

Esperance 1 (*ESP1 - Fitzgerald subregion*)

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Subregional description and biodiversity values

Description and area

The Esperance bioregion is characterised by myrtaceous and proteaceous scrub and mallee heaths on sandplain overlying Eocene sediments; rich in endemics. Herbfields and heaths (rich in endemics) on abrupt granite tors and quartzite ranges that rise from the plain. Eucalypt woodlands occur in gullies and alluvial foot-slopes. The ESP1 subregion has variable relief, comprising subdued relief on the sandplains of the coastal region, punctuated with metamorphosed granite and quartzite ranges both inland and on the coastal plain. It lies mainly on the Bremer Sedimentary Basin and the eastern and western sections of the ESP1 subregion within the Albany-Fraser Orogen of the Yilgarn Craton. It has extensive western plains over Eocene marine sediment basement with small areas of Gneiss outcropping. Archaean greenstones – sand sheets with varying levels of lateritisation with gravel soils also occurs. The region is dominated by duplex soils and deep and shallow sands on the plains and dissected areas and by shallow sandy soils on the mountain ranges.

Vegetation types are diverse, often cryptic and significantly endemically localised in nature. Eucalypts dominate most systems in an unparalleled array of diversity. They very broadly include: coastal dune woodlands of *Eucalyptus utilis* and *E. cornuta*, coastal shrublands and heathlands dominated by *Agonis flexuosa*, *Eucalyptus angulosa* and *E. notactites*, mallee shrubland and heath (rich in endemics) dominated by *Eucalyptus captiosa*, *E. decipiens* subsp. *chalaria* and subsp. *adsmophloia*, *E. falcata*, *E. flocktoniae*, *E. lehmannii*, *E. phaenophylla*, *E. pleurocarpa*, *E. sporadica*, *E. tetraptera*, *E. thamnoides* and *E. uncinata*; mallet and moort woodlands on gravel rises, clay sheets and colluvial slopes and greenstone (rich in endemics) *Eucalyptus astringens* subsp. *redacta*, *E. cernua*, *E. divicola*, *E. megacornuta*, *E. platypus* subsp. *platypus* and *E. praetermissa* are typical dominants of these woodlands; Yate and York Gum (in the Pallinup system) woodlands on alluvials, Jarrah/Marri woodlands in the west and Goldfields woodland and mallee systems mixing with south coast and wheatbelt taxa on Greenstone in the east with *Eucalyptus annulata*, *E. bradycalyx*, *E. cernua*, *E. desmunderis*, *E. gardneri* subsp. *ravensthorpeensis*, *E. occidentalis*, *E. oleosa* subsp. *corvina*, and *E. salmonophloia*.

More cryptic vegetation communities comprise herbfields and heaths (rich in endemics) on abrupt granite tors and quartzite ranges that rise from the plain and the greenstone heath and shrublands. The subregion has a Temperate Mediterranean climate with 600 – 800 mm annual rainfall.

Dominant land use

Mainly (vii) grazing - improved pasture & (iv) cultivation - dry-land agriculture, with lesser areas of (xiii) conservation, (xi) UCL and Crown reserves, (xiv) roads and other easements, (v) forestry plantation (see Appendix B, key b).

Continental Stress Class

The Continental Stress Class of ESP1 is 3.

The subregion should be a higher continental stress class than 3 (perhaps 2), as approximately half of it has been cleared of native vegetation. There are some large reserves and areas of Unoccupied Crown Land in North-West and eastern end of the subregion, but agriculturally productive landscapes (and the vegetation types that previously grew there) are now almost completely cleared.

Known special values in relation to landscape, ecosystem, species and genetic values

Near Shore Islands:

- Bald Island: haul out sites for New Zealand Fur Seal (*Arctocephalus forsteri*) and Australian Sea-lions (*Neophoca cinerea*); One of two known island refuges for Quokkas, and the only one on the south coast (isolated for approx 10,000 years); Significant breeding island for Great-winged Petrels (*Pterodroma macroptera*); Successful translocation site for Noisy Scrub-bird (*Atrichornis clamosus*); Vegetation is distinctive with stands of long unburnt (more than 100) *Callitris preissi* plus type locality for Bald Island Marlock *Eucalyptus conferruminata*.
- Doubtful Island: is a breeding site for both New Zealand Fur Seals and Australian Sea lions.
- Middle Doubtful Island is one of only two islands in WA known to have population of Yellow-footed Antechinus (*Antechinus flavipes*), the other is Michlemas.
- Red Islet (part of Fitzgerald River National Park) breeding site for Australian Sea-lions and New Zealand Fur Seals.
- Glasse Island: haul out and breeding site for Australian Sea-lions.
- Cheyne Island: Nesting sites for Hooded Plovers (*Charadrius rubricollis*) and Little Penguins (*Eudyptula minor*) and recently acquired as a Nature Reserve.

Rare Ecosystems:

- Stirling Range Montane Thicket and Heath of the South West Botanical Province – DRF includes *Dryandra montana*, *Sphenotoma drummondii* and *Andersonia axilliflora*, other priority taxa are *Adenanthos filifolius*, *Calothamnus crasus* and *Andersonia echinocephala*.

- Vegetation communities of the Ravensthorpe Range - *Eucalyptus argyphaea* low forest on magnesite on ridgetops and upper slopes. Species include *Beyeria brevifolia*, *Eremophila latrobei*, *Lasiopetalum rosmarifolium*, *Leucopogon carinatus*, *Melaleuca striata* and *Scaevola densifolia*.
- Thumb Peak/Mid Mount Barren Woolburup Hill *Eucalyptus acies* mallee heath - DRF includes *Cooperhooia georgei*, *Daviesia obovata* and *Grevillea infundibularis*.
- Montane Mallee Thicket Community, including *Banksia brownii*, *B. solandri*, *Eucalyptus marginata* and *Kunzea montana*.
- Plant assemblages of the Stirling Range National Park.
- Proteaceous and Myrtaceous assemblages of the Fitzgerald River National Park - sandplain and Barren Ranges heath families (e.g. Proteaceae, Myrtaceae, Epacridaceae)
- Manypeaks - Waychinicup National Park. Diversity of avifauna, including high number of threatened species. High floristic diversity, especially Proteaceae, Epacridaceae, Papilionaceae and Myrtaceae.
- Cape Riche
- Ravensthorpe Range exhibits very high Eucalypt diversity

Vulnerable and Specially Protected Fauna:

- Birds include the Noisy Scrub-bird (*Atrichornis clamosus*), Western Ground Parrot (*Pezoporus wallicus*), Western Bristlebird (*Dasyornis longirostris*), Western Whipbird (*Psophodes nigrogularis*), Malleefowl (*Leipoa ocellata*), Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Little Bittern (*Ixobrychus minutus*), Australian Bustard (*Botaurus poiciloptilus*), Shy Heathwren (*Hylacola cauta*) and Rufous Fieldwren (*Calamanthus campestris*).
- CWR mammals, such as the Dibbler (*Parantechinus apicalis*), Heath Rat (*Pseudomys shorridgei*), Red-tailed Phascogale (*Phascogale calura*), Brush-tailed Phascogale (*Phascogale tapoatafa*), Southern Brown Bandicoot (*Isodon obesulus*), Tamar Wallaby (*Macropus eugenii derbianus*), Western Brush Wallaby (*Macropus irma*), and Water Rat (*Hydromys chrysogaster*). Numbats (*Myrmecobius fasciatus*) have been released into Stirling Range National Park.
- Reptiles such as *Lerista viduata* and Carpet Python (*Morelia spilota*).
- Rare invertebrates *Moggridgea* sp. S and *Rhytidid* sp. Undescribed.

Centres of Endemism:

- Stirling Ranges Flora
- Fitzgerald River National Park (Biosphere)
- Ravensthorpe Range Flora (see Landform Junctions below)

Refugia:

- Mountain-top and gully communities of the Stirling Range (Threatened Montane Heath community, *Allocasuarina decussata*).
- Gondwanan refugia in deeply incised south facing gullies contain relictual species ie. *Moggridgea* sp. S, unnamed Rhytidid).
- Mt Manypeaks - Two Peoples Bay (crossing into JF2 subregion) mountain tops as climatic refugia for Gondwanan relictual species including threatened birds.
- Fitzgerald River National Park is a refuge for CWR mammals, proteaceous endemics from impacts of *Phytophthora* sp.
- Bremer Bay-Pallinup area may provide relictual habitat for some species normally restricted to west of Albany and Two Peoples Bay area including: *Stipa compressa*, *Eucalyptus calcicola* subsp. *unita*, *Banksia grandis*, *Beaumea vaginalis* and others.

High Species or Ecosystem Diversity:

Geology:

- The igneous granite systems of the Yilgarn Craton southern edge inland, and the coastal and sub-coastal Albany - Fraser Orogen which includes Porongurup Range,
- The igneous greenstone gneiss and mixed quartzite metamorphose complex of the Ravensthorpe Range,
- The metamorphose sedimentary quartzite systems of the Stirlings and Barrens Group
- The Eocene sedimentary plain,
- Laterite archipelagos as breakaways and gravel rises, and
- Quaternary Aeolian coastal limestone units.

Drainage Systems:

- The internal lake systems of the North Stirlings area
- The long south eastern draining Pallinup and Corackerup system that brings the western wheatbelt flora to the Subregion,
- Very short south-eastern draining creeks and rivers south from Lookout Point east to Groper Bluff.
- Short southern draining rivers south of the Jarrahwood axis of the Bremer, Gairdner, Fitzgerald and Hamersley rivers,
- The Phillips and Jerdacuttup systems that drain south off the Ravensthorpe Ramp over the Jerdacuttup Fault,
- The Mallee Road sump internal drainage,
- The Pabelup wetland swamp system

Soil Systems:

- Limestone sands
- Duplex sand plains
- Spongolite colluviums
- Laterite gravel colluviums and rises
- Alluvial flats and valleys
- Clay plains and rises
- Granite sands and loams
- Quartzite sands
- Wetland sands and loams

Landform Junctions:

Considerable diversity exists along borders where different land systems and soil types meet. This means that species and vegetation types that are common in other areas are found in unique combinations at landform junctions. For example:

- East Mt Barren and Hopetoun marks the edge of the Esperance sandplain and contains a mix of sandplain and quartzite species. Indeed this is the edge of the two ESP subregions.

- Ravensthorpe Range contains a mix of species that are common in the Wheatbelt and South Coast and also includes endemic species.
- The Pallinup system provides a corridor where wheatbelt species such as York gum *Eucalyptus loxophleba*, jam *Acacia acuminata*, Swamp sheoak *Casuarina obesa* and flooded gum *Eucalyptus rudis* can exist on the South Coast.

Existing subregional or bioregional plans and/or systematic reviews of biodiversity and threats

In 1974 the Conservation Through Reserves Committee (CTRC) made recommendations for reserves within the Eastern South Coast (System 3) and South Coast (System 2) in the CTRC Green Book (Conservation Through Reserves Committee 1974). Some but not all of these recommendations (with modification) were implemented over the following ten years. The ESP1

subregion is covered by a CALM Regional Management Plan, that provides an overview of biota, addresses land and wildlife conservation issues, but was generalised in its attention to detail (Department of Conservation and Land Management 1992). The reviews and strategies therein (for reserve system development or management of weeds, fire, feral animals, mining, ecosystem rehabilitation & disease quarantine) do not address the specific needs of the subregion, or even the bioregion. Management plans exist for the Stirling Range National Park (Herford *et al.* 1999) and Fitzgerald River National Park (Moore *et al.* 1991), and is in preparation for the Ravensthorpe Range. Interim Management Guidelines are in place for other conservation reserves (Waychincup (Department of Conservation and Land Management 1994d), Corackerup, Peniup). The South Coast Macro Corridor Project identifies areas in ESP1 where improved landscape connectivity will benefit biodiversity conservation.

Wetlands

Wetlands of National significance (DIWA listings)

Name	Location	Description ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Processes ⁵
Balicup Lake System	34° 13'-34° 18' S, 117° 46'-118° 00' E 20 km E of Cranbrook	B8, B12	iii	vi	ii	xii (agricultural activity in part of catchment impacts on wetlands in the system), x, i, vi (agricultural weeds), ix
Culham Inlet System	33° 54' S, 120° 04' E; 6 km NW of Hopetoun	B7, B1, B12	ii	iii	iii	ix, xi (eutrophication, siltation), x, i, xii (increased flow and frequency of flooding)
Fitzgerald Inlet System	33° 49'-34° S, 119° 18'-119° 40' E; 35 km NE of Bremer Bay	A10, B8, B2, B12	iii	iii-iv	iii	ix (river inflows), xi (eutrophication), i, xii (increased flow and frequency of flooding)
Yellilup Yate Swamp System	34° 18'-34° 23' S 118° 51'-119° 09' E 22 km WNW of Bremer Bay	B15, B7	i	ii	iii	ix, x (inundation, eutrophication, siltation), i

¹Appendix B, key d; ²Appendix C, rank 2; ³Appendix C, rank 3; ⁴Appendix C, rank 1; ⁵Appendix B, key e

Wetlands of subregional significance (in addition to the DIWA listed wetlands)

Name	Location	Description ¹	Special Values ²	Condition ³	Trend ⁴	Reliability ⁵	Threatening Processes ⁶
Blue Lagoon Suite	34° 27' S 119° 13' E Cheynes	A11-A12	ii, iii, v	iv	vi	i	No known threatening processes
Pabelup Suite	34° 06' S 119° 24' E Bremer	B6, B7, B8, B14	ii, iii, v	iii-i	iii-ii	iii	iv, ix, x, xii (eutrophication)
Corimup Suite	34° 35' S 118° 20' E (& surrounds) Manypeaks	B9, B10, B15	ii, iii, v	iii	iii	iii	xii (eutrophication), vii
Coyanarup Suite	34° 24' S 118° 06' E Borden	B15	ii, iii	iv	iv	ii	vii
Name	Location	Description ¹	Special Values ²	Condition ³	Trend ⁴	Reliability ⁵	Threatening Processes ⁶
Kojaneerup Suite	34° 21'- 30' S 118° 16'- 29' E Borden	B8	ii, iii	iii	iii	ii	ix
Manypeaks Suite	34° 11'- 34° 49' S 118° 04'- 119° 16' E South Stirling	B6, B8, B14	ii, iii, iv	iii-i	iv-ii	iii	ii, iv, ix, x
Marendiup Suite	34° 25' S	B9	ii, iii	iii	iv	i	vii, xi

	119° 10' - 11' E Bremer						
Mt Bland Lake	34° 11' S 119° 29' E Bremer	B9	ii	iv	iv	iii	x (possibly affected by diminishing rainfall)
Lake Chillinup	34° 33' S 118° 04' E South Stirlings	B7/B8	ii, iii, iv	ii	iii	iii	ix, x, i, iv, xii (access road has been re-aligned, may lead to runoff problems in lake)
Pabelup Suite (not including Yellilup Yate swamp system wetlands)	34° 06' - 23' S 119° 01' E - 25' Bremer	B6, B7, B8, B14	ii, iii	iii-i	iii-ii	iii	iv, ix, x, xii (eutrophication)
Qualimup Suite	34° 25' S 118° 59' E Bremer	A11	ii	iii-ii	iii	i	x
Swan Lake Suite	34° 43' S 117° 28' E Manypeaks	A11	ii, iii, iv, v	iii	iii	iii	xii (part of sandmining reserve), viii, i, vii

¹Appendix B, key d; ²Appendix B, key c; ³Appendix C, rank 2; ⁴Appendix C, rank 3; ⁵Appendix C, rank 1; ⁶Appendix B, key e

Riparian zone vegetation

In general, when rivers in ESP1 are inundated (particularly with summer rainfall), bank erosion, and uprooting/burial of native riparian vegetation occurs.

Weed plant species then invade and overrun riparian areas.

Name	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
Fitzgerald River	ii	iv - iii	ii	ix, x, xii (agricultural drainage; bank erosion, destruction of native vegetation, altered flow regimes and weed invasion), i, ii, v, iii, vii, viii
Gairdner River	i - ii	ii - iii	ii	vi (Bridal Creeper, agricultural weeds), ix, x, xii (agricultural drainage; bank erosion, destruction of native vegetation, altered flow regimes and weed invasion)
Bremer River	i - ii	ii	ii	vi (Bridal Creeper, agricultural weeds), ix, x, xii (agricultural drainage; bank erosion, destruction of native vegetation, altered flow regimes and weed invasion)
Pallinup River	i - ii	ii	ii	vi (Bridal Creeper, agricultural weeds), ix, x, xii (agricultural drainage; bank erosion, destruction of native vegetation, altered flow regimes and weed invasion)
Hamersley River	iii	iv	ii	xii (agricultural drainage; bank erosion, destruction of native vegetation, altered flow regimes and weed invasion), x
Phillips River	ii	iii	ii	ix, x, xii (agricultural drainage; bank erosion, destruction of native vegetation, altered flow regimes and weed invasion), vi (boxthorn, Bridal Creeper)
Waychinicup River	iii	iii - iv	ii	ix, x, xii (agricultural drainage; bank erosion, destruction of native vegetation, altered flow regimes and weed invasion), viii, vi (Bridal Creeper, Pine trees, agricultural weeds, <i>Watsonia</i>)

¹Appendix C, rank 2; ²Appendix C, rank 3; ³Appendix C, rank 1; ⁴Appendix B, key e

NOTE: Ranks for condition of riparian vegetation reflect variations in catchment land use activities e.g. for the Fitzgerald River much of the riparian vegetation is in good condition within conservation estate, while two major tributaries – the Sussetta and Twertup Rivers – are classed as degraded. Threatening processes refer to the latter listing.

Ecosystems at Risk

Threatened Ecological Communities (TECs)

In general, plant communities comprising of susceptible plant species are threatened by dieback (*Phytophthora cinnamomi*) and can be considered as ecosystems at risk.

These fungi eliminate numerous species of structurally and floristically dominant plant families such as the Proteaceae and Myrtaceae from ecosystems.

Community	Status	NVIS ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Processes ⁵
East Stirling Range Montane Heath and Thicket	CR	28	i	iii	iii	ii, viii (<i>Phytophthora</i> sp.), vii
Thumb Peak, mid mount Barren, Woolburnup Hill <i>Eucalyptus acies</i> mallee heath	VU	29	iv	iv	iii	iii, iv
Montane Mallee Thicket Community	EN	29	ii	iii	iii	viii (<i>Phytophthora</i> sp.)

¹Appendix B, key f; ²Appendix C, rank 2; ³Appendix C, rank 3; ⁴Appendix C, rank 1; ⁵Appendix B, key e

Other ecosystems at risk

In general, plant communities comprising of susceptible plant species are threatened by dieback (*Phytophthora cinnamomi*) and can be considered as ecosystems at risk.

These fungi eliminate numerous species of structurally and floristically dominant plant families such as the Proteaceae and Myrtaceae from ecosystems.

Beard Veg Assoc	Community	Status	NVIS ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Processes ⁵
691	Mallee heath on Quartzite ranges of the Fitzgerald River National Park - <i>Eucalyptus</i> spp. Heath on quartzite ranges	DD, NE	29	iv	iv	iii	vii, viii
936, 142	Cocanarup Timber Reserve - <i>Eucalyptus salmonophloia</i> over <i>Acacia acuminata</i> woodland on red loams	NE	16	iii	v	ii	vii, vi (agricultural weeds, <i>Pycnantha</i>)
980, 38	Shallow loam and sandy loam over schist Mountain peaks of eastern Stirling Range (surrounding the East Stirling Ranges Montane Thicket TEC)	CR	28	ii	ii	iii	viii, vii, v (rabbit), xii (recreation)
986	High altitude peat swamps of the Stirling Range National Park <i>Xyris exilis</i>	NE	43	ii-iii	iii	ii	vii, v (rabbit)
968	Vegetation of ravines draining Southern Stirling Ranges	NE	4	ii-iii	ii-iii	i	vii, viii
42	<i>Eucalyptus goniantha</i> subsp. <i>notactites</i> mallee heath; <i>Eucalyptus goniantha</i> and <i>E. calcicola</i> on sandy limestone between Cape Riche and Bremer Bay	NE, DD	29	ii-iii	iv	i	vii
968, 4, 991	<i>Eucalyptus wandoo</i> woodland on loamy clays of Stirling Range National Park	NE	8	iii	iii	i	vii, viii, vi (wild oats), xii (heavy Mistletoe infestations)
982, 980	<i>Eucalyptus decipiens</i> low woodland of on sandy gravels South Stirlings	NE, DD	29	iii	iv	i	i (remnants remaining from broadscale vegetation clearing), vi (african love grass, veldt grass, Sydney wattle, Bridal Creeper), vii (<i>Phytophthora</i> sp.)

Beard Veg Assoc	Community	Status	NVIS ¹	Condition ²	Trend ³	Reliability ⁴	Threatening Processes ⁵
931	<i>Eucalyptus occidentalis</i> woodlands over loamy clay in riparian zones (low landscape position)	NE, DD	8	ii	iii	i	i (remnants remaining from broadscale vegetation clearing), iv (historical grazing), vi (thistle, bridle creeper, wild oats, taylorina, arum lily), x, xii (lerp - ptsidid)
1967	<i>Eucalyptus occidentalis</i> woodlands on high ground loam over granite	NE, DD	8, 9	ii-iii	iii-iv	i	i (remnants remaining from broadscale vegetation clearing), iv, vi (wild oats), x, xii (lerp - ptsidid)
980	Jarrah-mallee heath on sandy gravels in the Cape Riche system	NE, DD	29	ii	iii	i	i (remnants remaining from broadscale vegetation clearing), viii, vii, vi (potential for invasion of Victorian Teatree)
931	Stirling Range Upland Yate Woodlands (to 15m) of <i>Eucalyptus cornuta</i> over a sparse shrub layer and open herbs.	P4	8	i	iii	ii	vii, v (rabbit), vi (<i>Solanum nigrum</i> , <i>Carduus</i> sp, <i>Hypochoeris</i> sp.)
48	North Porongurups Ironstone - Winter wet shrubland. <i>Kunzea</i> sp, <i>Hakea</i> sp dominants	NE, DD	32	ii	iv	i	xii (restricted distribution)
929	Moort Woodlands - <i>Eucalyptus platypus</i> low forest on heavy clays	NE, DD	8		iv	i	ix, i (remnants remaining from broadscale vegetation clearing), x, vii
691, 552, 47	Ravensthorpe Range - Proteaceous heath thickets of the Ravensthorpe Range laterite upland	NE, DD	30	iii-iv	iv	i	vii, viii, xii (mining exploration)
938, 352, 47	Ravensthorpe Range - Mallet woodlands of breakaway slopes of Ravensthorpe Range	NE, DD	8	iii-iv	iv	i	xii (mining exploration), vii
48, 980	<i>Banksia</i> proteaceous heath on deep sands over gravel in the Waychinicup area	NE, DD	28	i	ii	i	viii (<i>Phytophthora</i> sp.), vii, xii (human disturbance, recreation particularly 4WD vehicles and motor bikes)
48, 980	<i>Hakea</i> proteaceous heath of Mt Manypeaks and Waychinicup - <i>Hakea cucullata</i> , <i>H. elliptica</i> and <i>H. lasianthoides</i> heaths on gravels over granite	NE, DD	28	ii-iii	iii	i	viii (<i>Phytophthora</i> sp.), vii
938, 352, 47	Ravensthorpe Range - <i>Eucalyptus</i> spp on red loams lower foothills of the eastern Ravensthorpe Range	NE, DD	27	iii	iv	i	i (remnants remaining from broadscale vegetation clearing), xii (mining exploration)
48	<i>Banksia baxteri</i> and <i>Lambertia inermis</i> heath on deep sands in Fitzgerald River National Park	NE, DD	28	iii	iv	i	viii, vii
48	<i>Banksia coccinea</i> community in dieback free area - Gull Rock	P2	30		ii	ii	viii (aerial canker, <i>Armillaria</i> , <i>Phytophthora</i> sp.), vii, xii (recreation)

¹Appendix B, key f; ²Appendix C, rank 2; ³Appendix C, rank 3; ⁴Appendix C, rank 1; ⁵Appendix B, key e

Species at risk

Fauna

Species	Status	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
SCHEDULE 1: RARE/LIKELY TO BECOME EXTINCT, DIV 1 (MAMMALS)					
<i>Dasyurus geoffroi</i>	V	iii	v	iii	v (fox, cat) vii
<i>Myrmecobius fasciatus</i> (release)	V	ii	unknown	iii	v (fox, cat), vii, ii (loss of habitat)
<i>Parantechinus apicalis</i>	E	ii	iv	iii	v (fox, cat), vii, viii
<i>Phascoqale calura</i>	E	ii	vi	i-ii	v (fox, cat), vii
<i>Pseudocheirus occidentalis</i>	V	ii	iii-iv	ii	v (fox, cat), vii
<i>Pseudomys shortridgei</i>	V	ii	iii-iv	ii	v (fox, cat), vii, xii (potential for mining in area)
<i>Setonix brachyurus</i>	V	iii	v	iii	v (fox, cat), vii, viii
** <i>Eubalaena australis</i>	E	unknown	v	ii	xii (whale watching; ecotourism)
** <i>Balaenoptera musculus</i>	V	unknown	vi	unknown	xii (whale watching; ecotourism)

**Megaptera novaeangliae	V	unknown	vi	unknown	xii (whale watching; ecotourism)
SCHEDULE 1; RARE/LIKELY TO BECOME EXTINCT, DIV 2 (BIRDS)					
<i>Atrichornis clamosus</i>	V	ii-iii	v	iv	vii
<i>Botaurus poiciloptilus</i>	V	unknown	iii-iv	i	ix, x (loss of drought refuges), iv
<i>Calyptorhynchus baudinii</i>	V	unknown	vi	unknown	i, ii, vii
<i>Calyptorhynchus latirostris</i>	E	unknown	vi	unknown	i, ii, vii
<i>Dasyornis longirostris</i>	V	ii-iii	vi	unknown	vii
<i>Leipoa ocellata</i>	V	unknown	vi	unknown	v (foxes, cats, rabbits, goats), ii, vii, ix, iv, i
<i>Pezoporus wallicus flaviventris</i>	E	i	ii	iii	v (fox, cat), vii, viii
<i>Psophodes nigrogularis oberon</i>	V	iii	v	iv	v (fox), vii, viii
<i>Psophodes nigrogularis nigrogularis</i>	E	ii-iii	v	iii	v (fox), vii, viii
**Cereopsis novaehollandiae grisea	V	unknown	iv	unknown	xii (climate change; historic hunting by humans)
**Diomedea exulans	V	unknown	vi	unknown	xii (long line fishing, collision with trawlers)
**Diomedea gilsoni	V	unknown	vi	unknown	xii (long line fishing, collision with trawlers)
**Thalassarche cauta	V	ii	iv	iii	xii (long line fishing, collision with cables/trawlers)
**Diomedea amsterdamensis	E	unknown	vi	unknown	xii (long line fishing, collision with trawlers)
**Halobaena caerulea	V	unknown	vi	unknown	No information for species in region
**Pterodroma mollis	V	unknown	vi	unknown	No information for species in region
SCHEDULE 1; RARE/LIKELY TO BECOME EXTINCT, DIV 5 (FISH)					
**Carcharodon carcharias	V	unknown	vi	unknown	xii (incidental capture by fisheries; shark control activities such as targeted hunting and shark nets; removal of fins; ecotourism)
**Carcharias Taurus	V	unknown	vi	unknown	xii (commercial and recreational fisheries; shark control activities such as targeted hunting and shark nets; ecotourism)
SCHEDULE 1; RARE/LIKELY TO BECOME EXTINCT, DIV 6 (SNAILS)					
Undescribed <i>Rhytidid</i> sp. (WAM#2295-69)	E	i-ii	ii-iii	ii	vii, xii (climate change)

Species	Status	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
SCHEDULE 4: OTHER SPECIALLY PROTECTED FAUNA. DIVISION 3 (REPTILES)					
<i>Morelia spilota imbricata</i>	SP	iii	vi	i	i, v (grazers), xii (pasture improvement; predation)
OTHER SPECIES AT RISK WITHIN THE SUBREGION					
<i>Neophoca cinera</i>	Near Threatened	unknown	unknown	unknown	xii (historic harvesting of high numbers of individuals has lead to small population size; commercial fishing removing food source and net entanglements); xi (pollution via oil spills is a potential threat)
<i>Arctocephalus forsteri</i>	Conservation Dependent	unknown	unknown	unknown	xii (historic harvesting of high numbers of individuals has lead to small population size; commercial fishing removing food source and net entanglements)

Species marked with **asterisks indicate these species are occasional visitors to the subregion.

¹Appendix C, rank 2; ²Appendix C, rank 3; ³Appendix C, rank 1; ⁴Appendix B, key e

Flora

In general, plant communities comprising of susceptible plant species are threatened by dieback (*Phytophthora cinnamomi*) and can be considered as ecosystems at risk.

These fungi eliminate numerous species of structurally and floristically dominant plant families such as the Proteaceae and Myrtaceae from ecosystems.

Species Name	Status	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
DECLARED RARE FLORA					
<i>Andersonia axilliflora</i>	CR	i	ii	iii	viii, vii
<i>Banksia brownii</i>	CR	i	ii	iii	viii, vii
<i>Caladenia bryceana</i> subsp. <i>bryceana</i>	CR	ii	v	ii	vi (<i>Myrsiphyllum asparagoides</i> , <i>Oxalis</i> sp., Annual grasses), v (rabbit), xii (small number of individuals)
<i>Daviesia glossosema</i>	CR	i	ii	iii	viii, vii, xii (small number of individuals)
<i>Daviesia pseudaphylla</i>	CR	i	ii	iii	viii, vii, xii (small number of individuals)
<i>Drakaea confluens</i>	CR	ii	v	ii	xii (small number of individuals)
<i>Dryandra anatona</i>	CR	i	ii	iii	viii, vii
<i>Dryandra montana</i>	CR	i	ii	iii	viii, vii, xii (small number of individuals)
<i>Grevillea maxwellii</i>	CR	ii	v	iii	xii (drought), vii
<i>Isopogon uncinatus</i>	CR	i	iii	iii	viii
<i>Lambertia orbifolia</i>	CR	ii	v	ii	viii, vii, xii (restricted distribution)
<i>Leucopogon gnaphalioides</i>	CR	i	ii	iii	vii, viii, xii (small number of individuals)
<i>Nemcia luteifolia</i>	CR	ii	iii	iii	viii, xii (single population)
<i>Persoonia micranthera</i>	CR	i	ii	iii	viii, vii, xii (small number of individuals)
<i>Acacia rhaphophylla</i>	E	iii	iv	ii	xii (single population)
<i>Adenanthos cunninghamii</i>	E	iii	iv	ii	ix (small number of individuals), vii (<i>Phytophthora</i> sp.)
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	E	i	vi	ii	ii
<i>Apium prostratum</i> subsp. <i>phillipii</i>	E	iii	iv	ii	vi (<i>Dolichus</i> pea, <i>Rubus fruticosus</i> , <i>Myosotis sylvatica</i>)
<i>Boronia clavata</i>	E	iii	iv	ii	xii (restricted distribution, small number of individuals)
<i>Centrolepis caespitosa</i>	E	ii	iv	ii	vi, xii (roadworks)
<i>Coopermookia georgei</i>	E	iv	iv	ii	xii (restricted distribution)
<i>Darwinia collina</i>	E	i	iii	ii	viii, vii
<i>Darwinia oxylepis</i>	E	ii	iii	ii	viii

Species Name	Status	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
<i>Darwinia</i> sp. Stirling Range (G.J. Keighery 5732)	E	ii	iii	ii	viii, vii
<i>Darwinia wittwerorum</i>	E	ii	iii	iii	viii
<i>Daviesia megacalyx</i>	E	iii	iv	ii	xii (restricted distribution)
<i>Dryandra ionthocarpa</i>	E	ii	iii	iii	viii, vii, vi (<i>Myrsiphyllum asparagoides</i> , <i>Citrullus lanatus</i> , annual grasses, cape weed), xii
<i>Eucalyptus bennettiae</i>	E	ii	iv	ii	xii (small number of individuals)
<i>Eucalyptus burdettiana</i>	E	iii	iv	ii	xii (restricted distribution)
<i>Eucalyptus coronata</i>	E	iii	iv	ii	xii (restricted distribution)
<i>Grevillea infundibularis</i>	E	iv	iv	ii	xii (restricted distribution)
<i>Lambertia fairallii</i>	E	i	ii	iii	viii, vii, xii (restricted distribution)
<i>Myoporum cordifolium</i>	E	iii	v	iii	vii, xii (roadworks, small number of individuals), ix
<i>Orthrosanthus muelleri</i>	E	ii	iv	ii	vi (annual grasses), ix
<i>Sphenotoma drummondii</i>	E	ii	iii	ii	viii
<i>Verticordia fimbriolepis</i> subsp. <i>australis</i>	E	unknown	i	unknown	Unknown threatening processes
<i>Verticordia pityrhops</i>	E	iii	iv	ii	xii (restricted distribution)
<i>Villarsia calthifolia</i>	E	iii	iv	ii	xii (restricted distribution)
<i>Xyris exilis</i>	E	ii	iii	ii	vii (single population)
<i>Acacia awestoniana</i>	V	iii	iv	ii	xii (restricted distribution)
<i>Acacia trulliformis</i>	V	ii	iii	ii	ii
<i>Adenanthos dobagii</i>	V	iv	iv	ii	xii (restricted distribution)
<i>Adenanthos ellipticus</i>	V	iii	iv	ii	xii (restricted distribution)
<i>Adenanthos pungens</i> subsp. <i>pungens</i>	V	iv	iv	ii	xii (restricted distribution)
<i>Andersonia pinaster</i>	V	ii	iii	iii	viii
<i>Asplenium obtusatum</i>	V	iii	iv	ii	xii (restricted distribution)
<i>Banksia goodii</i>	V	iii	iv	ii	ii, xii (road works)
<i>Banksia verticillata</i>	V	iii	iv	ii	viii (<i>Phytophthora</i> sp., <i>Armillaria</i> , canker)
<i>Caladenia harringtonii</i>	V	unknown	vi	unknown	vi (<i>Watsonia</i> sp., <i>Acacia longifolia</i> , <i>Senecio glastifolius</i>)
<i>Chordifex abortivus</i>	V	iv	iv	ii	vii (single population)
<i>Conostylis misera</i>	V	iii	iii	ii	vi (<i>Leptospermum laevigatum</i> , <i>Watsonia</i> sp., <i>Eragrostis curvula</i>), v (rabbit)
<i>Darwinia meeboldii</i>	V	iii	iv	ii	xii (restricted distribution)
<i>Darwinia squarrosa</i>	V	iii	iii	ii	viii, vii
<i>Deyeuxia drummondii</i>	V	ii	v	ii	xii (restricted distribution)
<i>Drakaea micrantha</i>	V	ii	iv	ii	xii (small number of individuals)
<i>Eremophila denticulata</i> subsp. <i>denticulata</i>	V	iii	iv	ii	vii
<i>Eremophila veneta</i>	V	ii	iv	ii	ix, iv
<i>Kunzea pauciflora</i>	V	iii	v	ii	xii (restricted distribution)
<i>Laxmannia jamesii</i>	V	iii	iv	ii	xii (small number of individuals)
<i>Lepidium aschersonii</i>	V	unknown	i	unknown	Unknown threatening processes
<i>Marianthus villosus</i>	V	iii	iv	ii	xii (restricted distribution)
<i>Meziella trifida</i>	V	unknown	vi	unknown	Unknown threatening processes
<i>Microtis globula</i>	V	iii	iv	ii	vii
<i>Pleurophascum occidentale</i>	V	iii	v	ii	vii
<i>Ricinocarpos trichophorus</i>	V	iii	iv	ii	xii (small number of individuals)
<i>Stylidium galioides</i>	V	iv	iv	ii	xii (restricted distribution)
<i>Thelymitra psammophila</i>	V	iii	v	ii	xii (small number of individuals), vi (annual grasses), ix
<i>Tribonanthes purpurea</i>	V	iii	iv	ii	xii (restricted distribution)
<i>Verticordia carinata</i>	V	iii	iv	ii	xii (restricted distribution)
Species Name	Status	Condition ¹	Trend ²	Reliability ³	Threatening Processes ⁴
<i>Verticordia crebra</i>	V	iii	iv	ii	xii (restricted distribution)

<i>Verticordia helichrysantha</i>	V	iii	iv	ii	xii (restricted distribution)
PRIORITY 1					
<i>Caladenia longifimbriata</i> ms	1	unknown	vi	unknown	Unknown threatening processes
<i>Dampiera sericantha</i>	1	ii	vi	ii	xii (appears to be disturbance opportunist)
Priority 2					
<i>Acacia nitidula</i>	2	iii	iv	iii	Unknown threatening processes
<i>Andersonia carinata</i>	2	unknown	iv	unknown	Unknown threatening processes
<i>Astroloma</i> sp. Fitzgerald (GJ Keighery 8376)	2	ii	vi	iii	xii (appears to be disturbance opportunist; soil disturbance), vii
<i>Austrostipa exilis</i>	2	unknown	vi	unknown	Unknown threatening processes
<i>Calochilus</i> sp. Hopetoun (H Taylor s.n.) [aff. <i>campestris</i>]	2	ii-iii	iv	iii	Unknown threatening processes
<i>Gastrolobium rigidum</i>	2	ii-iii	iv	iii	xii (appears to be disturbance opportunist), Craig & Coates (2001) recommended deletion from priority list
<i>Goodenia scapiger</i> subsp. <i>graniticola</i>	2	unknown	vi	unknown	Unknown threatening processes
<i>Haegiela tatei</i>	2	unknown	iv	iii	xii (species is poorly collected)
<i>Hydrocotyle decipiens</i> ms	2	unknown	vi	unknown	Unknown threatening processes
<i>Isolepis australiensis</i>	2	unknown	vi	unknown	Unknown threatening processes
<i>Keraudrenia adenogyna</i> ms	2	unknown	vi	unknown	Unknown threatening processes
<i>Lasiopetalum maxwellii</i>	2	iii	iv	iii	xii (genus is undergoing taxonomic revision).
<i>Leucopogon compactus</i>	2	unknown	vi	unknown	Unknown threatening processes
<i>Leucopogon florulentus</i>	2	unknown	vi	unknown	Unknown threatening processes
<i>Leucopogon pleurandroides</i>	2	iii	iv	iii	xii (mining; appears to be disturbance opportunist), viii (<i>Phytophthora cinnamomi</i>)
<i>Leucopogon</i> sp. Kau Rock (MA Burgman 1126) [aff. <i>allittii</i>]	2	unknown	vi	unknown	Unknown threatening processes
<i>Melaleuca viminea</i> subsp. <i>appressa</i>	2	unknown	vi	ii	Unknown threatening processes
<i>Opercularia rubioides</i>	2	unknown	vi	ii	Unknown threatening processes
<i>Pimelea halophila</i>	2	unknown	vi	unknown	Unknown threatening processes
<i>Thysanotus brachiatus</i>	2	unknown	vi	unknown	Unknown threatening processes
<i>Thysanotus parviflorus</i>	2	iii	iv	iii	Unknown threatening processes

¹Appendix C, rank 2; ²Appendix C, rank 3; ³Appendix C, rank 1; ⁴Appendix B, key e

Analysis of appropriate management scenarios

Reservation priorities of ecosystems

Beard Veg Assoc	Ecosystem Description	IUCN Reserves	Non-IUCN Reserve	CALM Purchased Lease	Priority
4	Medium woodland; marri & wandoo				
8	Medium woodland; salmon gum & gimlet				
14	Low forest; jarrah				
27	Low woodland; paperbark (<i>Melaleuca</i> sp.)	X			
31	Shrublands; <i>Melaleuca thyooides</i> thicket with scattered York gum	X			
38	Shrublands; thicket, mixed	X			
42	Shrublands; mallee & acacia scrub on south coastal dunes	X			
47	Shrublands; tallerack mallee-heath	X			
48	Shrublands; scrub-heath	X			
50	Shrublands; dwarf scrub on granite (South coast)	X	X		
51	Sedgeland; reed swamps, occasionally with heath	X			
125	Bare areas; salt lakes	X			
126	Bare areas; freshwater lakes	X			
128	Bare areas; rock outcrops	X			

Beard Veg Assoc	Ecosystem Description	IUCN Reserves	Non-IUCN Reserve	CALM Purchased Lease	Priority
129	Bare areas; drift sand	X			
142	Medium woodland; York gum & salmon gum	X			
352	Medium woodland; York gum	X			
423	Shrublands; Acacia scrub-heath unknown spp	X			

511	Medium woodland; salmon gum & morrel	X			
516	Shrublands; mallee scrub, black marlock	X			
519	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i>	X			
552	Shrublands; <i>Casuarina acutivalvus</i> & calothamnus (also melaleuca) thicket on greenstone hills				
676	Succulent steppe; samphire	X			
691	Shrublands; <i>Dryandra quercifolia</i> & <i>Eucalyptus</i> spp. thicket	X			
929	Low forest; moort (<i>E. platypus</i>)				
931	Medium woodland; yate	X			
934	Shrublands; mallee scrub <i>Eucalyptus nutans</i>	X	X		
936	Medium woodland; salmon gum	X			
938	Medium woodland; York gum & yate	X			
940	Mosaic: Shrublands; mallee scrub, black marlock/Shrublands; tallerack mallee-heath	X			
942	Mosaic: Medium woodland; yate/Shrublands; mallee scrub, black marlock	X			
964	Shrublands; mallee scrub, black marlock & <i>Eucalyptus decipiens</i>	X			
965	Medium woodland; jarrah & marri	X			
967	Medium woodland; wandoo & yate	X			
968	Medium woodland; jarrah, marri & wandoo	X			
970	Low forest; jarrah & <i>Eucalyptus decipiens</i>	X			
975	Low woodland; jarrah	X			
976	Succulent steppe with low woodland; myoporium over samphire	X			
978	Low forest; jarrah, <i>Eucalyptus staeri</i> & <i>Allocasuarina fraseriana</i>				
980	Shrublands; jarrah mallee-heath	X			
982	Low woodland; <i>Eucalyptus decipiens</i>	X			
986	Shrublands; mallee-heath (Stirling Ra.)	X			
987	Medium woodland; jarrah & wandoo	X			
989	Shrublands; Albany blackbutt mallee-heath	X			
991	Medium woodland; small wandoo patches surrounded by e2, 5Mi; e5, 7Mi	X			
992	Medium forest; jarrah & wandoo (<i>E. wandoo</i>)	X			
994	Low forest; jarrah & casuarina (probably <i>Allocasuarina fraseriana</i>)	X	X		
995	Shrublands; mallee scrub, bushy yate & Bald l. marlock	X			
1075	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> & black marlock (<i>E. redunca</i>)				
1077	Medium woodland; jarrah & river gum				
1413	Shrublands; acacia, casuarina & melaleuca thicket				
1967	Medium woodland; wandoo, yate & river gum	X			
2048	Shrublands; scrub-heath in the Mallee Region				

Subregional constraints in order of priority

(see Appendix B, key g)

Irreplacibility: Very few options remain to conserve ecosystem and landscape.

Limited Opportunity Remains to Meet CAR Criteria

Economic Constraints (to a lesser extent)

Competing Land Uses: Major components of the landscape are covered by mines, mining tenements or exploration leases (e.g. Mining in Ravensthorpe Range) and to a lesser extent grazing.

Bioregional and subregional priority for reserve consolidation

Reserve consolidation rank is 5 (see Appendix D) on the table provided, but the bioregion should have an overall rank of 4 (Appendix C, rank 4). ESP1 is ranked 5 due to the relatively high level of reservation in the subregion, but ESP2 is under significantly more threat from mining, some vegetation associations have been extensively cleared and the reserve system is biased. Therefore, ESP2 should have a reserve consolidation rank of 3.

Reserve management standard

Many ESP1 reserves, particularly in the higher rainfall western end of the Bioregion, are subject to loss of biodiversity due to impact from *Phytophthora cinnamomi*. Minor agricultural weed invasion on sandy soils along western and northern boundaries of conservation reserves does occur. Wildfire management facilities are limited by resources, except for fire breaks and fire-access tracks

which are installed and maintained, some prescribed fuel reduction burning is undertaken on larger reserves - Manypeaks, Waychincup, Stirling Range, Corackerup, and Fitzgerald River. Feral predator control occurs in Manypeaks, Waychincup, Stirling Range, Corackerup, and Fitzgerald River National Parks only. Feral herbivore grazing (e.g. rabbits) occurs across most reserves, but goats are confined to Fitzgerald River.

Land status Class	Purpose	Reserve Number	Name	Category	Reserve Management ¹
A	National Park	14792	Stirling Range	National Park	iv
A	Conservation of Flora and Fauna	26160	Jebarjup	Nature Reserve	ii
A	Conservation of Flora and Fauna	26161	Camel Lake	Nature Reserve	ii
A	Conservation of Flora and Fauna	9159	Formby	Nature Reserve	ii
A	Conservation of Flora and Fauna	25583	Kalgan Plains	Nature Reserve	ii
A	Conservation of Flora and Fauna	25386	Chillinup	Nature Reserve	ii
C	Conservation of Flora and Fauna	26688	South Stirling	Nature Reserve	ii
A	National Park	25865	Waychincup	National Park	iii-iv
C	Conservation of Flora and Fauna	36028	Mount Manypeaks	Nature Reserve	iii
C	National Park	27502	Waychincup	National Park	iii-iv
C	Conservation of Flora and Fauna	36719	Arpenteur	Nature Reserve	i
A	Conservation of Flora and Fauna	25869	Bald Island	Nature Reserve	iii
C	Conservation of Flora and Fauna	27157	Cheyne Road	Nature Reserve	ii
A	National Park	26650	Hassell	National Park	i
C	Conservation of Flora and Fauna	26264	Tinkelelup	Nature Reserve	ii
A	Conservation of Flora and Fauna	29128	Basil Road	Nature Reserve	ii
C	Conservation of Flora and Fauna	26894	Mettler Lake	Nature Reserve	ii
C	Conservation of Flora and Fauna	26264	Mailalup	Nature Reserve	ii
C	Conservation of Flora and Fauna	17298	Greaves Road	Nature Reserve	ii
A	Conservation of Flora and Fauna	26793	Corackerup	Nature Reserve	ii
A	Conservation of Flora and Fauna	39971	Coomaldannerup	Nature Reserve	ii
A	Conservation of Flora and Fauna	28687	Pallinup	Nature Reserve	i-ii
A	National Park	31737	Fitzgerald River	National Park	iv
C	Conservation of Flora and Fauna	31425	Koomong	Nature Reserve	ii
A	Conservation of Flora and Fauna	31881	Long Creek	Nature Reserve	ii
C	Conservation of Flora and Fauna	31424	Aerodrome Road	Nature Reserve	ii
C	Conservation of Flora and Fauna	27525	Overshot Hill	Nature Reserve	ii
A	Conservation of Flora and Fauna	29184	Hayes Road	Nature Reserve	ii

Land status Class	Purpos	Reserve Number	Name	Category	Reserve Management ¹
C	Conservation of Flora and Fauna	26662	Steere River	Nature Reserve	ii
C	Conservation of Flora and Fauna	31128	Kundip	Nature Reserve	ii
C	Conservation of Flora and Fauna	27177	Unnamed	Nature Reserve	ii
A	Conservation of Flora and Fauna	25869	Bald Island	Nature Reserve	ii
A	Conservation of Flora and Fauna	31909	Glasse Island	Nature Reserve	ii
A	National Park	31738	Red Island, Unnamed, Unnamed	National Park	ii
A	Conservation of Flora and Fauna		Cheyne Island	Nature Reserve	i-ii
A	Conservation of Flora and Fauna	23516	Doubtful Islands	Nature Reserve	ii

¹Appendix C, rank 5

Off reserve conservation

Priority species or groups and existing recovery plans

Species	Beard Veg Assoc	Species Recovery Plan	General Recovery Plans	Prioritise for Subregion ¹
<i>Neophoca cinerea</i>	N/A	No	Action Plan for Australian Seals; South Coast Regional Management Plan.	
<i>Arctocephalus forsteri</i>	N/A	No	Action Plan for Australian Seals; South Coast Regional Management Plan.	
<i>Atrichornis clamosus</i>		RP	Action Plan for Australian Birds; South Coast Regional Management Plan.	iv
<i>Leipoa ocellata</i>		Malleefowl Preservation Society have current Action Plan and ongoing research	Action Plan for Australian Birds; South Coast Regional Management Plan.	
<i>Calyptorhynchus latirostris</i>		RP (draft)	Action Plan for Australian Birds; South Coast Regional Management Plan.	
<i>Dasyornis longirostris</i>		No	Action Plan for Australian Birds; South Coast Regional Management Plan.	
<i>Pseudocheirus occidentalis</i>		IRP	Action Plan for Australian Birds; South Coast Regional Management Plan.	
<i>Morelia spilota imbricata</i>		No	Action Plan for Australian Reptiles; South Coast Regional Management Plan.	
<i>Acacia rhamphophylla</i>	48	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	ii
<i>Acacia trulliformis</i>	931	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	ii
<i>Adenanthos cunninghamii</i>	42	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Andersonia pinaster</i>	978, 994	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Banksia brownii</i>	980,986	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Banksia goodii</i>	994	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv

Species	Beard Veg Assoc	Species Recovery Plan	General Recovery Plans	Prioritise for Subregion ¹
<i>Boronia clavata</i>	48	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	ii
<i>Caladenia bryceana</i> subsp. <i>bryceana</i>	931, 938, 967	IRP	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iii
<i>Caladenia harringtonii</i>	50	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Centrolepis caespitosa</i>		No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Conostylis misera</i>	14, 27	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iii
<i>Darwinia meeboldii</i>	986	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Daviesia megacalyx</i>	691, 47	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iii
<i>Drakaea confluens</i>	965	IRP	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Dryandra ionthocarpa</i>	47	IRP	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	ii
<i>Eremophila veneta</i>	676, 48	IRP	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Eucalyptus bennettiae</i>	47	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Grevillea maxwellii</i>	48,	IRP	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	ii
<i>Isopogon uncinatus</i>	48	IRP	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Kunzea pauciflora</i>	48	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Lambertia orbifolia</i>	14	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	ii
<i>Laxmannia jamesii</i>	994	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Lepidium aschersonii</i>		No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Marianthus villosus</i>	47	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Meziella trifida</i>		No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Myoporum cordifolium</i>	931, 929	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iii

Species	Beard Veg Assoc	Species Recovery Plan	General Recovery Plans	Prioritise for Subregion ¹
<i>Orthrosanthus muelleri</i>	967	IRP	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iii
<i>Pleurophascum occidentale</i>	14,994	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Thelymitra psammophila</i>	47	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iii
<i>Verticordia fimbriolepis</i> subsp <i>australis</i>		No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iv
<i>Verticordia helichrysantha</i>	48	No	Declared Rare and Poorly Known Flora in the Albany District; South Coast Regional Management Plan.	iii

¹Appendix C, rank 6.

Appropriate species recovery actions

Species	Recovery Actions ¹	Recovery Descriptions
<i>Neophoca cinerea</i>	i, iii, vii, vi, ix, xii, xiii, xiv	Habitat retention and protection through reserves and on other state lands; Feral animal control (rabbits); Weed control; Fire management; Research; Capacity building with Coast Care; Other – changes to commercial fishing and public education.
<i>Arctocephalus forsteri</i>	i, iii, vii, vi, ix, xii, xiii, xiv	Habitat retention and protection through reserves and on other state lands; Feral animal control (rabbits); Weed control; Fire management; Research; Capacity building with Coast Care; Other – changes to commercial fishing and public education.
<i>Atrichornis clamosus</i>	i, ii, iv, ix, x, xii, iii, vii, v, vi, xiv	Habitat retention and protection through reserves and on private land; Regrowth retention; Fire management; Translocation; Research; Habitat protection on other state lands; Feral animal control (rabbits); Fencing; Weed control; Other - consolidation of strategic connectivity between priority areas – e.g. The Macro Corridor priority linkages.
<i>Leipoa ocellata</i>	i, ii, iii, iv, v, vi, vii, viii, ix, xii, xiii, xiv	Habitat retention and protection through reserves, on private land and on other state lands; Regrowth retention; Fencing; Weed control; Feral animal control; Revegetation; Fire management; Research; Capacity building; Other - consolidation of strategic connectivity between priority areas – e.g. The Macro Corridor priority linkages.
<i>Calyptorhynchus latirostris</i>	i, ii, iii, iv, viii, ix, xi, xii, xiii, xiv	Habitat retention and protection through reserves, on private land and on other state lands; Regrowth retention; Revegetation; Fire management; Reinstatement of hydrology; Research; Capacity building; Other - consolidation of strategic connectivity between priority areas – e.g. The Macro Corridor priority linkages.
<i>Dasyornis longirostris</i>	ix, xii,	Fire management; Research – survey and monitoring.
<i>Pseudocheirus occidentalis</i>	vii, xii	Feral animal control; Research – survey and monitoring.
<i>Morelia spilota imbricata</i>	i, ii, iii, iv, vii, ix, xii, xiv	Habitat retention and protection through reserves, on private land and on other state lands; Regrowth retention; Feral animal control; Fire management; Research; Other - public awareness and consolidation of strategic connectivity between priority areas – e.g. The Macro Corridor priority linkages.
<i>Acacia rhamphophylla</i>	iii	Habitat protection on other state lands.
<i>Acacia trulliformis</i>	ii, ix, xi,	Habitat protection on private land; Fire management; Reinstatement of hydrology.
<i>Adenanthos cunninghamii</i>	i, iii, xii	Habitat retention and protection through reserves and on other state lands; Research.
<i>Andersonia pinaster</i>	iii, xiv	Habitat protection on private land; Other - phosphite application.
<i>Banksia brownii</i>	i, iii, ix, xiv	Habitat retention and protection through reserves and on other state lands; Fire management; Other - phosphite application.
<i>Banksia goodii</i>	i, ii, iii, ix, xiv	Habitat retention and protection through reserves, on private land and on other state lands; Fire management; Other - roadside markers.
<i>Boronia clavata</i>	iii, ix, xi, xiv	Habitat protection on private land; Fire management; Reinstatement of hydrology; Other - seed collection.

Species	Recovery Actions ¹	Recovery Descriptions
<i>Caladenia bryceana</i> subsp. <i>bryceana</i>	i, ii, iii, vi, ix, xiv	Habitat retention and protection through reserves, on private land and on other state lands; Weed control; Fire management; Other - seed collection and public education.
<i>Caladenia harringtonii</i>	iii, ix, vi, xiv	Habitat protection on private land; Fire management; Weed control; Other - seed collection.
<i>Centrolepis caespitosa</i>	iii	Habitat protection on private land.
<i>Conostylis misera</i>	i, ii, iii, v, vi, vii,	Habitat retention and protection through reserves, on private land and on other state lands; Fencing; Weed control; Feral animal control.
<i>Darwinia meeboldii</i>	i, ii, ix	Habitat retention and protection through reserves and on private land; Fire management.
<i>Daviesia megacalyx</i>	iii, ix, xiv	Habitat protection on other state lands; Fire management; Other - seed collection.
<i>Drakea confluens</i>	i, ii, vii, ix, xiv	Habitat retention and protection through reserves and on private land; Feral animal control; Fire management; Other - public education.
<i>Dryandra ionthocarpa</i>	iii, vi, ix, x, i, xii	Habitat protection on other state lands; Weed control; Fire management; Translocation;

		Habitat retention and protection through reserves; Research.
<i>Eremophila veneta</i>	ii, v, xi	Habitat protection on private land; Fencing; Reinstatement of hydrology.
<i>Eucalyptus bennettiae</i>	i, iii, xiii	Habitat retention and protection through reserves and on other state lands; Capacity building.
<i>Grevillea maxwellii</i>	ii, iii, v, vi, ix, xii, xiv	Habitat protection on private land and on other state lands; Fencing; Weed control; Fire management; Research; Other - public education.
<i>Isopogon uncinatus</i>	i, iii, ix, xiv	Habitat retention and protection through reserves and on other state lands; Fire management; Other - phosphite application.
<i>Kunzea pauciflora</i>	i, iii, ix	Habitat retention and protection through reserves and on other state lands; Fire management.
<i>Lambertia orbifolia</i>	i, ii, iii, v, vi, ix, x, xiii	Habitat retention and protection through reserves, on private land and on other state lands; Fencing; Weed control; Fire management; Translocation; Capacity building.
<i>Laxmannia jamesii</i>	i, iii	Habitat retention and protection through reserves and on other state lands;
<i>Lepidium aschersonii</i>		Recovery actions not known
<i>Marianthus villosus</i>	iii, ix	Habitat protection on other state lands; Fire management.
<i>Meziella trifida</i>		Recovery actions not known
<i>Myoporum cordifolium</i>	i, ii, iii, ix, xiv	Habitat retention and protection through reserves, on private land and on other state lands; Fire management; Other - roadside markers.
<i>Orthrosanthus muelleri</i>	ii, iii, vi, ix, xi, xiv	Habitat retention and protection on private land and on other state lands; Weed control; Fire management; Reinstatement of hydrology; Other - roadside markers.
<i>Pleurophascum occidentale</i>	i, ii, iii, ix	Habitat retention and protection through reserves, on private land and on other state lands; Fire management.
<i>Thelymitra psammophila</i>	i, ii, iii, vi, ix, xiv	Habitat retention and protection through reserves, on private land and on other state lands; Weed control; Fire management; Other - public education and roadside markers.
<i>Verticordia fimbriolepis</i> subsp. <i>australis</i>		Recovery actions not known
<i>Verticordia helichrysantha</i>	i, iii, ix, xiv	Habitat retention and protection through reserves and on other state lands; Fire management; Other - management of access.

¹Appendix B, key h.

All terrestrial mammals and most of the birds listed as being species at risk in this subregion are found within current Department of CALM estate and there are few if any recent records outside reserves. However, many of these species do have relevant recovery or interim recovery plans:

- Chuditch (*Dasyurus geoffroii*) (Orell and Morris 1994)
- Numbat (*Myrmecobius fasciatus*) (Friend 1994 (unpublished))
- Dibbler (*Parantechinus apicalis*) (Start 1998)
- Western Ground Parrot (*Pezoporus wallicus flaviventris*) (Burbidge *et al.* 1997)
- Giant Andersonia (*Andersonia axilliflora*) (Evans *et al.* 1999)
- Maroon-flowered Daviesia (*Daviesia glossema*) (Phillimore and Brown 2001)
- Stirling Range Daviesia (*Daviesia pseudaphylla*) (Phillimore and Brown 2001)
- Cactus Dryandra (*Dryandra anaton*) (Phillimore and Brown 2001)
- Stirling Range Dryandra (*Dryandra montana*) (Kershaw *et al.* 1997)
- Round-leafed Honeysuckle (*Lambertia orbifolia* subsp. *orbifolia* ms) (Phillimore and Brown 2002)
- Stirling Range Beard Heath (*Leucopogon gnaphalioides*) (Phillimore and Brown 2001)
- Small-flowered Snottygobble (*Persoonia micranthera*) (Evans *et al.* 1999)
- Gillham's Bell (*Darwinia oxylepis*) (Phillimore *et al.* 2001)
- South Stirling Morning Iris (*Orthrosanthus muelleri*) (Phillimore *et al.* 2001)
- Mountain Paper Heath (*Sphenotoma drummondii*) (Holland 1999)
- Grey Nurse Shark (*Carcharias taurus*) (Environment Australia 2002a)
- Great White Shark (*Carcharodon carcharias*) (Environment Australia 2002b)

In addition to these recovery or interim recovery that apply in to individual species, there are a number of action plans that are applicable for birds (Garnett and Crowley 2000), marsupials and monotremes (Maxwell *et al.* 1996), reptiles (Cogger *et al.* 1993), rodents (Lee 1995), seals (Shaugnessy 1999), albatrosses and petrels (Environment Australia 2001) and Declared Rare and poorly known flora of the Albany region (Robinson and Coates 1995).

Ecosystems, existing recovery plans and appropriate recovery actions

There are no off-park conservation actions required for Ecosystems at Risk. An Interim Recovery Plan is available for East Stirling Range Montane Heath and Thicket (Barrett 2000), but this TEC is currently in Department of CALM reserve. The Department's South Coast Regional Management Plan (1992) is also relevant to ecosystems and species at risk in the subregion.

Subregion priority for off reserve conservation

Most species in the above table have been assigned separate priorities.

Conservation actions as an integral part of NRM

Existing NRM actions

Incentives: May include fencing subsidies for protection of remnant vegetation which are moderately effective; private land conservation covenants; Land for Wildlife.

Legislation: Some aspects of State Government legislation is not enforced, e.g. Soil Land Conservation Act other legislation e.g. Wildlife Conservation Act is

outdated and requires replacement with comprehensive biodiversity protection legislation.

Threat Abatement Planning: Western Shield fox control programme very successful on some Crown lands in assisting the recovery of fauna numbers; Rabbit Calici Virus also maintaining some effect against rabbit numbers; Australian Locust control programme also moderately effective as a control; *Phytophthora* controlled in small areas using phosphite; Weed control occurs in some areas.

Industry Codes of Practice: Mining and environmental protection and revegetation in Ravensthorpe area; Kangaroo shooters are required to adhere to a code of practice to ensure treatment and killing of animals.

Environmental Management Systems & Ecologically Sustainable Product Marketing: Introduction of Sandalwood plantations on private land for essential oil production on private land; Limited application of organic agriculture.

Capacity Building: For example, South Coast Regional Initiative Planning Team (SCRIPT); the Macro Corridor project is used as a tool to be used to identify strategic landscape level connectivity.

Other Planning Opportunities: Including: local government planning; National Action Plan for Water Quality and Salinity – Salinity Action Plan and Ribbons of Blue projects successfully in place; Southern Prospects, Southern Shores.

Integration with Property Management Planning, Catchment Planning and Landcare: Landcare District Committees active in most areas of the Subregion providing opportunities for public participation in conservation projects. eg revegetation.

Feasible opportunities for NRM

Incentives: Have a lot of potential as channels for people to use to protect biodiversity on their land. Examples include expansion of the Land for Wildlife scheme and other government run conservation programmes.

Legislative: Revision is required eg Wildlife Conservation Act.

Institutional Reform: Rural reconstruction and new management systems which further incorporate opportunities for renewable resources, rural resources such as agroforestry, oil mallees and other specialty crops to make better use of cleared land and relieve commercial pressure on native flora.

protect remnant vegetation on private land e.g. taxation incentives or benefits a rural land rating

Valuing Ecosystem Services and Tradable Rights: Greater incentives are necessary to incentives for remnant vegetation protection.

Threat Abatement Planning: Further research and control measures are necessary into potential environmental weeds and those already causing impacts;

Research needs to be continued to improve feral cat control; Local governments need to be involved for management of threats in road and shire reserves; Further development of rabbit control techniques needs to occur.

Environmental Management Systems: Greater coordination is needed in planning and management of feral animals and weeds across all land tenure; Organic farming has the potential to be much more widely applied.

Capacity Building: Greater acknowledgement of the intrinsic environmental values of uncleared lands through public awareness education and property management planning – promoted through the South Coast Regional Initiative Planning Team (SCRIPT) – an interagency environmental and conservation planning approach or Landcare groups. There is further scope for the Macro Corridor project is used as a tool to be used to identify strategic landscape level connectivity.

Codes of Practice: These are needed for the agricultural industry (particularly for the issues of weeds, pesticides and insecticides), local governments and road reserves.

Other Planning Opportunities: The agricultural industry needs to aim for greater sustainability in farming practices.

Integration with Property Management Planning, Catchment Planning and Landcare: Needs to occur across all land tenures.

Impediments or constraints to opportunities

Outdated legislation represents an impediment to biodiversity conservation as do operational constraints arising from limited financial and human resources available for many ideas, initiatives and public education programmes. The Macro Corridor concept is a useful tool to raise awareness of biodiversity issues, however, existing land use conflicts have implication for natural land management. In general there is a lack of appreciation of complex biodiversity issues by the community. The terms of Native Title agreements (and future settlements) are likely to have profound implications for NRM actions in the future and the legal and administration issues are likely to be complex.

Subregions where specific NRM actions are a priority to pursue

Major constraints exist to implement effective NRM actions to achieve biodiversity outcomes in Jerramungup and Kent Shires in the ESP1 subregion due to past land clearing practices and current land management practices. Some NRM instruments are in place elsewhere, with some achieved biodiversity outcomes, giving an overall NRM rank of (ii) (see Appendix C, rank 7).

Data gaps

Gaps in data needed for the Identification of biodiversity values and management responses

Vegetation and Regional Ecosystem Mapping: No regolith mapping available. Vegetation map resolution is 1:250,000 at best. Fitzgerald River National Park has 1:100,000 vegetation mapping.

Systematic Fauna Survey: No systematic quadrat-based fauna survey information available for existing conservation reserves, except for the Fitzgerald River National Park (1: 100,000). No systematic quadrat-based fauna survey information available for off conservation reserves either. Data is confined to bird atlas, specific threatened bird distributions (ie Western Bristlebird, Western Ground Parrot, Noisy Scrub-bird), Fitzgerald River National Park surveys and six Western Shield monitoring sites for mammals. No funding for ongoing monitoring of stratified set of LTERM quadrats currently being sampled across the subregion. Most reserves don't have long-term survey data on species presence or absence even for vertebrates.

Flora Survey: No systematic quadrat-based flora survey, except for the Fitzgerald River Nature Park. Most reserves don't have long-term survey data on species presence/absence; data is confined to specific threatened flora, and a few large reserves. No funding for ongoing monitoring of stratified set of LTERM quadrats currently being sampled across the subregion.

Ecological and Life History Data: There is little data available on habitat requirements of virtually all

invertebrate species, most ephemeral plants (except some DRF), persisting and translocated CWR mammals (except dibbler, chuditch, tammar, numbat, phascogale), persisting E/V birds (except Noisy Scrub-bird, Whipbirds, Bristle Birds, Ground Parrots, Malleefowl), and uncommon vertebrate- and plant-species. There is no data to provide a regional context on life-history (including population-trend) of most species, including foxes, except baseline information on CWR mammals on Stirling Range National Park and Fitzgerald River National Park (data collected during Western Shield Monitoring).

Other priority data gaps include:

- No quantitative data on the effect of *Phytophthora* sp. on flora and fauna, exotic predators, weed colonisation, fragmentation & farm clean-up, fire.
- No data on effect of mining (exploration) on greenstone communities in Ravensthorpe Range.
- Effect of rising water table on species composition of communities remaining within the agricultural landscape.
- Impact of reduced rainfall on vegetation.
- No comprehensive biological survey of island biota.

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