thought the results from this process may be useful for other projects within the ND program such as the work being undertaken by DoW and the Ecoscapes project.

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## Appendix

Output from the BHVA prioritisation process. The highlighted BHVAs are endemic to the ANRMR (defined as containing >95% of their pre-European extent within the region). Rank represents the order of priority from 1 to 5 with 1 considered by the panel to be the highest priority; within each ranking the BHVA have been grouped by soil/landscape position and this ranking does not constitute within-ranking prioritisation. The four BHVA at the end of the table need some further work before their priority will be determined.

BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
1271	Bare areas; claypans	1	Clay	
931	Medium woodland; yate	1	Fresh	
948	Medium woodland; York gum & river gum	1	Fresh	
954	Shrublands; thicket, Jam & Allocasuarina huegeliana	1	Granite	Combine 954, 1041 and 3041 and visit to check status. High priority.
1041	Low woodland; Allocasuarina huegeliana & Jam	1	Granite	Combine 954, 1041 and 3041 and visit to check status. High priority.
3041	Mosaic: Low woodland; Allocasuarina huegeliana & jam around granite rocks	1	Granite	Combine 954, 1041 and 3041 and visit to check status. High priority.
25	Low woodland; Allocasuarina huegeliana & York gum	1	Granite	Small discrete area verify still intact as well as condition
413	Shrublands; Acacia neurophylla & A. species thicket	1	Lat/Sand	Small discrete area verify still intact as well as condition. BHVA 413 and 435 may be the same.
37	Shrublands; teatree thicket	1	Saline	
41	Shrublands; teatree scrub	1	Saline	
356	Succulent steppe with open woodland; eucalypts over saltbush	1	Saline	Small discrete area verify still intact as well as condition
392	Shrublands; Melaleuca thyoides thicket	1	Saline	
631	Succulent steppe with woodland and thicket; York gum over Melaleuca thyoides & samphire	1	Saline	

BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
953	Succulent steppe with thicket; teatree over samphire (m5)	1	Saline	
1062	Succulent steppe with open woodland & thicket; york gum over <i>Melaleuca thyooides</i> & samphire	1	Saline	
950	Medium woodland; <i>Casuarina obesa</i>	1	Saline	
951	Succulent steppe with sparse woodland & thicket; york gum & <i>Kondinin blackbutt</i> over teatree thicket & samphire	1	Saline	
959	Succulent steppe with sparse woodland & thicket; yorrell & <i>Kondinin blackbutt</i> over teatree & samphire	1	Saline	
966	Succulent steppe with sparse woodland & thicket; salmon gum & morrel over teatree & samphire	1	Saline	
1048	Mosaic: Shrublands; melaleuca patchy scrub / Succulent steppe; samphire	1	Saline	
1080	Succulent steppe with mallee & thickets; Mallee and <i>Melaleuca uncinata</i> thickets on salt flats	1	Saline	Small discrete area verify still intact as well as condition
49	Shrublands; mixed heath	1	Sand	An unusual combination, verify what is here
694	Shrublands; scrub-heath on yellow sandplain banksia-xylomelum alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	1	Sand	
1056	Shrublands; thicket, acacia & <i>Allocasuarina campestris</i>	1	Sand	Isolated
1147	Shrublands; scrub-heath in the south-east Avon-Wheatbelt Region	1	Sand	
949	Low woodland; banksia	1*	Sand	1* non-coastal; 5 coastal
352	Medium woodland; York gum	1	Valley Floor	
1023	Medium woodland; York gum, wandoo & salmon gum ( <i>Eucalyptus salmonophloia</i> )	1	Valley Floor	

BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
1053	Shrublands; Melaleuca uncinata thicket with scattered York gum	1	Valley Floor	
1200	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub Eucalyptus eremophila & black marlock (E. redunca)	1	Valley Floor	
145	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance	1	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations
537	Medium woodland; morrel (Eucalyptus longicornis)	1	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations
945	Mosaic: Medium woodland; salmon gum / Shrublands; mallee scrub, redwood & black marlock	1	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations
1025	Mosaic: Medium woodland; York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire	1	Valley Floor	Small discrete area verify still intact as well as condition
1049	Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	1	Valley Floor	
1059	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee Eucalyptus longicornis & E. sheathiana scrub	1	Valley Floor	Small discrete area verify still intact as well as condition
946	Medium woodland; wandoo	1*	Valley Floor	1 eastern (E. capillosa areas); 5 western
7	Medium woodland; York gum (Eucalyptus loxophleba) & wandoo	1*	Valley Floor	1 outlier mid-Avon; 5 western (ignore Western)
142	Medium woodland; York gum & salmon gum	1*	Valley Floor	1 southern occurrence; 5 elsewhere. Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations.
1061	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire	1	VF/Saline	
1079	Mosaic: Medium open woodland; salmon gum & morrel / Succulent steppe; saltbush	1	VF/Saline	

BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
2047	Shrublands; tamma & dryandra thicket	2	Laterite	
960	Shrublands; mallee scrub, redwood & black marlock	2	Sand	
131	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee scrub, redwood & black marlock	2	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations
1065	Mosaic: Shrublands; Medium woodland; wandoo & gimlet / York gum & Eucalyptus sheathiana mallee scrub	2	Valley Floor	
955	Mosaic: Shrublands; scrub-heath (South East Avon) / Shrublands; Allocasuarina campestris thicket	3	Lat/Sand	Potential high species diversity but, comparatively, low threat.
941	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub, redwood	3	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations. BHVA description for this does not agree with the NVIS mapping.
1055	Shrublands; York gum & Eucalyptus sheathiana mallee scrub	3	Valley Floor	Quite a bit of this type left
1057	Mosaic: Shrublands; Medium woodland; salmon gum & gimlet / York gum & Eucalyptus sheathiana mallee scrub	3	Valley Floor	
1081	Shrublands; mallee scrub, Eucalyptus longicornis & E. sheathiana	3	Valley Floor	
552	Shrublands; Casuarina acutivalvis & calothamnus (also Melaleuca) thicket on greenstone hills	4	Laterite	Be interesting to look at outliers in SW of the ANRMR
8	Medium woodland; salmon gum & gimlet	4	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations
141	Medium woodland; York gum, salmon gum & gimlet	4	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations
936	Medium woodland; salmon gum	4	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel

BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
				combinations
1075	Shrublands; mallee scrub, Eucalyptus eremophila & black marlock (Eucalyptus redunca)	4	Valley Floor	Low rating due to a lot left outside the ANRMR
511	Medium woodland; salmon gum & morrel	4	Valley Floor	Need to identify what (if any differences are found between these york gum/salmon gum/morrel combinations
128	Bare areas; rock outcrops	5	Granite	
4	Medium woodland; marri & wandoo	5		
51	Sedgeland; reed swamps, occasionally with heath	5		
125	Bare areas; salt lakes	5		
129	Bare areas; drift sand	5		
325	Succulent steppe; saltbush & samphire	5		
435	Shrublands; Acacia neurophylla, A. beauverdiana & A. resinomarginea thicket	5		BHVA 413 and 435 may be the same.
519	Shrublands; mallee scrub, Eucalyptus eremophila	5		
538	Shrublands; Acacia brachystachya scrub	5		
551	Shrublands; Allocasuarina campestris thicket	5		
676	Succulent steppe; samphire	5		
929	Low forest; moort (Eucalyptus platypus)	5		
942	Mosaic: Medium woodland; yate / Shrublands; mallee scrub, black marlock	5		Only a very small occurrence inside the ANRMR
947	Medium woodland; powderbark & mallet	5		



BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
952	Shrublands; dryandra heath	5		
965	Medium woodland; jarrah & marri	5		
968	Medium woodland; jarrah, marri & wandoo	5		
973	Low forest; paperbark ( <i>Melaleuca raphiophylla</i> )	5		
987	Medium woodland; jarrah & wandoo	5		
988	Succulent steppe with thicket; <i>Melaleuca thyoides</i> over samphire	5		
999	Medium woodland; marri	5		
1002	Medium open woodland; jarrah	5		
1003	Medium forest; jarrah, marri & wandoo	5		
1004	Mosaic: Medium open woodland; wandoo / Shrublands; mixed heath	5		
1005	Low woodland; <i>Allocasuarina huegeliana</i>	5		
1006	Medium woodland; jarrah, wandoo & powderbark	5		
1014	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	5		
1017	Medium open woodland; jarrah & marri, with low woodland; banksia	5		
1018	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; <i>Casuarina obesa</i>	5		
1019	Medium sparse woodland; jarrah & marri	5		
1024	Shrublands; mallee & casuarina thicket	5		

BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
1027	Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri	5		
1094	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; mallee scrub Eucalyptus eremophila & black marlock	5		
1413	Shrublands; acacia, casuarina & melaleuca thicket	5		
2048	Shrublands; scrub-heath in the Mallee Region	5		
3003	Medium forest; jarrah & marri on laterite with wandoo in valleys, sandy swamps with teatree and Banksia	5		
13	Medium open woodland; wandoo	5		
147	Succulent steppe with scrub; acacia species over saltbush	5		
535	Medium woodland; rough fruited mallee on greenstone hills	5		
536	Medium woodland; morrel & rough fruited mallee (Eucalyptus corrugata)	5		
956	Shrublands; Allocasuarina campestris thicket with scattered wandoo	5		
961	Mosaic: Shrublands; scrub-heath (South East Avon)/ Shrublands; Allocasuarina campestris thicket	5		
1020	Mosaic: Medium forest; jarrah-marri / Medium woodland; marri-wandoo	5		
1063	Medium-Low woodland; York gum & cypress pine (Callitris columellaris)	5		
1067	Medium woodland; salmon gum, morrel, gimlet & rough fruited mallee	5		
1068	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana	5		

BHVA #	Beards Description	Rank	Soil/Land-scape Position	Comments
1098	Mosaic: Medium sparse woodland; salmon gum & morrel / Succulent steppe; samphire	5		
3	Medium forest; jarrah-marri	5		
5	Medium woodland; wandoo & powderbark (Eucalyptus accedens)	5		
36	Shrublands; thicket, acacia-casuarina alliance	5		
47	Shrublands; tallerack mallee-heath	5		
380	Shrublands; scrub-heath on sandplain	5		
520	Shrublands; Acacia quadrimarginea thicket	5		
1148	Shrublands; scrub-heath in the Coolgardie Region	5		
962	Medium woodland; mallet (Eucalyptus astringens)	v		Need to check mapping and see if these are substantially different from other similar types. Also need to check whether <i>E. astringens</i> is in this location.
1058	Shrublands; York gum & Eucalyptus gongylocarpa mallee scrub	v		An odd combination of York gum & Eucalyptus gongylocarpa, need to see if it exists.
934	Shrublands; mallee scrub (Eucalyptus nutans)	v		Compare Sth coast with ANRMR population and see if they are the same, also need to check species as no longer <i>E. nutans</i> .
516	Shrublands; mallee scrub, black marlock	v		Possibly a mapping artefact, as this largely found on the south coast.

## Appendix 2.3 BHVA Tables

Table A2.2: The current and pre-European extent of the BVHA of the ANRMR.

This table shows the pre-European and current extent (ha) of each vegetation association in the agricultural (intensive) and pastoral (extensive) regions of the ANRMR, and the percent remaining (current extent as a percentage of pre-European extent). The final column shows the current extent of each regional BHVA expressed as a percentage of the current extent in the State. Rows shaded in grey are BHVA with >95% of their current extent in the ANRMR.

BHVA	Beards Description	Current Area (ha)				Pre-European Area (ha)			Percent		
		Avon Intensive	Avon Extensive	Avon Total	WA	Avon Intensive	Avon Extensive	Area WA	Remnant Avon	Remnant WA	Current Avon Of Current WA
3	Medium forest; jarrah-marri	99273	0	99273	1846549	122026	0	2661405	81	69	5
4	Medium woodland; marri & wandoo	112393	0	112393	245945	270569	0	1054280	42	23	46
5	Medium woodland; wandoo & powderbark (Eucalyptus accedens)	9827	0	9827	23123	15888	0	51731	62	45	42
7	Medium woodland; York gum (Eucalyptus loxophleba) & wandoo	311	0	311	22900	2809	0	179725	11	13	1
8	Medium woodland; salmon gum & gimlet	35594	49768	85362	329595	400201	49768	694638	19	47	26
13	Medium open woodland; wandoo	210	0	210	210	392	0	392	54	54	100
18	Low woodland; mulga (Acacia aneura)	0	15708	15708	19886871	0	15708	19888959	100	100	0
19	Low woodland; mulga between sandridges	0	3173	3173	4384254	0	3173	4385295	100	100	0
25	Low woodland; Allocasuarina huegeliana & York gum	958	0	958	5871	8374	0	13765	11	43	16
36	Shrublands; thicket, acacia-casuarina alliance	64746	870	65616	216340	299375	870	495431	22	44	30
37	Shrublands; teatree thicket	2470	0	2470	22849	7232	0	39385	34	58	11
39	Shrublands; mulga scrub	0	139	139	6613463	0	139	6613569	100	100	0
41	Shrublands; teatree scrub	4992	0	4992	179370	13772	0	194251	36	92	3
47	Shrublands; tallerack mallee-heath	15041	0	15041	290206	40501	0	820389	37	35	5
49	Shrublands; mixed heath	1135	0	1135	24366	1374	0	52492	83	46	5
51	Sedgeland; reed swamps, occasionally with heath	60	0	60	34008	63	0	59086	95	58	0
125	Bare areas; salt lakes	8526	132955	141481	3288247	135714	132955	3491804	53	94	4
128	Bare areas; rock outcrops	24249	72940	97189	281154	64770	72940	329870	71	85	35
131	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee scrub, redwood & black marlock	8941	0	8941	9820	171465	0	181155	5	5	91
141	Medium woodland; York gum, salmon gum & gimlet	12098	798440	810538	952986	199638	798440	1158760	81	82	85
142	Medium woodland; York gum & salmon gum	8643	47696	56339	188633	157967	47696	711262	27	27	30
144	Medium woodland; wandoo, salmon gum, morrel, gimlet & rough fruited mallee	0	3988	3988	3988	0	3988	3988	100	100	100

BHVA	Beards Description	Current Area (ha)				Pre-European Area (ha)			Percent		
		Avon Intensive	Avon Extensive	Avon Total	WA	Avon Intensive	Avon Extensive	Area WA	Remnant Avon	Remnant WA	Current Avon Of Current WA
145	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance	322	0	322	322	7949	0	8054	4	4	100
147	Succulent steppe with scrub; acacia species over saltbush	60	34406	34466	34466	1072	34406	35478	97	97	100
148	Medium woodland; gimlet	0	320	320	320	0	320	320	100	100	100
202	Shrublands; mulga & Acacia quadrimarginea scrub	0	1844	1844	448529	0	1844	448529	100	100	0
214	Mosaic: Medium woodland; goldfield eucalypts / Succulent steppe with open low woodland; myoporium over saltbush	0	15693	15693	505487	0	15693	505487	100	100	3
221	Succulent steppe; saltbush	0	12036	12036	63625	0	12036	63720	100	100	19
256	Low woodland; York gum, and cypress pine (adjacent to e6pMLi)	0	64955	64955	67666	0	64955	67666	100	100	96
314	Succulent steppe with open woodland; york gum over saltbush	0	6394	6394	7442	0	6394	7442	100	100	86
325	Succulent steppe; saltbush & samphire	249	7219	7468	60138	703	7219	64628	94	93	12
337	Mosaic: Shrublands; bowgada scrub / Hummock grasslands, mixed sandplain - open red mallee & mixed sparse dwarf shrubs over Triodia basedowii	0	2785	2785	2785	0	2785	2785	100	100	100
352	Medium woodland; York gum	21700	229	21929	120611	348719	229	724273	6	17	18
356	Succulent steppe with open woodland; eucalypts over saltbush	958	0	958	1967	3320	0	4330	29	45	49
357	Medium woodland over scrub; York gum over bowgada & jam (Acacia acuminata)	0	25556	25556	37003	0	25556	37003	100	100	69
380	Shrublands; scrub-heath on sandplain	13648	0	13648	338133	32541	0	580375	42	58	4
392	Shrublands; Melaleuca thyoides thicket	24	0	24	1383	191	0	3069	13	45	2
411	Succulent steppe with open scrub; scattered bowgada & jam over saltbush	0	22	22	44035	0	22	44035	100	100	0
413	Shrublands; Acacia neurophylla & A. species thicket	78	0	78	1620	375	0	3474	21	47	5
414	Succulent steppe with open scrub; scattered bowgada & jam over saltbush & bluebush	0	15714	15714	30389	0	15714	30389	100	100	52
416	Low woodland; mulga mixed with cypress pine & york gum	0	74263	74263	240331	0	74263	240331	100	100	31
420	Shrublands; bowgada & jam scrub	0	16251	16251	829286	0	16251	859632	100	96	2
435	Shrublands; Acacia neurophylla, A. beauverdiana & A. resinomarginea thicket	9940	505382	515322	757195	23626	505382	994575	97	76	68
436	Shrublands; mixed Acacia thickets in thickets of acacia-casuarina-melaleuca alliance	0	1059	1059	1059	0	1059	1059	100	100	100
437	Shrublands; Mixed acacia thicket on sandplain	0	114154	114154	474367	0	114154	505365	100	94	24
468	Medium woodland; salmon gum & goldfields blackbutt	0	352	352	592022	0	352	592022	100	100	0
483	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex ; red mallee mallee &	0	49064	49064	439579	0	49064	439579	100	100	11

BHVA	Beards Description	Current Area (ha)				Pre-European Area (ha)			Percent		
		Avon Intensive	Avon Extensive	Avon Total	WA	Avon Intensive	Avon Extensive	Area WA	Remnant Avon	Remnant WA	Current Avon Of Current WA
	mixed sparse dwarf shrubs over <i>Triodia basedowii</i>										
486	Mosaic: Medium woodland; salmon gum & red mallee / Shrublands; mallee scrub <i>Eucalyptus eremophila</i>	0	18	18	256582	0	18	436130	100	59	0
491	Medium woodland; morrel & Dundas blackbutt ( <i>E. dundasii</i> )	0	64	64	67168	0	64	67168	100	100	0
501	Medium woodland; goldfields blackbutt	0	68	68	48022	0	68	48022	100	100	0
511	Medium woodland; salmon gum & morrel	39158	444954	484112	493862	243608	444954	700409	70	71	98
519	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i>	232090	234726	466816	1398666	986398	234726	2333440	38	60	33
520	Shrublands; <i>Acacia quadrimarginea</i> thicket	7	24996	25003	37906	23	24996	37923	100	100	66
522	Medium woodland; redwood ( <i>Eucalyptus transcontinentalis</i> ) & merrit ( <i>E. flocktoniae</i> )	0	123327	123327	709715	0	123327	709715	100	100	17
535	Medium woodland; rough fruited mallee on greenstone hills	451	23136	23587	23587	1210	23136	24346	97	97	100
536	Medium woodland; morrell & rough fruited mallee ( <i>Eucalyptus corrugata</i> )	3987	1727	5714	5714	11450	1727	13178	43	43	100
537	Medium woodland; morrel ( <i>Eucalyptus longicornis</i> )	332	207	539	540	494	207	701	77	77	100
538	Shrublands; <i>Acacia brachystachya</i> scrub	1098	123869	124967	144196	4724	123869	147822	97	98	87
551	Shrublands; <i>Allocasuarina campestris</i> thicket	28444	17341	45785	69690	146524	17341	302423	28	23	66
552	Shrublands; <i>Casuarina acutivalvis</i> & <i>calothamnus</i> (also <i>melaleuca</i> ) thicket on greenstone hills	98	12341	12439	31733	745	12341	33909	95	94	39
555	Hummock grasslands, mallee steppe; red mallee over <i>spinifex</i> , <i>Triodia scariosa</i>	0	11656	11656	57420	0	11656	57420	100	100	20
631	Succulent steppe with woodland and thicket; York gum over <i>Melaleuca thyoidea</i> & samphire	3914	0	3914	53885	11812	0	106853	33	50	7
676	Succulent steppe; samphire	300	626	926	1958159	6810	626	2063389	12	95	0
694	Shrublands; scrub-heath on yellow sandplain <i>banksia-xylomelum</i> alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	4864	0	4864	60378	149967	0	346494	3	17	8
929	Low forest; moort ( <i>Eucalyptus platypus</i> )	181	0	181	7895	227	0	10735	80	74	2
931	Medium woodland; yate	648	0	648	13421	2216	0	31390	29	43	5
934	Shrublands; mallee scrub ( <i>Eucalyptus nutans</i> )	88	0	88	4264	259	0	9282	34	46	2
936	Medium woodland; salmon gum	9816	16132	25948	675636	29028	16132	698752	57	97	4
941	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub, redwood	3694	10822	14516	14516	23425	10822	34248	42	42	100
945	Mosaic: Medium woodland; salmon gum / Shrublands; mallee scrub, redwood & black marlock	13926	8443	22369	22369	168169	8443	176612	13	13	100
946	Medium woodland; wandoo	8151	786	8937	11316	44727	786	53225	20	21	79
947	Medium woodland; powderbark & mallet	2828	0	2828	10196	12717	0	34033	22	30	28

BHVA	Beards Description	Current Area (ha)				Pre-European Area (ha)			Percent		
		Avon Intensive	Avon Extensive	Avon Total	WA	Avon Intensive	Avon Extensive	Area WA	Remnant Avon	Remnant WA	Current Avon Of Current WA
948	Medium woodland; York gum & river gum	115	0	115	115	1441	0	1441	8	8	100
949	Low woodland; banksia	15199	0	15199	124758	22466	0	218194	68	57	12
950	Medium woodland; Casuarina obesa	190	0	190	190	497	0	497	38	38	100
951	Succulent steppe with sparse woodland & thicket; york gum & Kondinin blackbutt over teatree thicket & samphire	8444	0	8444	8444	27508	0	27508	31	31	100
952	Shrublands; dryandra heath	303	0	303	9266	495	0	58931	61	16	3
953	Succulent steppe with thicket; teatree over samphire (m5)	1431	0	1431	1613	9457	0	9928	15	16	89
954	Shrublands; thicket, Jam & Allocasuarina huegeliana	1044	0	1044	1044	6502	0	6502	16	16	100
955	Mosaic: Shrublands; scrub-heath (South East Avon) / Shrublands; Allocasuarina campestris thicket	9417	0	9417	10684	130560	0	139324	7	8	88
956	Shrublands; Allocasuarina campestris thicket with scattered wandoo	2744	0	2744	2744	25556	0	25556	11	11	100
959	Succulent steppe with sparse woodland & thicket; yorrell & Kondinin blackbutt over teatree & samphire	4005	0	4005	4005	13092	0	13092	31	31	100
960	Shrublands; mallee scrub, redwood & black marlock	23045	0	23045	23045	220441	0	220441	10	10	100
961	Mosaic: Shrublands; scrub-heath (South East Avon)/ Shrublands; Allocasuarina campestris thicket	4277	0	4277	4299	27390	0	27800	16	15	99
962	Medium woodland; mallet (Eucalyptus astringens)	4	0	4	4	62	0	62	6	6	100
965	Medium woodland; jarrah & marri	271	0	271	5145	723	0	9356	37	55	5
966	Succulent steppe with sparse woodland & thicket; salmon gum & morrell over teatree & samphire	379	0	379	379	7087	0	7087	5	5	100
968	Medium woodland; jarrah, marri & wandoo	53629	0	53629	97596	69062	0	296878	78	33	55
973	Low forest; paperbark (Melaleuca raphiophylla)	109	0	109	1786	242	0	5003	45	36	6
987	Medium woodland; jarrah & wandoo	37	0	37	1319	146	0	3595	25	37	3
988	Succulent steppe with thicket; Melaleuca thyoides over samphire	3377	0	3377	23166	49488	0	96635	7	24	15
999	Medium woodland; marri	256	0	256	14707	1069	0	115707	24	13	2
1002	Medium open woodland; jarrah	361	0	361	15527	361	0	15948	100	97	2
1003	Medium forest; jarrah, marri & wandoo	4369	0	4369	8337	5760	0	20109	76	41	52
1004	Mosaic: Medium open woodland; wandoo / Shrublands; mixed heath	1595	0	1595	3583	1658	0	9768	96	37	45
1005	Low woodland; Allocasuarina huegeliana	3	0	3	205	155	0	787	2	26	1
1006	Medium woodland; jarrah, wandoo & powderbark	20177	0	20177	22614	35903	0	44908	56	50	89
1014	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	959	0	959	21856	1976	0	41064	49	53	4
1017	Medium open woodland; jarrah & marri, with low woodland; banksia	248	0	248	11481	1272	0	17528	19	66	2



BHVA	Beards Description	Current Area (ha)				Pre-European Area (ha)			Percent		
		Avon Intensive	Avon Extensive	Avon Total	WA	Avon Intensive	Avon Extensive	Area WA	Remnant Avon	Remnant WA	Current Avon Of Current WA
1018	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; Casuarina obesa	1835	0	1835	3193	7005	0	14059	26	23	57
1019	Medium sparse woodland; jarrah & marri	191	0	191	361	514	0	804	37	45	53
1020	Mosaic: Medium forest; jarrah-marri / Medium woodland; marri-wandoo	1850	0	1850	1850	5610	0	5610	33	33	100
1023	Medium woodland; York gum, wandoo & salmon gum (Eucalyptus salmonophloia)	38342	0	38342	103053	844117	0	1601602	5	6	37
1024	Shrublands; mallee & casuarina thicket	38740	19582	58322	69895	573505	19582	742950	10	9	83
1025	Mosaic: Medium woodland; York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire	32	0	32	32	1920	0	1920	2	2	100
1027	Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri	8034	0	8034	22313	16567	0	39809	48	56	36
1041	Low woodland; Allocasuarina huegeliana & Jam	624	0	624	1185	2506	0	4781	25	25	53
1048	Mosaic: Shrublands; melaleuca patchy scrub / Succulent steppe; samphire	2373	0	2373	2373	13815	0	13815	17	17	100
1049	Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	30084	0	30084	30084	833385	0	833385	4	4	100
1053	Shrublands; Melaleuca uncinata thicket with scattered York gum	1722	0	1722	2212	12706	0	13823	14	16	78
1055	Shrublands; York gum & Eucalyptus sheathiana mallee scrub	13793	0	13793	13793	126806	0	126806	11	11	100
1056	Shrublands; thicket, acacia & Allocasuarina campestris	3098	0	3098	3098	21073	0	21073	15	15	100
1057	Mosaic: Shrublands; Medium woodland; salmon gum & gimlet / York gum & Eucalyptus sheathiana mallee scrub	13586	0	13586	13586	145311	0	145311	9	9	100
1058	Shrublands; York gum & Eucalyptus gongylocarpa mallee scrub	244	0	244	244	9363	0	9363	3	3	100
1059	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee Eucalyptus longicornis & E. sheathiana scrub	13	0	13	13	2260	0	2260	1	1	100
1061	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire	12495	0	12495	12495	42747	0	42747	29	29	100
1062	Succulent steppe with open woodland & thicket; york gum over Melaleuca thyoides & samphire	4270	335	4605	7442	18776	335	22527	24	33	62
1063	Medium-Low woodland; York gum & cypress pine (Callitris columellaris)	1824	160926	162750	162752	11553	160926	172482	94	94	100
1065	Mosaic: Shrublands; Medium woodland; wandoo & gimlet /	448	0	448	448	863	0	863	52	52	100

BHVA	Beards Description	Current Area (ha)				Pre-European Area (ha)			Percent		
		Avon Intensive	Avon Extensive	Avon Total	WA	Avon Intensive	Avon Extensive	Area WA	Remnant Avon	Remnant WA	Current Avon Of Current WA
	York gum & Eucalyptus sheathiana mallee scrub										
1067	Medium woodland; salmon gum, morrel, gimlet & rough fruited mallee	4046	9339	13385	13385	5932	9339	15272	88	88	100
1068	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana	24402	111467	135869	135869	157433	111467	268900	51	51	100
1071	Succulent steppe with scrub; acacia species over saltbush & bluebush	0	762	762	762	0	762	762	100	100	100
1075	Shrublands; mallee scrub, Eucalyptus eremophila & black marlock (Eucalyptus redunca)	29587	0	29587	62595	174477	0	527021	17	12	47
1078	Medium woodland; salmon gum, redwood, merrit, gimlet & Eucalyptus sheathiana	0	757	757	757	0	757	757	100	100	100
1079	Mosaic: Medium open woodland; salmon gum & morrel / Succulent steppe; saltbush	3877	0	3877	3877	10119	0	10119	38	38	100
1080	Succulent steppe with mallee & thickets; Mallee and Melaleuca uncinata thickets on salt flats	81	0	81	81	3951	0	3951	2	2	100
1081	Shrublands; mallee scrub, Eucalyptus longicornis & E. sheathiana	2266	0	2266	2266	15148	0	15148	15	15	100
1098	Mosaic: Medium sparse woodland; salmon gum & morrel / Succulent steppe; samphire	2967	0	2967	2967	13669	0	13669	22	22	100
1147	Shrublands; scrub-heath in the south-east Avon-Wheatbelt Region	2375	0	2375	2436	41057	0	42855	6	6	97
1148	Shrublands; scrub-heath in the Coolgardie Region	452	192029	192481	257534	3302	192029	260384	99	99	75
1200	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub Eucalyptus eremophila & black marlock (E. redunca)	8105	0	8105	12837	102557	0	162786	8	8	63
1271	Bare areas; claypans	31	495	526	86111	601	495	86684	48	99	1
1413	Shrublands; acacia, casuarina & melaleuca thicket	91839	728280	820119	1247105	490974	728280	1679917	67	74	66
2047	Shrublands; tamma & dryandra thicket	940	0	940	940	1463	0	1463	64	64	100
2048	Shrublands; scrub-heath in the Mallee Region	37108	107158	144266	155847	198538	107158	322220	47	48	93
3003	Medium forest; jarrah & marri on laterite with wandoo in valleys, sandy swamps with teatree and Banksia	36119	0	36119	40723	61566	0	66452	59	61	89
3041	Mosaic: Low woodland; Allocasuarina huegeliana & jam around granite rocks	843	0	843	1266	3947	0	6374	21	20	67

Table A2.3: Reservation status of vegetation associations in IUCN I-IV Reserves and other CALM-managed lands of ANRMR and the State (see text).

Reservation status is expressed as a percent of the pre-European extent of ANRMR and the State. Shaded vegetation associations are not represented or poorly reserved (<15%) in IUCN reserve categories I-IV within the State.

BHVA	Beard's Description	Area within IUCN I-IV (ha)		% Area in IUCN I-IV		Area S16 and UCL (ha)		% Area S16 and UCL		pre-European extent (ha)	
		Avon	WA	Avon	WA	Avon	WA	Avon	WA	Avon	WA
3	Medium forest; jarrah-marri	20645	490823	17	18	850	17248	1	1	122026	2661405
4	Medium woodland; marri & wandoo	34287	46226	13	4	715	6893	0	1	270569	1054280
5	Medium woodland; wandoo & powderbark ( <i>Eucalyptus accedens</i> )	7669	8178	48	16	173	198	1	0	15888	51731
7	Medium woodland; York gum ( <i>Eucalyptus loxophleba</i> ) & wandoo	1	529	0	0	0	238	0	0	2809	179725
8	Medium woodland; salmon gum & gimlet	14926	44683	3	6	38166	113039	8	16	449969	694638
13	Medium open woodland; wandoo	154	154	39	39	0	0	0	0	392	392
18	Low woodland; mulga ( <i>Acacia aneura</i> )	3296	424372	21	2	0	2851016	0	14	15708	19888959
19	Low woodland; mulga between sandridges	176	4783	6	0	2757	2771696	87	63	3173	4385295
25	Low woodland; <i>Allocasuarina huegeliana</i> & York gum	2	43	0	0	0	0	0	0	8374	13765
36	Shrublands; thicket, acacia-casuarina alliance	9314	25547	3	5	23902	98426	8	20	300244	495431
37	Shrublands; teatree thicket	1316	4803	18	12	151	2119	2	5	7232	39385
39	Shrublands; mulga scrub	0	479438	0	7	0	2443680	0	37	139	6613569
41	Shrublands; teatree scrub	6299	21751	46	11	205	112681	1	58	13772	194251
47	Shrublands; tallerack mallee-heath	6738	136946	17	17	6241	53011	15	6	40501	820389
49	Shrublands; mixed heath	1066	10562	78	20	0	1875	0	4	1374	52492
51	Sedgeland; reed swamps, occasionally with heath	63	22245	100	38	0	724	0	1	63	59086
125	Bare areas; salt lakes	62515	250416	23	7	106449	1333102	40	38	268669	3491804
128	Bare areas; rock outcrops	23386	47796	17	14	42279	158702	31	48	137711	329870
131	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee scrub, redwood & black marlock	1396	1408	1	1	94	94	0	0	171465	181155
141	Medium woodland; York gum, salmon gum & gimlet	120493	139499	12	12	228619	249211	23	22	998077	1158760
142	Medium woodland; York gum & salmon gum	5308	8646	3	1	21433	120731	10	17	205663	711262
144	Medium woodland; wandoo, salmon gum, morrel, gimlet & rough fruited mallee	303	303	8	8	3682	3682	92	92	3988	3988
145	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance	0	0	0	0	48	48	1	1	7949	8054
147	Succulent steppe with scrub; acacia species over saltbush	4297	4297	12	12	14425	14425	41	41	35478	35478

BHVA	Beard's Description	Area within IUCN I-IV (ha)		% Area in IUCN I-IV		Area S16 and UCL (ha)		% Area S16 and UCL		pre-European extent (ha)	
		Avon	WA	Avon	WA	Avon	WA	Avon	WA	Avon	WA
148	Medium woodland; gimlet	0	0	0	0	320	320	100	100	320	320
202	Shrublands; mulga & Acacia quadrimarginea scrub	335	1729	18	0	0	23615	0	5	1844	448529
214	Mosaic: Medium woodland; goldfield eucalypts / Succulent steppe with open low woodland; myoporum over saltbush	5032	5032	32	1	10439	124578	67	25	15693	505487
221	Succulent steppe; saltbush	0	3517	0	6	33	12115	0	19	12036	63720
256	Low woodland; York gum, and cypress pine (adjacent to e6pMLi)	30331	30331	47	45	533	3244	1	5	64955	67666
314	Succulent steppe with open woodland; york gum over saltbush	1084	1084	17	15	112	112	2	2	6394	7442
325	Succulent steppe; saltbush & samphire	0	0	0	0	1060	2935	13	5	7922	64628
337	Mosaic: Shrublands; bowgada scrub / Hummock grasslands, mixed sandplain - open red mallee & mixed sparse dwarf shrubs over Triodia basedowii	0	0	0	0	0	0	0	0	2785	2785
352	Medium woodland; York gum	1790	3071	1	0	929	7603	0	1	348947	724273
356	Succulent steppe with open woodland; eucalypts over saltbush	159	159	5	4	19	19	1	0	3320	4330
357	Medium woodland over scrub; York gum over bowgada & jam (Acacia acuminata)	0	0	0	0	1	805	0	2	25556	37003
380	Shrublands; scrub-heath on sandplain	10897	102376	33	18	0	93275	0	16	32541	580375
392	Shrublands; Melaleuca thyioides thicket	0	274	0	9	0	273	0	9	191	3069
411	Succulent steppe with open scrub; scattered bowgada & jam over saltbush	0	0	0	0	0	1113	0	3	22	44035
413	Shrublands; Acacia neurophylla & A. species thicket	0	24	0	1	31	1387	8	40	375	3474
414	Succulent steppe with open scrub; scattered bowgada & jam over saltbush & bluebush	0	0	0	0	0	1	0	0	15714	30389
416	Low woodland; mulga mixed with cypress pine & york gum	12122	16907	16	7	3607	47246	5	20	74263	240331
420	Shrublands; bowgada & jam scrub	0	490	0	0	0	11855	0	1	16251	859632
435	Shrublands; Acacia neurophylla, A. beauverdiana & A. resinomarginea thicket	111954	133640	21	13	311074	463950	59	47	529008	994575
436	Shrublands; mixed Acacia thickets in thickets of acacia-casuarina-melaleuca alliance	0	0	0	0	47	47	4	4	1059	1059
437	Shrublands; Mixed acacia thicket on sandplain	27508	63246	24	13	72667	267109	64	53	114154	505365
468	Medium woodland; salmon gum & goldfields blackbutt	56	25313	16	4	297	142961	84	24	352	592022
483	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex ; red mallee mallee & mixed sparse dwarf shrubs over Triodia basedowii	22423	22696	46	5	21116	234305	43	53	49064	439579
486	Mosaic: Medium woodland; salmon gum & red mallee / Shrublands; mallee scrub Eucalyptus eremophila	0	21207	0	5	18	183746	100	42	18	436130
491	Medium woodland; morrel & Dundas blackbutt (E. dundasii)	0	0	0	0	64	67106	100	100	64	67168
501	Medium woodland; goldfields blackbutt	0	0	0	0	68	10144	100	21	68	48022

BHVA	Beard's Description	Area within IUCN I-IV (ha)		% Area in IUCN I-IV		Area S16 and UCL (ha)		% Area S16 and UCL		pre-European extent (ha)	
		Avon	WA	Avon	WA	Avon	WA	Avon	WA	Avon	WA
511	Medium woodland; salmon gum & morrel	98911	98974	14	14	332679	341683	48	49	688562	700409
519	Shrublands; mallee scrub, Eucalyptus eremophila	149033	243624	12	10	250527	1040233	21	45	1221124	2333440
520	Shrublands; Acacia quadrimarginea thicket	10074	10074	40	27	1693	8690	7	23	25019	37923
522	Medium woodland; redwood (Eucalyptus transcontinentalis) & merri (E. floctoniae)	25118	30071	20	4	94612	647686	77	91	123327	709715
535	Medium woodland; rough fruited mallee on greenstone hills	0	0	0	0	390	390	2	2	24346	24346
536	Medium woodland; morrell & rough fruited mallee (Eucalyptus corrugata)	1294	1294	10	10	1288	1288	10	10	13178	13178
537	Medium woodland; morrel (Eucalyptus longicornis)	0	0	0	0	43	43	6	6	701	701
538	Shrublands; Acacia brachystachya scrub	16995	16995	13	11	72105	73606	56	50	128593	147822
551	Shrublands; Allocasuarina campestris thicket	18584	19387	11	6	110	2779	0	1	163865	302423
552	Shrublands; Casuarina acutivalvus & calothamnus (also melaleuca) thicket on greenstone hills	24	303	0	1	12114	29186	93	86	13086	33909
555	Hummock grasslands, mallee steppe; red mallee over spinifex, Triodia scariosa	6300	14678	54	26	5308	7134	46	12	11656	57420
631	Succulent steppe with woodland and thicket; York gum over Melaleuca thyoides & samphire	293	2604	2	2	152	3698	1	3	11812	106853
676	Succulent steppe; samphire	414	73745	6	4	2282	678982	31	33	7435	2063389
694	Shrublands; scrub-heath on yellow sandplain banksia-xyloelum alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions	1875	32222	1	9	31	10065	0	3	149967	346494
929	Low forest; moort (Eucalyptus platypus)	0	217	0	2	0	4814	0	45	227	10735
931	Medium woodland; yate	282	2392	13	8	0	1704	0	5	2216	31390
934	Shrublands; mallee scrub (Eucalyptus nutans)	0	1089	0	12	0	1962	0	21	259	9282
936	Medium woodland; salmon gum	6389	14899	14	2	12027	456839	27	65	45160	698752
941	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub, redwood	2829	2829	8	8	10834	10834	32	32	34248	34248
945	Mosaic: Medium woodland; salmon gum / Shrublands; mallee scrub, redwood & black marlock	4070	4070	2	2	8645	8645	5	5	176612	176612
946	Medium woodland; wandoo	1514	1514	3	3	1231	1286	3	2	45513	53225
947	Medium woodland; powderbark & mallet	891	2357	7	7	5	37	0	0	12717	34033
948	Medium woodland; York gum & river gum	7	7	0	0	36	36	2	2	1441	1441
949	Low woodland; banksia	551	29070	2	13	9792	17971	44	8	22466	218194
950	Medium woodland; Casuarina obesa	121	121	24	24	25	25	5	5	497	497
951	Succulent steppe with sparse woodland & thicket; york gum & Kondinin blackbutt over teatree thicket & samphire	4450	4450	16	16	938	938	3	3	27508	27508

BHVA	Beard's Description	Area within IUCN I-IV (ha)		% Area in IUCN I-IV		Area S16 and UCL (ha)		% Area S16 and UCL		pre-European extent (ha)	
		Avon	WA	Avon	WA	Avon	WA	Avon	WA	Avon	WA
952	Shrublands; dryandra heath	259	3828	52	6	0	0	0	0	495	58931
953	Succulent steppe with thicket; teatree over samphire (m5)	530	714	6	7	202	202	2	2	9457	9928
954	Shrublands; thicket, Jam & Allocasuarina huegeliana	346	346	5	5	0	0	0	0	6502	6502
955	Mosaic: Shrublands; scrub-heath (South East Avon) / Shrublands; Allocasuarina campestris thicket	1616	1783	1	1	49	228	0	0	130560	139324
956	Shrublands; Allocasuarina campestris thicket with scattered wandoo	1144	1144	4	4	15	15	0	0	25556	25556
959	Succulent steppe with sparse woodland & thicket; yorrell & Kondinin blackbutt over teatree & samphire	2982	2982	23	23	0	0	0	0	13092	13092
960	Shrublands; mallee scrub, redwood & black marlock	10462	10462	5	5	123	123	0	0	220441	220441
961	Mosaic: Shrublands; scrub-heath (South East Avon) / Shrublands; Allocasuarina campestris thicket	2879	2879	11	10	15	15	0	0	27390	27800
962	Medium woodland; mallet (Eucalyptus astringens)	0	0	0	0	0	0	0	0	62	62
965	Medium woodland; jarrah & marri	14	2302	2	25	5	15	1	0	723	9356
966	Succulent steppe with sparse woodland & thicket; salmon gum & morrell over teatree & samphire	0	0	0	0	192	192	3	3	7087	7087
968	Medium woodland; jarrah, marri & wandoo	10738	32850	16	11	57	537	0	0	69062	296878
973	Low forest; paperbark (Melaleuca raphiophylla)	112	303	46	6	0	59	0	1	242	5003
987	Medium woodland; jarrah & wandoo	0	746	0	21	0	121	0	3	146	3595
988	Succulent steppe with thicket; Melaleuca thyoides over samphire	1027	2363	2	2	269	564	1	1	49488	96635
999	Medium woodland; marri	0	890	0	1	0	46	0	0	1069	115707
1002	Medium open woodland; jarrah	0	12580	0	79	0	20	0	0	361	15948
1003	Medium forest; jarrah, marri & wandoo	3881	4485	67	22	0	2	0	0	5760	20109
1004	Mosaic: Medium open woodland; wandoo / Shrublands; mixed heath	1620	1627	98	17	0	176	0	2	1658	9768
1005	Low woodland; Allocasuarina huegeliana	0	0	0	0	0	0	0	0	155	787
1006	Medium woodland; jarrah, wandoo & powderbark	1986	1996	6	4	604	604	2	1	35903	44908
1014	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	2	8730	0	21	268	968	14	2	1976	41064
1017	Medium open woodland; jarrah & marri, with low woodland; banksia	0	12	0	0	0	201	0	1	1272	17528
1018	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; Casuarina obesa	175	221	2	2	19	23	0	0	7005	14059
1019	Medium sparse woodland; jarrah & marri	0	0	0	0	0	0	0	0	514	804
1020	Mosaic: Medium forest; jarrah-marri / Medium woodland; marri-wandoo	101	101	2	2	0	0	0	0	5610	5610
1023	Medium woodland; York gum, wandoo & salmon gum (Eucalyptus salmonophloia)	4453	12108	1	1	1793	3392	0	0	844117	1601602
1024	Shrublands; mallee & casuarina thicket	6045	6820	1	1	11386	11561	2	2	593087	742950

BHVA	Beard's Description	Area within IUCN I-IV (ha)		% Area in IUCN I-IV		Area S16 and UCL (ha)		% Area S16 and UCL		pre-European extent (ha)	
		Avon	WA	Avon	WA	Avon	WA	Avon	WA	Avon	WA
1025	Mosaic: Medium woodland; York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire	0	0	0	0	0	0	0	0	1920	1920
1027	Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri	263	6944	2	17	0	1	0	0	16567	39809
1041	Low woodland; Allocasuarina huegeliana & Jam	273	321	11	7	0	57	0	1	2506	4781
1048	Mosaic: Shrublands; melaleuca patchy scrub / Succulent steppe; samphire	36	36	0	0	58	58	0	0	13815	13815
1049	Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet	3307	3307	0	0	1119	1119	0	0	833385	833385
1053	Shrublands; Melaleuca uncinata thicket with scattered York gum	416	972	3	7	54	61	0	0	12706	13823
1055	Shrublands; York gum & Eucalyptus sheathiana mallee scrub	1133	1133	1	1	3609	3609	3	3	126806	126806
1056	Shrublands; thicket, acacia & Allocasuarina campestris	996	996	5	5	11	11	0	0	21073	21073
1057	Mosaic: Shrublands; Medium woodland; salmon gum & gimlet / York gum & Eucalyptus sheathiana mallee scrub	2881	2881	2	2	511	511	0	0	145311	145311
1058	Shrublands; York gum & Eucalyptus gonglocarpa mallee scrub	0	0	0	0	0	0	0	0	9363	9363
1059	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee Eucalyptus longicornis & E. sheathiana scrub	0	0	0	0	0	0	0	0	2260	2260
1061	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire	7627	7627	18	18	5410	5410	13	13	42747	42747
1062	Succulent steppe with open woodland & thicket; york gum over Melaleuca thyiodes & samphire	1384	2429	7	11	1149	1927	6	9	19111	22527
1063	Medium-Low woodland; York gum & cypress pine (Callitris columellaris)	127354	127354	74	74	9069	9072	5	5	172479	172482
1065	Mosaic: Shrublands; Medium woodland; wandoo & gimlet / York gum & Eucalyptus sheathiana mallee scrub	392	392	45	45	0	0	0	0	863	863
1067	Medium woodland; salmon gum, morrel, gimlet & rough fruited mallee	1556	1556	10	10	4357	4357	29	29	15272	15272
1068	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana	16790	16790	6	6	80468	80468	30	30	268900	268900
1071	Succulent steppe with scrub; acacia species over saltbush & bluebush	263	263	35	35	31	31	4	4	762	762
1075	Shrublands; mallee scrub, Eucalyptus eremophila & black marlock (Eucalyptus redunca)	18329	28493	11	5	428	878	0	0	174477	527021
1078	Medium woodland; salmon gum, redwood, merrit, gimlet & Eucalyptus sheathiana	757	757	100	100	0	0	0	0	757	757
1079	Mosaic: Medium open woodland; salmon gum & morrel / Succulent steppe; saltbush	4641	4641	46	46	200	200	2	2	10119	10119
1080	Succulent steppe with malle & thickets; Mallee and Melaleuca uncinata thickets on salt flats	0	0	0	0	0	0	0	0	3951	3951
1081	Shrublands; mallee scrub, Eucalyptus longicornis & E. sheathiana	427	427	3	3	41	41	0	0	15148	15148
1098	Mosaic: Medium sparse woodland; salmon gum & morrel / Succulent steppe; samphire	2762	2762	20	20	896	896	7	7	13669	13669



BHVA	Beard's Description	Area within IUCN I-IV (ha)		% Area in IUCN I-IV		Area S16 and UCL (ha)		% Area S16 and UCL		pre-European extent (ha)	
		Avon	WA	Avon	WA	Avon	WA	Avon	WA	Avon	WA
1147	Shrublands; scrub-heath in the south-east Avon-Wheatbelt Region	228	228	1	1	114	116	0	0	41057	42855
1148	Shrublands; scrub-heath in the Coolgardie Region	43053	45028	22	17	145747	207886	75	80	195330	260384
1200	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub Eucalyptus eremophila & black marlock (E. redunca)	2265	2376	2	1	643	680	1	0	102557	162786
1271	Bare areas; claypans	207	207	19	0	169	27704	15	32	1095	86684
1413	Shrublands; acacia, casuarina & melaleuca thicket	188782	192589	15	11	532246	900027	44	54	1219254	1679917
2047	Shrublands; tamma & dryandra thicket	467	467	32	32	0	0	0	0	1463	1463
2048	Shrublands; scrub-heath in the Mallee Region	18651	22502	6	7	108188	114338	35	35	305697	322220
3003	Medium forest; jarrah & marri on laterite with wandoo in valleys, sandy swamps with teatree and Banksia	4426	5248	7	8	168	170	0	0	61566	66452
3041	Mosaic: Low woodland; Allocasuarina huegeliana & jam around granite rocks	93	112	2	2	0	2	0	0	3947	6374

Table A2.4: Summary of ANRMR BHVA extent and reservation status.

Those shaded are extremely limited in their present extent (< 2,000 ha and/or ≤10% of original extent remaining in ANRMR or the State) and poorly represented (0% and/or <15% of original extent in ANRMR or the State) in the present conservation reserve system (IUCN I-IV reserves).

BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
3	Medium forest; jarrah-marri								
4	Medium woodland; marri & wandoo						X		X
5	Medium woodland; wandoo & powderbark ( <i>Eucalyptus accedens</i> )								
7	Medium woodland; York gum ( <i>Eucalyptus loxophleba</i> ) & wandoo	X				X	X	X	X
8	Medium woodland; salmon gum & gimlet						X		X
13	Medium open woodland; wandoo	X	X						
18	Low woodland; mulga ( <i>Acacia aneura</i> )								X
19	Low woodland; mulga between sandridges						X	X	X
25	Low woodland; <i>Allocasuarina huegeliana</i> & York gum	X				X	X	X	X
36	Shrublands; thicket, acacia-casuarina alliance						X		X
37	Shrublands; teatree thicket								X
39	Shrublands; mulga scrub	X				X	X		X
41	Shrublands; teatree scrub								X
47	Shrublands; tallerack mallee-heath								
49	Shrublands; mixed heath	X							
51	Sedgeland; reed swamps, occasionally with heath	X							
125	Bare areas; salt lakes								X
128	Bare areas; rock outcrops								X
131	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee scrub, redwood & black marlock			X	X		X		X
141	Medium woodland; York gum, salmon gum & gimlet						X		X
142	Medium woodland; York gum & salmon gum						X		X

BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
144	Medium woodland; wandoo, salmon gum, morrel, gimlet & rough fruited mallee						X		X
145	Mosaic: Medium woodland; York gum & salmon gum / Shrublands; thicket, acacia-casuarina-melaleuca alliance	X	X	X	X	X	X	X	X
147	Succulent steppe with scrub; acacia species over saltbush						X		X
148	Medium woodland; gimlet	X	X			X	X	X	X
202	Shrublands; mulga & Acacia quadrimarginea scrub	X						X	X
214	Mosaic: Medium woodland; goldfield eucalypts / Succulent steppe with open low woodland; myoporium over saltbush								X
221	Succulent steppe; saltbush					X	X		X
256	Low woodland; York gum, and cypress pine (adjacent to e6pMLi)								
314	Succulent steppe with open woodland; york gum over saltbush								
325	Succulent steppe; saltbush & samphire					X	X	X	X
337	Mosaic: Shrublands; bowgada scrub / Hummock grasslands, mixed sandplain - open red mallee & mixed sparse dwarf shrubs over Triodia basedowii					X	X	X	X
352	Medium woodland; York gum			X			X	X	X
356	Succulent steppe with open woodland; eucalypts over saltbush	X	X				X		X
357	Medium woodland over scrub; York gum over bowgada & jam (Acacia acuminata)					X	X	X	X
380	Shrublands; scrub-heath on sandplain								
392	Shrublands; Melaleuca thyioides thicket	X	X			X	X		X
411	Succulent steppe with open scrub; scattered bowgada & jam over saltbush	X				X	X	X	X
413	Shrublands; Acacia neurophylla & A. species thicket	X	X			X	X		X
414	Succulent steppe with open scrub; scattered bowgada & jam over saltbush & bluebush					X	X	X	X

BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
416	Low woodland; mulga mixed with cypress pine & york gum								X
420	Shrublands; bowgada & jam scrub					X	X	X	X
435	Shrublands; Acacia neurophylla, A. beauverdiana & A. resinomarginea thicket								X
436	Shrublands; mixed Acacia thickets in thickets of acacia-casuarina-melaleuca alliance	X	X			X	X	X	X
437	Shrublands; Mixed acacia thicket on sandplain								X
468	Medium woodland; salmon gum & goldfields blackbutt	X							X
483	Hummock grasslands, mixed sandplain - open mallee over sparse dwarf shrubs with spinifex ; red mallee mallee & mixed sparse dwarf shrubs over Triodia basedowii								X
486	Mosaic: Medium woodland; salmon gum & red mallee / Shrublands; mallee scrub Eucalyptus eremophila	X				X	X		X
491	Medium woodland; morrell & Dundas blackbutt (E. dundasii)	X				X	X	X	X
501	Medium woodland; goldfields blackbutt	X				X	X	X	X
511	Medium woodland; salmon gum & morrell						X		X
519	Shrublands; mallee scrub, Eucalyptus eremophila						X		X
520	Shrublands; Acacia quadrimarginea thicket								
522	Medium woodland; redwood (Eucalyptus transcontinentalis) & merrit (E. floctoniae)								X
535	Medium woodland; rough fruited mallee on greenstone hills					X	X	X	X
536	Medium woodland; morrell & rough fruited mallee (Eucalyptus corrugata)						X		X
537	Medium woodland; morrell (Eucalyptus longicornis)	X	X			X	X	X	X
538	Shrublands; Acacia brachystachya scrub						X		X
551	Shrublands; Allocasuarina campestris thicket						X		X
552	Shrublands; Casuarina acutivalvus & calothamnus (also melaleuca) thicket on greenstone hills					X	X		X

BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
555	Hummock grasslands, mallee steppe; red mallee over spinifex, Triodia scariosa								
631	Succulent steppe with woodland and thicket; York gum over Melaleuca thyoides & samphire						X		X
676	Succulent steppe; samphire	X					X		X
694	Shrublands; scrub-heath on yellow sandplain banksia-xyloelum alliance in the Geraldton Sandplain & Avon-Wheatbelt Regions			X			X		X
929	Low forest; moort (Eucalyptus platypus)	X				X	X		X
931	Medium woodland; yate	X					X		X
934	Shrublands; mallee scrub (Eucalyptus nutans)	X				X	X		X
936	Medium woodland; salmon gum						X		X
941	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub, redwood						X		X
945	Mosaic: Medium woodland; salmon gum / Shrublands; mallee scrub, redwood & black marlock						X		X
946	Medium woodland; wandoo						X		X
947	Medium woodland; powderbark & mallet						X		X
948	Medium woodland; York gum & river gum	X	X	X	X	X	X	X	X
949	Low woodland; banksia						X		X
950	Medium woodland; Casuarina obesa	X	X						
951	Succulent steppe with sparse woodland & thicket; york gum & Kondinin blackbutt over teatree thicket & samphire								
952	Shrublands; dryandra heath	X							X
953	Succulent steppe with thicket; teatree over samphire (m5)	X	X				X		X
954	Shrublands; thicket, Jam & Allocasuarina huegeliana	X	X				X		X

BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
955	Mosaic: Shrublands; scrub-heath (South East Avon) / Shrublands; Allocasuarina campestris thicket			X	X		X		X
956	Shrublands; Allocasuarina campestris thicket with scattered wandoo						X		X
959	Succulent steppe with sparse woodland & thicket; yorrell & Kondinin blackbutt over teatree & samphire								
960	Shrublands; mallee scrub, redwood & black marlock						X		X
961	Mosaic: Shrublands; scrub-heath (South East Avon)/ Shrublands; Allocasuarina campestris thicket						X		X
962	Medium woodland; mallet (Eucalyptus astringens)	X	X	X	X	X	X	X	X
965	Medium woodland; jarrah & marri	X					X		
966	Succulent steppe with sparse woodland & thicket; salmon gum & morrell over teatree & samphire	X	X	X	X	X	X	X	X
968	Medium woodland; jarrah, marri & wandoo								X
973	Low forest; paperbark (Melaleuca raphiophylla)	X	X						X
987	Medium woodland; jarrah & wandoo	X	X			X	X		
988	Succulent steppe with thicket; Melaleuca thyoides over samphire			X			X		X
999	Medium woodland; marri	X				X	X		X
1002	Medium open woodland; jarrah	X				X	X		
1003	Medium forest; jarrah, marri & wandoo								
1004	Mosaic: Medium open woodland; wandoo / Shrublands; mixed heath	X							
1005	Low woodland; Allocasuarina huegeliana	X	X	X		X	X	X	X
1006	Medium woodland; jarrah, wandoo & powderbark						X		X
1014	Mosaic: Low woodland; banksia / Shrublands; teatree thicket	X				X	X		
1017	Medium open woodland; jarrah & marri, with low woodland; banksia	X				X	X	X	X

BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
1018	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; Casuarina obesa	X					X		X
1019	Medium sparse woodland; jarrah & marri	X	X			X	X	X	X
1020	Mosaic: Medium forest; jarrah-marri / Medium woodland; marri-wandoo	X	X				X		X
1023	Medium woodland; York gum, wandoo & salmon gum (Eucalyptus salmonophloia)			X	X		X		X
1024	Shrublands; mallee & casuarina thicket				X		X		X
1025	Mosaic: Medium woodland; York gum, salmon gum & morrel / Succulent steppe; saltbush & samphire	X	X	X	X	X	X	X	X
1027	Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri						X		
1041	Low woodland; Allocasuarina huegeliana & Jam	X	X				X		X
1048	Mosaic: Shrublands; melaleuca patchy scrub / Succulent steppe; samphire					X	X	X	X
1049	Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet			X	X	X	X	X	X
1053	Shrublands; Melaleuca uncinata thicket with scattered York gum	X					X		X
1055	Shrublands; York gum & Eucalyptus sheathiana mallee scrub						X		X
1056	Shrublands; thicket, acacia & Allocasuarina campestris						X		X
1057	Mosaic: Shrublands; Medium woodland; salmon gum & gimlet / York gum & Eucalyptus sheathiana mallee scrub			X	X		X		X
1058	Shrublands; York gum & Eucalyptus gonglocarpa mallee scrub	X	X	X	X	X	X	X	X
1059	Mosaic: Medium woodland; salmon gum & gimlet / Shrublands; mallee Eucalyptus longicornis & E. sheathiana scrub	X	X	X	X	X	X	X	X



BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
1061	Mosaic: Medium sparse woodland; salmon gum & yorrell / Succulent steppe; saltbush & samphire								
1062	Succulent steppe with open woodland & thicket; york gum over Melaleuca thiodes & samphire						X		X
1063	Medium-Low woodland; York gum & cypress pine ( <i>Callitris columellaris</i> )								
1065	Mosaic: Shrublands; Medium woodland; wandoo & gimlet / York gum & Eucalyptus sheathiana mallee scrub	X	X						
1067	Medium woodland; salmon gum, morrel, gimlet & rough fruited mallee						X		X
1068	Medium woodland; salmon gum, morrel, gimlet & Eucalyptus sheathiana						X		X
1071	Succulent steppe with scrub; acacia species over saltbush & bluebush	X	X						
1075	Shrublands; mallee scrub, Eucalyptus eremophila & black marlock ( <i>Eucalyptus redunca</i> )						X		X
1078	Medium woodland; salmon gum, redwood, merrit, gimlet & Eucalyptus sheathiana	X	X						
1079	Mosaic: Medium open woodland; salmon gum & morrel / Succulent steppe; saltbush								
1080	Succulent steppe with malle & thickets; Mallee and Melaleuca uncinata thickets on salt flats	X	X	X	X	X	X	X	X
1081	Shrublands; mallee scrub, Eucalyptus longicornis & E. sheathiana						X		X
1098	Mosaic: Medium sparse woodland; salmon gum & morrel / Succulent steppe; samphire								
1147	Shrublands; scrub-heath in the south-east Avon-Wheatbelt Region			X	X		X		X
1148	Shrublands; scrub-heath in the Coolgardie Region								

BHVA	Beard's Description	Remnant Extent				Representation in IUCN I-IV Reserves			
		<2000 ha Avon	<2000 ha WA	<10% Avon	<10% WA	0% Avon	<15% Avon	0% WA	<15% WA
1200	Mosaic: Medium woodland; salmon gum & morrel / Shrublands; mallee scrub Eucalyptus eremophila & black marlock (E. redunca)			X	X		X		X
1271	Bare areas; claypans	X						X	X
1413	Shrublands; acacia, casuarina & melaleuca thicket								X
2047	Shrublands; tamma & dryandra thicket	X	X						
2048	Shrublands; scrub-heath in the Mallee Region						X		X
3003	Medium forest; jarrah & marri on laterite with wandoo in valleys, sandy swamps with teatree and Banksia						X		X
3041	Mosaic: Low woodland; Allocasuarina huegeliana & jam around granite rocks	X	X				X		X

## Appendix 3: Ecological Communities

Table A3.1: The Threatened Ecological Communities of the ANRMR and the 20km buffer  
 These communities have been arranged by conservation status in Western Australia; those shaded are endemic to the ANRMR.  
 The definitions of the criteria (eg A, B or C) and sub-criteria (eg (i)) can be found in Appendix1.1.

Community Identifier	Community Name	Conservation Status			Number of Occurrences			
		WA Conservation Status	EPBC Act	Recovery Plan	Buffer	AVON	WA	Total
Mound Springs SCP	Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)	CR A) i), CR A) ii), CR B) i), CR B) ii)	EN	Y	1	3		4
Toolibin	Perched wetlands of the Wheatbelt region with extensive stands of <i>Casuarina obesa</i> and <i>Melaleuca strobophylla</i>	CR A) i); CR A) 11); CR C)	EN	Y	3	1		4
NTHIRON	Perth to Gingin Ironstone Association	CR A) ii), CR B) ii), CR C)	EN	Y		3		3
Bryde	Unwooded freshwater wetlands of the southern Wheatbelt dominated by <i>Muehlenbeckia horrida</i> subsp. <i>abditata</i> and <i>Tecticornia verrucosa</i>	CR B) i), CR B) ii)		Y		2		2
CAVES SCP01	Aquatic Root Mat Community Number 1 of Caves of the Swan Coastal Plain	CR B) i), CR B) ii)	EN	Y	7			7
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain	CR B) ii)	EN	Y	2			2
SCP19b	Woodlands over sedgeland in Holocene dune swales of the southern Swan Coastal Plain (original description; Gibson et al. (1994).	CR B) ii)	EN	Y	1		37	38
SCP3a	<i>Eucalyptus calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain	CR B) ii)	EN	Y	1		26	27
SCP3c	<i>Eucalyptus calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain	CR B) ii)	EN	Y	5	11	10	26
SCP20b	<i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands of the eastern side of the Swan Coastal Plain	EN B) i), EN B) ii)		N	1	1	33	35
MUCHEA LIMESTONE	Shrublands and woodlands on Muchea Limestone	EN B) ii)	EN	Y	1	2	6	9

Community Identifier	Community Name	Conservation Status		Recovery Plan	Number of Occurrences			
		WA Conservation Status	EPBC Act		Buffer	AVON	WA	Total
SCP20a	Banksia attenuata woodland over species rich dense shrublands	EN B) ii)		Y	32	1	16	49
Limestone ridges (SCP 26a)	Melaleuca huegelii - Melaleuca acerosa (currently M. systema) shrublands on limestone ridges (Gibson et al. 1994 type 26a)	EN B) iii)		Y	46		33	79
Herblands and Bunch Grasslands	Herblands and Bunch Grasslands on gypsum lunette dunes alongside saline playa lakes	VU B)		N	1			1
SCP07	Herb rich saline shrublands in clay pans	VU B)		N	5	2	19	26
SCP08	Herb rich shrublands in clay pans	VU B)		N		2	19	21
SCP15	Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain	VU C)		N		4	2	6
<b>Total</b>					<b>106</b>	<b>32</b>	<b>20</b>	<b>339</b>

Table A3.2: The Priority Ecological Communities of the ANRMR and the 20km buffer.  
The definitions of the Conservation Status (eg P1, P2 etc) and sub-criteria (eg (i)) can be found in Appendix1.1.

Community Identifier	Conservation Status	Community Name	Number of occurrences			
			20 km Buffer	Avon	WA	Total
Die Hardy Range1	P1	Low Woodland on sandy, clayey silt		1		1
Die Hardy Range2	P1	Low Woodland along a drainage line of the Die Hardy Range		1		1
Die Hardy Range3	P1	Allocasuarina corniculata thickets on the lower slopes of the Die Hardy Range		1		1
Die Hardy Range5	P1	Mid-slope thickets of the Die Hardy Range		1		1
Die Hardy Range6	P1	Mid-slope open scrub of the Die Hardy Range		1		1
Die Hardy Range7	P1	Low Woodland on clayey silt soils of the Die Hardy Range		1		1
Helena and Aurora Range1	P1	Shrublands and woodlands on banded ironstone uplands of the Helena and Aurora Range		1		1
Helena and Aurora Range2	P1	Eucalypt woodlands on banded ironstone uplands of the Helena and Aurora Range		1		1
Helena and Aurora Range3	P1	Midslope community dominated by Eucalyptus ebbanoensis and/or E. corrugata of the Helena and Aurora Range		1		1
Helena and Aurora Range4	P1	Lower slopes and flats community of the Helena and Aurora Range		1		1
Helena and Aurora Range5a	P1	Eucalypt woodlands on the flats below the Helena and Aurora Range with a diverse chenopod understorey		1		1
Helena and Aurora Range5b	P1	Eucalypt woodlands on the extensive flats between the Helena and Aurora Range with a diverse chenopod understorey		1		1
Highclere Hills1	P1	Eucalypt woodlands of the Highclere Hills.		1		1
Highclere Hills2	P1	Acacia acuminata shrublands on greenstones of the Highclere Hills.		1		1
Highclere Hills3	P1	Acacia tetragonophylla and Scaevola spinescens shrublands on the ridges of massive banded ironstone of the Highclere Hills.		1		1
Highclere Hills4	P1	Acacia tetragonophylla and Scaevola spinescens shrublands on either banded ironstone or greenstone lower in the landscape		1		1
Highclere Hills5	P1	Shrublands on a lateritic breakaway of the Highclere Hills.		1		1
Melaleuca thicket	P1	Dense Melaleuca thickets with emergent Eucalyptus erythronema var. marginata and Eucalyptus transcontinentalis		1		1

Community Identifier	Conservation Status	Community Name	Number of occurrences			
			20 km Buffer	Avon	WA	Total
Mottlecah	P1	Wheatbelt Mottlecah dominated heathland on deep white sands.		1		1
Mount Jackson1	P1	Open Heath to Tall Shrubland on the Mount Jackson Range		1		1
Parker Range System	P3 (iii)	Plant assemblage of the Parker Range System		1		1
Pteridium fernland	P2	Wheatbelt Allocasuarina huegeliana over Pteridium esculentum communities		1		1
Saline Seeps	P1	Natural organic saline seeps of the Avon Botanical District		1		1
Windarling1	P1	Mixed shrublands on shallow soils of the Windarling Ranges slopes		1		1
Canegrass	P1	Perched clay wetlands of the Wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla		2		2
Chinocup	P2	Gypsum dunes (Lake Chinocup)		2		2
Red Morrel Woodland	P1	Red Morrel Woodlands of the Wheatbelt		2		2
Tamma-Dryandra-Eremaea shrubland	P1	Tamma-Dryandra-Eremaea shrubland on cream sands of the Ulva Landform Unit		2		2
Claypans with shrubs over herbs	P1	Claypans with mid dense shrublands of Melaleuca lateritia over herbs	4	3	5	12
Wandoo woodland over dense low sedges	P1	Wandoo woodland over dense low sedges of Mesomelaena preisii		3		3
Wongan Hills System	P4a	Plant assemblages of the Wongan Hills System		4		4
Avon Pools	P1	Deep pools of the Avon Botanical District		6		6
Mortlock Flats	P1	Salt Flats Plant Assemblages of the Mortlock River (East Branch)		7		7
Low level sandplains	P1	Banksia prionotes and Xylomelum angustifolium low woodlands on transported yellow sands		11		11
Bremer Range	P1	Plant assemblages of the Bremer Range System	1			1
Die Hardy Range4	P1	Thickets on the lower slopes of the Die Hardy Range	1			1
<b>Total</b>			<b>6</b>	<b>66</b>	<b>5</b>	<b>77</b>

## Appendix 4: Flora

### Appendix 4.1 Endemic Flora

Table A4.1: The endemic flora of the ANRMR.

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
27839	Fungi	LICHEN	Collemataceae	Leptogium corniculatum				2
27819	Fungi	LICHEN	Lecideaceae	Lecidea contigua				1
27861	Fungi	LICHEN	Mycoporaceae	Mycoporum quercus				2
18007	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia fumigata		P1		1
27750	Fungi	LICHEN	Parmeliaceae	Flavoparmelia secalonica				2
27915	Fungi	LICHEN	Parmeliaceae	Parmelina endoleuca				1
28112	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia cheelii				1
28133	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia filsonii				1
28136	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia furcata				1
28141	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia hypoleiella		P3		2
28149	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia luminosa				2
28152	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia microcephala				1
28161	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia nortegeta				1
28324	Fungi	LICHEN	Parmeliaceae	Protoparmelia pulchra				1
28358	Fungi	LICHEN	Parmeliaceae	Imshaugia sp. Corinthia (R.J. Cranfield 11814)	PN			1
29017	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia scabrosina		P1		2
29020	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia subbarbatica		P1		2
29041	Fungi	LICHEN	Parmeliaceae	Xanthoparmelia subloxodella				1
28026	Fungi	LICHEN	Ramalinaceae	Ramalina canariensis				1
29388	Fungi	LICHEN	Thelotremaaceae	Diploschistes conceptionis				1
23476	Plantae	DICOT	Amaranthaceae	Ptilotus halophilus		P4		4
1337	Plantae	MONOCOT	Anthericaceae	Thysanotus lavanduliflorus		P1		6



TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
20657	Plantae	MONOCOT	Anthericaceae	Arthropodium sp. Yenyening (G.J. Keighery & N. Gibson 2957)	PN			1
29183	Plantae	MONOCOT	Anthericaceae	Caesia sp. Ennuin (N. Gibson & M.N. Lyons 2737)	PN			1
6215	Plantae	DICOT	Apiaceae	Chlaenosciadium gardneri				20
14373	Plantae	DICOT	Apiaceae	Hydrocotyle hexaptera	MS	P1		2
12632	Plantae	DICOT	Asteraceae	Millotia steetziana		P2		6
13240	Plantae	DICOT	Asteraceae	Rhodanthe chlorocephala subsp. chlorocephala				1
14338	Plantae	DICOT	Asteraceae	Millotia newbeyi		P1		3
14343	Plantae	DICOT	Asteraceae	Millotia pilosa		P2		2
20793	Plantae	DICOT	Asteraceae	Angianthus sp. Altham (M.N. Lyons 2623)	PN			1
23469	Plantae	DICOT	Asteraceae	Angianthus halophilus		P3		6
23985	Plantae	DICOT	Asteraceae	Senecio glabrescens				1
28287	Plantae	DICOT	Asteraceae	Dimorphotheca sinuata				2
19831	Plantae	MONOCOT	Boryaceae	Borya sp. Wheatbelt (A.S. George 16470)	PN			2
3028	Plantae	DICOT	Brassicaceae	Lepidium genistoides		P2		17
1727	Plantae	DICOT	Casuarinaceae	Allocauarina fibrosa		R	VU	28
12654	Plantae	DICOT	Casuarinaceae	Allocauarina tortiramula		R	VU	8
2577	Plantae	DICOT	Chenopodiaceae	Rhagodia acicularis		R	VU	5
2588	Plantae	DICOT	Chenopodiaceae	Roycea pycnophylloides		R	VU	53
15755	Plantae	DICOT	Chenopodiaceae	Chenopodium melanocarpum forma melanocarpum				1
16597	Plantae	DICOT	Chenopodiaceae	Halosarcia halocnemoides subsp. Lake Grace (N. Casson G231. 10)	PN			2
14642	Plantae	MONOCOT	Cyperaceae	Lepidosperma obtusum				9
16279	Plantae	MONOCOT	Cyperaceae	Schoenus sp. Bullsbrook (J.J. Alford 915)	PN	P2		1
19667	Plantae	MONOCOT	Cyperaceae	Schoenus sp. Toodyay (G.J. Keighery & N. Gibson 2918)	PN			1
29138	Plantae	MONOCOT	Cyperaceae	Lepidosperma sp. Pigeon Rocks (H. Pringle 30237)	PN			3

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
29187	Plantae	MONOCOT	Cyperaceae	Lepidosperma sp. Ironcap (K.R. Newbey 5233)	PN			4
14457	Plantae	DICOT	Dilleniaceae	Hibbertia glabriuscula		P2		15
14458	Plantae	DICOT	Dilleniaceae	Hibbertia graniticola		P3		12
19430	Plantae	DICOT	Dilleniaceae	Hibbertia axillibarba		P1		4
19690	Plantae	DICOT	Dilleniaceae	Hibbertia lepidocalyx subsp. tuberculata		P1		4
19932	Plantae	DICOT	Dilleniaceae	Hibbertia glomerata subsp. wandoo		P3		14
20035	Plantae	DICOT	Dilleniaceae	Hibbertia chartacea		P2		4
3099	Plantae	DICOT	Droseraceae	Drosera graniticola		P4		10
13184	Plantae	DICOT	Droseraceae	Drosera walyunga				4
13195	Plantae	DICOT	Droseraceae	Drosera helodes				3
13226	Plantae	DICOT	Droseraceae	Drosera grieviei		P1		7
13388	Plantae	DICOT	Droseraceae	Drosera macrophylla subsp. monantha				22
19254	Plantae	DICOT	Droseraceae	Drosera zigzagia				9
16526	Plantae	DICOT	Epacridaceae	Leucopogon sp. Helena & Aurora Range (B.J. Lepschi 2077)	PN	R	CR	8
6356	Plantae	DICOT	Epacridaceae	Leucopogon amplectens		P2		14
14506	Plantae	DICOT	Epacridaceae	Leucopogon sp. Yanneymooning (F. Mollemans 3797)	PN			11
17697	Plantae	DICOT	Epacridaceae	Brachyloma delbi		P1		6
17872	Plantae	DICOT	Epacridaceae	Astroloma sp. sessile leaf (J.L. Robson 657)	PN			9
19367	Plantae	DICOT	Epacridaceae	Leucopogon sp. Gunapin (F. Hort 808)	PN			15
19413	Plantae	DICOT	Epacridaceae	Leucopogon sp. Bungulla (R.D. Royce 3435)	PN	P2		14
19424	Plantae	DICOT	Epacridaceae	Leucopogon sp. Flynn (F. Hort, J. Hort & A. Lowrie 859)	PN	P2		5
19515	Plantae	DICOT	Epacridaceae	Leucopogon sp. Corrigin (K. Kershaw KK 2091)	PN			30
19581	Plantae	DICOT	Epacridaceae	Leucopogon sp. Lake King (A.J.G. Wilson 65)	PN			11
19591	Plantae	DICOT	Epacridaceae	Pseudactinia sp. Bruce Rock (J. Buegge D36)	PN	P1		1

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
19656	Plantae	DICOT	Epacridaceae	Leucopogon compressicarpus	MS	P1		3
20084	Plantae	DICOT	Epacridaceae	Leucopogon sp. Brookton (K. Kershaw & L. Kerrigan KK 2192)	PN	P1		3
20306	Plantae	DICOT	Epacridaceae	Conostephium pungens				3
20327	Plantae	DICOT	Epacridaceae	Brachyloma sp. Forrestania White (M. Hislop & F. Hort MH 2591)	PN			2
20413	Plantae	DICOT	Epacridaceae	Leucopogon sp. Parker Range (F.H. & M.P. Mollemans 2860)	PN	P1		6
20645	Plantae	DICOT	Epacridaceae	Lissanthe scabra		P2		6
20867	Plantae	DICOT	Epacridaceae	Leucopogon sp. Dragon Rocks (A.M. Coates 2609)	PN			10
14225	Plantae	DICOT	Euphorbiaceae	Ricinocarpos brevis	MS	R	CR	12
11744	Plantae	DICOT	Euphorbiaceae	Beyeria calycina var. minor				4
20753	Plantae	DICOT	Euphorbiaceae	Beyeria sp. Jackson Range (R. Cranfield & P. Spencer 7751)	PN	P1		7
5208	Plantae	DICOT	Frankeniaceae	Frankenia parvula		R	EN	7
20795	Plantae	DICOT	Frankeniaceae	Frankenia sp. southern gypsum (M.N. Lyons 2864)	PN			1
12526	Plantae	DICOT	Goodeniaceae	Goodenia integerrima		R	EN	1
7667	Plantae	DICOT	Goodeniaceae	Verreauxia verreauxii		P4		40
19119	Plantae	DICOT	Goodeniaceae	Goodenia sp. Lake King (M. Gustafsson et K. Bremer 132)	PN	P2		3
19224	Plantae	DICOT	Goodeniaceae	Dampiera sp. Central Wheatbelt (L.W. Sage, F. Hort, C.A. Hollister LWS 2321)	PN			2
19348	Plantae	DICOT	Goodeniaceae	Scaevola sp. Lake Cairlocup (K. Newbey 9834)	PN			1
19349	Plantae	DICOT	Goodeniaceae	Goodenia heatheriana		P1		92
19753	Plantae	DICOT	Goodeniaceae	Goodenia sp. Chiddarcooping (S.D. Hopper 7055)	PN			2
19782	Plantae	DICOT	Goodeniaceae	Goodenia pulchella subsp. Dragon Rocks (A.M. Coates 3374)	PN			1
19784	Plantae	DICOT	Goodeniaceae	Goodenia sp. Jaurdi (L.W. Sage 1628)	PN			3
20524	Plantae	DICOT	Goodeniaceae	Lechenaultia hortii	MS	P2		3

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1449	Plantae	MONOCOT	Haemodoraceae	Conostylis rogeri		R	VU	16
1419	Plantae	MONOCOT	Haemodoraceae	Conostylis albescens		P2		7
29613	Plantae	MONOCOT	Haemodoraceae	Tribonanthes minor	MS	P3		3
13082	Plantae	DICOT	Haloragaceae	Myriophyllum lapidicola		R	VU	3
6153	Plantae	DICOT	Haloragaceae	Gonocarpus ericifolius		P2		2
6157	Plantae	DICOT	Haloragaceae	Gonocarpus intricatus		P4		9
20655	Plantae	MONOCOT	Hypoxidaceae	Hypoxis sp. Chinocup (R. Cugley 89)	PN	P1		3
14434	Plantae	MONOCOT	Iridaceae	Patersonia rudis subsp. velutina				4
8	Plantae	FERN	Isoetaceae	Isoetes brevicula		P3		7
6819	Plantae	DICOT	Lamiaceae	Pityrodia scabra		R	CR	9
6890	Plantae	DICOT	Lamiaceae	Microcorys eremophiloides		R	VU	17
6834	Plantae	DICOT	Lamiaceae	Hemiandra coccinea		P3		18
6846	Plantae	DICOT	Lamiaceae	Hemigenia conferta		P4		6
6940	Plantae	DICOT	Lamiaceae	Westringia discipulorum				12
12120	Plantae	DICOT	Lamiaceae	Prostanthera semiteres subsp. semiteres				22
12704	Plantae	DICOT	Lamiaceae	Prostanthera nanophylla		P3		6
18283	Plantae	DICOT	Lamiaceae	Hemigenia sp. Merredin (M. Koch 2959)	PN			9
18316	Plantae	DICOT	Lamiaceae	Microcorys sp. Forrestania (V. English 2004)	PN	P4		28
19436	Plantae	DICOT	Lamiaceae	Brachysola halganiacea		P2		2
29634	Plantae	DICOT	Lamiaceae	Hemigenia sp. Sweet Webb (R.J. Chinnock 8266)	PN			2
29635	Plantae	DICOT	Lamiaceae	Hemigenia sp. Jaurdi Station (L.W. Sage & F. Hort 2241)	PN			1
12970	Plantae	DICOT	Loganiaceae	Logania exilis		P2		5
3487	Plantae	DICOT	Mimosaceae	Acacia pharangites		R	CR	11
3531	Plantae	DICOT	Mimosaceae	Acacia sciophanes		R	CR	19
3597	Plantae	DICOT	Mimosaceae	Acacia volubilis		R	CR	10
14063	Plantae	DICOT	Mimosaceae	Acacia cochlocarpa subsp. velutinoso		R	CR	12
14146	Plantae	DICOT	Mimosaceae	Acacia subflexuosa subsp. capillata		R	CR	12
12263	Plantae	DICOT	Mimosaceae	Acacia lobulata		R	EN	24

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
13611	Plantae	DICOT	Mimosaceae	Acacia pygmaea		R	EN	10
14687	Plantae	DICOT	Mimosaceae	Acacia ataxiphylla subsp. magna		R	EN	19
3293	Plantae	DICOT	Mimosaceae	Acacia denticulosa		R	VU	25
13610	Plantae	DICOT	Mimosaceae	Acacia leptalea		R	VU	12
14053	Plantae	DICOT	Mimosaceae	Acacia auratiflora		R	VU	28
3218	Plantae	DICOT	Mimosaceae	Acacia anfractuosa				70
3243	Plantae	DICOT	Mimosaceae	Acacia botrydion		P4		17
3252	Plantae	DICOT	Mimosaceae	Acacia campylophylla		P3		20
3334	Plantae	DICOT	Mimosaceae	Acacia fauntleroyi				37
3385	Plantae	DICOT	Mimosaceae	Acacia inophloia		P3		22
3441	Plantae	DICOT	Mimosaceae	Acacia merrickiae		P4		11
3486	Plantae	DICOT	Mimosaceae	Acacia phaeocalyx		P3		31
3536	Plantae	DICOT	Mimosaceae	Acacia semicircularis		P4		17
11838	Plantae	DICOT	Mimosaceae	Acacia sclerophylla var. sclerophylla				9
12248	Plantae	DICOT	Mimosaceae	Acacia ascendens		P2		24
12251	Plantae	DICOT	Mimosaceae	Acacia caesariata		P1		17
12254	Plantae	DICOT	Mimosaceae	Acacia cowaniana		P2		23
12270	Plantae	DICOT	Mimosaceae	Acacia torticarpa				7
14031	Plantae	DICOT	Mimosaceae	Acacia sp. P69 (W.E. Blackall 3754)	PN			5
14037	Plantae	DICOT	Mimosaceae	Acacia sp. P170 (B.R. Maslin 4474)	PN			2
14044	Plantae	DICOT	Mimosaceae	Acacia adinophylla		P1		22
14065	Plantae	DICOT	Mimosaceae	Acacia congesta subsp. wonganensis		P2		13
14069	Plantae	DICOT	Mimosaceae	Acacia desertorum var. nudipes		P1		19
14127	Plantae	DICOT	Mimosaceae	Acacia mutabilis subsp. stipulifera		P1		26
14139	Plantae	DICOT	Mimosaceae	Acacia repanda		P3		18
14148	Plantae	DICOT	Mimosaceae	Acacia tetraurea		P1		24
14151	Plantae	DICOT	Mimosaceae	Acacia tuberculata		P2		17
14160	Plantae	DICOT	Mimosaceae	Acacia sclerophylla var. pilosa		P2		5
14618	Plantae	DICOT	Mimosaceae	Acacia concolorans		P2		15

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14679	Plantae	DICOT	Mimosaceae	Acacia sedifolia subsp. pulvinata		P3		13
15293	Plantae	DICOT	Mimosaceae	Acacia yorkrakinensis subsp. yorkrakinensis				15
16118	Plantae	DICOT	Mimosaceae	Acacia cracentis				17
16124	Plantae	DICOT	Mimosaceae	Acacia flavipila var. ovalis				20
16149	Plantae	DICOT	Mimosaceae	Acacia sedifolia subsp. sedifolia				23
20338	Plantae	DICOT	Mimosaceae	Acacia sp. Merredin (B.R. Maslin 586)	PN			16
20339	Plantae	DICOT	Mimosaceae	Acacia sp. Kokeby (L. Preiss 937)	PN			3
20791	Plantae	DICOT	Mimosaceae	Acacia sp. Kulin (S. Murray 504)	PN	P1		5
7279	Plantae	DICOT	Myoporaceae	Eremophila verticillata		R	CR	6
7262	Plantae	DICOT	Myoporaceae	Eremophila resinosa		R	EN	17
7280	Plantae	DICOT	Myoporaceae	Eremophila virens		R	EN	15
7275	Plantae	DICOT	Myoporaceae	Eremophila ternifolia		R	VU	1
7179	Plantae	DICOT	Myoporaceae	Eremophila adenotricha		P2		8
14852	Plantae	DICOT	Myoporaceae	Eremophila complanata	MS	P2		1
15050	Plantae	DICOT	Myoporaceae	Calamphoreus inflatus	MS	P4		20
16523	Plantae	DICOT	Myoporaceae	Eremophila papillata	MS			23
20265	Plantae	DICOT	Myoporaceae	Eremophila glabra subsp. Kokeby (R. Davis 5080)	PN			1
23994	Plantae	DICOT	Myoporaceae	Eremophila glabra subsp. Forrestania (G.F. Craig 5897)	PN			1
29061	Plantae	DICOT	Myoporaceae	Eremophila sp. Beverley (K. Kershaw KK 2438)	PN			1
29377	Plantae	DICOT	Myoporaceae	Eremophila glabra subsp. York (P.G. Wilson 12172 B)	PN			2
12464	Plantae	DICOT	Myrtaceae	Verticordia staminosa var. erecta		R	CR	8
15614	Plantae	DICOT	Myrtaceae	Verticordia staminosa subsp. staminosa		R	CR	12
5567	Plantae	DICOT	Myrtaceae	Eucalyptus brevipes		R	EN	20
5962	Plantae	DICOT	Myrtaceae	Melaleuca sciotostyla		R	EN	6
6089	Plantae	DICOT	Myrtaceae	Verticordia hughanii		R	EN	5
20335	Plantae	DICOT	Myrtaceae	Darwinia foetida	MS	R	EN	11

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12463	Plantae	DICOT	Myrtaceae	Verticordia staminosa var. cylindracea		R	VU	26
13016	Plantae	DICOT	Myrtaceae	Eucalyptus recta		R	VU	12
20457	Plantae	DICOT	Myrtaceae	Chamelaucium lullfitzii	MS	R	VU	6
5345	Plantae	DICOT	Myrtaceae	Baekkea exserta				3
5370	Plantae	DICOT	Myrtaceae	Baekkea tenuiramea				53
5466	Plantae	DICOT	Myrtaceae	Calytrix merrelliana				7
5469	Plantae	DICOT	Myrtaceae	Calytrix parvivalis		P2		6
5732	Plantae	DICOT	Myrtaceae	Eucalyptus ornata				30
6032	Plantae	DICOT	Myrtaceae	Scholtzia eatoniana		P1		3
11656	Plantae	DICOT	Myrtaceae	Eucalyptus erythronema var. erythronema				84
11758	Plantae	DICOT	Myrtaceae	Eucalyptus caesia subsp. caesia		P4		34
11823	Plantae	DICOT	Myrtaceae	Eucalyptus caesia subsp. magna		P4		27
12372	Plantae	DICOT	Myrtaceae	Calytrix oncophylla		P2		5
12427	Plantae	DICOT	Myrtaceae	Verticordia gracilis		P3		19
12442	Plantae	DICOT	Myrtaceae	Verticordia mitodes		P3		21
12445	Plantae	DICOT	Myrtaceae	Verticordia multiflora subsp. solox		P2		25
12454	Plantae	DICOT	Myrtaceae	Verticordia pulchella		P2		20
12687	Plantae	DICOT	Myrtaceae	Leptospermum macgillivrayi		P1		5
13132	Plantae	DICOT	Myrtaceae	Hypocalymma uncinatum				12
13232	Plantae	DICOT	Myrtaceae	Calothamnus superbus		P1		1
13514	Plantae	DICOT	Myrtaceae	Eucalyptus myriadena subsp. parviflora		P1		11
14024	Plantae	DICOT	Myrtaceae	Baekkea sp. Chittering (R.J. Cranfield 1983)	PN	P4		19
14258	Plantae	DICOT	Myrtaceae	Chamelaucium paynterae	MS	P1		6
14710	Plantae	DICOT	Myrtaceae	Verticordia citrella		P2		7
14711	Plantae	DICOT	Myrtaceae	Verticordia dasystylis subsp. dasystylis		P2		18
15493	Plantae	DICOT	Myrtaceae	Darwinia mollissima	MS			7
16017	Plantae	DICOT	Myrtaceae	Verticordia serrata var. Udumung (D. Hunter & B. Yarran 941006)	PN	P2		4
16027	Plantae	DICOT	Myrtaceae	Darwinia sp. Chiddarcooping (S.D. Hopper 6944)	PN	P4		12



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16737	Plantae	DICOT	Myrtaceae	Baekkea sp. Bencubbin-Koorda (M.E. Trudgen 5421)	PN			25
16844	Plantae	DICOT	Myrtaceae	Euryomyrtus ciliata	MS	P1		3
17039	Plantae	DICOT	Myrtaceae	Astartea sp. Mt Dimer (C. McChesney TRL4/72)	PN	P1		1
17984	Plantae	DICOT	Myrtaceae	Eremaea violacea subsp. Dobaderry Swamp (M.E. Trudgen 3909)	PN			1
18128	Plantae	DICOT	Myrtaceae	Melaleuca tuberculata var. arenaria				20
18637	Plantae	DICOT	Myrtaceae	Calytrix sp. Jingaring (F. Obbens, R. Davis & L.W. Sage LWS1332)	PN	P2		4
19287	Plantae	DICOT	Myrtaceae	Darwinia sp. Westdale (F. Hort 864)	PN	P2		2
19318	Plantae	DICOT	Myrtaceae	Darwinia sp. Wyalgima Hill (L.W. Sage, J.P. Pigott & E.B. Pigott LWS1549)	PN	P1		4
19450	Plantae	DICOT	Myrtaceae	Melaleuca grieviana		P1		7
19464	Plantae	DICOT	Myrtaceae	Aluta aspera subsp. localis		P2		6
19521	Plantae	DICOT	Myrtaceae	Melaleuca manglesii		P1		5
19575	Plantae	DICOT	Myrtaceae	Eucalyptus obtusiflora subsp. cowcowensis				8
19601	Plantae	DICOT	Myrtaceae	Hypocalymma sylvestre		P1		2
19605	Plantae	DICOT	Myrtaceae	Melaleuca wonganensis				8
19637	Plantae	DICOT	Myrtaceae	Eucalyptus mimica subsp. mimica		P3		23
19638	Plantae	DICOT	Myrtaceae	Eucalyptus mimica subsp. continens		P1		10
19694	Plantae	DICOT	Myrtaceae	Thryptomene salina		P1		1
19993	Plantae	DICOT	Myrtaceae	Baekkea sp. Walyahmoning (M.E. Trudgen 5412)	PN			9
20142	Plantae	DICOT	Myrtaceae	Micromyrtus triptycha subsp. elata	MS			4
20273	Plantae	DICOT	Myrtaceae	Eucalyptus spathulata subsp. salina		P3		12
20309	Plantae	DICOT	Myrtaceae	Eucalyptus leptophylla var. floribunda				6
20334	Plantae	DICOT	Myrtaceae	Darwinia divisa		P1		7
20404	Plantae	DICOT	Myrtaceae	Eucalyptus kochii subsp. yellowdinensis				5
20418	Plantae	DICOT	Myrtaceae	Calytrix sp. Dragon Rocks (K. Kershaw & L. Kerrigan KK 2180)	PN	P2		4

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20443	Plantae	DICOT	Myrtaceae	Enekbatus clavifolius	MS			17
20613	Plantae	DICOT	Myrtaceae	Baeckea sp. Elsewhere Road (M.E. Trudgen 5420)	PN	P3		7
20614	Plantae	DICOT	Myrtaceae	Baeckea sp. Tammin (R. Coveny 8319 & B. Habberley)	PN	P3		11
20617	Plantae	DICOT	Myrtaceae	Baeckea sp. Bungalbin Hill (B.J. Lepschi, L.A. Craven 4586)	PN	P1		6
20621	Plantae	DICOT	Myrtaceae	Baeckea sp. Yacke Yackine Dam (K.R. Newbey 9195)	PN	P1		1
20623	Plantae	DICOT	Myrtaceae	Baeckea sp. Muntadgin (E.T. Bailey 231)	PN	P1		6
20625	Plantae	DICOT	Myrtaceae	Baeckea sp. Baladjie (P.J. Spencer 24)	PN	P1		4
20626	Plantae	DICOT	Myrtaceae	Baeckea sp. Beringbooding (A.R. Main 11/9/1957)	PN	P1		3
20627	Plantae	DICOT	Myrtaceae	Baeckea sp. Stockton Road (M.E. Trudgen MET22077 & B. Rye)	PN	P1		1
20628	Plantae	DICOT	Myrtaceae	Baeckea sp. Lake Cronin (K.R. Newbey 9191)	PN	P1		1
20630	Plantae	DICOT	Myrtaceae	Baeckea sp. North Ironcap (R.J. Cranfield 10580)	PN	P2		2
20631	Plantae	DICOT	Myrtaceae	Baeckea sp. Sheoaks Rocks (M.E. Trudgen MET5452)	PN	P1		4
20632	Plantae	DICOT	Myrtaceae	Baeckea sp. Forrestania (K.R. Newbey 1105)	PN	P1		9
20634	Plantae	DICOT	Myrtaceae	Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)	PN	P2		1
20675	Plantae	DICOT	Myrtaceae	Baeckea sp. Wildflower Show (?A.M. Coates S 4407)	PN			1
20677	Plantae	DICOT	Myrtaceae	Baeckea sp. Chapman Road (M.E. Trudgen MET 5446)	PN			5
20679	Plantae	DICOT	Myrtaceae	Baeckea sp. Helena and Aurora Range (G.J. Keighery 4424)	PN	P1		2
20681	Plantae	DICOT	Myrtaceae	Baeckea sp. Pigeon Rocks (D. Grace DJP 281)	PN	P1		1
20682	Plantae	DICOT	Myrtaceae	Baeckea sp. Boorabbin (J.H. Willis s.n.)	PN			1

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20685	Plantae	DICOT	Myrtaceae	Baeckea sp. Lake Brown (E. Merrall s.n. 1889)	PN			2
20689	Plantae	DICOT	Myrtaceae	Baeckea sp. Queen Victoria Rock (K.R. Newbey 6103)	PN			2
20690	Plantae	DICOT	Myrtaceae	Baeckea sp. Mt Jackson (G.J. Keighery 4362)	PN			1
20748	Plantae	DICOT	Myrtaceae	Baeckea sp. Kalgarin Hill Road (A.M. Lyne, L. Craven & F. Zich AML1018)	PN			4
20751	Plantae	DICOT	Myrtaceae	Baeckea sp. Flying Fox Mine (A. O'Connor & V. Longman FF532)	PN			2
20804	Plantae	DICOT	Myrtaceae	Baeckea sp. Parker Range (M. Hislop & F. Hort MH2968)	PN	P1		1
20805	Plantae	DICOT	Myrtaceae	Baeckea sp. Yorkrakine (C.A. Gardner s.n. September 1933)	PN			1
20806	Plantae	DICOT	Myrtaceae	Baeckea sp. Bullfinch (K.R. Newbey 5838)	PN			2
20809	Plantae	DICOT	Myrtaceae	Eucalyptus phenax subsp. compressa				1
20812	Plantae	DICOT	Myrtaceae	Baeckea sp. Billyacatting Hill (A.S. George 14349)	PN			7
20814	Plantae	DICOT	Myrtaceae	Baeckea sp. Tampia Hill (J.C. Amway 327)	PN			3
20857	Plantae	DICOT	Myrtaceae	Baeckea sp. Narembreen (G.J. Keighery & N. Gibson 3010)	PN	P2		2
28315	Plantae	DICOT	Myrtaceae	Baeckea sp. Eujinyn (J. Buegge D 99)	PN	P1		1
28320	Plantae	DICOT	Myrtaceae	Baeckea sp. Kellerberrin (C.A. Gardner s.n. PERTH 03351009)	PN	P1		1
29557	Plantae	DICOT	Myrtaceae	Micromyrtus redita	MS	P1		2
29735	Plantae	DICOT	Myrtaceae	Eucalyptus sp. Great Victoria Desert (D. Nicolle & M. French DN 3877)	PN			1
29776	Plantae	DICOT	Myrtaceae	Eucalyptus drummondii subsp. York (D. Nicolle & M. French DN 3684)	PN			2
13828	Plantae	MONOCOT	Orchidaceae	Drakaea isolata	MS	R	CR	3
13861	Plantae	MONOCOT	Orchidaceae	Caladenia melanema		R	CR	5
19873	Plantae	MONOCOT	Orchidaceae	Caladenia williamsiae		R	CR	4

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20716	Plantae	MONOCOT	Orchidaceae	Caladenia graniticola		R	CR	7
10858	Plantae	MONOCOT	Orchidaceae	Diuris picta				16
15401	Plantae	MONOCOT	Orchidaceae	Cyanicula ashbyae				5
17429	Plantae	MONOCOT	Orchidaceae	Prasophyllum giganteum subsp. fuliginum	MS			7
18027	Plantae	MONOCOT	Orchidaceae	Caladenia postea				4
18031	Plantae	MONOCOT	Orchidaceae	Caladenia pendens subsp. talbotii				9
18594	Plantae	MONOCOT	Orchidaceae	Caladenia sp. Muddarning Hill (S.D. Hopper 4013)	PN			1
19709	Plantae	MONOCOT	Orchidaceae	Pterostylis sp. Helena River (G. Brockman GBB 340)	PN			6
19710	Plantae	MONOCOT	Orchidaceae	Caladenia sp. Wyalkatchem (G.B. Brockman GBB 661)	PN			5
20186	Plantae	MONOCOT	Orchidaceae	Prasophyllum sp. Brookton Highway (G. Brockman 734)	PN			4
20393	Plantae	MONOCOT	Orchidaceae	Caladenia sp. Brookton Hwy (G. Brockman GBB 547)	PN			7
20394	Plantae	MONOCOT	Orchidaceae	Caladenia sp. Julimar (S.D. Hopper 3992)	PN			1
20459	Plantae	MONOCOT	Orchidaceae	Pterostylis sp. laterite (D.L. Jones 3081 & M.A. Clements)	PN			1
25839	Plantae	MONOCOT	Orchidaceae	Caladenia sp. Central Wheatbelt (G. Brockman GBB 1161)	PN			2
29731	Plantae	MONOCOT	Orchidaceae	Thelymitra yorkensis	MS			19
3810	Plantae	DICOT	Papilionaceae	Daviesia euphorbioides		R	CR	13
3902	Plantae	DICOT	Papilionaceae	Gastrolobium glaucum		R	CR	14
16988	Plantae	DICOT	Papilionaceae	Daviesia cunderdin		R	CR	4
19113	Plantae	DICOT	Papilionaceae	Gastrolobium diabolophyllum		R	CR	8
14750	Plantae	DICOT	Papilionaceae	Jacksonia quairading	MS	R	EN	12
4109	Plantae	DICOT	Papilionaceae	Muelleranthus crenulatus		R	VU	5
3841	Plantae	DICOT	Papilionaceae	Daviesia spiralis		P4		12
4103	Plantae	DICOT	Papilionaceae	Mirbelia taxifolia		P1		9
10969	Plantae	DICOT	Papilionaceae	Gompholobium hendersonii				39

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
11142	Plantae	DICOT	Papilionaceae	Gastrolobium spectabile		P3		17
14200	Plantae	DICOT	Papilionaceae	Daviesia lineata		P2		13
14746	Plantae	DICOT	Papilionaceae	Jacksonia jackson	MS	P1		11
14755	Plantae	DICOT	Papilionaceae	Daviesia oxylobium		P4		17
15439	Plantae	DICOT	Papilionaceae	Daviesia elongata subsp. implexa		P3		30
16413	Plantae	DICOT	Papilionaceae	Gastrolobium tenue		P1		16
16581	Plantae	DICOT	Papilionaceae	Daviesia intricata subsp. xiphophylla				5
16584	Plantae	DICOT	Papilionaceae	Daviesia nudiflora subsp. drummondii				18
16590	Plantae	DICOT	Papilionaceae	Daviesia sarissa subsp. redacta				4
16592	Plantae	DICOT	Papilionaceae	Daviesia smithiorum				4
17346	Plantae	DICOT	Papilionaceae	Mirbelia magentea	MS			10
19292	Plantae	DICOT	Papilionaceae	Eutaxia lasiophylla	MS			20
19563	Plantae	DICOT	Papilionaceae	Urodon sp. Narkal (B.H. Smith 1440)	PN	P1		1
19729	Plantae	DICOT	Papilionaceae	Gastrolobium wonganense		P2		4
20041	Plantae	DICOT	Papilionaceae	Aotus sp. Cunderdin (B.J. Lepschi et al. 3587)	PN			2
20401	Plantae	DICOT	Papilionaceae	Gastrolobium euryphyllum		P1		2
20480	Plantae	DICOT	Papilionaceae	Gastrolobium effusum		P2		6
20481	Plantae	DICOT	Papilionaceae	Gastrolobium crispatum		P1		6
20516	Plantae	DICOT	Papilionaceae	Gastrolobium cyanophyllum				34
20702	Plantae	DICOT	Papilionaceae	Eutaxia neurocalyx subsp. hirsuta	MS			5
20741	Plantae	DICOT	Papilionaceae	Eutaxia lasiocalyx	MS			4
20742	Plantae	DICOT	Papilionaceae	Eutaxia rubricarina	MS			7
23488	Plantae	DICOT	Papilionaceae	Gompholobium wonganense	MS			5
19191	Plantae	MONOCOT	Phormiaceae	Styandra jamesii		P2		4
3150	Plantae	DICOT	Pittosporaceae	Bentleya spinescens		P4		17
20794	Plantae	DICOT	Plantaginaceae	Plantago sp. Kondinin hairy (M.N. Lyons 2917)	PN			1
11446	Plantae	MONOCOT	Poaceae	Echinopogon ovatus var. pubiglumis		P1		1
17337	Plantae	MONOCOT	Poaceae	Austrostipa geoffreyi		P1		5

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
19171	Plantae	MONOCOT	Poaceae	Neurachne sp. Helena & Aurora (K.R. Newbey 8972)	PN	P3		6
17050	Plantae	DICOT	Polygonaceae	Muehlenbeckia horrida subsp. abdita		R	EN	12
2091	Plantae	DICOT	Proteaceae	Grevillea scapigera		R	CR	25
20354	Plantae	DICOT	Proteaceae	Dryandra ionthocarpa subsp. chrysophoenix		R	CR	17
25898	Plantae	DICOT	Proteaceae	Isopogon robustus		R	CR	3
2024	Plantae	DICOT	Proteaceae	Grevillea involucrata		R	EN	14
2125	Plantae	DICOT	Proteaceae	Hakea aculeata		R	EN	16
14412	Plantae	DICOT	Proteaceae	Grevillea dryandroides subsp. hirsuta		R	VU	17
1896	Plantae	DICOT	Proteaceae	Dryandra comosa		P4		14
1910	Plantae	DICOT	Proteaceae	Dryandra horrida		P3		27
1926	Plantae	DICOT	Proteaceae	Dryandra pulchella		P4		17
1933	Plantae	DICOT	Proteaceae	Dryandra shanklandiorum		P4		33
1959	Plantae	DICOT	Proteaceae	Grevillea asteriscosa		P4		44
1975	Plantae	DICOT	Proteaceae	Grevillea candolleana		P2		17
2027	Plantae	DICOT	Proteaceae	Grevillea kenneallyi		P2		20
2033	Plantae	DICOT	Proteaceae	Grevillea lissopleura		P1		5
2034	Plantae	DICOT	Proteaceae	Grevillea lullfitzii		P1		20
2041	Plantae	DICOT	Proteaceae	Grevillea minutiflora		P1		6
2085	Plantae	DICOT	Proteaceae	Grevillea roycei		P3		17
2106	Plantae	DICOT	Proteaceae	Grevillea tetrapleura		P4		22
8830	Plantae	DICOT	Proteaceae	Grevillea ceratocarpa				26
11353	Plantae	DICOT	Proteaceae	Hakea cygna subsp. needlei		P1		11
12223	Plantae	DICOT	Proteaceae	Grevillea marriottii		P1		6
13415	Plantae	DICOT	Proteaceae	Grevillea petrophiloides subsp. magnifica				9
13901	Plantae	DICOT	Proteaceae	Hakea sp. Walyunga (L. Penn s.n.)	PN			3
13981	Plantae	DICOT	Proteaceae	Dryandra wonganensis		P4		12
13998	Plantae	DICOT	Proteaceae	Dryandra epimicta		P2		11
14002	Plantae	DICOT	Proteaceae	Conospermum galeatum		P1		5

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
14319	Plantae	DICOT	Proteaceae	<i>Grevillea corrugata</i>		P1		7
14410	Plantae	DICOT	Proteaceae	<i>Grevillea dissecta</i>		P4		3
14416	Plantae	DICOT	Proteaceae	<i>Grevillea pilosa</i> subsp. <i>redacta</i>		P3		14
14437	Plantae	DICOT	Proteaceae	<i>Isopogon scabriusculus</i> subsp. <i>scabriusculus</i>				28
14450	Plantae	DICOT	Proteaceae	<i>Petrophile misturata</i>				8
15973	Plantae	DICOT	Proteaceae	<i>Grevillea xiphoidea</i>				6
16036	Plantae	DICOT	Proteaceae	<i>Dryandra idiogenes</i>		P2		12
16673	Plantae	DICOT	Proteaceae	<i>Dryandra lindleyana</i> subsp. <i>agricola</i>		P2		24
16684	Plantae	DICOT	Proteaceae	<i>Dryandra speciosa</i> subsp. <i>speciosa</i>		P2		32
16766	Plantae	DICOT	Proteaceae	<i>Synaphea canaliculata</i>		P2		12
16767	Plantae	DICOT	Proteaceae	<i>Synaphea parviflora</i>		P2		6
16771	Plantae	DICOT	Proteaceae	<i>Synaphea tamminensis</i>		P2		1
16868	Plantae	DICOT	Proteaceae	<i>Synaphea constricta</i>		P3		24
16898	Plantae	DICOT	Proteaceae	<i>Hakea petiolaris</i> subsp. <i>trichophylla</i>				16
16899	Plantae	DICOT	Proteaceae	<i>Hakea petiolaris</i> subsp. <i>angusta</i>				3
17272	Plantae	DICOT	Proteaceae	<i>Synaphea cervifolia</i>		P2		14
17441	Plantae	DICOT	Proteaceae	<i>Grevillea cheilocarpa</i>				4
17772	Plantae	DICOT	Proteaceae	<i>Dryandra nivea</i> subsp. <i>Morangup</i> (M. Pieroni 94/2)	PN	P2		1
18635	Plantae	DICOT	Proteaceae	<i>Grevillea</i> sp. <i>Gunapin</i> (F. Hort 308)	PN			18
19056	Plantae	DICOT	Proteaceae	<i>Synaphea</i> sp. <i>Jilakin Flat Rocks Rd</i> (R. Butcher et. al RB200)	PN			3
19568	Plantae	DICOT	Proteaceae	<i>Grevillea synapheae</i> subsp. <i>latiloba</i>				1
20260	Plantae	DICOT	Proteaceae	<i>Grevillea squiresiae</i>		P1		4
20358	Plantae	DICOT	Proteaceae	<i>Dryandra pteridifolia</i> subsp. <i>inretita</i>		P1		7
28307	Plantae	DICOT	Proteaceae	<i>Grevillea endlicheriana</i> subsp. <i>Wongan Hills</i> (G.J. Keighery 15351)	PN			2
29185	Plantae	DICOT	Proteaceae	<i>Synaphea</i> sp. <i>Darkin</i> (F. Hort et al. 586)	PN			12
29415	Plantae	DICOT	Proteaceae	<i>Synaphea</i> sp. <i>York</i> (F. Hort 666)	PN			6
17625	Plantae	MONOCOT	Restionaceae	<i>Loxocarya albipes</i>		P4		2



TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
14794	Plantae	DICOT	Rhamnaceae	Trymalium densiflorum		P1		1
15545	Plantae	DICOT	Rhamnaceae	Cryptandra apetala var. anomala				21
16026	Plantae	DICOT	Rhamnaceae	Cryptandra dielsii	MS	P3		21
16192	Plantae	DICOT	Rhamnaceae	Cryptandra polyclada subsp. aequabilis				2
19706	Plantae	DICOT	Rhamnaceae	Stenanthemum liberum		P1		4
13497	Plantae	DICOT	Rutaceae	Philotheca basistyla		R	CR	5
4499	Plantae	DICOT	Rutaceae	Phebalium drummondii		P1		10
13496	Plantae	DICOT	Rutaceae	Philotheca langei		P1		5
13498	Plantae	DICOT	Rutaceae	Drummondita wilsonii		P1		9
16328	Plantae	DICOT	Rutaceae	Boronia westringioides		P2		15
18517	Plantae	DICOT	Rutaceae	Philotheca falcata		X		5
18519	Plantae	DICOT	Rutaceae	Philotheca coccinea				29
19493	Plantae	DICOT	Rutaceae	Boronia sp. Brookton (F. Hort 1098)	PN			1
7062	Plantae	DICOT	Scrophulariaceae	Glossostigma trichodes				1
7044	Plantae	DICOT	Solanaceae	Symonanthus bancroftii		R	CR	9
17289	Plantae	DICOT	Sterculiaceae	Guichenotia seorsiflora		R	CR	8
17740	Plantae	DICOT	Sterculiaceae	Lysiosepalum abollatum		R	CR	9
13495	Plantae	DICOT	Sterculiaceae	Thomasia glabripetala		R	VU	29
5082	Plantae	DICOT	Sterculiaceae	Thomasia gardneri		X		6
16337	Plantae	DICOT	Sterculiaceae	Lasiopetalum sp. Ironcaps (P.G. Wilson 7024)	PN			14
19503	Plantae	DICOT	Sterculiaceae	Guichenotia glandulosa		P1		6
19915	Plantae	DICOT	Sterculiaceae	Lasiopetalum sp. Northam (F. Hort 1196)	PN	P2		4
19975	Plantae	DICOT	Sterculiaceae	Lasiopetalum leucogriseum	MS			3
25874	Plantae	DICOT	Sterculiaceae	Lasiopetalum sp. Weam Reserve (M. Hislop 2755)	PN			2
29495	Plantae	DICOT	Sterculiaceae	Commersonia sp. Bindoon (C. Wilkins & F. & J. Hort CW 2155)	PN	P1		2
17410	Plantae	DICOT	Stylidiaceae	Stylidium semaphorum		R	CR	6
7761	Plantae	DICOT	Stylidiaceae	Stylidium merrallii		R	VU	12

TAXON ID	KINGDM	GROUP	FAMILY	SPECIES	INFRML	CONS CODE	IUCN	# WA Vouchers
7748	Plantae	DICOT	Stylidiaceae	<i>Stylidium leptocalyx</i>		P4		9
17582	Plantae	DICOT	Stylidiaceae	<i>Stylidium glabrifolium</i>		P2		4
17993	Plantae	DICOT	Stylidiaceae	<i>Stylidium</i> sp. Dewars Pool (K.F. Kenneally 11400)	PN			1
18418	Plantae	DICOT	Stylidiaceae	<i>Stylidium pseudosacculatum</i>		P2		6
18564	Plantae	DICOT	Stylidiaceae	<i>Stylidium aceratum</i>		P2		1
19207	Plantae	DICOT	Stylidiaceae	<i>Stylidium chiddarcoopingense</i>		P2		6
23472	Plantae	DICOT	Stylidiaceae	<i>Stylidium coroniforme</i> subsp. <i>amblyphyllum</i>	MS	P1		4
25803	Plantae	DICOT	Stylidiaceae	<i>Stylidium applanatum</i>	MS	P1		3
25834	Plantae	DICOT	Stylidiaceae	<i>Stylidium egralliforme</i>	MS			11
25835	Plantae	DICOT	Stylidiaceae	<i>Stylidium</i> sp. Chittering (J.A. Wege 709)	PN			2
4529	Plantae	DICOT	Tremandraceae	<i>Tetratheca deltoidea</i>		R	CR	6
23988	Plantae	DICOT	Tremandraceae	<i>Tetratheca paynterae</i> subsp. <i>paynterae</i>	MS	R	CR	14
4534	Plantae	DICOT	Tremandraceae	<i>Tetratheca harperi</i>		R	VU	17
20761	Plantae	DICOT	Tremandraceae	<i>Tetratheca erubescens</i>	MS	R	VU	17
29489	Plantae	DICOT	Tremandraceae	<i>Tetratheca aphylla</i> subsp. <i>aphylla</i>	MS	R		14
29490	Plantae	DICOT	Tremandraceae	<i>Tetratheca aphylla</i> subsp. <i>megacarpa</i>	MS	R		8

## Appendix 4.2 Declared Rare and Priority Flora

Table A4.2: The Declared Rare and Priority Flora taxa of the ANRMR. Shaded species are those endemic to the ANRMR.

Conservation Status	Species name	Number of pops Avon	Number of pops WA
CR	<i>Acacia cochlocarpa</i> subsp. <i>velutinos</i>	3	3
CR	<i>Acacia pharangites</i>	3	3
CR	<i>Acacia sciophanes</i>	7	7
CR	<i>Acacia subflexuosa</i> subsp. <i>capillata</i>	4	4
CR	<i>Acacia vassalii</i>	11	29
CR	<i>Acacia volubilis</i>	19	19
CR	<i>Caladenia drakeoides</i>	11	27
CR	<i>Caladenia graniticola</i>	10	10
CR	<i>Caladenia melanema</i>	2	2
CR	<i>Caladenia williamsiae</i>	4	4
CR	<i>Cyphanthera odgersii</i> subsp. <i>occidentalis</i>	3	3
CR	<i>Daviesia cunderdin</i>	2	2
CR	<i>Daviesia euphorbioides</i>	18	18
CR	<i>Daviesia microcarpa</i>	2	6
CR	<i>Drakaea elastica</i>	1	44
CR	<i>Drakaea isolata</i>	3	3
CR	<i>Dryandra ionthocarpa</i> subsp. <i>chrysophoenix</i>	5	5
CR	<i>Eremophila nivea</i>	1	14
CR	<i>Eremophila subteretifolia</i>	6	8
CR	<i>Eremophila verticillata</i>	5	5
CR	<i>Gastrolobium diablophyllum</i>	2	2
CR	<i>Gastrolobium glaucum</i>	5	5
CR	<i>Gastrolobium hamulosum</i>	5	10
CR	<i>Grevillea althoferorum</i>	1	2
CR	<i>Grevillea curviloba</i> subsp. <i>curviloba</i>	6	10
CR	<i>Grevillea dryandroides</i> subsp. <i>dryandroides</i>	13	13
CR	<i>Grevillea scapigera</i>	16	16
CR	<i>Guichenotia seorsiflora</i>	5	5
CR	<i>Gyrostemon reticulatus</i>	1	5
CR	<i>Hemiandra rutilans</i>	1	1
CR	<i>Hydatella leptogyne</i>	1	1
CR	<i>Isopogon robustus</i>	1	1
CR	<i>Leucopogon</i> sp. <i>Helena &amp; Aurora Range</i> (B.J. Lepschi 2077)	12	12
CR	<i>Lysiosepalum abollatum</i>	2	2
CR	<i>Philotheca basistyla</i>	4	4
CR	<i>Pityrodia scabra</i>	6	6
CR	<i>Rhizanthella gardneri</i>	3	6
CR	<i>Ricinocarpos brevis</i>	5	5
CR	<i>Stylidium semaphorum</i>	1	1
CR	<i>Symonanthus bancroftii</i>	2	2
CR	<i>Tetrateca deltoidea</i>	1	1
CR	<i>Tetrateca paynterae</i> subsp. <i>paynterae</i>	2	2
CR	<i>Thelymitra dedmaniarum</i>	9	9
CR	<i>Verticordia staminosa</i> subsp. <i>staminosa</i>	4	4

Conservation Status	Species name	Number of pops Avon	Number of pops WA
CR	<i>Verticordia staminosa</i> var. <i>erecta</i>	4	4
EN	<i>Acacia ataxiphylla</i> subsp. <i>magna</i>	20	20
EN	<i>Acacia chapmanii</i> subsp. <i>australis</i>	2	9
EN	<i>Acacia depressa</i>	14	24
EN	<i>Acacia lobulata</i>	6	6
EN	<i>Acacia pygmaea</i>	18	18
EN	<i>Adenanthos pungens</i> subsp. <i>pungens</i>	9	10
EN	<i>Banksia cuneata</i>	10	17
EN	<i>Caladenia dorrienii</i>	1	15
EN	<i>Conostylis seorsiflora</i> subsp. <i>trichophylla</i>	1	4
EN	<i>Conostylis wonganensis</i>	14	14
EN	<i>Darwinia acerosa</i>	7	12
EN	<i>Darwinia foetida</i>	4	4
EN	<i>Eremophila resinosa</i>	29	29
EN	<i>Eremophila virens</i>	25	25
EN	<i>Eremophila viscida</i>	19	32
EN	<i>Eucalyptus brevipes</i>	10	10
EN	<i>Eucalyptus crucis</i> subsp. <i>crucis</i>	9	9
EN	<i>Frankenia parvula</i>	7	7
EN	<i>Goodenia integerrima</i>	4	4
EN	<i>Grevillea bracteosa</i>	9	32
EN	<i>Grevillea christineae</i>	1	15
EN	<i>Grevillea curviloba</i> subsp. <i>incurva</i>	32	36
EN	<i>Grevillea involucrata</i>	29	29
EN	<i>Hakea aculeata</i>	39	39
EN	<i>Jacksonia quairading</i>	5	5
EN	<i>Lasiopetalum rotundifolium</i>	11	12
EN	<i>Melaleuca sciotostyla</i>	3	3
EN	<i>Muehlenbeckia horrida</i> subsp. <i>abdita</i>	4	4
EN	<i>Philotheca wonganensis</i>	5	6
EN	<i>Ptilotus fasciculatus</i>	7	13
EN	<i>Stylidium coroniforme</i> subsp. <i>coroniforme</i>	13	13
EN	<i>Thelymitra stellata</i>	9	36
EN	<i>Verticordia hughanii</i>	2	2
VU	<i>Acacia anomala</i>	17	32
VU	<i>Acacia aphylla</i>	29	40
VU	<i>Acacia auratiflora</i>	23	23
VU	<i>Acacia brachypoda</i>	13	13
VU	<i>Acacia caesariata</i>	3	3
VU	<i>Acacia denticulosa</i>	14	15
VU	<i>Acacia lanuginophylla</i>	20	20
VU	<i>Acacia leptalea</i>	10	10
VU	<i>Allocasuarina fibrosa</i>	6	6
VU	<i>Allocasuarina tortiramula</i>	3	3
VU	<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	2	15
VU	<i>Asterolasia nivea</i>	9	9
VU	<i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i>	25	27
VU	<i>Boronia adamsiana</i>	27	27

Conservation Status	Species name	Number of pops Avon	Number of pops WA
VU	<i>Boronia capitata</i> subsp. <i>capitata</i>	1	1
VU	<i>Boronia revoluta</i>	7	10
VU	<i>Calectasia pignattiana</i>	8	17
VU	<i>Chamelaucium lullfitzii</i>	15	15
VU	<i>Conostylis rogeri</i>	7	7
VU	<i>Dryandra aurantia</i>	6	6
VU	<i>Eleocharis keigheryi</i>	6	20
VU	<i>Eremophila ternifolia</i>	6	6
VU	<i>Eucalyptus recta</i>	15	15
VU	<i>Eucalyptus steedmanii</i>	7	7
VU	<i>Eucalyptus synandra</i>	11	42
VU	<i>Frankenia conferta</i>	6	10
VU	<i>Gastrolobium graniticum</i>	3	10
VU	<i>Grevillea dryandroides</i> subsp. <i>hirsuta</i>	14	14
VU	<i>Grevillea flexuosa</i>	42	43
VU	<i>Hydatella dioica</i>	1	3
VU	<i>Lechenaultia loricata</i>	12	12
VU	<i>Microcorys eremophiloides</i>	34	34
VU	<i>Muelleranthus crenulatus</i>	4	4
VU	<i>Myriophyllum lapidicola</i>	5	6
VU	<i>Pultenaea pauciflora</i>	24	34
VU	<i>Rhagodia acicularis</i>	5	5
VU	<i>Roycea pycnophylloides</i>	22	22
VU	<i>Spirogardnera rubescens</i>	5	21
VU	<i>Stylidium merrallii</i>	8	8
VU	<i>Tetradthea aphylla</i> subsp. <i>aphylla</i>	8	8
VU	<i>Tetradthea aphylla</i> subsp. <i>megacarpa</i>	4	4
VU	<i>Tetradthea erubescens</i>	4	4
VU	<i>Tetradthea harperi</i>	2	2
VU	<i>Tetradthea paynterae</i> subsp. <i>cremnobata</i>	2	3
VU	<i>Thelymitra psammophila</i>	1	20
VU	<i>Thomasia glabripetala</i>	8	8
VU	<i>Thomasia montana</i>	27	27
VU	<i>Tribonanthes purpurea</i>	5	9
VU	<i>Verticordia fimbriolepis</i> subsp. <i>fimbriolepis</i>	11	22
VU	<i>Verticordia plumosa</i> var. <i>pleiobotrya</i>	1	11
VU	<i>Verticordia staminosa</i> var. <i>cylindracea</i>	13	13
1	<i>Acacia desertorum</i> var. <i>nudipes</i>	8	8
1	<i>Acacia lanei</i>	14	14
1	<i>Acacia mutabilis</i> subsp. <i>stipulifera</i>	5	5
1	<i>Acacia sclerophylla</i> var. <i>teretiuscula</i>	12	12
1	<i>Acacia tetraneura</i>	9	9
1	<i>Acacia trinalis</i>	1	4
1	<i>Andersonia saxatilis</i>	1	6
1	<i>Austrostipa geoffreyi</i>	3	3
1	<i>Baekkea crispiflora</i> subsp. <i>Ongerup</i> (A.Scougall & C.Garawanta E35)	2	5
1	<i>Beyeria</i> sp. Jackson Range (R. Cranfield & P. Spencer 7751)	2	2

Conservation Status	Species name	Number of pops Avon	Number of pops WA
1	<i>Brachyloma nguba</i>	3	3
1	<i>Calandrinia</i> sp. <i>Piawaning</i> (A.C. Beauglehole 12257)	3	3
1	<i>Commersonia</i> sp. <i>Bindoon</i> (C. Wilkins & F. & J. Hort CW 2155)	2	2
1	<i>Conostylis caricina</i> subsp. <i>elachys</i>	1	2
1	<i>Dampiera glabrescens</i>	3	3
1	<i>Dampiera scaevolina</i>	3	3
1	<i>Darwinia divisa</i>	1	1
1	<i>Drosera grievlei</i>	3	3
1	<i>Dryandra pteridifolia</i> subsp. <i>inretita</i>	4	4
1	<i>Eucalyptus mimica</i> subsp. <i>continens</i>	5	5
1	<i>Eucalyptus myriadena</i> subsp. <i>parviflora</i>	3	3
1	<i>Eucalyptus subangusta</i> subsp. <i>virescens</i>	11	14
1	<i>Gastrolobium crispatum</i>	7	7
1	<i>Gastrolobium rotundifolium</i>	1	11
1	<i>Gastrolobium tenue</i>	3	3
1	<i>Grevillea corrugata</i>	6	6
1	<i>Grevillea lullfitzii</i>	5	5
1	<i>Grevillea marriottii</i>	5	5
1	<i>Grevillea minutiflora</i>	14	14
1	<i>Grevillea phillipsiana</i>	1	4
1	<i>Guichenotia glandulosa</i>	2	2
1	<i>Hakea cygna</i> subsp. <i>needlei</i>	3	3
1	<i>Hibbertia axillibarba</i>	1	1
1	<i>Hibbertia glomerata</i> subsp. <i>ginginensis</i>	1	2
1	<i>Hydrocotyle hexaptera</i>	1	1
1	<i>Hydrocotyle muriculata</i>	6	6
1	<i>Hypocalymma sylvestre</i>	1	1
1	<i>Jacksonia debilis</i>	3	5
1	<i>Lasiopetalum exiguum</i>	1	2
1	<i>Lechenaultia magnifica</i>	3	4
1	<i>Leucopogon compressicarpus</i>	1	1
1	<i>Leucopogon teretostylus</i>	2	2
1	<i>Melaleuca agathosmoides</i>	3	9
1	<i>Mirbelia densiflora</i>	4	9
1	<i>Pimelea pelinos</i>	1	2
1	<i>Senecio gilbertii</i>	3	3
1	<i>Synaphea panhesya</i>	1	2
1	<i>Thysanotus lavanduliflorus</i>	9	9
1	<i>Thysanotus sabulosus</i>	3	3
1	<i>Trymalium myrtillus</i> subsp. <i>pungens</i>	1	2
1	<i>Xanthoparmelia nashii</i>	1	1
1	<i>Xanthoparmelia scabrosina</i>	1	1
2	<i>Acacia browniana</i> var. <i>glaucescens</i>	6	6
2	<i>Acacia congesta</i> subsp. <i>wonganensis</i>	6	6
2	<i>Acacia cowaniana</i>	4	4
2	<i>Acacia drewiana</i> subsp. <i>minor</i>	9	9
2	<i>Acacia gemina</i>	4	12

Conservation Status	Species name	Number of pops Avon	Number of pops WA
2	<i>Acacia heterochroa</i> subsp. <i>robertii</i>	6	6
2	<i>Acacia lirellata</i> subsp. <i>compressa</i>	8	8
2	<i>Acacia mutabilis</i> subsp. <i>incurva</i>	10	15
2	<i>Acacia sclerophylla</i> var. <i>pilosa</i>	5	6
2	<i>Acacia tuberculata</i>	9	9
2	<i>Amperea micrantha</i>	1	5
2	<i>Andersonia carinata</i>	1	11
2	<i>Astartea clavifolia</i>	8	8
2	<i>Boronia ericifolia</i>	9	11
2	<i>Calytrix oncophylla</i>	2	2
2	<i>Cyanicula ixiooides</i> subsp. <i>candida</i>	1	1
2	<i>Dampiera orchardii</i>	1	2
2	<i>Darwinia</i> sp. <i>Westdale</i> (F. Hort 864)	1	1
2	<i>Daviesia lineata</i>	4	4
2	<i>Diplolaena andrewsii</i>	6	7
2	<i>Drosera salina</i>	2	4
2	<i>Dryandra conferta</i> var. <i>parva</i>	1	14
2	<i>Dryandra epimicta</i>	6	6
2	<i>Dryandra erythrocephala</i> var. <i>inopinata</i>	6	10
2	<i>Dryandra foliosissima</i>	4	11
2	<i>Dryandra idiogenes</i>	5	5
2	<i>Dryandra lindleyana</i> subsp. <i>agricola</i>	10	10
2	<i>Dryandra nivea</i> subsp. <i>Morangup</i> (M. Pieroni 94/2)	2	2
2	<i>Dryandra speciosa</i> subsp. <i>speciosa</i>	9	9
2	<i>Eremophila adenotricha</i>	7	7
2	<i>Eremophila brevifolia</i>	1	6
2	<i>Eremophila complanata</i>	1	1
2	<i>Eremophila sargentii</i>	1	4
2	<i>Eucalyptus sparsicoma</i>	3	4
2	<i>Fitzwillia axilliflora</i>	4	5
2	<i>Gastrolobium effusum</i>	3	3
2	<i>Gastrolobium nudum</i>	7	7
2	<i>Gastrolobium rigidum</i>	7	17
2	<i>Goodenia arthrotricha</i>	1	4
2	<i>Goodenia</i> sp. <i>Lake King</i> (M. Gustafsson et K. Bremer 132)	2	2
2	<i>Grevillea bififormis</i> subsp. <i>cymbiformis</i>	1	10
2	<i>Grevillea candolleana</i>	9	9
2	<i>Grevillea crowleyae</i>	1	2
2	<i>Grevillea kenneallyi</i>	11	11
2	<i>Grevillea rosieri</i>	2	5
2	<i>Guichenotia asteriskos</i>	4	4
2	<i>Haegiela tatei</i>	5	10
2	<i>Hakea pendens</i>	11	11
2	<i>Isotropis cuneifolia</i> subsp. <i>glabra</i>	1	2
2	<i>Keraudrenia adenogyna</i>	7	11
2	<i>Lasioptalum</i> sp. <i>Northam</i> (F. Hort 1196)	3	3
2	<i>Lechenaultia hortii</i>	3	3



Conservation Status	Species name	Number of pops Avon	Number of pops WA
2	<i>Lepidium genistoides</i>	4	4
2	<i>Lepidobolus spiralis</i>	1	3
2	<i>Leucopogon amplexans</i>	6	6
2	<i>Leucopogon</i> sp. Bindoon (F. Hort 2766)	3	3
2	<i>Leucopogon</i> sp. Flynn (F. Hort, J. Hort & A. Lowrie 859)	2	2
2	<i>Leucopogon</i> sp. Bungulla (R.D. Royce 3435)	5	5
2	<i>Lissanthe scabra</i>	6	6
2	<i>Microcorys lenticularis</i>	1	11
2	<i>Millotia steetziana</i>	2	2
2	<i>Millotia tenuifolia</i> var. <i>laevis</i>	1	1
2	<i>Opercularia rubioides</i>	1	3
2	<i>Perosonia hakeiformis</i>	3	5
2	<i>Petrophile filifolia</i> subsp. <i>laxa</i>	1	8
2	<i>Pimelea halophila</i>	3	7
2	<i>Schoenus capillifolius</i>	2	7
2	<i>Stylidium sejunctum</i>	8	9
2	<i>Synaphea boyaginensis</i>	1	1
2	<i>Synaphea canaliculata</i>	5	5
2	<i>Synaphea cervifolia</i>	8	8
2	<i>Synaphea flexuosa</i>	3	3
2	<i>Synaphea parviflora</i>	3	3
2	<i>Synaphea tripartita</i>	16	17
2	<i>Thysanotus acerosifolius</i>	3	4
2	<i>Verticordia citrella</i>	2	2
2	<i>Verticordia serrata</i> var. <i>Udumung</i> (D. Hunter & B. Yarran 941006)	1	1
3	<i>Acacia anarthros</i>	11	20
3	<i>Acacia brachyphylla</i> var. <i>recurvata</i>	3	4
3	<i>Acacia campylophylla</i>	10	10
3	<i>Acacia drummondii</i> subsp. <i>affinis</i>	10	13
3	<i>Acacia horridula</i>	3	16
3	<i>Acacia improcera</i>	1	1
3	<i>Acacia mutabilis</i> subsp. <i>rhyngophylla</i>	1	1
3	<i>Acacia newbeyi</i>	1	1
3	<i>Acacia obesa</i>	2	2
3	<i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>	1	6
3	<i>Acacia sedifolia</i> subsp. <i>pulvinata</i>	2	2
3	<i>Acacia singula</i>	2	3
3	<i>Acacia undosa</i>	5	5
3	<i>Acrotriche plurilocularis</i>	1	1
3	<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	13	16
3	<i>Allocasuarina ramosissima</i>	1	6
3	<i>Angianthus halophilus</i>	2	2
3	<i>Anigozanthos bicolor</i> subsp. <i>exstans</i>	13	17
3	<i>Asteridea gracilis</i>	1	8
3	<i>Astroloma microphyllum</i>	2	8
3	<i>Astroloma recurvum</i>	1	2
3	<i>Baeckea</i> sp. Hyden (J.M. Brown 141)	2	3

Conservation Status	Species name	Number of pops Avon	Number of pops WA
3	<i>Banksia micrantha</i>	1	11
3	<i>Blennospora phlegmatocarpa</i>	2	4
3	<i>Boronia penicillata</i>	3	5
3	<i>Bossiaea divaricata</i>	1	4
3	<i>Calectasia obtusa</i>	3	3
3	<i>Cryptandra dielsii</i>	11	11
3	<i>Cryptandra polyclada</i> subsp. <i>polyclada</i>	1	1
3	<i>Cyathochaeta teretifolia</i>	1	5
3	<i>Daviesia elongata</i> subsp. <i>implexa</i>	9	9
3	<i>Daviesia tortuosa</i>	4	4
3	<i>Daviesia uncinata</i>	8	11
3	<i>Dryandra ferruginea</i> subsp. <i>chelomacarpa</i>	4	4
3	<i>Dryandra ferruginea</i> subsp. <i>flavescens</i>	3	3
3	<i>Dryandra meganotia</i>	1	12
3	<i>Dryandra xylothemelia</i>	18	19
3	<i>Eucalyptus depauperata</i>	13	15
3	<i>Eucalyptus macrocarpa</i> x <i>pyriformis</i>	3	17
3	<i>Eucalyptus microschemata</i>	16	16
3	<i>Eucalyptus mimica</i> subsp. <i>mimica</i>	11	11
3	<i>Eucalyptus quaerenda</i>	2	2
3	<i>Frankenia drummondii</i>	4	4
3	<i>Frankenia glomerata</i>	2	3
3	<i>Galium migrans</i>	1	9
3	<i>Gastrolobium axillare</i>	1	18
3	<i>Gastrolobium cruciatum</i>	4	5
3	<i>Goodenia trichophylla</i>	1	2
3	<i>Grevillea florida</i>	8	10
3	<i>Grevillea manglesii</i> subsp. <i>dissectifolia</i>	3	10
3	<i>Grevillea newbeyi</i>	26	32
3	<i>Gyrostemon prostratus</i>	2	2
3	<i>Hakea brachyptera</i>	9	14
3	<i>Hakea lasiocarpa</i>	1	1
3	<i>Haloragis tenuifolia</i>	1	10
3	<i>Johnsonia inconspicua</i>	1	5
3	<i>Lasiopetalum fitzgiibonii</i>	1	3
3	<i>Lechenaultia acutiloba</i>	3	6
3	<i>Leucopogon</i> sp. <i>Ironcaps</i> (N. Gibson & K. Brown 3070)	4	6
3	<i>Melaleuca sclerophylla</i>	2	6
3	<i>Melaleuca sculponeata</i>	4	5
3	<i>Monotoca leucantha</i>	6	9
3	<i>Myriocephalus appendiculatus</i>	1	6
3	<i>Myriophyllum echinatum</i>	1	10
3	<i>Persoonia brevihachis</i>	18	18
3	<i>Phebalium brachycalyx</i>	4	4
3	<i>Phlegmatospermum drummondii</i>	2	3
3	<i>Pityrodia</i> sp. <i>Yilgarn</i> (A.P. Brown 2679)	7	21
3	<i>Platysace ramosissima</i>	1	4

Conservation Status	Species name	Number of pops Avon	Number of pops WA
3	<i>Pultenaea daena</i>	1	3
3	<i>Rhodanthe pyrethrum</i>	1	16
3	<i>Stylidium cymiferum</i>	2	5
3	<i>Stylidium longitubum</i>	2	7
3	<i>Stylidium pulviniforme</i>	5	7
3	<i>Stylidium rhipidium</i>	2	7
3	<i>Tetratheca pilifera</i>	6	6
3	<i>Tetratheca similis</i>	2	7
3	<i>Verticordia huegelii</i> var. <i>tridens</i>	1	10
3	<i>Verticordia serrata</i> var. <i>linearis</i>	3	4
4	<i>Acacia cuneifolia</i>	19	20
4	<i>Acacia merrickiae</i>	31	31
4	<i>Acacia semicircularis</i>	33	33
4	<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>	2	34
4	<i>Asterolasia grandiflora</i>	20	20
4	<i>Astroloma</i> sp. <i>Cataby</i> (E.A.Griffin 1022)	4	14
4	<i>Baeckea</i> sp. <i>Chittering</i> (R.J.Cranfield 1983)	3	3
4	<i>Bentleya spinescens</i>	27	31
4	<i>Boronia tenuis</i>	1	26
4	<i>Caladenia cristata</i>	2	8
4	<i>Caladenia integra</i>	4	18
4	<i>Caladenia speciosa</i>	1	17
4	<i>Calamphoreus inflatus</i>	6	6
4	<i>Calothamnus affinis</i>	1	10
4	<i>Calothamnus brevifolius</i>	7	8
4	<i>Calothamnus rupestris</i>	2	6
4	<i>Calytrix sylvana</i>	11	20
4	<i>Centrolepis caespitosa</i>	2	34
4	<i>Chordifex chaunocoleus</i>	8	14
4	<i>Darwinia pimelioides</i>	2	10
4	<i>Darwinia thymoides</i> subsp. <i>bella</i>	1	1
4	<i>Daviesia oxylobium</i>	20	20
4	<i>Daviesia purpurascens</i>	3	4
4	<i>Daviesia spiralis</i>	20	20
4	<i>Drosera occidentalis</i> subsp. <i>occidentalis</i>	2	30
4	<i>Eremaea blackwelliana</i>	8	8
4	<i>Eremophila caerulea</i> subsp. <i>merrallii</i>	4	4
4	<i>Eremophila racemosa</i>	4	4
4	<i>Eremophila serpens</i>	2	5
4	<i>Eremophila veneta</i>	27	30
4	<i>Eucalyptus exilis</i>	20	26
4	<i>Eucalyptus latens</i>	8	27
4	<i>Eucalyptus loxophleba</i> x <i>wandoo</i>	10	16
4	<i>Gastrolobium callistachys</i>	9	24
4	<i>Gastrolobium densifolium</i>	15	18
4	<i>Gonocarpus intricatus</i>	3	3
4	<i>Grevillea drummondii</i>	1	11
4	<i>Grevillea prostrata</i>	38	38

Conservation Status	Species name	Number of pops Avon	Number of pops WA
4	<i>Hemiandra hancocksiana</i>	1	14
4	<i>Hydrocotyle lemnoides</i>	4	10
4	<i>Lechenaultia pulvinaris</i>	23	46
4	<i>Lepidium pseudotasmanicum</i>	1	2
4	<i>Microcorys sp. Forrestania</i> (V. English 2004)	4	4
4	<i>Myriophyllum petraeum</i>	7	16
4	<i>Persoonia sulcata</i>	8	11
4	<i>Rinzia affinis</i>	3	3
4	<i>Schoenus natans</i>	2	11
4	<i>Sowerbaea multicaulis</i>	1	2
4	<i>Stylidium scabridum</i>	11	14
4	<i>Stylidium striatum</i>	6	9
4	<i>Synaphea grandis</i>	1	3
4	<i>Templetonia drummondii</i>	6	14
4	<i>Thysanotus glaucus</i>	1	11
4	<i>Verreauxia verreauxii</i>	45	45
4	<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	2	38
4	<i>Villarsia submersa</i>	3	28
4	<i>Wurmbea drummondii</i>	4	8

Table A4.3: The Recovery and Interim Recovery Plans for DRF and Priority taxa of the ANRMR.

Conservation Status	Species Name	Existing RP/IRP number	RP/IRP operative dates	Current Status
CR	<i>Acacia pharangites</i>	IRP 20	1999-2002	Update in prep.
CR	<i>Acacia sciophanes</i>	IRP 77	2000-2003	Update in prep.
CR	<i>Acacia subflexuosa subsp. capillata</i>	IRP 157	2003-2008	
CR	<i>Acacia volubilis</i>	IRP 158	2003-2008	
CR	<i>Caladenia drakeoides</i>	IRP 141	2003-2008	
CR	<i>Cyphanthera odgersii subsp. occidentalis</i>			in prep.
CR	<i>Daviesia cunderdin</i>	IRP 37	1999-2002	Update in prep.
CR	<i>Daviesia euphorbioides</i>	IRP 70	2000-2003	
CR	<i>Daviesia microcarpa</i>	IRP 11	1996-1999	
CR	<i>Eremophila nivea</i>	IRP 101	2001-2004	
CR	<i>Eremophila verticillata</i>	IRP 142	2003-2008	
CR	<i>Gastrolobium glaucum</i>			in prep.
CR	<i>Gastrolobium hamulosum</i>	IRP 113	2002-2005	
CR	<i>Grevillea althoferorum</i>	IRP 129	2003-2008	
CR	<i>Grevillea curviloba subsp. curviloba</i>	IRP 72	2000-2003	
CR	<i>Grevillea dryandroides subsp. dryandroides</i>	IRP 64	2000-2003	
CR	<i>Grevillea scapigera</i>	IRP 224	2006-2011	
CR	<i>Gyrostemon reticulatus</i>	IRP 119	2002-2007	
CR	<i>Hemiandra rutilans</i>			in prep.
CR	<i>Philotheca basistyla</i>	IRP 170	2004-2009	
CR	<i>Pityrodia scabra</i>			in prep.
CR	<i>Rhizanthella gardneri</i>	IRP 127	2003-2008	
CR	<i>Symonanthus bancroftii</i>	IRP 84	2000-2003	
CR	<i>Tetratheca deltoidea</i>	IRP 89	2001-2004	
CR	<i>Tetratheca paynterae subsp. paynterae</i>		2006-2016	in prep.
CR	<i>Verticordia staminosa subsp. staminosa</i>	IRP 90	2001-2004	
EN	<i>Acacia ataxiphylla subsp. magna</i>	IRP 156	2003-2008	
EN	<i>Acacia lobulata</i>			in prep.
EN	<i>Acacia pygmaea</i>	IRP 9	1996-1999	

Conservation Status	Species Name	Existing RP/IRP number	RP/IRP operative dates	Current Status
EN	<i>Banksia cuneata</i>			RP (in prep.)
EN	<i>Eremophila resinosa</i>			in prep.
EN	<i>Eremophila viscida</i>	IRP 137	2003-2008	
EN	<i>Frankenia parvula</i>			in prep.
EN	<i>Goodenia integerrima</i>	IRP 136	2003-2008	
EN	<i>Grevillea involucrata</i>			in prep.
EN	<i>Muehlenbeckia horrida subsp. abdita</i>	IRP 135	2003-2008	
EN	<i>Stylidium coroniforme subsp. coroniforme</i>	IRP 149	2003-2008	
VU	<i>Acacia auratiflora</i>			in prep.
VU	<i>Acacia lanuginophylla</i>			in prep.
VU	<i>Acacia leptalea</i>			in prep.
VU	<i>Anigozanthos bicolor subsp. minor</i>	IRP 223	2006-2011	
VU	<i>Frankenia conferta</i>			in prep.
VU	<i>Grevillea dryandroides subsp. hirsuta</i>	IRP 222	2006-2011	
VU	<i>Myriophyllum lapidicola</i>	IRP 187	2004-2009	
4*	<i>Bentleya spinescens</i>			in prep.
4*	<i>Centrolepis caespitosa</i>	IRP 159	2004-2008	

\* Previously listed as DRF.

Table A4.4: The vesting of land on which populations of the ANRMR Threatened and Priority flora are found.

Vested in	CR	EN	VU	Number DRF	%DRF	1	2	3	4	Number Priority	% Priority	Total DRF and P	%DRF and Priority
Chief Exec Dept of Agriculture	6	5	2	13	1	1	1	2		4	0	17	1
Commonwealth of Australia		7	10	17	1	3	1	1	3	8	1	25	1
Conservation Commission - NPNCA - LFC	36	78	157	271	23	18	115	119	143	395	29	666	26
Dept of Land Administration	6	1	10	17	1	10	15	5	1	31	2	48	2
Exec Direc CALM			2	2	0		3		1	4	0	6	0
Freehold				0	0			1		1	0	1	0
Lands and Forests Commission		3	4	7	1	1	1	6	84	92	7	99	4
Main Roads WA	5	12	10	27	2	8	13	29	19	69	5	96	4
Minister for Agriculture				0	0			1		1	0	1	0
Minister for Water Resources	1	3	7	11	1	2	2	2	1	7	1	18	1
Minister for Works	1		1	2	0					0	0	2	0
Natural Trust of Australia WA			1	1	0					0	0	1	0
Not Vested	25	16	59	100	9	28	25	16	20	89	6	189	7
NPNCA			1	1	0					0	0	1	0
Other	2			2	0					0	0	2	0
Private	46	105	158	309	26	25	35	28	77	165	12	474	19
Shire	84	119	114	317	27	61	77	77	142	357	26	674	26
State of Western Australia				0	0			4		4	0	4	0
Telstra			1	1	0					0	0	1	0
TOWN			1	1	0					0	0	1	0
Unknown	3	2	1	6	1	23	31	40	6	100	7	106	4
Water & Rivers Commission		1	3	4	0	3	2	3	1	9	1	13	1
Water Corporation	4	8	8	20	2	2	10	5	9	26	2	46	2
Western Power		1		1	0					0	0	1	0
Westrail	13	17	11	41	4	8	1	7	7	23	2	64	3
Total	232	378	561	1171	100	193	332	346	514	1385	100	2556	100



Table A4.5: The land purpose on which populations of the ANRMR Threatened and Priority flora are found.

	CR	EN	VU	Number of DRF	%DRF	1	2	3	4	Number Priority	% Priority	Total DRF and Priority	%DRF and Priority
Aerodrome				0	0			1		1	0	1	0
Airport	2	1	2	5	0		2		1	3	0	8	0
Camping		3		3	0			1	1	2	0	5	0
Car Park			1	1	0		1			1	0	2	0
Common		4		4	0					0	0	4	0
Conservation of Fauna			1	1	0		1	3	4	8	1	9	0
Conservation of Flora			7	7	1		6	5	2	13	1	20	1
Conservation Of Flora & Fauna	33	68	104	205	18	15	93	108	103	319	23	524	21
Conservation Park			35	35	3		4		21	25	2	60	2
Defence		7		7	1	3		1	2	6	0	13	1
Excepted from sale	1			1	0					0	0	1	0
Experimental Farm		5		5	0	1		2		3	0	8	0
Firewood		2	2	4	0					0	0	4	0
Firing Range		1	9	10	1			1	1	2	0	12	0
Golf	1		2	3	0	1			1	2	0	5	0
Government Requirements	1		1	2	0	1	1	1	1	4	0	6	0
Gravel Pit	1		2	3	0		2	4	4	10	1	13	1
Heritage Purposes			1	1	0					0	0	1	0
Hospital		1		1	0					0	0	1	0
Mining lease	2			2	0					0	0	2	0
Municipal Purposes	1			1	0					0	0	1	0
National Park				0	0		9		8	17	1	17	1
Nature Reserve	1	10	13	24	2	1	1	2	1	5	0	29	1
Other	7	3	3	13	1	1	2	3		6	0	19	1
Parkland (& Recreation)		1	1	2	0	4		3	1	8	1	10	0
Pastoral lease	6		2	8	1	2	2		1	5	0	13	1
Protection of Flora & Fauna	1			1	0			1		1	0	2	0
Public access			1	1	0					0	0	1	0

	CR	EN	VU	Number of DRF	%DRF	1	2	3	4	Number Priority	% Priority	Total DRF and Priority	%DRF and Priority
Public Open Space			1	1	0					0	0	1	0
Public Utility			1	1	0	2		1		3	0	4	0
Racecourse		1		1	0					0	0	1	0
Railway Reserve	12	17	11	40	3	8	1	7	7	23	2	63	2
Recreation	9	1	11	21	2	2	2	1	7	12	1	33	1
Re-establish Native Plants	1			1	0					0	0	1	0
Road Verge	74	116	98	288	25	67	85	101	147	400	29	688	27
Rubbish		2	1	3	0					0	0	3	0
Sand				0	0				1	1	0	1	0
School-site	1			1	0	2		1		3	0	4	0
Shire Requirements			1	1	0					0	0	1	0
Soil Conservation				0	0		1			1	0	1	0
State Forest		3	4	7	1	3	3	7	87	100	7	107	4
Stopping place			1	1	0			1		1	0	2	0
Timber		4		4	0		1	1	1	3	0	7	0
Town-site	1			1	0				1	1	0	2	0
Unallocated Crown Land	12	2	21	35	3	2	5	7	1	15	1	50	2
Unknown	3	1	1	5	0	7	12	14	1	34	2	39	2
Vacant Crown Land	6	4	43	53	5	23	26	4	11	64	5	117	5
Vermin Proof Fence			2	2	0					0	0	2	0
Water	8	15	17	40	3	9	14	6	14	43	3	83	3
Water & Conservation of F & F			2	2	0			4		4	0	6	0
#N/A	47	106	159	312	27	39	58	55	84	236	17	548	21
Grand Total	232	378	561	1171	100	193	332	346	514	1385	100	2556	100

Table A4.6: The species of threatened and priority flora of the ANRMR that are considered to have a high derived salinity risk. These are species that have all of their populations less than .5m above valley floor (see Section 3.3.3.3). Those species shaded are endemic to the ANRMR.

Conservation Status	Species name	Number of populations
CR	<i>Caladenia melanema</i>	2
CR	<i>Hydatella leptogyne</i>	1
EN	<i>Goodenia integerrima</i>	4
EN	<i>Muehlenbeckia horrida</i> subsp. <i>abdita</i>	4
VU	<i>Frankenia conferta</i>	6
1	<i>Austrostipa geoffreyi</i>	3
1	<i>Baeckea crispiflora</i> subsp. <i>Ongerup</i> (A.Scougall & C.Garawanta E35)	2
1	<i>Hibbertia axillibarba</i>	1
1	<i>Hydrocotyle hexaptera</i>	1
1	<i>Hydrocotyle muriculata</i>	6
2	<i>Astartea clavifolia</i>	8
2	<i>Drosera salina</i>	2
2	<i>Eremophila complanata</i>	1
2	<i>Goodenia</i> sp.Lake King(M.Gustafsson et K.Bremer 132)	2
2	<i>Opercularia rubioides</i>	1
2	<i>Pimelea halophila</i>	3
3	<i>Acacia mutabilis</i> subsp. <i>rhynchophylla</i>	1
3	<i>Angianthus halophilus</i>	2
3	<i>Blennospora phlegmatocarpa</i>	2
3	<i>Eucalyptus quaerenda</i>	2
3	<i>Frankenia glomerata</i>	2
3	<i>Gastrolobium axillare</i>	1
3	<i>Goodenia trichophylla</i>	1
3	<i>Haloragis tenuifolia</i>	1
3	<i>Lechenaultia acutiloba</i>	3
3	<i>Myriophyllum echinatum</i>	1
3	<i>Pultenaea daena</i>	1
4	<i>Caladenia speciosa</i>	1
4	<i>Darwinia thymoides</i> subsp. <i>bella</i>	1

Table A4.7: The threatened and priority species of the ANRMR that are already salt-affected.

These are species that have all their populations in areas already affected by salt (see Section 3.3.3.3). Those species shaded are endemic to the ANRMR.

Conservation Status	Species name	Number of populations
CR	Caladenia melanema	2
EN	Goodenia integerrima	4
1	Hydrocotyle hexaptera	1
1	Pimelea pelinos	1
2	Astartea clavifolia	8
2	Goodenia sp.Lake King(M.Gustafsson et K.Bremer 132)	2
2	Millotia steetziana	2
2	Drosera salina	2
2	Pimelea halophila	3
3	Pultenaea daena	1
4	Caladenia cristata	2

## Appendix 4.3 Declared Rare and Priority Flora Prioritisation Database

Table A4.8: The fields of a spreadsheet developed for aiding in DRF and Priority on ground action planning.

The spreadsheet is a collation of present operational information (eg LastRFRF, RP/IRP, CONSTATUS), extent (eg Avon only, Range of taxa), tenure based information (PURPOSE and VESTING) as well as derived threat based information (eg DEM\_Ht); see Section 3.3.3.4.

VARIABLE	DESCRIPTION
Sp Name	Taxa name
POPID1	Population Number identifier (ie Population 5)
POPID2	Subpopulation Identifier
Number of pops Avon	Number of populations of this taxa within the ANRMR
Number of pops Buffer	Number of populations of this taxa within the 20km buffer
Rest of WA	Number of populations of this taxa within Western Australia
Total number of pops	Total Number of populations of this taxa
Avon only	A flag for endemics to the ANRMR
RP/IRP number	Existing Recovery Plan (RP) or Interim Recovery Plan (IRP) for this taxa
RP/IRP operative dates	Operative dates for existing RP or IRP
RPs/IRPs in progress	Flag for RP or IRP for this taxa being written
Range of taxa	Extent of this taxa as derived from the DEFL database (see Section 2.3.3)
Range category	The above extent within predefined categories (ie 0, 0-500m, 1km-2km, etc)
CONSTATUS	Conservation Category of the taxa
VESTING	Land vesting code for this population
VESTING2	Land vesting full description for this population
PURPOSE1	Land purpose code for this population
PURPOSE2	Land purpose full description for this population
ISDIEBACK	Dieback recorded from RFRF
DEM_Ht	Height above valley floor as determined from Digital Elevation Model (DEM)
Salt	Salt present as determined by ACLP see Section 2.2.1
Extent	Within the ANRMR or the 20km buffer
LASTRFRF	The last submitted Rare Flora Report Form (RFRF)
DATUM	Datum used to locate population
DISTRICT	DEC District with the responsibility to manage this population
GDA94LAT	Latitude
GDA94LONG	Longitude
HABITATNOT	Recorded habitat
LANDFORM	Landform as indicated by RFRF
LOCATION	Description of location
OTHERCOMME	Comments
ROCKTYPE	Rock Type as indicated on RFRF
SHEETNO	DEFL Sheet number
SHIRE	Shire of occurrence of this population

## Appendix 5 Fauna

### Appendix 5. 1 The Fauna of the ANRMR

This Appendix presents the known fauna of the ANRMR, see Section 2.3.4.1 for how these tables were derived and Section 3.3.4.1 for the caveats in using these results.

Table A5.1: The reptiles of the ANRMR.

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
Agamidae	dragon lizards	Ctenophorus cristatus	Crested Dragon	Y	Y		+	+	dec
		Ctenophorus fordii	Mallee Sand Dragon	Y	Y			+	stable
		Ctenophorus inermis	Central Netted Dragon	N	Y			+	stable
		Ctenophorus isolepis	Military Dragon	Y	Y			+	stable
		Ctenophorus maculatus	Spotted Sand Dragon	Y	Y		+		dec
		Ctenophorus ornatus	Ornate Dragon	Y	Y	+	+		stable
		Ctenophorus pictus	Painted Dragon	N	Y			+	stable
		Ctenophorus reticulatus	Southern Netted Dragon	Y	Y		+	+	dec
		Ctenophorus salinarum	Salt Lake Dragon	Y	Y		+	+	dec
		Ctenophorus scutulatus	Lozenge-marked Bicycle Dragon	Y	Y			+	stable
		Moloch horridus	Mountain Devil	Y	Y		+	+	dec
		Pogona minor	Western Bearded Dragon	Y	Y	+	+	+	dec
		Rankinia adelaidensis	Western Heath Dragon	Y	N				
		Tympanocryptis adelaidensis	Sandhill Dragon	N	Y	+			dec
Gekkonidae	geckoes	Christinus marmoratus		Y	N				
		Crenadactylus ocellatus	Clawless Gecko	Y	Y		+		dec
		Diplodactylus assimilis		N	Y			+	stable
		Diplodactylus elderi		N	Y			+	stable
		Diplodactylus granariensis		Y	Y		+		dec

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		Diplodactylus maini		Y	Y		+		dec
		Diplodactylus polyophthalmus		Y	N				
		Diplodactylus pulcher	Beautiful Gecko	Y	Y		+	+	dec
		Diplodactylus spinigerus	Spiny-tailed Gecko	N	Y		+		dec
		Diplodactylus stenodactylus		Y	Y			+	stable
		Diplodactylus wellingtonae		N	Y			+	stable
		Gehyra purpurascens		Y	Y			+	stable
		Gehyra variegata	Tree Dtella	Y	Y		+	+	dec
		Heteronotia binoei	Bynoe's Gecko	Y	Y		+	+	dec
		Nephurus stellatus		Y	Y			+	stable
		Nephurus vertebralis		Y	N				
		Oedura reticulata	Salmon Gum Gecko	Y	Y		+		dec
		Phyllodactylus marmoratus	Marbled Gecko	N	Y	+			dec
		Rhynchoedura ornata	Beaked Gecko	Y	Y			+	stable
		Strophurus assimilis		Y	N				
		Strophurus elderi		Y	N				
		Strophurus spinigerus		Y	N				
		Underwoodisaurus mii	Barking Gecko	Y	Y		+		dec
Pygopodidae	legless lizards	Aprasia pulchella		Y	N				
		Aprasia repens	Sandplain Worm Lizard	Y	Y	+			dec
		Delma australis		Y	Y		+		dec
		Delma butleri		Y	Y			+	stable
		Delma fraseri	Fraser's Legless Lizard	Y	Y	+			dec
		Delma grayii		Y	Y	+			dec
		Delma nasuta		N	Y			+	stable
		Lialis burtonis	Burton's Legless Lizard	Y	Y	+	+	+	dec



Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		<i>Pletholax gracilis</i>		Y	N				
		<i>Pygopus lepidopodus</i>	Common Scalefoot	Y	Y	+	+		dec
		<i>Pygopus nigriceps</i>	Hooded Scalefoot	Y	Y			+	stable
Scincidae	skinks	<i>Acritoscincus trilineatum</i>		Y	N				
		<i>Cryptoblepharus carnabyi</i>		Y	Y			+	stable
		<i>Cryptoblepharus plagiocephalus</i>	Fence Skink	Y	Y	+	+	+	?
		<i>Ctenotus atlas</i>		Y	Y			+	stable
		<i>Ctenotus australis</i>		Y	Y		?		?
		<i>Ctenotus brooksi</i>		Y	Y			+	stable
		<i>Ctenotus delli</i>		Y	N				
		<i>Ctenotus fallens</i>		Y	N				
		<i>Ctenotus gemmula</i>		Y	N				
		<i>Ctenotus impar</i>		Y	Y	+	+		dec
		<i>Ctenotus labillardieri</i>		Y	N				
		<i>Ctenotus leonhardii</i>		Y	Y			+	stable
		<i>Ctenotus mimetes</i>		Y	Y			+	stable
		<i>Ctenotus pantherinus</i>		Y	N				
		<i>Ctenotus pantherinus ocellifer</i>		N	Y			+	stable
		<i>Ctenotus pantherinus pantherinus</i>		N	Y		+		dec
		<i>Ctenotus schomburgkii</i>		Y	Y		+	+	dec
		<i>Ctenotus severus</i>		Y	N				
		<i>Ctenotus uber</i>		Y	Y			+	stable
		<i>Ctenotus xenopleura</i>		Y	Y	?	?	?	?
		<i>Cyclodomorphus melanops</i>		Y	N				
		<i>Egernia carinata</i>		N	Y		+		dec

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		<i>Egernia depressa</i>		Y	Y			+	stable
		<i>Egernia formosa</i>		Y	Y			+	stable
		<i>Egernia inornata</i>		Y	Y			+	dec
		<i>Egernia kingii</i>	King's Skink	Y	Y	+			dec
		<i>Egernia multiscutata</i>		Y	Y		+		dec
		<i>Egernia napoleonis</i>		Y	N				
		<i>Egernia pulchra</i>		Y	N				
		<i>Egernia richardi</i>		Y	Y	?	?	?	?
		<i>Egernia stokesii</i>		Y	Y			+	dec
		<i>Eremiascincus richardsonii</i>		Y	Y		+	+	dec
		<i>Hemiergis initialis</i>		Y	Y	+	+	+	dec
		<i>Hemiergis millewae</i>		N	Y			+	?
		<i>Hemiergis peronii</i>		Y	Y	+			dec
		<i>Hemiergis quadrilineata</i>		Y	N				
		<i>Lerista christinae</i>		Y	N				
		<i>Lerista distinguenda</i>		Y	Y	+			dec
		<i>Lerista elegans</i>		Y	N				
		<i>Lerista gerrardii</i>		Y	Y		+	+	dec
		<i>Lerista lineopunctulata</i>		Y	N				
		<i>Lerista macropisthopus</i>		Y	Y			+	stable
		<i>Lerista muelleri</i>		N	Y			+	stable
		<i>Lerista picturata</i>		Y	Y			+	stable
		<i>Lerista praepedita</i>		Y	N				
		<i>Menetia greyii</i>	Dwarf Skink	Y	Y	+	+	+	inc?
		<i>Morethia adelaidensis</i>		N	Y			+	stable
		<i>Morethia butleri</i>		Y	Y			+	stable

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		<i>Morethia lineocellata</i>		Y	N				
		<i>Morethia obscura</i>	Dusky Morethia	Y	Y		+		dec
		<i>Tiliqua occipitalis</i>	Western Bluetongue	Y	Y	+	+	+	?
		<i>Tiliqua rugosa</i>	Bobtail	Y	Y	+	+	+	dec
		<i>Tympanocryptis cephal</i>	Earless Pebble Dragon	N	Y			+	stable
Varanidae	monitor lizards	<i>Varanus caudolineatus</i>		Y	N				
		<i>Varanus giganteus</i>		Y	N				
		<i>Varanus gouldii</i>	Gould's Sand Goanna	Y	Y	+	+	+	dec
		<i>Varanus rosenbergi</i>	Rosenberg's Goanna	Y	Y	+			dec
		<i>Varanus tristis</i>	Black-tailed Tree Goanna	Y	Y		+	+	dec
Cheluidae	side-necked turtles	<i>Chelodina oblonga</i>	Long-necked Tortoise	Y	Y	+			dec
		<i>Pseudemydura umbrina</i>	Western Swamp Tortoise	Y	N				
Boidae	pythons	<i>Antaresia stimsoni</i>	Stimson's python	Y	Y		+		dec
		<i>Aspidites ramsayi</i>	Ramsay's python or woma	Y	Y		+		dec*
		<i>Morelia spilota</i>	Carpet python	Y	N				
		<i>Morelia spilota imbricata</i>	Carpet Python	N	Y	+	+		dec*
Elapidae	front-fanged snakes	<i>Acanthophis antarcticus</i>	Southern death-adder	Y	Y	+			dec
		<i>Brachyuropsis fasciolata</i>	Narrow Banded Snake	Y	Y			+	dec
		<i>Brachyuropsis semifasciata</i>	Southern shovel-nosed snake	Y	Y		+	+	dec
		<i>Demansia psammophis</i>	Yellow-faced whipsnake	Y	Y		+		dec
		<i>Denisonia fasciata</i>	Rosen's Snake	N	Y		+	+	dec
		<i>Drysdalia coronatus</i>	Crowned Snake	N	Y	+			dec
		<i>Echiopsis curta</i>	Bardick	Y	N				
		<i>Echiopsis curtus</i>	Bardick	N	Y	+			dec
		<i>Elapognathus coronatus</i>	Crowned snake	Y	N				
		<i>Furina ornata</i>	Moon Snake	Y	Y			+	stable

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		<i>Neelaps bimaculatus</i>	Black-naped snake	Y	Y				
		<i>Neelaps calonotos</i>	Black-striped snake	Y	Y	?			dec
		<i>Notechis scutatus</i>	Tiger snake	Y	Y	+			dec
		<i>Parasuta gouldii</i>	Gould`s snake	Y	Y	+	+		dec
		<i>Parasuta monachus</i>	Monk snake	Y	Y			+	stable
		<i>Parasuta nigriceps</i>	Black-backed snake	Y	Y	+			stable
		<i>Paroplocephalus atriceps</i>		Y	N				
		<i>Pseudechis australis</i>	Mulga Snake	Y	Y		+	+	dec
		<i>Pseudonaja affinis</i>	Dugite	Y	Y	+			inc?
		<i>Pseudonaja modesta</i>		Y	Y		+	+	dec
		<i>Pseudonaja nuchalis</i>	Gwardar	Y	Y		+	+	inc?
		<i>Simoselaps bertholdi</i>	Jan's Bandy-Bandy	Y	Y		+	+	dec
		<i>Suta fasciata</i>		Y	N				
		<i>Suta punctata</i>	Spotted Snake	N	Y			?	?
Typhlopidae	blind snakes	<i>Ramphotyphlops australis</i>		Y	Y	+	+	+	dec
		<i>Ramphotyphlops bicolor</i>		Y	N				
		<i>Ramphotyphlops bituberculatus</i>		Y	Y			+	stable
		<i>Ramphotyphlops hamatus</i>		Y	Y			+	stable
		<i>Ramphotyphlops pinguis</i>		Y	Y	+			dec
		<i>Ramphotyphlops waitii</i>		Y	Y		+		dec

Table A5.2: The mammals of the ANRMR.

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/Erem	Erem	Status
Tachyglossidae	echidnas	Tachyglossus aculeatus	Echidna	Y	Y	+	+	+	dec
Burramyidae	pygmy possums	Cercartetus concinnus	Western Pygmy Possum	N	Y	+	+	+	dec *
Dasyuridae	quolls and allies	Antechinomys laniger	Kultarr	Y	Y			+	dec
		Antechinus flavipes	Yellow-footed Antechinus, Mardo	Y	Y	+			dec*
		Dasyurus geoffroii	Western Quoll, Chuditch	Y	Y	+	+	+	dec
		Ningauai ridei	Wongai Ningauai	Y	Y			+	stable
		Ningauai yvonneae	Southern Ningauai	Y	Y			+	stable
		Parantechinus apicalis	Dibbler	N	N				
		Phascogale calura	Red-tailed Phascogale	Y	Y		+		dec *
		Phascogale tapoatafa	Southern Brush-tailed Phascogale	Y	Y	+			dec*
		Pseudantechinus woolleyae	Woolley`s Pseudantechinus	Y	N				
		Sminthopsis crassicaudata	Fat-tailed Dunnart	Y	Y		+	+	inc
		Sminthopsis dolichura	Little Long-tailed Dunnart	Y	Y	+	+		dec*
		Sminthopsis gilberti	Gilbert`s Dunnart	Y	Y		+		dec*
		Sminthopsis granulipes	White-tailed Dunnart	Y	Y		+		dec*
		Sminthopsis griseoventer	Grey-bellied Dunnart	Y	Y	+			dec*
		Sminthopsis hirtipes	Hairy-footed Dunnart	Y	Y			+	stable
		Sminthopsis ooldea	Ooldea Dunnart	N	Y			+	stable
Macropodidae	kangaroos and allies	Lagostrophus fasciatus	Banded Hare-wallaby	Y	Y		+		loc Ex
		Macropus eugenii	Tammar	Y	Y	+			dec
		Macropus fuliginosus	Western Grey Kangaroo	Y	Y	+	+	+	inc
		Macropus irma	Western Brush Wallaby	Y	Y	+			dec
		Macropus robustus	Euro, Biggada	Y	Y		+	+	inc
		Macropus rufus	Red Kangaroo, Marlu	Y	Y			+	stable

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/Erem	Erem	Status
		<i>Petrogale lateralis</i>	Rock-wallaby	Y	Y		+	+	dec
		<i>Lagorchestes hirsutus</i>	Mala Rufous Hare-Wallaby	N	Y		+	+	loc Ex
		<i>Onychogalea lunata</i>	Crescent Nailtail Wallaby	N	Y		+	+	Ext
		<i>Setonix brachyurus</i>	Quokka	N	Y	+			loc Ex
Myrmecobiidae	numbat	<i>Myrmecobius fasciatus</i>	numbat, Walpurti	Y	Y	+	+	+	dec
Peramelidae	bandicoots	<i>Chaeropus ecaudatus</i>	Pig-footed Bandicoot	N	Y		+	+	Ext
		<i>Perameles bougainville</i>	Western Barred Bandicoot	N	Y		+	+	loc Ex
Phalangeridae	brush-tail possums	<i>Trichosurus vulpecula</i>	Brush-tail Possum	Y	Y	+	+	+	dec
Potoroidae	bettongs and potoroos	<i>Bettongia lesueur</i>	Burrowing Bettong, Boodie	Y	Y	+	+	+	loc Ex
		<i>Bettongia penicillata</i>	Brush-tailed Bettong, Woylie	Y	Y	+	+		loc Ex
		<i>Potorous platyops</i>	Broad-faced Potoroo	N	Y		+		Ext
Pseudocheiridae	ring-tailed possums	<i>Pseudocheirus occidentalis</i>	Western Ring-tailed Possum	N	Y	+			loc Ex
Tarsipedidae	honey possums	<i>Tarsipes rostratus</i>	Honey Possum, Noolbenger	Y	Y	+	+		dec *
Peramelidae	bandicoots	<i>Isoodon obesulus</i>	Southern Brown Bandicoot, Quenda	Y	Y	+	+		dec
Thylacomyidae	bilbies	<i>Macrotis lagotis</i>	Bilby, Dalgyte	Y	Y	+	+	+	loc Ex
Bovidae	horned ruminants	<i>Bos taurus</i>	European Cattle	Y	N				
		<i>Capra hircus</i>	Feral Goat	N	Y			+	inc
Canidae	dogs and foxes	<i>Vulpes vulpes</i>	Red Fox	Y	Y	+	+	+	inc
		<i>Canis lupus dingo</i>	Dingo	N	Y	+	+	+	loc Ex
Equidae	horses	<i>Equus caballus</i>	Horse	Y	N				
Felidae	cat family	<i>Felis catus</i>	Cat	Y	Y	+	+	+	inc
Leporidae	rabbits	<i>Oryctolagus cuniculus</i>	Rabbit	Y	Y	+	+	+	inc
Molossidae	free-tailed bats	<i>Mormopterus planiceps</i>	Southern Freetail-bat	Y	Y	+	+	+	dec
		<i>Tadarida Australis</i>	White-striped Freetail-bat	Y	N				
		<i>Nyctinomus australis</i>	White-striped Bat	N	Y	+	+	+	dec

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/Erem	Erem	Status
Muridae	mice and rats	Hydromys chrysogaster	Water-rat	Y	Y	+	+		dec
		Leporillus apicalis	Lesser Stick-nest Rat	Y	N				
		Mus musculus	House Mouse	Y	Y	+	+	+	inc
		Notomys alexis	Spinifex Hopping-mouse	Y	Y			+	stable
		Notomys mitchellii	Mitchell`s Hopping-mouse	Y	Y		+	+	dec
		Pseudomys albocinereus	Ash-grey Mouse	Y	Y		+		dec
		Pseudomys bolami	Bolam`s Mouse	Y	Y			+	stable
		Pseudomys hermannsburgensis	Sandy Inland Mouse	Y	Y			+	stable
		Pseudomys occidentalis	Western Mouse	Y	Y		+		dec
		Pseudomys shortridgei	Heath Rat	Y	Y		+		dec
		Rattus fuscipes	Western Bush Rat	Y	N				
		Rattus rattus	Black Rat	Y	Y	+	+		inc
		Leporillus conditor	Wopilkara or Great Stick-nest Rat	N	Y			+	loc Ex
		Notomys longicaudatus	Koolawa or Longtailed hopping mouse	N	Y		?		Ext
		Notomys macrotis	Noompa or Big-eared Hopping-Mouse	N	Y		?		Ext
Pteropodidae	fruit bats	Pteropus scapulatus	Little Red Flying-fox	N	Y	?	?	?	vagrant
Vespertilionidae	evening bats	Chalinolobus gouldii	Gould`s Wattled Bat	Y	Y	+	+	+	dec
		Chalinolobus morio	Chocolate Wattled Bat	Y	Y	+	+		dec
		Nyctophilus timoriensis	Greater Long-eared Bat	Y	Y	+	+		dec
		Scotorepens balstoni	Inland Broad-nosed Bat	Y	Y			+	dec
		Vespadelus baverstocki	Inland Forest Bat	Y	N				
		Vespadelus regulus	Southern Forest Bat	Y	N				
		Falsistrellus mackenziei		N	Y	+			dec
		Nyctophilus geoffroyi	Lesser Long-eared Bat	Y	Y	+	+	+	dec
		Nyctophilus gouldii	Gould`s Long-eared Bat	Y	Y	+			dec
		Scotorepens greyii	Little Broad-nosed Bat	N	Y			+	dec



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Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/Erem	Erem	Status
		Vespedalus regulus	King River Eptesicus	N	Y	+	+		dec

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Table A5.3: The birds of the ANRMR.  
Family order was derived from Birds Australia (2003).

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
Casuariidae	emus	Dromaius novaehollandiae	Emu	Y	Y	+	+	+	dec
Megapodiidae	mound-builders	Leipoa ocellata	Malleefowl	Y	Y	+	+	+	dec*
Phasianidae	quails	Coturnix pectoralis	Stubble Quail	Y	Y	+	+		inc
		Coturnix ypsilophora	Brown Quail	Y	Y	+			dec
Anatidae	ducks, geese and swans	Anas superciliosa	Pacific Black Duck	Y	N				
		Biziura lobata	Musk Duck	Y	Y	+			dec
		Cygnus atratus	Black Swan	Y	Y	+	+		inc
		Cygnus olor	Mute Swan	Y	Y	+			inc
		Malacorhynchus membranaceus	Pink-eared Duck	Y	Y	+	+	+	stable
		Anas castanea	Chestnut Teal	N	Y	+	+		dec
		Anas gibberifrons	Grey Teal	N	Y	+	+	+	stable
		Anas platyrhynchos	Mallard	N	Y	+			inc
		Anas rhynchotis	Australasian Shoveler	N	Y	+			dec
		Anas superciliosus	Pacific Black Duck	N	Y	+	+		stable
		Aythya australis	Hardhead (White-eyed Duck)	N	Y	+			dec
		Chenonetta jubata	Australian Wood Duck	N	Y	+	+		inc
		Oxyura australis	Blue-billed Duck	N	Y	+			dec
		Tadorna tadornoides	Australian Shelduck	N	Y	+	+	+	inc
Podicipedidae	grebes	Podiceps cristatus	Great Crested Grebe	N	Y	+			dec
		Tachybaptus novaehollandiae	Australasian Grebe	N	Y	+	+	+	dec
		Poliiocephalus poliocephalus	Hoary-headed Grebe	Y	Y	+	+	+	inc
Anhingidae	darters	Anhinga melanogaster	Darter	N	Y	+			stable
Phalacrocoracidae	cormorants	Phalacrocorax melanoleucos	Little Pied Cormorant	Y	Y	+	+		stable
		Phalacrocorax carbo	Great Cormorant	N	Y	+			stable
		Phalacrocorax sulcirostris	Little Black Cormorant	N	Y	+			stable
		Phalacrocorax varius	Pied Cormorant	N	Y	+			vagrant

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
Pelecanidae	pelicans	<i>Pelecanus conspicillatus</i>	Australian Pelican	N	Y	+			vagrant
Ardeidae	herons and egrets	<i>Ardea alba</i>	Great Egret	Y	N				
		<i>Ardea novaehollandiae</i>	White-faced Heron	Y	N				
		<i>Ardea pacifica</i>	White-necked Heron	Y	Y	+			inc
		<i>Botaurus poiciloptilus</i>	Australasian Bittern	Y	N				
		<i>Ixobrychus minutus</i>	Little Bittern	Y	N				
		<i>Nycticorax caledonicus</i>	Rufous Night Heron	Y	Y	+			?
		<i>Dupetor flavicollis</i>	Black Bittern	N	Y	+			dec
		<i>Egretta alba</i>	Great Egret	N	Y	+			inc
		<i>Egretta garzetta</i>	Little Egret	N	Y	+			vagrant
		<i>Egretta novaehollandiae</i>	White-faced Heron	N	Y	+	+	+	inc
Plataleidae	ibis and spoonbills	<i>Platalea flavipes</i>	Yellow-billed Spoonbill	N	Y	+			inc
		<i>Threskiornis molucca</i>	Australian White Ibis	N	Y	+			inc
Threskiornithidae	ibises and spoonbills	<i>Plegadis falcinellus</i>	Glossy Ibis	Y	N				
		<i>Threskiornis spinicollis</i>	Straw-necked Ibis	Y	Y	+			inc
Accipitridae	kites, hawks and eagles	<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk	Y	Y	+	+	+	dec
		<i>Accipiter fasciatus</i>	Brown Goshawk	Y	Y	+	+		dec
		<i>Aquila audax</i>	Wedge-tailed Eagle	Y	Y	+	+	+	?
		<i>Aquila morphnoides</i>	Little Eagle	Y	N				
		<i>Circus assimilis</i>	Spotted Harrier	N	Y	+	+	+	?
		<i>Elanus caeruleus</i>	Black-shouldered Kite	Y	N				
		<i>Elanus notatus</i>	Black-shouldered Kite	N	Y	+	+		inc
		<i>Haliastur spheurnus</i>	Whistling Kite	Y	Y	+	+	+	?
		<i>Hamirostra isura</i>	Square-tailed Kite	Y	N				
		<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	Y	N				
		<i>Hieraaetus morphnoides</i>	Little Eagle	N	Y	+	+	?	

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		Lophoictinia isura	Square-tailed Kite	N	Y	+	+		dec
		Circus approximans	Swamp Harrier	N	Y	+	+		?
Falconidae	falcons	Falco berigora		Y	Y	+	+	+	inc
		Falco cenchroides		Y	Y	+	+	+	inc
		Falco longipennis	Australian Hobby	Y	Y	+	+		?
		Falco peregrinus	Peregrine Falcon	Y	Y	+	+		?
		Falco hypoleucos	Grey Falcon	N	Y			?	?
Rallidae	crakes and rails	Gallinula ventralis	Black-tailed Native-hen	Y	Y		+	+	stable
		Gallirallus philippensis	Buff-banded Rail	Y	N				
		Porzana fluminea	Australian Spotted Crake	Y	Y	+			?
		Porzana Pusilla	Baillon`s Crake	Y	Y	+			?
		Fulica atra	Eurasian Coot	N	Y	+	+		?
		Gallinula tenebrosa	Dusky Moorhen	N	Y	+			dec
		Porphyria porphyrio	Purple Swampphen	N	Y	+			dec
		Porzana tabuensis	Spotless Crake	N	Y	+	+		?
		Rallus philippensis	Buff-banded Rail	N	Y	+			?
Otididae	bustards	Ardeotis australis	Australian Bustard	N	Y		+	+	dec
Turnicidae	button-quails	Turnix varia	Painted Button-quail	Y	Y	+	+		dec
		Turnix velox	Little Button-quail	Y	Y		+	+	?
Scolopacidae	sandpipers	Calidris acuminata	Sharp-tailed Sandpiper	Y	Y	+	+		inc
		Calidris subminuta	Long-toed Stint	Y	N				
		Calidris ruficollis	Red-necked Stint	N	Y	+	+		inc
		Tringa glareola	Wood Sandpiper	N	Y	+			?
		Tringa hypoleucos	Common Sandpiper	N	Y	+	+		inc
		Tringa nebularia	Common Greenshank	N	Y	+	+	+	inc
		Tringa stagnatalis	Marsh Sandpiper	N	Y	+			stable
Burhinidae	stone-curlews	Burhinus grallarius	Bush Stone-curlew	Y	Y	+	+	+	dec*
Recurvirostridae	stilts and	Cladorhynchus leucocephalus	Banded Stilt	Y	Y	+	+	+	inc

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
	avocets								
		Himantopus himantopus	Black-winged Stilt	Y	N				
		Recurvirostra novaehollandiae	Red-necked Avocet	Y	Y	+	+		inc
		Himantopus himantopus	Black-winged Stilt	N	Y	+	+		inc
Charadriidae	lapwings and plovers	Charadrius melanops	Black-fronted Dotterel	Y	N				
		Charadrius rubricollis	Hooded Plover	Y	N				
		Charadrius ruficapillus	Red-capped Plover	Y	Y	+	+		inc
		Erythrogonys cinctus	Red-kneed Dotterel	Y	Y		+	+	inc
		Peltohyas Australis	Inland Dotterel	Y	N				
		Vanellus tricolor	Banded Lapwing	Y	Y	+	+	+	inc
		Charadrius australis	Inland Dotterel	N	Y		+	+	?
		Elsyornis melanops	Black- Fronted Dotterel	N	Y	+	+	+	inc
		Thinornis rubricollis	Hooded Plover	N	Y		+	+	stable
Laridae	gulls and terns	Larus novaehollandiae	Silver Gull	Y	Y	+	+		inc
		Chlidonias hybrida	Whiskered Tern	N	Y	+			?
Columbidae	doves and pigeons	Columba livia	Domestic Pigeon	Y	Y	+	+		inc
		Geopelia cuneata	Diamond Dove	Y	Y			+	stable
		Phaps chalcoptera	Common Bronzewing	Y	Y	+	+	+	dec
		Streptopelia senegalensis	Laughing Turtle-Dove	Y	Y	+	+		inc
		Ocyphaps lophotes	Crested Pigeon	N	Y	+	+	+	inc
		Streptopelia chinensis	Spotted Turtle-Dove	N	Y	+			inc
Cacatuidae	cockatoos	Calyptorhynchus latirostris	Short-billed Black-Cockatoo	N	Y	+	+		dec*
Psittacidae	lorikeets and parrots	Cacatua galerita	Sulphur-crested Cockatoo	Y	N				
		Cacatua leadbeateri	Major Mitchell's Cockatoo	Y	Y		+	+	dec
		Cacatua pastinator	Western Long-billed Corella	Y	Y		+		inc
		Cacatua roseicapilla	Galah	Y	Y	+	+	+	inc
		Cacatua sanguinea	Little Corella	Y	Y		+	+	inc

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		<i>Calyptorhynchus banksii</i>	Red-tailed Black Cockatoo	Y	Y	+	+		inc
		<i>Calyptorhynchus baudinii</i>	Baudin`s Cockatoo	Y	Y	+			dec
		<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	Y	Y	+	+		dec
		<i>Melopsittacus undulatus</i>	Budgerigar	Y	Y			+	stable
		<i>Neophema bourkii</i>	Bourke`s Parrot	Y	N				
		<i>Neophema elegans</i>	Elegant Parrot	Y	Y	+	+		?
		<i>Nymphicus hollandicus</i>	Cockatiel	Y	Y		+	+	?
		<i>Pezoporus wallicus flaviventrus</i>	Western Ground Parrot	N	N-buffer				
		<i>Platycercus icterotis</i>	Western Rosella	Y	Y	+	+		dec
		<i>Platycercus spurius</i>	Red-capped Parrot	Y	N				
		<i>Platycercus varius</i>	Mulga Parrot	Y	N				
		<i>Platycercus zonarius</i>	Australian Ringneck (Ring-necked Parrot)	Y	N				
		<i>Polytelis anthopeplus</i>	Regent Parrot	Y	Y	+	+		dec
		<i>Barnardius zonarius</i>	Australian Ringneck	N	Y	+	+	+	inc
		<i>Psephotus varius</i>	Mulga Parrot	N	Y		+	+	?
		<i>Purpureicephalus spurius</i>	Red-capped Parrot	N	Y	+			dec
Cuculidae	cuckoos	<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	Y	N				
		<i>Chrysococcyx basalis</i>	Horsfield`s Bronze Cuckoo	Y	Y	+	+		?
		<i>Chrysococcyx lucidus</i>	Shining Bronze Cuckoo	Y	Y	+	+		dec
		<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	Y	Y			+	dec
		<i>Cuculus pallidus</i>	Pallid Cuckoo	Y	Y	+	+	+	?
		<i>Cuculus pyrrhophanus</i>	Fan-tailed Cuckoo	N	Y	+	+		dec
Strigidae	hawk-owls	<i>Ninox novaeseelandiae</i>	Boobook Owl	Y	Y	+	+	+	?
		<i>Ninox connivens</i>	Barking Owl	N	Y	+	+		dec
Tytonidae	barn owls	<i>Tyto alba</i>	Barn Owl	Y	Y	+	+		inc
Podargidae	frogmouths	<i>Podargus strigoides</i>	Tawny Frogmouth	Y	Y	+	+	+	dec
Caprimulgidae	owlet-night jars	<i>Eurostopodus argus</i>	Spotted Nightjar	Y	Y		+	+	?

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
Aegothelidae	owlet-night jars	Aegotheles cristatus	Australian Owlet-nightjar	Y	Y	+	+	+	dec
Apodidae	swifts	Apus pacificus	Fork-tailed Swift	N	Y	+	+		stable
Halcyonidae	forest kingfishers	Todiramphus pyrrhopygia	Red-backed Kingfisher	Y	Y			+	stable
		Todiramphus sanctus	Sacred Kingfisher	Y	Y	+	+		dec
		Dacelo novaeguineae	Laughing Kookaburra	N	Y	+			inc
Meropodidae	bee-eaters	Merops ornatus	Rainbow Bee-eater	Y	Y	+	+	+	stable
Climacteridae	treecreepers	Climacteris rufa	Rufous Treecreeper	Y	Y	+	+		dec*
		Climacteris affinis	White-browed Treecreeper	N	Y			+	stable
Maluridae	fairy-wrens	Amytornis textilis	Thick-billed Grasswren	Y	Y		+	+	loc Ex
		Malurus lamberti	Variiegated Fairy-wren	Y	Y		+	+	dec*
		Malurus leucopterus	White-winged Fairy-wren	Y	Y		+	+	dec*
		Malurus pulcherrimus	Blue-breasted Fairy-wren	Y	Y	+	+		dec*
		Malurus lamberti	Variiegated Fairy-wren	Y	N				
		Malurus leucopterus	White-winged Fairy-wren	Y	N				
		Malurus pulcherrimus	Blue-breasted Fairy-wren	Y	N				
		Malurus splendens	Splendid Fairy-wren	Y	Y	+	+	+	dec*
		Stipiturus malachurus	Southern Emu-wren	N	Y	+			dec*
		Acanthizidae	Australian warblers	Acanthiza apicalis	Broad-tailed Thornbill (Inland Thornbill)	Y	Y	+	+
Acanthiza chrysorrhoa	Yellow-rumped Thornbill			Y	Y	+	+	+	dec
Acanthiza robustirostris	Slaty-backed Thornbill			Y	N				
Acanthiza uropygialis	Chestnut-rumped Thornbill			Y	Y		+	+	dec*
Aphelocephala leucopsis	Southern Whiteface			Y	Y			+	stable
Calamanthus campestris	Rufous Fieldwren			Y	N				
Gerygone fusca	Western Gerygone			Y	Y	+	+		dec*
Hylacola cauta	Shy Groundwren (Shy Heathwren)			Y	Y		+		dec*
Pyrrholaemus brunneus	Redthroat			Y	N				
Sericornis frontalis	White-browed Scrubwren			Y	Y	+	+		dec*



Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
		<i>Smicromis brevirostris</i>	Weebill	Y	Y	+	+	+	dec*
Pardalotidae	pardalotes	<i>Pardalotus punctatus</i>	Spotted Pardalote	Y	Y	+			dec*
		<i>Dasyornis longirostris</i>	Western Bristlebird	N	N -buffer				
		<i>Pardalotus striatus</i>	Striated Pardalote	Y	Y	+	+	+	dec*
		<i>Acanthiza inornata</i>	Western Thornbill	N	Y	+	+		dec*
		<i>Sericornis brunneus</i>	Redthroat	N	Y		+	+	dec*
		<i>Sericornis campestris</i>	Rufous Fieldwren	N	Y	+	+		dec*
Meliphagidae	honeyeaters	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	Y	Y		+	+	dec*
		<i>Acanthorhynchus superciliosus</i>	Western Spinebill	Y	Y	+			dec*
		<i>Anthochaera carunculata</i>	Red Wattlebird	Y	Y	+	+	+	dec*
		<i>Epthianura albifrons</i>	White-fronted Chat	Y	Y	+	+		inc
		<i>Epthianura tricolor</i>	Crimson Chat	Y	Y		+	+	stable
		<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	Y	Y		+		dec*
		<i>Lichenostomus leucotis</i>	White-eared Honeyeater	Y	Y		+		dec*
		<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	Y	Y		+		dec*
		<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater	Y	Y			+	stable
		<i>Lichenostomus virescens</i>	Singing Honeyeater	Y	Y	+	+	+	dec*
		<i>Lichmera indistincta</i>	Brown Honeyeater	Y	Y	+	+	+	dec*
		<i>Manorina flavigula</i>	Yellow-throated Miner	Y	Y	+	+	+	inc
		<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	Y	Y	+	+		dec*
		<i>Melithreptus chloropsis</i>	Western White-naped Honeyeater	Y	N				
		<i>Phylidonyris albifrons</i>	White-fronted Honeyeater	Y	Y		+	+	dec*
		<i>Phylidonyris melanops</i>	Tawny-crowned Honeyeater	Y	Y	+	+		dec*
		<i>Phylidonyris nigra</i>	White-cheeked Honeyeater	Y	Y	+	+		dec*
		<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Y	Y	+			dec*
		<i>Anthochaera chrysoptera</i>	Little Wattlebird	N	Y	+	+		dec*
		<i>Certhionyx niger</i>	Black Honeyeater	N	Y			+	stable
		<i>Certhionyx variegatus</i>	Pied Honeyeater	N	Y			+	stable

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		<i>Lichenostomus leucotis</i>	White-eared Honeyeater	Y	Y		+		dec*
		<i>Melithreptus lunatus</i>	White-naped Honeyeater	N	Y	+			dec*
Petroicidae	Australian robins	<i>Drymodes brunneopygia</i>	Southern Scrub-robin	Y	Y		+		dec*
		<i>Eopsaltria Australis</i>	Yellow Robin	Y	N				
		<i>Eopsaltria georgiana</i>	White-breasted Robin	Y	N				
		<i>Eopsaltria griseogularis</i>	Western Yellow Robin	N	Y		+		dec*
		<i>Melanodryas cucullata</i>	Hooded Robin	N	Y		+	+	dec*
		<i>Microeca fascians</i>	Jacky Winter	Y	N				
		<i>Microeca leucophaea</i>	Jacky Winter	N	Y	+	+		dec*
		<i>Petroica cucullata</i>	Hooded Robin	Y	N				
		<i>Petroica goodenovii</i>	Red-capped Robin	Y	Y		+	+	dec*
		<i>Petroica multicolor</i>	Scarlet Robin	Y	Y	+			dec*
Pomatostomidae	Australian babblers	<i>Pomatostomus superciliosus</i>	White-browed Babbler	Y	Y	+	+		dec*
Cinclosomatidae	quail-thrushes and allies	<i>Cinclosoma castanotus</i>	Chestnut Quail-thrush	Y	N				
		<i>Psophodes nigrogularis</i>	Western Whipbird	Y	Y	+			loc Ex
		<i>Cinclosoma castanotum</i>	Chestnut Quail-thrush	N	Y			+	dec*
Neosittidae	sittellas	<i>Daphoenositta chrysoptera</i>	Varied Sittella	Y	Y	+	+	+	dec*
Pachycephalidae	whistlers	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Y	Y	+	+	+	dec*
		<i>Oreoica gutturalis</i>	Crested Bellbird	Y	Y		+	+	dec*
		<i>Pachycephala inornata</i>	Gilbert`s Whistler	Y	Y		+	+	dec*
		<i>Pachycephala pectoralis</i>	Golden Whistler	Y	Y	+	+		dec*
		<i>Pachycephala rufiventris</i>	Rufous Whistler	Y	Y	+	+	+	dec*
		<i>Falcunculus frontatus</i>	Crested Shrike-tit	N	Y	+	+		dec*
Dicruridae	flycatchers	<i>Grallina cyanoleuca</i>	Magpie-lark	Y	Y	+	+	+	?
		<i>Myiagra inquieta</i>	Restless Flycatcher	Y	Y	+	+		dec*
		<i>Rhipidura fuliginosa</i>	Grey Fantail	Y	Y	+	+		dec*
		<i>Rhipidura leucophrys</i>	Willie Wagtail	Y	Y	+	+	+	inc

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
Campephagidae	cuckoo-shrikes	Coracina novaehollandiae	Black-faced Cuckoo-shrike	Y	Y	+	+	+	?
		Lalage tricolor	White-winged Triller	Y	N				
		Coracina maxima	Ground Cuckoo-shrike	N	Y		+	+	dec*
		Lalage sueurii	White-winged Triller	N	Y	+	+	+	dec*
Artamidae	woodswallows	Artamus cinereus	Black-faced Woodswallow	Y	Y	+	+	+	stable
		Artamus cyanopterus	Dusky Woodswallow	Y	Y	+	+		dec
		Artamus minor	Little Woodswallow	Y	N				
		Artamus personatus	Masked Woodswallow	Y	Y			+	stable
		Gymnorhina tibicen	Australian Magpie	N	Y	+	+	+	inc
Cracticidae	butcherbirds and relatives	Cracticus nigrogularis	Pied Butcherbird	Y	Y		+	+	inc
		Cracticus tibicen	Australian Magpie	Y	N				
		Cracticus torquatus	Grey Butcherbird	Y	Y	+	+	+	dec
		Strepera versicolor	Grey Currawong	Y	Y	+	+		dec
Corvidae	ravens and crows	Corvus bennetti	Little Crow	Y	Y			+	inc
		Corvus coronoides		Y	Y	+	+		inc
		Corvus orru	Torresian Crow	Y	N				
		Corvus splendens	House Crow	Y	N				
Motacillidae	pipits	Anthus Australis	Australian Pipit	Y	N				
		Anthus novaeseelandiae	Richard's Pipit	N	Y	+	+		inc
Passeridae	finches and allies	Stagonopleura oculata	Red-eared Firetail	Y	N				
		Taeniopygia guttata	Zebra Finch	Y	Y		+	+	inc
Dicaeidae	flower-peckers	Dicaeum hirundinaceum	Mistletoebird	Y	Y	+	+	+	dec
Hirundinidae	swallows	Cheramoeca leucosternus	White-backed Swallow	Y	Y		+	+	?
		Hirundo neoxena	Welcome Swallow	Y	Y	+	+	+	inc
		Hirundo nigricans	Tree Martin	Y	Y	+	+	+	?
		Hirundo ariel	Fairy Martin	N	Y		+	+	?
Sylviidae	Old World	Cincloramphus cruralis	Brown Songlark	Y	Y	+	+	+	inc

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/ Erem	Erem	Status
	warblers								
		<i>Cincloramphus mathewsi</i>	Rufous Songlark	Y	Y	+	+	+	inc
		<i>Megalurus gramineus</i>	Little Grassbird	N	Y	+			dec
		<i>Acrocephalus stentoreus</i>	Clamorous Reed-Warbler	N	Y	+			dec
		<i>Cincloramphus cruralis</i>	Brown Songlark	Y	Y	+	+	+	inc
Zosteropidae	white-eyes	<i>Zosterops lateralis</i>	Grey-breasted White-eye (Silvereye)	Y	N				
		<i>Zosterops lateralis</i>	Silvereye	N	Y	+	+		dec*

Table A5.4: The frogs of the ANRMR.

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/Erem	Erem	Status
Hylidae	tree frogs	<i>Litoria adelaidensis</i>	Slender Tree Frog	Y	Y	+			dec
		<i>Litoria cyclorhyncha</i>	Spotted-thighed Frog	Y	N				
		<i>Litoria moorei</i>	Motorbike Frog or Bell Frog	Y	Y	+			dec
Myobatrachidae	ground frogs	<i>Crinia georgiana</i>	Quacking Frog	Y	Y	+			dec
		<i>Crinia glauerti</i>	Glauert`s Froglet	Y	N				
		<i>Crinia insignifera</i>	Squelching Froglet	Y	N				
		<i>Crinia pseudinsignifera</i>	Bleating Froglet	Y	Y	+	+		dec
		<i>Geocrinia leai</i>	Lea`s Frog	Y	N				
		<i>Heleioporus albopunctatus</i>	Western Spotted Frog	Y	Y	+	+		dec
		<i>Heleioporus barycragus</i>	Western Marsh Frog	Y	Y	+			dec
		<i>Heleioporus eyrei</i>	Moaning Frog	Y	Y	+	+		dec
		<i>Heleioporus inornatus</i>	Whooping Frog	Y	N				
		<i>Heleioporus psammophilus</i>	Sand Frog	Y	Y	+			dec
		<i>Limnodynastes dorsalis</i>	Bullfrog or Banjo Frog	Y	Y	+	+		dec
		<i>Myobatrachus gouldii</i>	Turtle Frog	Y	Y	+	+		dec
		<i>Neobatrachus albipes</i>	White-footed Trilling Frog	Y	Y		+		dec
		<i>Neobatrachus kunapalari</i>	Kunapalari Frog or Wheatbelt Frog	Y	Y		+	+	dec
		<i>Neobatrachus pelobatoides</i>	Humming Frog	Y	Y	+	+		dec
<i>Neobatrachus sutor</i>	Shoemaker Frog	Y	Y				+	stable	
<i>Neobatrachus wilsmorei</i>	Wilsmore`s Frog	Y	N						
<i>Pseudophryne guentheri</i>	Crawling Frog or Günther`s Toadlet	Y	Y	+	+			dec	
<i>Pseudophryne occidentalis</i>	Western Toadlet	Y	Y		+	+		dec	

Table A5.5: The fish of the ANRMR.

Family	Family Common	Species	Common Name	Museum	Safstrom	Bass	Bass/Erem	Erem	Status
Atherinidae	hardyheads	Atherinosoma wallacei	Inland Water Silverside	Y	N				
		Leptatherina wallacei	Western Hardyhead	N	Y	+	+		?
Cetorhinidae	basking sharks	Cetorhinus maximus	Basking Shark	Y	N				
Cyprinidae	minnows or carps	Carassius auratus	Goldfish	Y	N				
		Cyprinus carpio	Carp	Y	N				
Galaxiidae	Australian minnows	Galaxias occidentalis	Western Minnow	Y	Y	+			dec
		Galaxiella nigrostriata	Black-striped Minnow	N	Y	?			?
		Galaxiella munda	Mud Minnow	Y	Y	?			?
Geotriidae	pouched lampreys	Geotria australis	Pouched Lamprey	N	Y	+			dec
Gobiidae	gobies	Afurcagobius suppositus	Big Headed Goby	Y	N				
		Pseudogobius olorum	Bluespot Goby/Swan River Goby	Y	Y	+	+		?
Gonorynchidae	beaked salmons	Gonorynchus greyi	Beaked Salmon	Y	N				
Nannopercidae	pygmy-perches	Edelia vittata	Pygmy Perch	Y	Y	+			dec
Ophichthidae	snake and worm eels	Ophisurus serpens	Serpent Eel	Y	N				
Ostraciidae	Cowfishes and trunkfishes	Aracana Aurita	Shaws Cowfish	Y	N				
		Lactoria concatenatus	Nil	Y	N				
Percichthyidae	Australian perches	Bostockia porosa	Nightfish.	Y	Y	+			dec
Percidae	perches and true perches	Perca fluviatilis	Redfin Perch	Y	N				
Plotosidae	eel-tailed catfish	Tandanus bostocki	Freshwater Cobbler	N	Y	+			dec
Poeciliidae	live-bearing tooth-carps	Gambusia affinis	Western Mosquitofish	Y	N				
	live-bearing tooth-carps	Gambusia holbrooki	Mosquito Fish	N	Y	+	+		inc
Scorpaenidae	scorpionfishes	Gymnapistes marmoratus	Cobbler	Y	N				
Sillaginidae	whittings	Sillago schomburgkii	Yellowfin Whiting	Y	N				
Terapontidae	grunters	Leiopotherapon unicolor	Spangled Perch	Y	N				

## Appendix 5.2 The Threatened and Priority Fauna of the ANRMR

Table A5.6: Threatened and Priority fauna species records from within the Avon NRM Region.

This species list has been derived from DEC's Threatened and Priority Fauna database (see Section 2.3.4). These data were reviewed (see Appendix 5.3 below) to determine which species are considered regionally extant and the table was attributed to reflect that discussion as well as current recovery/conservation activities.

Main Group	Common Name	Scientific name	Conservation Code			Range, extant in		Current recovery Action <sup>3</sup>
			WA	IUCN	C'wealth	ANRMR <sup>1</sup>	Buffer only	
Mammals	Big-eared Hopping Mouse (Noompa) <sup>2</sup>	<i>Notomys macrotis</i>	E	EX	EX		1	
Mammals	Boodie (mainland)	<i>Bettongia lesueur graii</i>	E	EX				
Mammals	Pig-footed Bandicoot (Kantjilpa)	<i>Chaeropus ecaudatus</i>	E	EX	EX			
Mammals	Long-tailed Hopping Mouse (Koolawa)	<i>Notomys longicaudatus</i>	E	EX	EX			
Mammals	Crescent Nailtail Wallaby	<i>Onychogalea lunata</i>	E	EX	EX			
Inverts	Bothriembryon praecelsus	<i>Bothriembryon praecelsus</i>	E					
Birds	Western Ground Parrot <sup>2</sup>	<i>Pezoporus wallicus flaviventrus</i>	T	CR	EN		1	IRP
Reptiles	Western Swamp Tortoise	<i>Pseudemydura umbrina</i>	T	CR	EN	1		RP
Inverts	Crystal Cave Crangonyctoid <sup>2</sup>	<i>Hurleya</i> sp (WAM642-97)	T	CR			1	
Inverts	Yorkrakine Trapdoor Spider	<i>Kwonkan eboracum</i>	T	CR		1		ACC
Inverts	Minnivale Trapdoor Spider	<i>Teyl</i> sp (BY Main 1953/2683, 1984/13)	T	CR		1		IRP; ACC
Birds	Baudin's Black-Cockatoo	<i>Calyptorhynchus baudinii</i>	T	EN		1		
Birds	Carnaby's Black-Cockatoo	<i>Calyptorhynchus latirostris</i>	T	EN	VU	1		RP, ACC
Reptiles	Western Spiny-tailed Skink	<i>Egernia stokesii badia</i>	T	EN	EN	1		
Inverts	Graceful Sunmoth <sup>2</sup>	<i>Synemon gratiosa</i>	T	EN			1	SCC
Inverts	Leioproctus douglasiellus	<i>Leioproctus douglasiellus</i>	T	EN		1		SCC
Inverts	Tree-stem Trapdoor Spider	<i>Aganippe castellum</i>	T	EN		1		ACC
Mammals	Dibbler <sup>2</sup>	<i>Parantechinus apicalis</i>	T	EN	EN		1	
Mammals	Western Barred Bandicoot	<i>Perameles bougainville bougainville</i>	T	EN	EN			



Main Group	Common Name	Scientific name	Conservation Code			Range, extant in		Current recovery Action <sup>3</sup>
			WA	IUCN	C'wealth	ANRMR <sup>1</sup>	Buffer only	
Mammals	Red-tailed Phascogale	<i>Phascogale calura</i>	T	EN	EN	1		
Birds	Western Bristlebird <sup>2</sup>	<i>Dasyornis longirostris</i>	T	VU	EN		1	
Birds	Australasian Bittern	<i>Botaurus poiciloptilus</i>	T	VU		1		
Birds	Western Whipbird (western heath subsp.)	<i>Psophodes nigrogularis nigrogularis</i>	T	VU	EN			
Birds	Recherche Cape Barren Goose	<i>Cereopsis novaehollandiae grisea</i>	T	VU	VU			
Birds	Australian Painted Snipe	<i>Rostratula benghalensis australis</i>	T	VU		1		
Birds	Malleefowl	<i>Leipoa ocellata</i>	T	VU	VU	1		
Inverts	Shield-backed Trapdoor Spider	<i>Idiosoma nigrum</i>	T	VU		1		ACC
Mammals	Quokka	<i>Setonix brachyurus</i>	T	VU		??xx		
Mammals	Greater Stick-nest Rat (Wopilkara)	<i>Leporillus conditor</i>	T	VU	EN	??xx		
Mammals	Banded Hare-wallaby	<i>Lagostrophus fasciatus fasciatus</i>	T	VU	EN	0		
Mammals	Western Ringtail Possum	<i>Pseudocheirus occidentalis</i>	T	VU	VU	??xx		
Mammals	Heath Mouse (Dayang)	<i>Pseudomys shortridgei</i>	T	VU	EN	1		
Mammals	Bilby	<i>Macrotis lagotis</i>	T	VU	VU	??xx		
Mammals	Black-flanked Rock-wallaby	<i>Petrogale lateralis lateralis</i>	T	VU	VU	1		RP in prep., ACC
Mammals	Numbat	<i>Myrmecobius fasciatus</i>	T	VU	EN	1		
Mammals	Chuditch	<i>Dasyurus geoffroii</i>	T	VU	EN	1		RP
Reptiles	Woma (southwest pop)	<i>Aspidites ramsayi</i>	P1			??xx		
Inverts	Austromerope poultoni <sup>2</sup>	<i>Austromerope poultoni</i>	P1			1	1	
Inverts	Branchinella simplex	<i>Branchinella simplex</i>	P1			1		
Inverts	Arbanitis inornatus	<i>Arbanitis inornatus</i>	P1			1		
Inverts	Bothriembryon bradshawi	<i>Bothriembryon bradshawi</i>	P1			1		
Inverts	Ixalodectes flectocercus	<i>Ixalodectes flectocercus</i>	P1			1		
Inverts	Parartemia contracta	<i>Parartemia contracta</i>	P1			1		
Inverts	Daphnia jollyi	<i>Daphnia jollyi</i>	P1			1		
Birds	Black Bittern	<i>Ixobrychus flavicollis australis</i>	P2			1		
Birds	Barking Owl (southwest pop)	<i>Ninox connivens connivens</i>	P2			1		

Main Group	Common Name	Scientific name	Conservation Code			Range, extant in		Current recovery Action <sup>3</sup>
			WA	IUCN	C'wealth	ANRMR <sup>1</sup>	Buffer only	
Inverts	Leioproctus contrarius	<i>Leioproctus contrarius</i>	P3			1		
Birds	Masked Owl (SW ssp)	<i>Tyto novaehollandiae novaehollandiae</i>	P3			1		
Birds	Forest Red-tailed Black-Cockatoo	<i>Calyptorhynchus banksii naso</i>	P3			1		
Birds	Western Rosella (inland ssp)	<i>Platycercus icterotis xanthogenys</i>	P3			1		
Fish	Black-stripe Minnow <sup>2</sup>	<i>Galaxiella nigrostriata</i>	P3			1	1	
Inverts	Austrosaga spinifer <sup>2</sup>	<i>Austrosaga spinifer</i>	P3			1	1	
Inverts	Mogumber Bush Cricket <sup>2</sup>	<i>Throscodectes xederoides</i>	P3			1	1	
Inverts	Hylaeus globuliferus	<i>Hylaeus globuliferus</i>	P3			1		
Mammals	Southern Brush-tailed Phascogale	<i>Phascogale tapoatafa tapoatafa</i>	P3			1		
Birds	Little Bittern <sup>2</sup>	<i>Ixobrychus minutus</i>	P4			1	1	
Birds	Rufous Fieldwren (western wheatbelt)	<i>Calamanthus campestris montanellus</i>	P4			1		
Birds	Crested Shrike-tit (sw subsp)	<i>Falcunculus frontatus leucogaster</i>	P4			1		
Birds	Australian Bustard	<i>Ardeotis australis</i>	P4			1		
Birds	Western Whipbird (sthn WA subsp)	<i>Psophodes nigrogularis oberon</i>	P4		EN	1		
Birds	Hooded Plover	<i>Charadrius rubricollis</i>	P4		VU	1		
Birds	Bush Stonecurlew	<i>Burhinus grallarius</i>	P4			1		
Birds	Shy Heathwren (western ssp)	<i>Hylacola cauta whitlocki</i>	P4			1		
Birds	Crested Bellbird (southern)	<i>Oreoica gutturalis gutturalis</i>	P4			1		
Birds	White-browed Babbler (western wheatbelt)	<i>Pomatostomus superciliosus ashbyi</i>	P4			1		
Fish	Western Mud Minnow <sup>2</sup>	<i>Galaxiella munda</i>	P4			1	1	
Reptiles	Dell's Skink <sup>2</sup>	<i>Ctenotus delli</i>	P4			1	1	
Inverts	Guildford Springtail <sup>2,4</sup>	<i>Australotomurus</i> sp (SAM122621)	P4			1	1	
Inverts	Westralunio carteri	<i>Westralunio carteri</i>	P4			1		
Mammals	Western False Pipistrelle	<i>Falsistrellus mackenziei</i>	P4			1		
Mammals	Central Long-eared Bat	<i>Nyctophilus timoriensis</i> (central form)	P4			1		

Main Group	Common Name	Scientific name	Conservation Code			Range, extant in		Current recovery Action <sup>3</sup>
			WA	IUCN	C'wealth	ANRMR <sup>1</sup>	Buffer only	
Mammals	Water-rat (Rakali)	<i>Hydromys chrysogaster</i>	P4			1		
Mammals	Western Mouse	<i>Pseudomys occidentalis</i>	P4		VU	1		
Mammals	Western Brush Wallaby	<i>Macropus irma</i>	P4			1		
Mammals	Woylie	<i>Bettongia penicillata ogilbyi</i>	P5	CD		1		RP
Mammals	Quenda	<i>Isoodon obesulus fusciventer</i>	P5	CD		1		
Mammals	Tammar Wallaby	<i>Macropus eugenii derbianus</i>	P5	CD		1		
Birds	Major Mitchell's Cockatoo	<i>Cacatua leadbeateri</i>	S					
Birds	Peregrine Falcon	<i>Falco peregrinus</i>	S					
Reptiles	Carpet Python	<i>Morelia spilota imbricata</i>	S/P4		VU			

<sup>1</sup> These species are those that are known to live in the ANRMR after records from DEC's Threatened Fauna Database for the ANRMR and the buffer were reviewed (see Methods).

<sup>2</sup> These species are found in the buffered area only.

<sup>3</sup> This field identifies current recovery actions such as the existence of a Western Australia Recovery Plans (RP) or Interim Recovery Plans (IRP); it also identifies other recovery actions undertaken as part of ACC investment within the Natural Diversity projects (ACC) or Swan Catchment Council (SCC).

<sup>4</sup> This species has now been removed from DEC's Threatened and Priority Species list.

### Appendix 5.3 Review of the Threatened and Priority Fauna of the ANRMR

The list of regional threatened and priority fauna has been derived from the Fauna File (see Section 2.3.4). The following discussion looks at each of these species with the intent of improving the understanding of each species distribution, conservation activities and status through enquires of experts and from literature review.

From the Fauna File database there are 1159 records of Threatened and Priority fauna from within the ANRMR; their status is:

- The pulmonate gastropod *Bothriembryon praecelsus* is presumed extinct under WA legislation and has been nominated for Federal listing in August 2006. There is only one record for this species collected from near Kellerberrin prior to 1939.
- Records for the Critically Endangered (CR) Western Ground Parrot (*Pezoporus wallicus flaviventrus*), have been recorded only within the 20 kilometre buffer of the ANRMR boundary. It is considered unlikely for the species to exist in the ANRMR (pers. comm. Alan Burbidge<sup>6</sup>). There is an Interim Recovery Plan (Burbidge *et al.*, 1997) for the species.
- The CR Western Swamp Tortoise (*Pseudemydura umbrina*) has natural extant populations only within the ANRMR at Ellen Brook Nature Reserve and Twin Swamps Nature Reserve; there is a translocated population at Mogumber (just outside the ANRMR). This species has a recovery plan (Burbidge and Kuchling, 2004).
- The CR Yorkrakine Trapdoor Spider (*Kwonkan eboracum*) is an ANRMR endemic and is only known from three records, only one of which was post 2000. It is assumed that this species is still extant in the ANRMR. A conservation plan is currently in preparation for this species as part of ANRM investment.
- The CR Minnivale Trapdoor Spider (*Teyl* sp (BY Main 1953/2683, 1984/13) is known from only six records across the State. Four of these are from within the ANRMR. This species has an interim recovery plan (Burbidge *et al.*, 1999) and conservation plan is currently in preparation for this species as part of ANRM investment.
- The Endangered (EN) Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*) is uncommonly recorded from within the ANRMR; these records are from the western edge of the ANRMR within the marri/jarrah forests.
- The EN Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) is found with the southern and western parts of the ANRMR. A recovery plan (Cale, 2003) exists for the species, and there is an ACC funded program for this species.
- The southern range of the EN Western Spiny-tailed Skink (*Egernia stokesii badia*) is within the ANRMR, where this species has been recently recorded around Wyalkatchem.
- The Endangered Graceful Sunmoth (*Synemon gratiosa*) has only been located on the Swan Coastal Plain (Anon. 2006) though it is possible that the species may be found in the western edge of the ANRMR. Swan Catchment Council (SCC) has a project to reassess existing records through resurveying to identify habitat and distribution (pers. comm. Nicole Withers<sup>7</sup>).

<sup>6</sup> Alan Burbidge, Research Scientist, DEC, Perth.

<sup>7</sup> Nicole Withers, Fauna Conservation Officer, DEC's Swan Region.

- The EN bee, *Leioproctus douglasiellus* is only known from a single 1954 record within the ACC. Most of the records for this species are from the Swan Coastal Plain where SCC has a project to reassess existing records through resurveying to identify habitat and distribution (pers. comm. Nicole Withers<sup>2</sup>).
- All but one of the records for the EN Tree-stem Trapdoor Spider (*Aganippe castellum*) is from within the ANRMR; the exception is a 1994 record from near Mullewa. A conservation plan is currently in preparation for this species as part of ANRM investment.
- There is only a single record of the EN Dibbler (*Parantechinus apicalis*) within the ANRMR and the 20km buffer. This is an 1843 record from New Norcia, this species is considered regionally extinct.
- The EN Western Barred Bandicoot has only one record from the ANRMR from 1906. The only known wild populations of this species are on islands; it is considered to be locally extinct.
- The EN Red-tailed Phascogale (*Phascogale calura*) is probably still extant in the ANRMR, though recent records for this species are scant with only 5 disparate records from 2000 or later. There are some historical monitoring sites attributed to Tony Friend.
- Database records for the VU Western Bristlebird (*Dasyornis longirostris*) within the ANRMR are only a single record within the buffer. It is considered unlikely that this species is resident in that area and hence within the ANRMR.
- The VU Australasian Bittern (*Botaurus poiciloptilus*) has only one record within the ANRMR, with two in the buffer. The most recent record is 1997. It may be an occasional visitor to the region and as such should be retained on regional lists.
- The Vulnerable (VU) Western Whipbird (western heath subsp.; *Psophodes nigrogularis nigrogularis*) is known from the ANRMR from single record from Wongan Hills in 1842, it is assumed to not to be extant within the ANRMR.
- The VU Recherche Cape Barren Goose (*Cereopsis novaehollandiae grisea*) is known from the ANRMR from single record from near Lake Grace in 1933. Other records from the State are generally from the south coast. While it is not considered a resident of the ANRMR it may be an occasional visitor and retained as a potential regional species.
- The VU Australian Painted Snipe (*Rostratula benghalensis australis*) is known from two recent (2002) records from the Goomalling Shire both on private property, a month apart. These records highlight the lack of survey effort for birds (and indeed many other species) across the ANRMR.
- The VU Malleefowl (*Leipoa ocellata*) is a well known resident of many areas of the ANRMR. There is a research program currently underway through CSIRO looking at the conservation status of the species.
- The VU Shield-backed Trapdoor Spider (*Idiosoma nigrum*) extends from just south of the Exmouth Gulf south to and including the ANRMR. A conservation plan is currently in preparation for this species as part of ANRM investment.
- Within the ANRMR the VU Quokka (*Setonix brachyurus*) is believed to now only be found in Karakamia Sanctuary.
- The VU Greater Stick-nest Rat (*Leporillus conditor*) is locally extinct with the only regional records are of nest materials.
- None of the VU Banded Hare-wallaby (*Lagostrophus fasciatus fasciatus*) records are dated within the database, however the records come from Gould's collections in the Natural History Museum, London or Western Australian Museum. These records have been attributed to either Gould or Shortridge

collections from the 1800s and early 1900s respectively. This species is locally extinct.

- The VU Western Ringtail Possum (*Pseudocheirus occidentalis*) was in Tutanning Nature Reserve until the mid-1970s and probably elsewhere<sup>8</sup>. In the ANRMR it is now only known from Karakamia Sanctuary.
- The VU Heath Mouse (*Pseudomys shortridgei*) is known recently from Lake Magenta Nature Reserve and from the 1990s in Dragon Rocks Nature Reserve, in 1994 there was a record from near Burngup (north-east of Lake Grace).
- There is only one post-1980 record of the Bilby (*Macrotis lagotis*) in the ANRMR: a 2003 record 5.5 kilometres from Chiddarcooping Nature Reserve. This record may warrant further investigation, as previous records are all quite old.
- Most records of the VU Black-flanked Rock-wallaby (*Petrogale lateralis lateralis*) come from known populations at: Nangeen Hill Nature Reserve, Kokerbin Nature Reserve, Mount Caroline Nature Reserve, Querekin Rock and Mount Stirling Nature Reserve. They have been translocated to Walyunga National Park, Paruna Sanctuary and Avon Valley National Park, the success of these translocations is unknown. There are some single records the status of these populations is unknown: a 1986 record from Gundaring Nature Reserve; and the clustered 1960, 1969, 1986, 1997 and 2003 records on private property. A recovery plan is currently in preparation for this species (pers. comm. Dave Pearson<sup>9</sup>) and there is some ACC investment for this species within the Natural Diversity program.
- The Numbat (*Myrmecobius fasciatus*) is considered Threatened under WA legislation and VU under IUCN criteria. There are recent (post-2000) records at Tutanning Nature Reserve and Boyagin Nature Reserve. There is an extant population at Karakamia Sanctuary. There have been translocations to Qualen and Dale Conservation Park (in the Hills Forest) and Karroun Hill Nature Reserve in the 1990s but the success of these translocations are unknown. There are many pre-1985 records scattered across the western edge of the ANRMR. There is no recovery plan for this species.
- The Chuditch (*Dasyurus geoffroii*) is considered Threatened under WA legislation and VU under IUCN criteria. There are numerous records of this iconic dasyurid with recent (post-2000) records from the Perth Hills and foothills, a 2004 record at Mukinbudin, 2005 east of the clearing line at Forrestiana, just north of Beverley in 2003. There is a recovery plan for this species (Orell and Morris, 1994). This species is monitored as part of DEC's Western Shield program.
- The sole record of the Priority Level 1 (P1) Woma python is an unlikely 1996 record from Julimar State Forest. The closest confirmed record for this species is 135 kilometres north at Watheroo National Park, this species has been retained in the potential list for the ANRMR, but is not considered a priority for action.
- There are 17 records of the P1 scorpion-fly (*Austromerope poultoni*) across WA from Eneabba to Pemberton. The most recent of these records is from 1982; there are no records from within the ANRMR, but one 1962 record is from within the buffer. Clearly, more work needs to be done on this species, but it is not considered a NRMR priority.
- The P1 brine shrimp (*Branchinella simplex*) is only known from two records; one near Meekatharra, the other within the ANRMR approximately 80km east of

<sup>8</sup> Paul de Torres, DEC Science Division

<sup>9</sup> David Pearson, Research Scientist, Department of Environment and Conservation.



Hyden. Like many Priority invertebrates it needs substantially more work to confirm its conservation status.

- The P1 spider *Arbanitis inornatus* is only known from two records, one of which is within the ANRMR; this is a 1950 record from Bullsbrook. The paucity of records infers more work needs to be on this group (and on spiders generally).
- The P1 pulmonate gastropod *Bothriembryon bradshawii* is only known from five records, two of which are in the ANRMR (both in Lake Magenta Nature Reserve in 1999 and 2002); the other records are from private property near Kojonup. As snails are comparatively easy to locate it is suggested that there may be some contribution to this species distribution throughout the life of the ACC funding.
- The P1 orthopteran *Ixalodectes flectocercus* is a poorly known (five records) endemic to the ANRMR and clearly needs more work. It is recommended that this species gets some attention.
- The P1 brine shrimp *Parartemia contracta* is known from eight records, one of which is from north of Exmouth, the other records are within or nearby to the ANRMA. Aquatic invertebrates need considerable work across the Wheatbelt to identify conservation status and concerns. It is recommended that support be given for those types of projects.
- The P1 Water Flea (*Daphnia jollyi*) is known from only 11 records, eight of which are in the ANRMR. Aquatic invertebrates need considerable work across the Wheatbelt to identify conservation status and concerns. It is recommended that support be given for those types of projects.
- There are only two old (1930 and 1948) records for P2 Black Bittern (*Ixobrychus flavicollis australis*) within the ANRMR. While it is unlikely that the species is a resident it may use the area occasionally, thus it is retained as a species from within the region but will not be recommended for any action.
- The P2 Barking Owl (southwest pop.) (*Ninox connivens connivens*) has rarely (three times) been recorded within the ANRMR. The species may have unrecorded populations and has been recently (2005) recorded from the nearby Dryandra State Forest. It is recommended that some effort be made to improve the collection of records for his species.
- The P3 bee *Leioproctus contrarius* has three records from within the ANRMR and buffer, two from 1954 the remaining from 1982. DEC records show that an application to have this species listed as EN was to be submitted in the mid-1990s but it was subsequently found to be more widely distributed including on the conservation estate, than previously thought (pers. comm. Kellie Mantle<sup>10</sup>). Most of these populations are on the Swan Coastal Plain. Thus, this species is not considered a regional priority.
- The P3 Masked Owl (SW ssp) (*Tyto novaehollandiae novaehollandiae*) has only two records from the ANRMR, both from the 1970s and both near Northam. As with the Barking Owl we recommend that some effort be made to improve the collection of records for his species.
- Recent ANRMR records of the P3 Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) are only from the western edge of the region; most records are to the west and south of these. This species is not considered a priority for regional action.
- The P3 Western Rosella (inland ssp) (*Platycercus icterotis xanthogenys*) has only been recorded in two locations post-2000 within the ANRMR: in Boyagin Nature

<sup>10</sup> Kellie Mantle, Species and Communities Branch, Dept. of Environment and Conservation, Perth.

Reserve and Forrestiana. As with the other birds we recommend that some effort is made to improve the collection of records for his species.

- There are 146 records of the P3 Black-stripe Minnow (*Galaxiella nigrostriata*) on DEC's Threatened and Priority Fauna database; one of these was located within the buffer, near Ellen Brook. Most of the remaining records are near the south coast. It is presumed that the species may be found within that part of the Avon boundary below the Darling Scarp. As the species is found elsewhere it is not considered a priority species for regional action.
- There are only four records for the State for the Priority 3 insect *Austrosaga spinifer*. Two of these records are within the 20km buffer (14 km west of the Avon boundary), both of these are from Neerabup National Park from the early 1980s. The other two records are from Nambung National Park (also from the early 1980s). As so little is known about this insect, it is retained as a species that may possibly exist within the ANRMR but it is not considered a priority for regional action.
- There are only four records for the State for the Priority 3 Mogumber Bush Cricket (*Throscodectes xederoides*), two of which are within 3 kilometres of the Avon NRM boundary. It is assumed that this species may be found within the region, but it is not considered a priority for regional action.
- Only two of the 19 records of the P3 bee *Hylaeus globuliferus* are from the ANRMR, both from 1996. Little is known of this species, but it is not considered a priority for regional action.
- The P3 Southern Brush-tailed Phascogale (*Phascogale tapoatafa tapoatafa*) is only recorded from the marri/jarrah forests on the western end of the ANRMR in the Shires of Chittering, Mundaring and Northam. The majority of records for this species are to the west and south of the ANRMR. There is no active project unique to this species underway within the ANRMR.
- There are four records of the Little Bittern (*Ixobrychus minutus*) within the buffer, all of these are at Wanneroo (two records from 2001) or Lake Jandabup (one record from 1986 the other from 1983). It is assumed that this species could be found within the ANRMR. It is not considered a regional priority.
- The P4 Rufous Fieldwren (western wheatbelt) (*Calamanthus campestris montanellus*) is an uncommonly recorded species: 11 records from the State, only 2 old records (1967 and 1982) for the ANRMR. As with many birds of-concern for the ANRMR little is known of the species current location or status. It is not considered a regional priority.
- The P4 Crested Shrike-tit (south-western subsp.) (*Falcunculus frontatus leucogaster*) is an uncommonly recorded species. The easterly records from within the ANRMR are typically old with the more western edge more recent. As with many birds of-concern for the ANRMR little is known of the species current location or status. It is not considered a regional priority.
- The P4 Australian Bustard (*Ardeotis australis*) is known from quite a few 2005 records from within the ANRMR. As with many birds of-concern for the ANRMR little is known of the species current location or status. It is not considered a regional priority.
- The P4 Western Whipbird (sthn WA subsp) (*Psophodes nigrogularis oberon*) is largely only known from old records pre/mid-1990s from the southern part of the ANRMR; it is mainly been recorded to the south of the ANRMR. This species is considered EN under the Commonwealth legislation. It is assumed that the species is still extant within the region.
- The P4 Hooded Plover (*Charadrius rubricollis*), typically a coastal species, is known from several recordings within the ANRMR, including a 2000 record in the pastoral zone in the north west of the region. There are few records within the



region and it is assumed that the species uses the regional occasionally. This species is considered VU under Commonwealth legislation. As with many birds of-concern for the ANRMR little is known of the species current location or status. It is not considered a regional priority.

- The P4 Bush Stone curlew (*Burhinus grallarius*) is known from several records mainly in the western half of the ANRMR. As with many birds of-concern for the ANRMR little is known of the species current location or status. It is not considered a regional priority.
- The P4 Shy Heathwren (western ssp) (*Hylacola cauta whitlocki*) is known from 35 records in the central southern part of the south-west of WA. There are few records within the ANRMR, though recent (2005) records have come from the western edge of the region. . As with many birds of-concern for the ANRMR little is known of the species current location or status. It is not considered a regional priority.
- The P4 Crested Bellbird (southern) (*Oreoica gutturalis gutturalis*) has mainly been recorded in the south-west of the WA. It is clearly resident but, as with many birds of-concern for the ANRMR little is known of the species current location or status. It is not considered a regional priority.
- The P4 White-browed Babbler (western wheatbelt) (*Pomatostomus superciliosus ashbyi*) is a south-west subspecies with many records within the ANRMR. It is not considered a regional priority.
- The P4 Western Mud Minnow (*Galaxiella munda*) is mainly known from the Southern Jarrah Forest and Warren IBRA regions except for a single record at Gingin Brook 2003 which is within the buffered area. It is presumed that this species may be found within that part of the ANRMR below the Darling Scarp. It is not considered a regional priority.
- Dell's Skink (*Ctenotus delli*) is known from a single record within the buffer 6 miles east of Kalamunda in 1970. It is presumed that this Priority 4 species can live within the Avon NRM Region. It is not considered a regional priority.
- The P4 Guildford Springtail (*Australotomurus* sp (SAM122621) is known from three records within the 20 kilometre buffer. This species has been recently (late 2006) taken off the Threatened and Priority Fauna list.
- The P4 Freshwater Mussel (*Westralunio carteri*) has largely been recorded from near ocean areas on the south coast and has not been recorded in the ANRMR since 1971. It is presumed to still be extant within the ANRMR.
- Of the 42 records State records for the P4 bat the Western False Pipistrelle (*Falsistrellus mackenziei*) only one (from 1973) is within the ANRMR. Most records are west and south of the ANRMR. Most records for this species are pre-1985 with only single record from 2000 or later. That record is 17km outside the ANRMR. It is assumed to still be extant within the region.
- There are only seven records for the P4 Central Long-eared Bat (*Nyctophilus timoriensis* (central form)), all but two of these are from the eastern edge of the ANRMR. It is assumed that this species is still extant within the ANRMR.
- The P4 Water-rat (*Hydromys chrysogaster*) has been recorded across the State with most records being from the Kimberley and the far south-west. Within the ANRMR the only recent records (1997 and 2000) are from near York Township. Previous records are from the 1960s or earlier. It is assumed that this species is still extant in that area. As the species may have suffered decline due to changes increases in the salinity of waterways, extant populations of this species may indicative of relatively healthy and intact pools. It is recommended that some effort be put into identifying if these populations are still extant.

- The P4 Western Mouse (*Pseudomys occidentalis*) has recent records from Dragon Rocks Nature Reserve and Lake Magenta Nature Reserve and older (typically 1970s) records from Tarin Rock Nature Reserve, Chinocup Nature Reserve, North Karlgarin Nature Reserve, Bending Nature Reserve, Flat Rock Nature Reserve, an unnamed Nature Reserve, Dunn Rock Nature Reserve as well as from private property. Many of these locations are within areas baited for foxes. There is no active program specifically for this species.
- The P4 Western Brush Wallaby (*Macropus irma*) is generally known from the western and southern parts of the ANRMR. There is no active program specifically for this species.
- The P5 (conservation dependent) Woylie (*Bettongia penicillata ogilbyi*) is found in numerous areas within the ANRMR including Boyagin NR, Dryandra State Forest and Tutanning NR and the privately managed Paruna Sanctuary. This species has also been translocated to Avon Valley National Park, Dobaderry NR, Mundaring State Forest, a Timber Reserve abutting Youraling State Forest, and , in 2005 to North Karlgarin Nature Reserve. There is a recovery plan (Start *et al.*, 1995) written for the species and there is a recovery group in place. The species is extant in the ANRMR and is not considered a priority for action.
- Records for the P5 Quenda (*Isodon obesulus fusciventer*) across the ANRMR are uncommon with at least three known extant populations: the privately owned and managed Paruna and Karakamia Sanctuaries and Tutanning Nature Reserve. The remaining records from DEC's database are single instances. In 1996 there was a record from Lake Magenta Nature Reserve; in 1977 locals reported them at Manmanning Dam Nature Reserve; there is an unconfirmed record (scratchings) from Damboring Nature Reserve from 1980; a 1984 record of scratchings from Walyunga National Park; a 1967 record of scratchings from Tarin Rock Nature Reserve; a road-kill from the Upper Swan on the Great Northern Highway, beside Ellen Brook Nature Reserve, in 2004; a 2005 record 25 kilometres east of Pingelly on Pingelly/Bullaring Road; a 1997 record on the Brookton Highway about 0.7 km east of Metro Road. It is recommended that the current locations of Quendas across the ANRMR be resolved.
- The P5 Tammar Wallaby (*Macropus eugenii derbianus*) has been recorded regularly and recently but patchily across the ANRMR. While there are extant populations within ANRMR, there are also historical records that need confirmation and more recent records for established populations. For instance, there are no records from Tutanning Nature Reserve but one of us (JR) has seen the species there regularly. Likewise, they have not been recorded in Chinocup Nature Reserve since 1992 and it is unknown if there are extant populations there (there was also a record 6 km west of Chinocup from 1954) ; in Tarin Rock Nature Reserve they have not been recorded since 1987 including during recent surveys (eg Robinson 2003, 2005a, 2005b); in Boyagin Nature Reserve they have not been recorded since 1993 though they are regularly trapped there (pers. comm. P.Orell<sup>11</sup>,.); in Merilup Nature Reserve they have been unrecorded since 1988 and it is unknown if they are still there, in the privately owned and managed Karakamia and Paruna Sanctuaries there are healthy populations; in Mount Caroline Nature Reserve the last record was in 1963, this reserve is trapped regularly and they have not been seen so it is unlikely that they are extant in the reserve (pers. comm. P.Orell<sup>11</sup>); there have been translocations (in 2003 and 2004) of Tammars to Walyunga National Park but the success of these is unknown; there was a translocation to Julimar State Forest in 1998, a Tammar was seen spotlighting in 2004, but otherwise the

<sup>11</sup> Peter Orell, Zoologist, DEC, Perth.

translocation success is unknown; in 2004 there were two sightings in Morangup on private property; there were Tammar scats and sightings in 1999 on a private property abutting an Nature Reserve 20046; in 1991 there was a road-killed Tammar at Petercarring Nature Reserve (Reserve No. 20095), approximately three kilometres north-west of Tutanning Nature Reserve; in 1996 a road kill Tammar was found one kilometre from Petercarring Nature Reserve in a Timber Reserve (No. 20097), it was commented that there have been others found at this location; in 1991 a Tammar was spotlighted near Kulin. It is recommended that the current locations of Tammars across the ANRMR be resolved.

DRAFT