

SOUTH COAST THREATENED BIRDS RECOVERY PLAN

2009-2018

Western Ground Parrot (*Pezoporus wallicus flaviventris*)

Western Bristlebird (*Dasyornis longirostris*)

Noisy Scrub-bird (*Atrichornis clamosus*)

Western Whiibird (western heath) (*Psophodes nigrogularis nigrogularis*)

Western Whiibird (western mallee) (*Psophodes nigrogularis oberon*)

Rufous Bristlebird (western) (*Dasyornis broadbenti litoralis*)

Western Australian Wildlife Management Program No. 44



Department of
Environment and Conservation

Our environment, our future



Australian Government

South Coast Threatened Birds Recovery Plan 2009-2018

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Rufous Bristlebird (western) (*Dasyornis broadbenti litoralis*)

July 2009

South Coast Region
Department of Environment and Conservation
120 Albany Highway, Albany WA 6330

for the South Coast Threatened Birds Recovery Team

FOREWORD

This Recovery Plan has been developed within the framework laid down in the Western Australian Department of Environment and Conservation (DEC) Policy Statements Nos 44 and 50, and the Commonwealth Department of the Environment, Water, Heritage and the Arts Revised Recovery Plan Guidelines for Nationally Listed Threatened Species and Ecological Communities.

Recovery Plans outline the recovery actions that are required to address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

Recovery Plans delineate, justify and schedule management actions necessary to support the recovery of threatened species and ecological communities. The attainment of objectives and the provision of funds necessary to implement actions is subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities. This Recovery Plan does not necessarily represent the views or the official position of individuals or organisations represented on the South Coast Threatened Birds Recovery Team.

This Recovery Plan was approved by the Department of Environment and Conservation. Approved Recovery Plans are subject to modification as dictated by new findings, changes in status of the taxa or ecological community and the completion of recovery actions. The provision of funds identified in this Recovery Plan is dependent on budgetary and other constraints affecting the Department, as well as the need to address other priorities.

This South Coast Threatened Birds Recovery Plan will operate within a 10-year time-frame, though it will remain in force unless reviewed and updated or replaced. This Recovery Plan replaces the current Recovery Plans for the Noisy Scrub-bird (Danks *et al.* 1996) and the Western Ground Parrot (Burbidge *et al.* 1997).

The South Coast Threatened Birds Recovery Team has the responsibility of coordinating and directing the implementation of the recovery actions outlined in this Recovery Plan. Background information and further recovery action details are provided in the Gilfillan *et al.* (2006) addendum to this document.

Information in this Plan is accurate at July 2009.

RECOVERY PLAN PREPARATION

This Recovery Plan was prepared by Sandra Gilfillan, Sarah Comer, Allan Burbidge, John Blyth, Alan Danks and Janet Newell of the Department of Environment and Conservation, by adaptation of parts of Gilfillan *et al.* (2006) and addition of current information, for the South Coast Threatened Birds Recovery Team. Anna Nowicki (Species and Community Branch, Department of Environment and Conservation) proofread the plan; any remaining errors are not her responsibility. The preparation of this Recovery Plan was funded by the Commonwealth Department of the Environment, Water, Heritage and the Arts, and the Department of Environment and Conservation.

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SUMMARY

Western Ground Parrot (*Pezoporus wallicus flaviventris*)

Family:	Psittacidae
DEC Regions:	South Coast
DEC Districts:	Albany, Esperance
Current status of taxon:	National: Endangered, WA: Critically Endangered
Distribution and Habitat:	Currently only occur in two areas: Fitzgerald River National Park, and Cape Arid National Park and nearby parts of Nuytsland Nature Reserve. They occur in long unburnt (5 to 40+ years), floristically diverse, near-coastal dry heath (400-600 mm rainfall).

Western Bristlebird (*Dasyornis longirostris*)

Family:	Dasyornithidae
DEC Regions:	South Coast
DEC Districts:	Albany
Current status of taxon:	National: Vulnerable, WA: Vulnerable
Distribution and Habitat:	The Western Bristlebird currently occurs at Two Peoples Bay Nature Reserve, Betty's Beach, Mt. Manypeaks to Bluff Creek, and in the Fitzgerald River National Park (McNee 1986; Comer & McNee 2001). They occur in floristically diverse, closed, near-coastal heaths 1-1.5 m high with a wide variety of shrubs, usually with abundant sedges and thickets of low eucalypts 2-4 m tall. In Fitzgerald River National Park the habitat is more open, but generally contains patches of dense shrubs (McNee 1986).

Noisy Scrub-bird or Tjimiriluk (*Atrichornis clamosus*)

Family:	Atrichornithidae
DEC Regions:	South Coast, Warren, South West, Swan
DEC Districts:	Albany, Frankland, Wellington, Blackwood, Perth Hills
Current status of taxon:	National: Vulnerable, WA: Endangered
Distribution and Habitat:	The Noisy-Scrub bird occurs from Two Peoples Bay Nature Reserve to Cheyne Beach, with an outlying translocated sub-population on Bald Island. They are found in dense vegetation, including low forest, scrub/thicket and (rarely) heath. These vegetation formations generally occur in the gullies and drainage lines of hills and granite mountains and, in lowland areas, in overgrown swamps, lake margins and beside streams.

Western Whistler (western heath) (*Psophodes nigrogularis nigrogularis*)

Family:	Psophodidae
DEC Regions:	South Coast
DEC Districts:	Albany
Current status of taxon:	National: Endangered, WA: Endangered
Distribution and Habitat:	Restricted to a small coastal strip east of Albany from Two Peoples Bay/Mt Gardiner in the south west to about Cape Riche Road in the north east, with the South Coast Highway as an approximate inland boundary. In this area, it occurs in heath-like thicket associations on coastal dunes and in low, dense mallee woodland or shrubland with understorey of dense, stunted shrubs.

Western Whipbird (western mallee) (*Psophodes nigrogularis oberon*)

Family:	Psophodidae
DEC Regions:	South Coast, Wheatbelt
DEC Districts:	Albany, Esperance, Great Southern
Current status of taxon:	National: Vulnerable, WA: Priority 4
Distribution and Habitat:	Restricted to scattered sub-populations throughout the southern wheatbelt and central south coast regions, with largest sub-populations in Fitzgerald River and Stirling Ranges National Parks. It occurs in open mallee eucalypt woodland with dense, tall shrub layer up to 1.5 m tall, dominated by such species as <i>Hakea</i> , <i>Lambertia</i> , <i>Dryandra</i> or <i>Banksia</i> .

Rufous Bristlebird (western) or South-western Bristlebird (*Dasyornis broadbenti litoralis*)

Family:	Dasyornithidae
DEC Regions:	South West
DEC Districts:	Blackwood
Current status of taxon:	National: Extinct, WA: Presumed to be Extinct
Distribution and Habitat:	Was known only from the coast between Cape Mentelle and Cape Naturaliste at the south-western tip of Western Australia. Habitat preferences are poorly known, but it was reported to be an inhabitant of dense coastal heath around 40 cm high.

Habitat Critical for Survival:

For the south coast threatened birds, habitat critical to the survival of these taxa is defined as:

- the current area of occupancy of one or more taxa;
- possible other areas used, e.g. dispersal corridors; and
- potential habitat into which one or more of the taxa could disperse or be translocated.

Recovery Plan Objectives:

1. Integrate the management and recovery of the five extant south coast threatened birds.
2. Maintain population numbers of south coast threatened birds at least at current levels, and increase where possible.
3. Improve knowledge of the current distribution of south coast threatened birds.
4. Increase management options through improved knowledge of those aspects of south coast threatened birds' ecology that limits their distribution and numbers.
5. Reduce vulnerability of south coast threatened bird populations due to their small size and area of extent, in particular Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds.
6. Increase community participation and stewardship in the conservation of south coast threatened birds.

Recovery Team:

South Coast Threatened Birds Recovery Team.

Recovery Actions:

- 1.1. Integrate the coordination and implementation of the multi-species recovery actions.
- 1.2. Seek the funding necessary to implement the recovery actions.
- 2.1. Continue habitat management and threat abatement of all areas occupied by south coast threatened birds within an adaptive management framework.
- 2.2. Ensure that the conservation of 'habitat critical' for south coast threatened birds is taken into consideration as part of all fire management planning and implementation for those habitats.
- 2.3. Continue to census known sub-populations and any new sub-populations of all extant south coast threatened birds.
 - 3.1. Map the area of 'habitat critical', and estimate population densities, for each of the south coast threatened birds.
 - 3.2. Determine and map the areas of potential suitable habitat for south coast threatened birds.
 - 3.3. Investigate reported sightings of south coast threatened birds from new locations, in particular Western Ground Parrot, Western Bristlebird and Rufous Bristlebird (western).
 - 3.4. Conduct surveys of potential Western Ground Parrot and Western Bristlebird habitat to search for new sub-populations.
 - 3.5. Refine census/monitoring protocols for south coast threatened birds to improve detection of population changes, in particular changes in small populations.
 - 3.6. Obtain funding for, design, and conduct a systematic survey of all likely habitats for the Rufous Bristlebird (western).
- 4.1. Continue to investigate the habitat requirements for south coast threatened birds, in particular in relation to fire age, vegetation structure and food availability.
- 4.2. Investigate and document the responses of all south coast threatened birds to fire and post-fire regeneration.
- 4.3. Investigate the relationship between *Phytophthora cinnamomi* and the habitat requirements of south coast threatened birds, including the impact of *P. cinnamomi* on food supply and habitat suitability.
- 4.4. Investigate the impact of cat and fox predation on the south coast threatened birds and support the development of cat control methods.
- 4.5. Investigate the dietary requirements of Western Ground Parrots.
- 4.6. Conduct genetic research to resolve the status of the two Western Whistler subspecies.
- 5.1. Continue to investigate the need, and opportunities, for translocations of all extant south coast threatened birds taxa.
 - 5.2. Continue the Western Bristlebird translocation program.
 - 5.3. Continue the Noisy Scrub-bird translocation program.
 - 5.4. Develop a Western Ground Parrot translocation program, beginning with a trial translocation (if there are suitable source populations).
 - 5.5. Develop a captive breeding program for Western Ground Parrots.
- 6.1. Publish and distribute information to the public, landholders and scientific community relating to the management and recovery of south coast threatened birds.
- 6.2. Continue to facilitate participation by the community in recovery project activities.
- 6.3. Foster and encourage 'Friends' groups for south coast threatened birds.
- 6.4. Continue to encourage appropriate community membership on the Recovery Team.

Cost: \$5,880,000 over five years.

1 INTRODUCTION

This recovery plan covers five taxa of threatened birds that occur in coastal and near-coastal habitats on the south coast of Western Australia (Table 1). In addition to these five extant taxa, this plan also covers one taxon that is presumed to be extinct. These five extant taxa and one presumed extinct taxon are herein referred to as the ‘south coast threatened birds’.

The south coast threatened birds covered by this recovery plan overlap extensively in their distributions and have largely declined to their current status due to similar factors. Five other threatened bird taxa also occur in the same south coast region: Carnaby’s Black-Cockatoo (*Calyptorhynchus laticaudis*), Baudin’s Black-Cockatoo (*Calyptorhynchus baudinii*), Western Long-billed or Muir’s Corella (southern) (*Cacatua pastinator pastinator*), Malleefowl (*Leipoa ocellata*) and Australasian Bittern (*Botaurus poiciloptilus*), but are not covered by this plan because they have far more widespread distributions, occur largely in different habitat and/or are covered by other current recovery plans.

This recovery plan provides background information on the south coast threatened birds and threatening processes affecting them, and integrated actions for the recovery of these taxa. Further background information, species-specific recovery actions, and area-based management actions are provided in the Gilfillan *et al.* (2006) addendum to this document.

1.1 Conservation Status

The five extant south coast threatened birds considered in this recovery plan are listed as threatened under Commonwealth legislation (Table 1). However, the Western Whistler (western mallee) (*Psophodes nigrogularis oberon*) is not listed under State legislation and data supporting its delisting is currently being considered by the Commonwealth Department of the Environment, Water, Heritage and the Arts. This taxon is included in this recovery plan and managed on the basis of its State classification as a Priority species.

Table 1: National and State conservation status of the six south coast threatened birds covered in this recovery plan.

Species	Conservation Status	
	National ¹	Western Australia ²
Western Ground Parrot (<i>Pezoporus wallicus flaviventris</i>)	Endangered	Schedule 1 (Critically Endangered)
Western Bristlebird (<i>Dasyornis longirostris</i>)	Vulnerable	Schedule 1 (Vulnerable)
Noisy Scrub-bird or Tjimirlik (<i>Atrichornis clamosus</i>)	Vulnerable	Schedule 1 (Endangered)
Western Whistler (western heath) (<i>Psophodes nigrogularis nigrogularis</i>)	Endangered	Schedule 1 (Endangered)
Western Whistler (western mallee) (<i>Psophodes nigrogularis oberon</i>)	Vulnerable (currently under review)	Not listed (Priority 4)
Rufous Bristlebird (western) or South-western Bristlebird (<i>Dasyornis broadbenti litoralis</i>)	Extinct	Schedule 2 (Presumed to be Extinct)

Relevant legislation:

¹ Environmental Protection and Biodiversity Conservation Act 1999

² Wildlife Conservation Act 1950

1.2 South Coast Threatened Birds Recovery Team

The south coast threatened birds are covered by a multi-species South Coast Threatened Birds Recovery Team, which was formed in 1996. This recovery team replaced three single species (Noisy Scrub-bird, Western Bristlebird and Western Ground Parrot) recovery teams and also assumed responsibility for the two Western Whipbird subspecies. This multi-species recovery team was formed because membership of all three single species teams was similar, and to improve cost-effectiveness and facilitate the integration of recovery activities for the five south coast threatened bird taxa, all affected by the same threatening processes, especially where their geographic ranges overlap.

The membership of the South Coast Threatened Birds Recovery Team includes representatives from the Department of Environment and Conservation (DEC), Alcoa Australia, Birds Australia, independent researchers and veterinarians, Friends of the Western Ground Parrot and the Albany Bird Group.

The South Coast Threatened Birds Recovery Team has the responsibility of coordinating and directing the implementation of the recovery actions outlined in this recovery plan. This recovery plan replaces the current recovery plans for the Noisy Scrub-bird (Danks *et al.* 1996) and the Western Ground Parrot (Burbidge *et al.* 1997).

2 SPECIES INFORMATION

2.1 Western Ground Parrot (*Pezoporus wallicus flaviventris*)

2.1.1 Description

The Western Ground Parrot (*Pezoporus wallicus flaviventris*) is a medium-sized, slim parrot (105-110 g, wing length 135-145 mm (Burbidge *et al.* 1989)) with a long, strongly graduated tail comprising narrow, pointed feathers (Forshaw 1973, 1981) and short, rounded wings. The adults are generally rich green, strongly mottled with black and yellow, with a red frontal band above the beak.

There are three subspecies of Ground Parrot (*P. wallicus*), with the western subspecies differing from the other subspecies with slight morphological differences (*P. w. flaviventris* have a yellow, rather than greenish yellow, lower breast and abdomen), some habitat differences, and possibly behavioural differences (including differences in calls) (Burbidge *et al.* 1989; Burbidge *et al.* 1990). Recent genetic work indicates that the Western Ground Parrot differs significantly from the Eastern birds and is probably a full species in its own right (Murphy *et al.* 2009). However, until this is confirmed in the scientific literature, this plan will continue to refer to the Western Ground Parrot as *P. w. flaviventris*.

2.1.2 Distribution and Habitat

The Ground Parrot (*Pezoporus wallicus*) is a cryptic, ground-dwelling parrot with a fragmented distribution in coastal south-eastern and south-western parts of Australia. At the time of European colonisation, the Western Ground Parrot (*P. w. flaviventris*) was distributed in coastal areas from Cape Arid, west along the south coast and north possibly to the Dongara-Watheroo area of Western Australia (Watkins 1985) (Appendix 1: Map1).

At the time of writing this plan, Western Ground Parrots are known to exist in only two areas: Fitzgerald River National Park, and Cape Arid National Park and nearby parts of Nuytsland Nature Reserve (Appendix 1: Map1). They occur in long unburnt (5 to 40+ years), floristically diverse, near-coastal dry heath (400-500 mm rainfall). This vegetation is usually <0.5 m high, though often up to 1 m high, with >50% cover. Sedges are generally abundant, making up >40% of total cover. Although these parrots are usually found in long unburnt vegetation, they have been observed to feed in habitats 2-3 years post-fire provided there is older vegetation nearby.

The whole population of Western Ground Parrots was estimated in 2004 and 2005 to be fewer than 200 individuals in eight sub-populations, having declined from an estimated 378 birds in 1990 (Table 2). Although reliable estimates of numbers are difficult to obtain due to the parrots cryptic nature and low population densities (Cale & Burbidge 1993), it does appear that this decline in numbers is real in at least some sub-populations. By 2007 and 2008 considerable surveying is suggesting that further rapid decline is occurring and that the population as of 2008 may be fewer than 140 birds (Table 2).

Table 2: Estimates of population size at each sub-population and the whole population of the Western Ground Parrot (*Pezoporus wallicus flaviventris*) in 1990, 2004, 2005, 2007 and 2008 (from Watkins & Burbidge 1992; B. Barrett & A. Berryman unpublished).

Site	Sub-population estimates 1990	Sub-population estimates 2004	Sub-population estimates 2005	Sub-population estimates 2007	Sub-population estimates 2008
<i>Fitzgerald River National Park</i>					
Hamersley Dr (Burnt 97/98)	145	<5	<5	0	-
Short Road	67	30	30	3-4	0
Fitzgerald Track	40	<5	0	-	-
Drummond Track	35	20	30	10-15	6-12
Moir Track	3	2	0	-	-
Telegraph Track		6	10	1-2	2-4
Other	?13	15	10	-	-
<i>Waychinicup</i>					
	-	<4 [#]	0	0	0
<i>Cape Arid National Park</i>					
Poison Creek Road	75	30+	30	20-40	20+
Pasley/Telegraph Track	-	20+	40	30-40?	100+*
Pt Malcolm	-	2	20	-	-
Whole population estimate	378	<200	<180	64-101	78-136

[#] Estimate based on one bird heard calling in late 2003.

* Since the 2008 survey, a fire at Pasley/Telegraph Track is estimated to have impacted 40-50 of the birds heard in that survey and their whereabouts are unknown.

2.1.3 Biology and Ecology

Western Ground Parrots are known to have good dispersal abilities and can fly long distances. However, they are rarely seen, and spend much of the day walking, feeding and resting in the low heathlands. These parrots eat seeds, fruits and flowers with little specialisation (although they avoid large seeds in woody fruits) and forage on the ground or in low shrubs. Regular flights are not made until after sunset or before sunrise when they fly between feeding and overnight roosting sites.

Western Ground Parrots are generally solitary and are not known to not establish territories. The breeding season appears to be from July to December, although few nests have ever been observed.

The call of the Western Ground Parrot is a distinctive series of high-pitched whistling notes and an occasional buzzing call (buzzing calls have not been reported for the Eastern Ground Parrot and have only been recorded in Western birds in Fitzgerald River National Park). Calling generally occurs 20 to 60 minutes after sunset and about 60 to 20 minutes before sunrise.

2.2 Western Bristlebird (*Dasyornis longirostris*)

2.2.1 Description

The Western Bristlebird (*Dasyornis longirostris*) is a medium-sized (weight 26-39 g, length c. 17 cm), ground dwelling bird with short wings, long graduated tail and a sturdy, slightly decurved bill. The adults have rufous brown wings, rump and tail, and the under-body is off-white to brownish-grey, finely scalloped black-brown (Higgins & Peter 2002).

2.2.2 Distribution and Habitat

Historic records of the Western Bristlebird suggest that it occurred in coastal areas from Perth to Augusta and from Albany to Fitzgerald River National Park (Appendix 1: Map 2). The Western Bristlebird currently occurs at Two Peoples Bay Nature Reserve, Betty's Beach, Mt. Manypeaks to Bluff Creek, and in the Fitzgerald River National Park (McNee 1986; Comer & McNee 2001). No Bristlebirds have been located in the area between these two populations, a distance of 120 km, despite there being extensive apparently suitable habitat.

Western Bristlebirds occur in floristically diverse, closed, near-coastal heaths 1-1.5 m high with a wide variety of shrubs, usually with abundant sedges and thickets of low eucalypts 2-4 m tall. In Fitzgerald River National Park the habitat is more open, but generally contains patches of dense shrubs (McNee 1986). The fire requirements of this species are poorly known. It appears to be able to survive fire where patches of habitat remain unburnt. At Two People's Bay Nature Reserve heaths were reoccupied 2-3 years post fire (Burbidge 2003), though heaths in drier areas may not be reoccupied until 11-14 years after fire (Smith 1987).

The total population size of the Western Bristlebird is not known with certainty. The most recent population estimate was of at least 327 pairs in 2005. The density of birds appears to be far greater in the Manypeaks-Waychinicup areas than in the Fitzgerald River National Park, but reasons for this are unknown. The number of birds in the Albany to Mt Manypeaks area was found to have declined from 2001 to 2005, largely as a result of wildfires, although the cause for the decline in some areas is unclear (Comer & McNee 2001; Tiller *et al.* 2006).

2.2.3 Biology and Ecology

The Western Bristlebird is shy, elusive and rarely seen, though frequently heard in suitable habitat. They forage mostly on or close to the ground for invertebrates and seeds. They fly weakly and reluctantly, and then only for short distances, skimming the vegetation (Higgins & Peter 2002).

Western Bristlebirds occupy home ranges that may or may not overlap with other individuals. In each home range there is a dominant 'A' calling bird (assumed to be male) and a second (presumed female bird) providing answering 'B' calls. However, more than two Western Bristlebirds are sometimes associated with a given home range and a single individual has been heard to give both 'A' and 'B' calls. This means that population indices based on the presence of 'A' calling birds must be interpreted with caution.

2.3 Noisy Scrub-bird (*Atrichornis clamosus*)

2.3.1 Description

Noisy Scrub-birds (*Atrichornis clamosus*), also known as Tjimiriluk, are small, solidly built birds with a strong pointed bill, powerful legs, graduated tail and short, round wings. They are brown above with dark cross-barring extending from the head to the tip of the tail. The dark bars are very fine on the head, broader and more obvious on the back, and form irregular bands on the tail feathers. The underparts are paler with a buff-coloured abdomen grading to bright rufous around the vent. The species is sexually dimorphic in size and plumage, with adult males having a dark grey band of variable width across the off-white throat and prominent white side flashes, and the females having cream-coloured throats and lacking the band. During the breeding season, females have a mean weight of 34.6 g (n=42, range = 31.5 g – 39.2 g) while males have a mean weight of 51.8 g (n=456, range 47.0 g – 57 g).

2.3.2 Distribution and Habitat

The Noisy Scrub-bird was recorded from three separate areas in the south west of Western Australia in the first 50 years after it was discovered by Europeans: Mt. William-Drakesbrook, Augusta-Margaret

River, and the Albany area (Appendix 1: Map 3). By the early 1900s it was considered extinct, until its rediscovery at Two People's Bay in 1961 (Webster 1962). Despite searches elsewhere in its former range, further sub-populations have not been located. The Noisy-Scrub bird currently occurs from Two Peoples Bay Nature Reserve to Cheyne Beach, with an outlying translocated sub-population on Bald Island (Appendix 1: Map 3).

Noisy Scrub-bird populations are censused by recording the number of singing territorial males. Therefore, a census does not provide an absolute measure, but rather an index, of the actual population size (Smith & Forrester 1981). A complete survey of the Noisy Scrub-bird in 2001 revealed a population index of 765 (increased from 590 in 1997). However, a survey in 2005 recorded only 343 territorial males. The decline was primarily due to a large wildfire at Mt Manypeaks in 2004 (Comer *et al.* 2005).

Historically, it is considered that Noisy Scrub-birds may have been confined to the wetter areas within the distribution of Marri (*Eucalyptus calophylla*) and Jarrah (*E. marginata*), in particular to the ecotone between forest and swamp vegetation (Smith 1985b). Noisy Scrub-birds are currently found in dense vegetation, including low forest, scrub/thicket and (rarely) heath (Danks *et al.* 1996). These vegetation formations generally occur in the gullies and drainage lines of hills and granite mountains and, in lowland areas, in overgrown swamps, lake margins and beside streams.

Noisy Scrub-birds currently occur in long unburnt vegetation and are most abundant in vegetation 10+ years post fire. It is thought that habitat may be suitable for re-colonisation 4-10 years after fire, depending on the habitat type. The maximum post-fire age at which vegetation can support these birds is unknown (Danks *et al.* 1996).

2.3.3 Biology and Ecology

The Noisy Scrub-bird has been relatively well researched since its rediscovery, including its life history, food preferences, translocation habitat suitability, and song-sharing and repertoire, which are summarised in Danks *et al.* (1996), Gilfillan *et al.* (2006) and Berryman (2007). Despite this, there is still limited knowledge on many aspects of the bird's biology and ecology.

Noisy Scrub-birds have very limited capacity for flight, being unable to sustain flight for more than a few metres. However, they frequently use their small wings to assist in rapid manoeuvring and short runs on the ground and in leaping from shrub to shrub. They are also agile climbers, moving quickly from shrubs and sedges to the low canopy.

Noisy Scrub-birds feed mostly on or near the ground, foraging in leaf litter, the bases of sedge clumps, dense shrubs and decaying wood, primarily on invertebrates and occasionally small frogs and lizards (Danks & Calver 1993; Danks *et al.* 1996).

Noisy Scrub-birds are territorial, with males defending long-term, non-overlapping territories with a loud, directional song that can be heard throughout the year, but which is more frequent during the breeding season of May to October.

2.4 Western Whippbird (western heath) (*Psophodes nigrogularis nigrogularis*) and Western Whippbird (western mallee) (*Psophodes nigrogularis oberon*)

2.4.1 Description

Western Whippbirds are medium sized, highly elusive, greyish olive-green birds with a slight crest, black throat bordered on either side by white whiskers, and outer tail feathers with a subterminal black band and prominently tipped white.

There are four subspecies of Western Whippbird, two of which occur in Western Australia. *P. n. nigrogularis* (western heath) are plain olive-grey birds with dull banded tails while *P. n. oberon* (western mallee) are slightly larger, greyer and whiter-bellied birds with brighter bands on the tail (Schodde & Mason 1991). These two subspecies also have recognisably different calls (B. Newbey¹ personal communication 2004) and different nest architecture (R. Johnstone² personal communication 2004).

2.4.2 Distribution and Habitat

The Western Whippbird (western heath) previously occurred along the west coast from Perth to Augusta, and on the south coast from King Georges Sound east to Two People's Bay (Milligan 1901; Smith 1977; Schodde & Mason 1991; Garnett & Crowley 2000). This bird is now restricted to a small coastal strip east of Albany from Two Peoples Bay/Mt Gardiner in the south west to about Cape Riche Road in the north east, with the South Coast Highway as an approximate inland boundary (Appendix 1: Map 4). In this area, it occurs in heath-like thicket associations on coastal dunes and in low, dense mallee woodland or shrubland with understorey of dense, stunted shrubs (Higgins & Peter 2002). The structure of the vegetation is thought to be more important in determining habitat suitability than the floristics.

The Western Whippbird (western mallee) previously occurred between Cape Arid and Cape Riche, extending inland in the west to about 30°S (Schodde & Mason 1991). This bird is now restricted to scattered sub-populations throughout the southern wheatbelt and central south coast region, with the largest sub-populations in Fitzgerald River and Stirling Ranges National Parks (McNee 1986; Cale & Burbidge 1993; Garnett & Crowley 2000) (Appendix 1: Map 4). It occurs in open mallee eucalypt woodland with dense, tall shrub layer up to 1.5 m tall, dominated by such species as *Hakea*, *Lambertia*, *Dryandra* or *Banksia* (Higgins & Peter 2002).

The western mallee subspecies is much more widely distributed than the western heath subspecies, but much of that distribution is on remnant vegetation outside conservation reserves and the conservation status of such sub-populations is poorly known.

2.4.3 Biology and Ecology

Both subspecies of Western Whippbird are insectivorous, mostly foraging on the ground or in low vegetation. They occupy sometimes overlapping home ranges and their breeding season is July to October. Their flight is strong but not for great distances, and they therefore have a fairly poor dispersal ability. These birds are sexually dimorphic in calls, which are made up of a series of grating and creaking whistles. Some calling is antiphonal, with females replying to the male's territorial calls.

2.5 Rufous Bristlebird (western) (*Dasyornis broadbenti*)

2.5.1 Description

The Rufous Bristlebird (*Dasyornis broadbenti*) is a medium-sized and sturdy bird, similar to the Western Bristlebird but larger (c. 25 cm long and weighing about 75 g), with a more rufous colour, especially around the head, and a noticeably large, broad tail. There is slight sexual dimorphism (wing: males c. 88-92, females c. 88-90 mm; tail: males c. 112-117, females c. 106-109 mm; tail/wing ratio: males c. 1.26-1.28, females c. 1.18-1.24) (Schodde & Mason 1999).

2.5.2 Distribution and Habitat

The Rufous Bristlebird (western) was known only from the coast between Cape Mentelle and Cape Naturaliste at the south-western tip of Western Australia (Milligan 1901), where it was last recorded reliably in 1906 (Smith 1977). There were unconfirmed reports of this subspecies in 1940 (Serventy & Whittell 1976) and more recently in 1977 (Garnett 1992a) but subsequent attempts to find it in the

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Leeuwin Naturaliste area have not been successful (Blakers *et al.* 1984; Garnett 1992a). Therefore, on the basis of the lack of confirmed records since 1906, this taxon is presumed to be extinct.

The habitat preferences of the Rufous Bristlebird (western) are poorly known, but it was reported to be an inhabitant of dense coastal heath around 40 cm high (Milligan 1901; Garnett & Crowley 2000). This type of habitat is still found on the Leeuwin-Naturaliste ridge, and is largely restricted to the Leeuwin-Naturaliste National Park.

The Rufous Bristlebird (western) is considered to have become extinct due to the burning and clearing of its habitat for pasture (Carter 1924). Predation by feral cats is also considered to possibly have adversely affected the population of this ground foraging bird.

2.5.3 Biology and Ecology

Little is known about the Rufous Bristlebird (western) but inferring from other subspecies suggests this western subspecies would have been sedentary in small, permanent home ranges (Higgins & Peter 2002). Other extant subspecies forage on invertebrates, fruits and seeds, foraging usually on the ground or in low vegetation (Chapman 1999).

3 THREATENING PROCESSES

3.1 Historical Causes of Decline

Historically, all the south coast threatened birds suffered significant reduction in numbers and contraction of range following European settlement in the late 1800s. The dramatic reduction in suitable habitat in the region, through land clearing and inappropriate fire regimes that followed, has been implicated as the most significant cause of population decline for all taxa (Ashby 1921; Condon 1966; Smith 1977; Smith 1985a; Mcnee 1986; Garnett 1992b; Garnett 1992a; Watkins & Burbidge 1992; Danks *et al.* 1996; Burbidge 2003). The resultant small size, low number and fragmented nature of sub-populations of south coast threatened birds is the main factor placing these taxa at threat of local extinction from the processes discussed below.

3.2 Current Threatening Processes

All the south coast threatened birds are highly susceptible to local extinction through ecological processes or stochastic events, due to the small size, number, and fragmented nature of their populations. The high degree of isolation and small size of many south coast threatened bird sub-populations also renders them susceptible to a loss of genetic variation through inbreeding depression, genetic drift and founder effects.

The key threats to the south coast threatened birds are loss or degradation of habitat through too frequent and/or too extensive fires, predation by introduced predators, the current fragmentation of their habitat and the potential threat of climate change. Other threatening processes include dieback caused by *Phytophthora cinnamomi*, clearing of native vegetation, disturbance by introduced animals (particularly hard-hoofed animals), weed invasion and changes in hydrological regimes. The effects of the key threats on the south coast threatened birds are summarised below. Further details on all the threatening processes and their effects on the birds are summarised in Gilfillan *et al.* (2006).

3.2.1 Loss or degradation of habitat through too frequent and/or too extensive fires

All the south coast threatened birds currently occur in a low number of small and/or fragmented sub-populations and therefore extensive fire, even if infrequent, is the single most significant threat to their persistence. The significance of the threat of large wildfires on these taxa was demonstrated by the Mt

Manypeaks fire in December 2004, which resulted in the loss of over half of the population of Noisy-Scrub-birds and a significant proportion of the populations of both Western Bristlebirds and Western Whipbirds (western heath) (Comer *et al.* 2005).

The intensity, extent and frequency of fires are likely to be critical factors in determining both survival and post-fire colonisation by south coast threatened bird taxa. The species-specific responses of the Western Bristlebird, Western Ground Parrot and Noisy Scrub-bird to fire have been discussed by Burbidge (2003), although much is still to be learnt. The response of the Western Whipbird to fire is less well known, but it has been suggested that the species requires long unburnt vegetation (Smith 1985a; McNee 1986).

All south coast threatened bird taxa utilise long unburnt habitat, but the optimal age for each species is not well-understood. Habitat more than seven years post-fire is recommended for south coast threatened bird taxa (Gilfillan *et al.* 2006) but there is little evidence to date of a maximum suitable post-fire age being reached. For example, Noisy Scrub-birds translocated to Bald Island, which has been unburnt for over 100 years, have successfully established despite a small founder group of only eight males and three females (Burbidge 2003).

There are some records of Western Bristlebirds and Noisy Scrub-birds recolonising areas in the Angove Reserve within three years of fire but it is not known if this habitat was sufficiently dense to support breeding. The age at which vegetation becomes suitable as breeding habitat is unknown, but is likely to vary between species and habitats. Until such information becomes available, it is best to assume that, in most instances, a post-fire age of at least seven years is required by all taxa (Gilfillan *et al.* 2006).

Rebuilding, or establishing a population after fire is dependant on the time taken for cover and food supplies to return to a level suitable for breeding, and on the availability of a source of birds to recolonise an area. All taxa produce only one clutch per year, which is restricted to a specific season. Clutch size varies from 1-3. The time taken for regeneration of habitat and food sources, combined with the low fecundity of the south coast threatened bird taxa, results in all being extremely vulnerable to local extinction because rapid build-up and recolonisation post fire is not possible.

3.2.2 Feral Predators

The impact of predation by feral predators on populations is poorly understood for all taxa of the south coast threatened birds. The fact that all these taxa nest and forage on or close to the ground suggests that predation by feral predators may be a significant threat. Detailed data are lacking but observations and anecdotal evidence allow some assessment of the level of threat posed by particular predators.

For the taxa that inhabit relatively open vegetation types in some parts of their range, fox predation is suspected to be a significant threat. These include the Western Ground Parrot and the Western Whipbird (western mallee) and the Western Bristlebird in the Fitzgerald River National Park. Due to the very low numbers of Western Ground Parrots, the dry and relatively open habitats utilised, the possession of a powerful scent that is easily found by dogs (Mattingley 1918; Edwards 1924), and the known threat of foxes to ground-dwelling mammals (e.g. Kinnear *et al.* 1988), the fox is suspected to be a threat to the Western Ground Parrot. Similarly for the Western Whipbird (western mallee), the open nature of its habitat throughout most of its range suggests that predation by foxes may be a current threat.

Predation by feral cats has possibly been a factor in the recent decline of Western Ground Parrots, as there are historical anecdotal reports of feral cats killing both Night Parrots and Ground Parrots (e.g. Ashby 1924). A brief survey of cats at several sites at which Western Ground Parrots have declined recently in Fitzgerald River National Park was conducted in February 2004. Five cats were trapped, which is considered to indicate a high density of cats in this area. Cat numbers are thought to have

increased in many of the reserves in the south coast since regular fox baiting began in 1996 (A. Burbidge³ personal communication 2009).

Feral cats may also be more of a threat to those bird taxa that inhabit dense vegetation than foxes due to cats' stalk and ambush hunting tactics (Dickman 1996). Noisy Scrub-bird feathers have been detected in the gut of one cat at Two Peoples Bay (D. Algar⁴ personal communication 2005) and cats have been observed in significant numbers in Two Peoples Bay, Mt Manypeaks and Waychinicup areas.

3.2.3 *Fragmentation of Remnant Vegetation*

Among south coast threatened birds the effects of past fragmentation of habitat are most pronounced for sub-populations of the Western Whipbird (western mallee) in the Wheatbelt Region. Within this region more than half of the whipbird sub-populations occur in isolated patches of remnant vegetation of less than 150 ha.

There is some evidence to suggest that individuals can move between these isolated remnants. McNee (1986) reported that Western Whipbirds (western mallee) were found to have established themselves in a reserve near Ongerup, where they had not been recorded previously. The nearest known source of birds was 4.5 km away and there was very little connectivity between the two remnants. It is unknown if birds can move between remnants that are a greater distance apart. If some sub-populations are effectively isolated there are likely to be consequences for genetic variability such as inbreeding depression, genetic drift and founder effects, all of which can lead to a loss of genetic variation in small, isolated sub-populations. The complete isolation of most of these remnants is still quite a recent event (i.e. 40 years), so the genetic consequences may still be developing. The small size of these remnants also increases the likelihood and impact of threatening processes such as weed invasion and predation by feral animals.

The high degree of isolation and small size of these remnants suggests that the probability of local extinction in the Western Whipbird (western mallee) is high. Vulnerability to local extinction is increased by demographic stochasticity (e.g. failure to breed in one year, or loss of young), and environmental stochasticity (e.g. random variation in factors such as rainfall, food or predators) (Bennett 1999). Adding to their susceptibility to stochastic events, Western Whipbirds have a relatively low fecundity, with only one clutch per year (usually with two eggs).

Therefore, the current fragmented and localised nature of populations of all taxa of south coast threatened birds means that loss or degradation of appropriate habitat through climate change is a likely threat in the future.

3.3 Areas under threat

All areas occupied by south coast threatened birds are considered at risk from one or more of the threatening processes discussed above.

3.4 Populations under threat

All populations of south coast threatened birds are considered under threat from one or more of the processes discussed above, in particular too frequent and/or too extensive wildfire. Adverse effects of wildfire are likely to be exacerbated by fragmentation of habitat, predation and perhaps climate change.

³ Dr Allan Burbidge, Science Division, Department of Environment and Conservation

⁴ Dr David Algar, Science Division, Department of Environment and Conservation

4 HABITAT CRITICAL TO THE SURVIVAL OF IMPORTANT POPULATIONS

For the south coast threatened birds, habitat critical to the survival of these taxa is defined as:

- the current area of occupancy of one or more taxa;
- possible other areas used, e.g. dispersal corridors; and
- potential habitat into which one or more of the taxa could disperse or be translocated.

Given the limited number of populations remaining of Western Ground Parrot, Noisy Scrub-bird, Western Whipbird (western heath) and Western Bristlebird, all sub-populations of these taxa are considered to be important populations. For the more widespread Western Whipbird (western mallee) all sub-populations found on State managed lands will be treated as important populations by DEC.

5 GUIDE FOR DECISION MAKERS

Proposed developments and on-ground works (e.g. clearing, firebreaks and roadworks) in the immediate vicinity of habitat critical to the survival of one or more of the south coast threatened birds would require an environmental assessment and approval under the *EPBC Act 1999*. Works should not be approved unless the proponent can demonstrate that they will have no significant impact on the taxon, its habitat or potential habitat, nor have the potential to spread or amplify threatening processes such as *Phytophthora cinnamomi* and adverse hydrological changes.

The conservation of habitat critical to the survival of one or more of the south coast threatened birds should be included in all land use and fire management planning for the relevant areas. The South Coast Threatened Birds Area Management Plan in Gilfillan *et al.* (2006) provides management actions specific to the protection of critical habitat and the amelioration of threatening processes in key south coast threatened birds Management Zones.

6 INTERNATIONAL OBLIGATIONS

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention.

The Noisy Scrub-bird, Western Bristlebird and Rufous Bristlebird are listed under Appendix 1 (most endangered) of CITES, while the Western Ground Parrot is listed under Appendix II. The actions proposed in this recovery plan are consistent with these listings.

7 AFFECTED INTERESTS

Most of the current area of occupancy of the south coast threatened bird taxa is within DEC-managed land, primarily National Parks and Nature Reserves. DEC will be primarily responsible for the implementation of this Recovery Plan under the guidance of the South Coast Threatened Birds Recovery Team which includes representatives from the Department of Environment and Conservation (DEC), Alcoa Australia, Birds Australia, independent researchers and veterinarians, Friends of the Western Ground Parrot, and the Albany Bird Group

Small numbers of Western Whipbirds (both subspecies), Western Bristlebirds and Noisy Scrub-birds also occur on private land, and the whipbird (western mallee) occurs within the former BHP Billiton

Ravensthorpe Nickel Operation Mining Lease and on unallocated crown land (UCL). Private landholders in the Albany region have for some years been aware of, and invited to participate in, Noisy Scrub-bird recovery actions where this taxon occurs on their lands. Information on habitat requirements of the taxon and appropriate management has been supplied. In addition, invitations to participate in surveys for the scrub-bird and other south coast threatened bird taxa are always extended when surveys are carried out on private property. Landholders are also kept informed of conservation efforts through the annual South Coast Threatened Birds Newsletter, which is produced through the Recovery Team.

8 ROLE AND INTEREST OF INDIGENOUS PEOPLE

Relevant groups, including the Department of Indigenous Affairs (southern region and goldfields) and Southern Aboriginal Corporation, have been contacted for input into this plan and/or the management of the taxa through implementation of the recovery actions, but to date no replies have been received. Implementation of recovery actions under this plan will continue to include consideration of the role and interests of indigenous communities in the region.

9 BENEFITS TO OTHER SPECIES/ECOLOGICAL COMMUNITIES

The implementation of this plan will provide biodiversity benefits to other threatened and important taxa of both flora and fauna and threatened ecological communities that occur within the area of occupancy of the taxa considered under this plan as follows:

- **Threatened and other important fauna:** Dibbler (*Parantechinus apicalis*), Red-tailed Phascogale (*Phascogale calura*), Western Mouse (*Pseudomys occidentalis*), Heath Mouse (*Pseudomys shortridgei*), Gilbert's Potoroo (*Potorous gilbertii*), Quokka (*Setonix brachyurus*), Western Ringtail Possum (*Pseudocheirus occidentalis*), Malleefowl (*Leipoa ocellata*), Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*), Australasian Bittern (*Botaurus poiciloptilus*), the Moggridgea trap-door spider (*Moggridgea* sp. nov. S), the Stirling Range Rhytidid Snail (Rhytidid sp.) and an extremely rich aquatic invertebrate fauna at Two Peoples Bay Nature Reserve.
- **Threatened flora:** A large number of Declared Rare Flora (DRF) species occur throughout the area covered by the plan, particularly in the floristically rich Fitzgerald River and Stirling Range National Parks. DRF species include *Nemcia luteifolia*, *Leucopogon gnaphalioides*, *Banksia brownii* (Stirling Range National Park); *Ricinocarpus trichophorus*, *Verticordia crebra* (Fitzgerald River National Park); *B. brownii*, *B. verticillata*, *Isopogon uncinatus* (Waychinicup/Manypeaks area); *Adenanthes cunninghamii*, *Stylidium plantagineum* (Two Peoples Bay Nature Reserve); *Andersonia pinaster*, *Grevillea baxteri* and *Kennedia beckxiana* (Cape Arid National Park).
- **Threatened and Priority Ecological Communities:** The Western Whistler (western mallee) occurs within the montane mallee thicket community of the Stirling Range National Park, which is listed as Endangered on DEC's Threatened Ecological Community Database. The same subspecies occurs within close proximity to the Bandalup Hill ecological community which is a Priority community.
- As insectivorous or granivorous, largely ground-dwelling taxa, south coast threatened birds are likely to play an important role in maintaining the broad ecological functioning within the communities of which they are part. Management to benefit the target taxa of this plan is likely to benefit the other threatened species and communities discussed above.

10 SOCIAL AND ECONOMIC IMPACTS

The implementation of this recovery plan has the potential to have some minimal social and economic impact, as several sub-populations are located on private property or mining tenements. However, most landholders are amenable to managing the habitat of the species for conservation. The actions in this plan will be implemented in co-operation with private landholders or with leaseholders, including in relation to mining tenements.

11 EXISTING CONSERVATION MEASURES

The conservation and recovery of South Coast Threatened Birds, especially in the South Coast region, has in recent years primarily been conducted by DEC with strong community support. This has included regular population monitoring, biological and ecological research, translocations (Noisy Scrub-bird, Western Bristlebird) and threat abatement. Further details are given in Gilfillan *et al.* (2006), Burbidge *et al.* (1997) and Danks *et al.* (1996). Some of the threat abatement that has been conducted to reduce the impact of the key threatening processes is summarised below.

11.1 Loss or degradation of habitat through too frequent and/or too extensive fires

The aim of fire management for south coast threatened birds in the South Coast has been to develop and implement a prescription burning program and wildfire response protocol to minimise impact on occupied and habitat critical for these species. Over the past few years fire management has developed considerably through cooperation between DEC nature conservation staff and fire management officers in planning for the mitigation of wildfire and prescription burning, the inclusion of nature conservation staff in the wildfire response incident control team and the preparation of Fire Management Guidelines for south coast threatened bird taxa.

Evidence of an increase in the incidence and extent of wildfire suggests that this will remain an important avenue for investment in the conservation of south coast threatened bird taxa.

11.2 Feral Predators

The impact of feral predators on south coast threatened birds has been managed by the Western Shield Fauna Recovery Program since 1996, which has successfully contributed to the reduction of feral predators, primarily foxes, on a landscape scale. However, the standard baits and baiting regimes have proved ineffective in targeting cats which, with the reduction in fox competition, are thought to have increased in number. Given the differences in hunting techniques of these two predators, it is likely that each has a different level of threat to south coast threatened bird taxa, though this in general is unknown.

Recent planning efforts for south coast threatened bird recovery have concentrated on the development of a program to manage feral cat numbers on a landscape scale, including critical habitat. Although not currently funded, it is expected that benefits from this program, when it can be implemented, will flow on to other small to medium-sized native fauna species, with the knowledge obtained also to be utilised in the preparation of future translocation sites.

11.3 Fragmentation of Remnant Vegetation

Although land clearing is no longer considered a major threat for the four threatened bird taxa on the south coast, the past fragmentation of remnant vegetation and the subsequent increase in threat caused by inappropriate fire and feral predators has restricted the distribution and dispersal capacity of each species. The Noisy Scrub-bird translocation program has been effective in increasing both the size and distribution of this species by manually assisting its dispersal and managing threats at translocation sites.

12 RECOVERY OBJECTIVE AND CRITERIA

12.1 Recovery Objectives

The long-term objectives for the recovery of south coast threatened birds are to:

1. Reduce the impact of threatening processes and ensure that there are viable populations of all extant taxa in suitable habitat throughout their former range, so that they can be removed from threatened species lists, or remain unlisted, and intensive management is no longer necessary for their survival.
2. Establish long-term community participation in the management of these birds.

The objectives of this Recovery Plan are to:

1. Integrate the management and recovery of the five extant south coast threatened birds.
2. Maintain population numbers of south coast threatened birds, at least at current levels, and increase where possible.
3. Continue to improve knowledge of the current distribution of south coast threatened birds.
4. Increase management options through improved knowledge of those aspects of south coast threatened birds that limit their distribution and numbers.
5. Reduce vulnerability of south coast threatened bird populations due to their small size and area of extent, in particular Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds.
6. Increase community participation and stewardship in the conservation of south coast threatened birds.

12.2 Criteria for Success

This Recovery Plan will be deemed successful if:

- The implementation of the recovery actions for the five extant taxa of south coast threatened birds is effectively integrated.
- All known populations of the extant south coast threatened birds have remained stable or increased in numbers.
- All known sub-populations and any new sub-populations of the extant south coast threatened birds have been censused.
- A systematic survey for the Rufous Bristlebird (western) has been completed.
- The critical habitat for each species of south coast threatened birds is identified and mapped.
- Utilisation of an adaptive management approach has resulted in a significant increase in knowledge of the factors limiting population growth for south coast threatened birds.
- Translocations of Western Ground Parrots, Western Bristlebird and Noisy Scrub-birds have resulted in the establishment of at least one additional breeding population of each species.
- There is active community participation in planning and implementation of the recovery actions for Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds, including at least 1,000 hours per year of volunteer activity and at least two community members on the South Coast Threatened Birds Recovery Team.

12.3 Criteria for Failure

This Recovery Plan will be deemed to have failed if:

- The implementation of the recovery actions for the five extant taxa of south coast threatened birds is not effectively integrated.
- Any of the five extant taxa of the south coast threatened birds have become extinct.
- More than 10% of the known sub-populations of the extant south coast threatened birds have not been censused at least once.
- The critical habitat for at least one species of the south coast threatened birds has not been mapped.
- A systematic survey for the Rufous Bristlebird (western) has not been completed.
- An adaptive management framework has not been put in place to assess the factors limiting population growth for south coast threatened birds.
- No translocations of any taxa of south coast threatened birds were conducted.
- There was little to no community participation in the implementation of the recovery actions for Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds.

12.4 Evaluation

This Recovery Plan will operate from July 2009 and will remain in force until withdrawn or replaced. The South Coast Threatened Birds Recovery Team will coordinate, regularly review and revise if necessary, the implementation of this Recovery Plan.

DEC and the South Coast Threatened Birds Recovery Team will evaluate the performance of this Recovery Plan. In addition to annual reporting on progress against the criteria for success and failure, the plan will be reviewed and revised every five years.

13 RECOVERY ACTIONS

The following Recovery Actions are not in order of priority, but have been classified as High, Medium or Low priority. However, this prioritisation should not constrain addressing any of the priorities if new information warrants a re-ranking of priorities or funding is available for 'lower' priorities and other opportunities arise.

The following Recovery Actions have been developed from species-specific recovery objectives, strategies, actions and performance criteria that were developed by Gilfillan *et al.* (2006). Detailed area-based strategies and actions are also detailed in Gilfillan *et al.* (2006).

Objective 1:

Integrate the management and recovery of the five extant south coast threatened birds.

1.1. Integrate the coordination and implementation of the multi-species recovery actions.

All the south coast threatened birds covered by this recovery plan overlap extensively in their distributions, have largely declined to their current status due to similar factors, and are currently threatened by the same threatening processes. For these reasons, the management and recovery of the six taxa should be integrated for the most efficient use of resources and expertise.

The coordination of the recovery of the south coast threatened birds has been integrated by the formation of the South Coast Threatened Bird Recovery Team in 1996 and the development of this multi-species recovery plan. Further integration of the implementation of management and recovery activities will be considered.

Responsibility: Recovery Team
Cost: \$1,000 p.a.
Priority: High
Completion date: Ongoing

1.2. Seek the funding necessary to implement the recovery actions.

Many of the recovery actions in this Plan are funded, at least in part, by DEC, such as some salaries, infrastructure and use of vehicles. However, there is insufficient funding to cover all recovery actions, thus the development of funding applications submitted to appropriate funding bodies to implement recovery actions will be encouraged. Recovery Team members and stakeholders will be able to pursue funding opportunities, with the guidance of the Recovery Team.

Responsibility: DEC (South Coast Region), Recovery Team
Cost: Part of action 1.1
Priority: High
Completion date: Ongoing

Objective 2:

Maintain population numbers of south coast threatened birds at least at current levels, and increase where possible.

2.1. Continue habitat management and threat abatement of all areas occupied by south coast threatened birds within an adaptive management framework.

The majority of the populations of south coast threatened birds are within DEC-managed land. Current habitat management and threat abatement which should be continued in areas occupied by south coast threatened birds includes fox baiting (through the Western Shield program), fire management (prescribed burning and wildfire control) and *Phytophthora cinnamomi* hygiene protocols.

This habitat management should be conducted within an adaptive management framework, with new information being used to inform and improve decision-making and management. An important aspect of adaptive management is the monitoring of actions in order to allow for the evaluation and measure of the performance of the action. Therefore, current monitoring and evaluation of habitat management actions will be continued, or where such monitoring is currently not conducted, a monitoring program should be developed.

For the Western Ground Parrot, it is an urgent priority to implement an integrated feral predator control program within an adaptive management framework for Fitzgerald River and Cape Arid National Parks. Such a program would include monitoring numbers of vertebrate predators and native prey species, to allow evaluation of the effectiveness of the actions and inform future management decisions for an array of threatened vertebrates in this area.

Responsibility: DEC (South Coast Region), Recovery Team
Cost: \$350,000 p.a. additional to existing DEC estate management
Priority: High
Completion date: Ongoing

2.2. Ensure that the conservation of habitat critical for south coast threatened birds is taken into consideration as part of all fire management planning and implementation for those habitats.

Although the fire requirements of all the south coast threatened birds are not currently fully understood, most current populations occur in long unburnt habitat. Therefore, until further information becomes available, it is being assumed that, in most instances, post-fire age of at least seven years is required by all south coast threatened bird taxa. Current fire protocol for south coast threatened birds is in general fire exclusion of habitat critical for these taxa.

To ensure the consideration of south coast threatened birds in all fire management planning, up to date locations of habitat critical for south coast threatened birds and their fire requirements should be regularly provided to DEC and Fire Emergency Services Authority of Western Australia (FESA) fire management personnel. Such up to date information should also be kept in a format (e.g. GIS map) that can be easily provided to incident management teams to provide advice in wildfire situations.

Responsibility: Recovery Team, DEC (South Coast Region)

Cost: \$37,000 p.a.

Priority: High

Completion date: Ongoing

2.3. Continue to census known sub-populations and any new sub-populations of all extant south coast threatened birds.

There are currently population monitoring programs for the Western Ground Parrot, Noisy Scrub-bird and Western Bristlebird, with only limited surveys having been conducted for the Western Whiibirds. These census programs will be continued and where possible expanded.

The Noisy Scrub-bird monitoring will annually monitor specific sub-populations, with a complete census of this species completed approximately every five years. Complete census of the Western Bristlebird and Western Whiibirds will also be completed approximately every five years.

Responsibility: Project Officers

Cost: Part of action 3.1, then \$120,000 p.a. plus \$150,000 every 5th year

Priority: Medium

Completion date: Ongoing

Objective 3:

Continue to improve knowledge of the current distribution of south coast threatened birds.

3.1. Map the area of critical habitat, and estimate population densities, for each of the south coast threatened birds.

Effective management of south coast threatened birds relies on knowledge of the birds' population numbers, distribution and habitat requirements. There are current active population monitoring programs for the Western Ground Parrot, Noisy Scrub-bird and Western Bristlebird, with only limited surveys having been conducted for the Western Whiibirds (refer to action 2.3).

The critical habitat is currently relatively well known for the Western Ground Parrot, Noisy Scrub-bird and Western Bristlebird, with less known for the Western Whiibirds. This critical habitat will be GIS mapped in a format that it can be made available to stakeholders, including land managers and fire management personnel (refer to action 2.2).

Responsibility: Recovery Team, Project Officers
Cost: \$450,000 for first three years
Priority: High
Completion date: 2010

3.2. Determine and map the areas of potential suitable habitat for south coast threatened birds.

Identifying areas within the past distributions of the south coast threatened birds that are potentially suitable habitat would allow the identification of areas for potential future translocations. Therefore, as part of mapping 'habitat critical' (action 3.1), areas of potential suitable habitat will be mapped. Priority will be given to identifying suitable habitat for the Western Ground Parrot, Noisy Scrub-bird and Western Bristlebird, taxa for which translocations are a current recovery action (refer to actions 5.2, 5.3 and 5.4). Although translocations to some areas may not be conducted for some time, early identification of suitable habitat would allow the management of those areas to take into account the requirements of the south coast threatened birds.

Responsibility: Recovery Team, Project Officers
Cost: Part of cost of action 3.1
Priority: High
Completion date: 2010

3.3. Investigate reported sightings of south coast threatened birds from new locations, in particular Western Ground Parrot, Western Bristlebird and Rufous Bristlebird (western).

Any reported sightings of south coast threatened birds from areas with no currently known population will be investigated in order to identify potential new populations. Priority will be given to sightings of the Western Ground Parrot, Western Bristlebird and Rufous Bristlebird (western).

Responsibility: Project Officers, Friends
Cost: \$15,000 p.a.
Priority: High
Completion date: Ongoing

3.4. Conduct surveys of potential Western Ground Parrot and Western Bristlebird habitat to search for new sub-populations.

Intensive, systematic surveys for Western Ground Parrots and Western Bristlebirds will be conducted of areas with previously known populations or reported sightings of these birds, or other areas identified as potential suitable habitat under action 3.2.

Responsibility: Project Officers, Friends
Cost: \$150,000 p.a. for three years
Priority: Medium
Completion date: 2012

3.5. Refine census/monitoring protocols for south coast threatened birds to improve detection of population changes, in particular changes in small populations.

The cryptic nature of south coast threatened birds means that these birds are rarely seen and, therefore, current census/monitoring protocols consist of listening for their distinctive calls. For the Western Bristlebird, Noisy Scrub-bird and Western Whippbirds, such surveys only give a population index of the number of territories, and as the social organisation of these taxa is not well understood, these indices need to be interpreted with caution. A better understanding of the social organisation of these taxa could increase the accuracy of current census protocols.

For Noisy Scrub-birds, recent work has indicated that analysis of individual variation in song, using methods developed by Berryman (2003; 2007) and Portelli (2004), may reflect social organisation. This work will be continued to establish the relationships between individual birds, which may provide insight to help interpret census data.

The census protocol for Western Ground Parrots requires a number of observers to listen for calls during the two calling periods (before sunrise and after sunset), from which the numbers of parrots can be estimated. There are considerable difficulties with this technique (discussed by Cale and Burbidge (1993)), which is time and labour intensive. The development of a more accurate and less labour intensive census technique will be a priority.

Responsibility: Recovery Team, Project Officers
Cost: \$50,000 for three years
Priority: Medium (High for the Western Ground Parrot)
Completion date: 2011

3.6. Obtain funding for, design, and conduct a systematic survey of all likely habitats for the Rufous Bristlebird (western).

The Rufous Bristlebird (western) is presumed to be extinct as there have been no confirmed records of this taxon since 1906. However, there have been a small number of unconfirmed sightings and no systematic survey for this taxon. A systematic survey for the Rufous Bristlebird (western) in all likely habitats will be conducted to confirm the status of this taxon.

Responsibility: Recovery Team
Cost: \$120,000
Priority: Low
Completion date: 2011

Objective 4:

Increase management options through improved knowledge of those aspects of south coast threatened birds that limit their distribution and numbers.

4.1. Continue to investigate the habitat requirements for south coast threatened birds, in particular in relation to fire age, vegetation structure and food availability.

'Habitat critical' is currently relatively well known for the Western Ground Parrot, Noisy Scrub-bird and Western Bristlebird, but the features of that habitat (e.g. vegetation structure and composition, fire age) which make it suitable for the taxon are generally less well understood. The habitat requirements for each of the extant south coast threatened birds will be investigated in conjunction with action 3.2.

For Western Ground Parrots, this will include continuing vegetation sampling stated by Burbidge *et al.* (1989), which will be expanded to also measure food value and seed production.

Responsibility: Project Officers
Cost: Part of cost of action 3.2
Priority: Medium
Completion date: 2011

4.2. Investigate and document the responses of all south coast threatened birds to fire and post-fire regeneration.

Most current populations of south coast threatened birds occur in long unburnt habitat, although the responses of these taxa to fire and post-fire regeneration are currently not fully understood. Further understanding of these birds' responses to fire is required for fire management (refer to actions 2.1 and 2.2).

In particular, the responses of south coast threatened birds will be regularly monitored following a fire through any area that has been identified as 'habitat critical' for a particular taxa (refer to actions 3.1 and 3.2). For example, the Project Phoenix program following the 2004 Mt Manypeaks fire (S. Comer⁵, personal communication 2006).

Responsibility: Project Officers, DEC (South Coast Region)

Cost: \$100,000 p.a.

Priority: Medium

Completion date: Ongoing

4.3. Investigate the relationship between *Phytophthora cinnamomi* and the habitat requirements of south coast threatened birds, including the impact of *P. cinnamomi* on food supply and habitat suitability.

The impact of *Phytophthora cinnamomi* dieback on south coast threatened birds is unknown. Habitat used by the Western Bristlebird, Western Whiibird and Noisy Scrub-bird in the Two Peoples Bay Nature Reserve has been infected by *P. cinnamomi* since the 1940s, suggesting that these taxa are able to withstand any detrimental effects within this time frame (refer to Gilfillan *et al.* 2006). However, longer term impacts of dieback remains unknown. The impact of *P. cinnamomi* dieback on Western Ground Parrots is unknown, though there is potential that dieback would improve some areas of habitat, as the habitat utilised by this taxon is often dominated by sedges (which are not susceptible to *P. cinnamomi*).

The relationship between *P. cinnamomi* and the habitat requirements of the extant taxa of south coast threatened birds will be investigated. For Western Ground Parrots, this will include continuing vegetation sampling started by Burbidge *et al.* (1989), which will be expanded to also measure food value and seed production (refer to action 4.1).

Responsibility: Project Officers

Cost: Part of action 4.1

Priority: Low

Completion date: 2011

4.4. Investigate the impact of cat and fox predation on the south coast threatened birds and support the development of cat eradication methods.

Predation by feral cats and foxes is thought to be a significant threat to all south coast threatened birds. The impact of both cat and fox predation on south coast threatened birds, in particular Western Ground Parrot, will be investigated.

Fox baiting through the Western Shield program is regularly conducted throughout most of 'habitat critical' for south coast threatened birds. However, there is currently no effective method of cat eradication suitable for these areas, so projects relating to the development of a suitable cat eradication method will be encouraged and support will be provided.

⁵ Sarah Comer, Regional Ecologist, South Coast Region, Department of Environment and Conservation

Responsibility: Recovery Team, Project Officers, DEC (Science and South Coast Region)
Cost: \$60,000 p.a. for five years.
Priority: High
Completion date: 2011

4.5. Investigate the dietary requirements of Western Ground Parrots.

Western Ground Parrots are primarily granivorous, foraging on the ground or in low shrubs. The dietary requirements of the Western Ground Parrot will be investigated, as a greater understanding of this will assist in the identification of habitat requirements (action 4.1), selection of potential translocation sites (actions 5.1 and 5.4), and be valuable for potential future captive breeding programs (action 5.5).

Responsibility: Project Officers, DEC (Science)
Cost: Part of action 4.1
Priority: Low
Completion date: 2011

4.6. Conduct genetic research to resolve the status of the two Western Whipbird subspecies.

The resolution of the subspecific status of the two subspecies of Western Whipbirds in Western Australia will greatly influence further priorities for the management of this species in Western Australia. The importance to conservation of the different subspecies is that they may represent significantly different gene pools. Therefore, it is essential to investigate this question at the genetic level before management is commenced, as the result will determine what kind of management is appropriate. Molecular genetic analyses appear to be the most suitable because they can be done on relatively small quantities of material which can be obtained with non-destructive sampling techniques.

Responsibility: Recovery Team
Cost: \$20,000
Priority: High
Completion date: 2010

Objective 5:

Reduce vulnerability of south coast threatened bird populations due to their small size and area of extent, in particular Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds.

5.1. Continue to investigate the need and opportunities for translocations of all extant south coast threatened birds taxa.

All the south coast threatened birds are highly susceptible to local extinction through ecological processes or stochastic events, due to the small size, number, and fragmented nature of their populations. Therefore, the need and opportunities for translocations of all the extant south coast threatened bird taxa will be regularly considered.

All the translocations will be subject to approval as laid down in the DEC Policy Statement No. 29 'Translocation of threatened flora and fauna'.

Responsibility: Recovery Team
Cost: Part of action 1.1
Priority: High
Completion date: Ongoing

5.2. Continue the Western Bristlebird translocation program.

Although the trial translocation of Western Bristlebirds from Two Peoples Bay Nature Reserve to Walpole-Nornalup National Park in 1999 and 2000 was unsuccessful in the long-term, it showed that translocated birds were able to persist for some time in the habitat. Further translocations to Walpole-Nornalup National Park and other suitable habitat (identified through action 3.2) will be considered.

Responsibility: Project Officers, Recovery Team

Cost: \$50,000 p.a.

Priority: Medium

Completion date: Ongoing

5.3. Continue the Noisy Scrub-bird translocation program.

There has been an active Noisy Scrub-bird translocation program since the early 1980s, which has resulted in the establishment of new sub-populations, most significantly on Bald Island. Further translocations to other suitable areas (identified through action 3.2) will be considered.

This translocation program will include an investigation of the genetic variability of all the sub-populations. Translocations between already established sub-populations will then be considered to boost genetic diversity of the sub-populations.

Noisy Scrub-birds were translocated to the Darling Range between 1997 and 2003, but this translocation does not appear to have been successful. A review will be conducted of this translocation in order to determine the factors that prevented the successful establishment of Noisy Scrub-birds into this area within their former range.

Responsibility: Project Officers, Recovery Team

Cost: \$10,000 p.a. plus \$50,000 for review of the Darling Range translocation

Priority: High

Completion date: Ongoing

5.4. Develop a Western Ground Parrot translocation program, beginning with a trial translocation (if there are suitable source populations).

As Western Ground Parrots are now known from only two areas (Fitzgerald River National Park and Cape Arid National Park/Nuytsland Nature Reserve), establishing additional populations would be an important step in their recovery. Therefore, a trial translocation to suitable habitat (identified through action 3.2) will be conducted. However, a translocation will only be conducted if the known populations are considered sufficiently viable to allow the removal of enough birds for a translocation.

If birds are removed from a population for translocation, the source population will be closely monitored to determine if the removals have had any impact.

Responsibility: Project Officers, Recovery Team

Cost: \$50,000 p.a.

Priority: Medium

Completion date: Ongoing

5.5. Develop a captive breeding program for Western Ground Parrots.

Due to the small population and the apparent decline in numbers of the Western Ground Parrot, a captive breeding program will be developed and implemented if possible. If the known populations are considered sufficiently viable to allow removal of enough birds for a sustainable breeding population or for translocation, the priority should be given for translocation (action 5.4).

If it is decided that captive breeding is desirable, the Recovery Team will seek to co-operate with appropriate agencies and individuals in designing a captive breeding program. If successful, captive breeding could provide birds for reintroduction to establish new sub-populations.

Responsibility: Recovery Team

Cost: \$175,000 in first year, then \$100,000 p.a.

Priority: Medium

Completion date: 2011

Objective 6:

Increase community participation and stewardship in the conservation of south coast threatened birds.

6.1. Publish and distribute information to the public, landholders and scientific community relating to the management and recovery of south coast threatened birds.

Public awareness and understanding of south coast threatened birds is currently facilitated through the publication of information brochures, regular newsletters (i.e. South Coast Threatened Birds News and Western Ground Parrot newsletter) and the 'Friends of the Western Ground Parrot' website. The results of research are also regularly presented at scientific workshops and conferences. This distribution of information to the general public and scientific community will be continued.

Responsibility: Project Officers, Recovery Team

Cost: \$40,000 p.a.

Priority: Medium

Completion date: Ongoing

6.2. Continue to facilitate participation by the community in recovery project activities.

The community is currently strongly involved in volunteer activities for south coast threatened birds, in particular the Western Ground Parrot and Noisy Scrub-bird. Community involvement in recovery activities for all these bird taxa will continue to be facilitated through 'friends' groups, Birds Australia WA and volunteer activities.

Responsibility: Recovery Team, Project Officers

Cost: \$10,000 p.a.

Priority: High

Completion date: Ongoing

6.3. Foster and encourage 'Friends' groups for south coast threatened birds.

There is currently a 'Friends of the Western Ground Parrots' group which is active in volunteering for field trips and profile-raising for the conservation of the parrot. The involvement of this and other interested community groups in the recovery of all the south coast threatened birds will continue to be encouraged.

Responsibility: Recovery Team, Project Officers

Cost: \$20,000 p.a.

Priority: High

Completion date: Ongoing

6.4. Continue to encourage appropriate community membership on the Recovery Team.

A minimum membership of two community members on the South Coast Threatened Birds Recovery Team will be maintained.

Responsibility: Recovery Team, DEC (Species and Community Branch)

Cost: \$ 2,000 p.a.

Priority: Medium

Completion date: Ongoing

14 IMPLEMENTATION SCHEDULE:

Table 3: Summary of the recovery actions, their priority, responsibility and estimated costs for the first five years of implementation. These estimated costs were costed in 2009 costs and do not take into account inflation.

Action	Priority	Responsibility	Cost						Completion Date
			Year 1	Year 2	Year 3	Year 4	Year 5	Total	
1.1. Integrate the coordination and implementation of recovery actions.	High	Recovery Team	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$5,000	Ongoing
1.1. Seek the funding necessary to implement the recovery actions.	High	Recovery Team	Part of action 1.1						Ongoing
2.1. Habitat management and threat abatement.	High	DEC (South Coast), Recovery Team	\$350,000	\$350,000	\$350,000	\$350,000	\$350,000	\$1,750,000	Ongoing
2.2. Conservation of 'habitat critical' as part of fire management.	High	DEC (South Coast), Recovery Team	\$37,000	\$37,000	\$37,000	\$37,000	\$37,000	\$185,000	Ongoing
2.3. Continue to census known and any new sub-populations.	Medium	Project Officers	Part of action 3.1			\$120,000	\$270,000	\$390,000	Ongoing
3.1. Map the area of 'critical habitat', and estimate population densities.	High	Project Officers	\$200,000	\$200,000	\$200,000			\$600,000	2010
3.2. Determine and map the areas of potential suitable habitat.	High	Project Officers, Friends	Part of action 3.1						2010
3.3. Investigate reported sightings of birds from new locations.	High	Project Officers, Friends	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000	Ongoing
3.4. Conduct surveys of potential Western Ground Parrot and Western Bristlebird habitat.	Medium	Project Officers, Friends		\$150,000	\$150,000	\$150,000		\$450,000	2012
3.5. Refine census/monitoring protocols.	High/Medium	Recovery Team, Project Officers		\$50,000	\$50,000	\$50,000		\$150,000	2011
3.6. A systematic survey for the Rufous Bristlebird (western).	Low	Recovery Team				\$120,000		\$120,000	2011
4.1. Continue to investigate the habitat requirements.	Medium	Project Officers	Part of action 3.2						2011
4.2. Investigate and document the responses to post-fire regeneration.	Medium	Project Officers, DEC (South Coast)	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000	Ongoing
4.3. Investigate the relationship between <i>P. cinnamomi</i> and the habitat.	Low	Project Officers	Part of action 4.1						2011
4.4. Investigate the impact of cat and fox predation.	High	Project Officers, DEC (Science & SC)	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$300,000	2011
4.5. Investigate the dietary requirements of Western Ground Parrot.	Low	Project Officers, DEC (Science)	Part of action 4.1						2011

4.6. Conduct genetic research to resolve the status of the two Western Whibird.	High	Recovery Team		\$20,000				\$20,000	2009
5.1. Continue to investigate the need and opportunities for translocations.	High	Recovery Team	Part of action 1.1						Ongoing
5.2. Continue the Western Bristlebird translocation program.	Medium	Project Officers, Recovery Team	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$250,000	Ongoing
5.3. Continue the Noisy Scrub-bird translocation program.	Medium	Project Officers, Recovery Team	\$10,000	\$10,000	\$60,000	\$10,000	\$10,000	\$100,000	Ongoing
5.4. Develop a Western Ground Parrot translocation program.	Medium	Recovery Team	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$250,000	Ongoing
5.5. Develop a captive breeding program for Western Ground Parrots.	Medium	Project Officers, Recovery Team			\$175,000	\$100,000	\$100,000	\$375,000	2011
6.1. Publish information to the public, landholders and scientific community.	Medium	Project Officers, Recovery Team	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000	\$200,000	Ongoing
6.2. Continue to facilitate participation by the community in recovery actions.	High	Project Officers, Recovery Team	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$50,000	Ongoing
6.3. Foster and encourage 'Friends' groups.	High	Project Officers, Recovery Team	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$100,000	Ongoing
6.4. Continue appropriate community membership on the Recovery Team.	Medium	Recovery Team, DEC (SCB)	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000	Ongoing
TOTAL			\$945,000	\$1,285,000	\$1,640,000	\$1,165,000	\$845,000	\$5,880,000	

Abbreviations:

Project Officers - Staff (generally DEC) involved in the recovery of south coast threatened birds

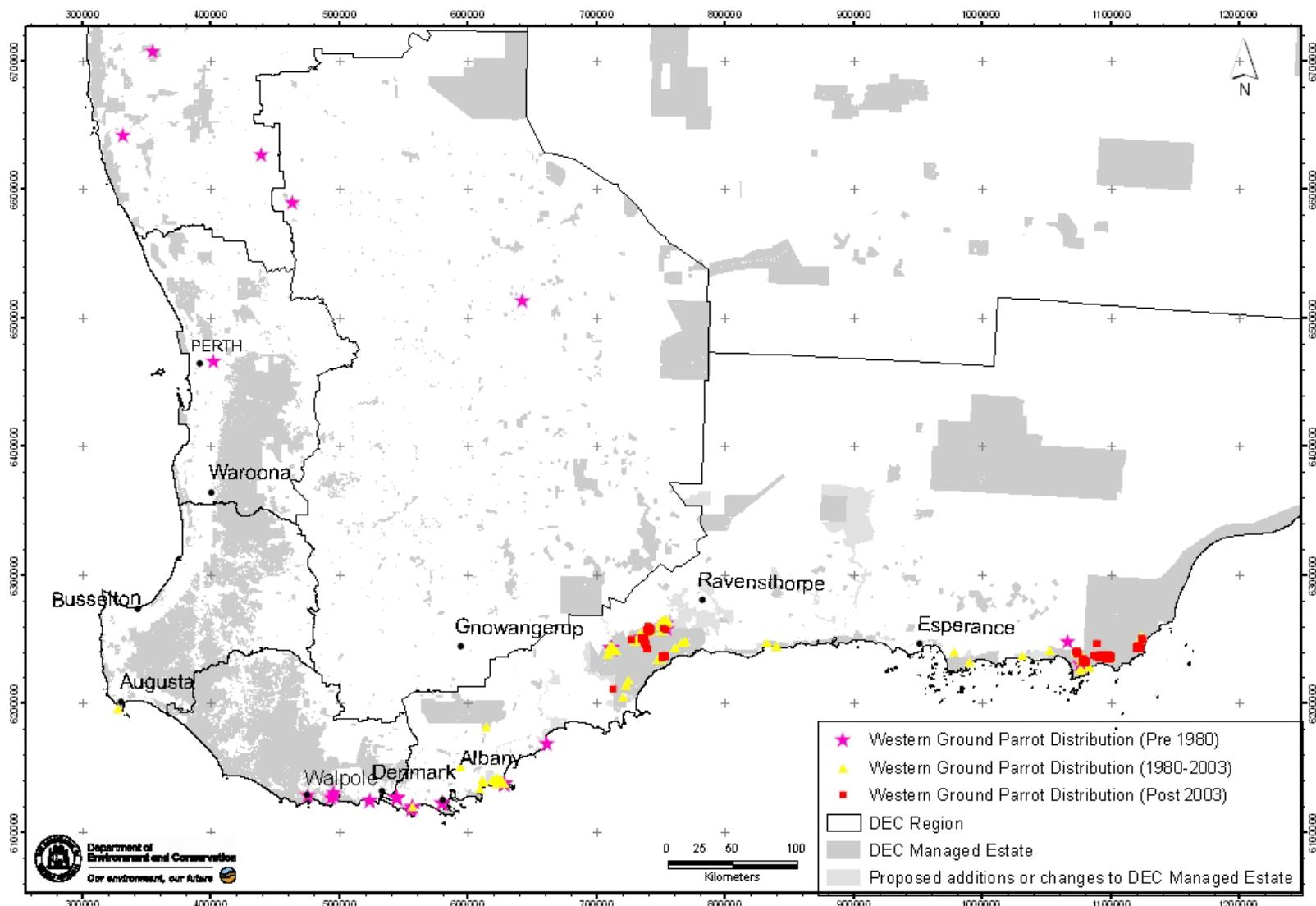
DEC (South Coast) - Department of Environment and Conservation (South Coast Region)

DEC (Science) - Department of Environment and Conservation (Science)

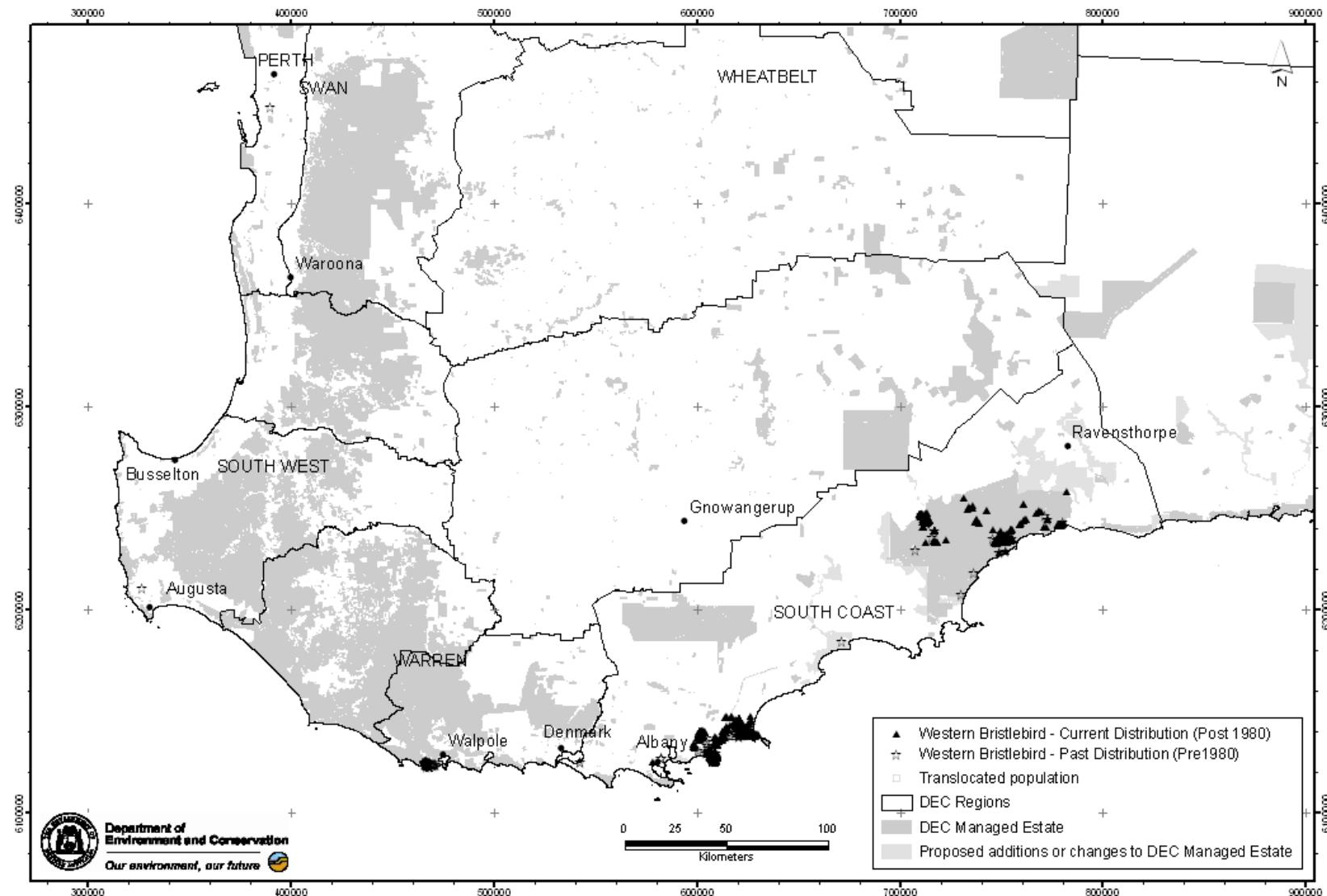
DEC (SCB) - Department of Environment and Conservation (Species and Communities Branch)

Friends - Friends groups (i.e. Friends of the Western Ground Parrot) and other community groups

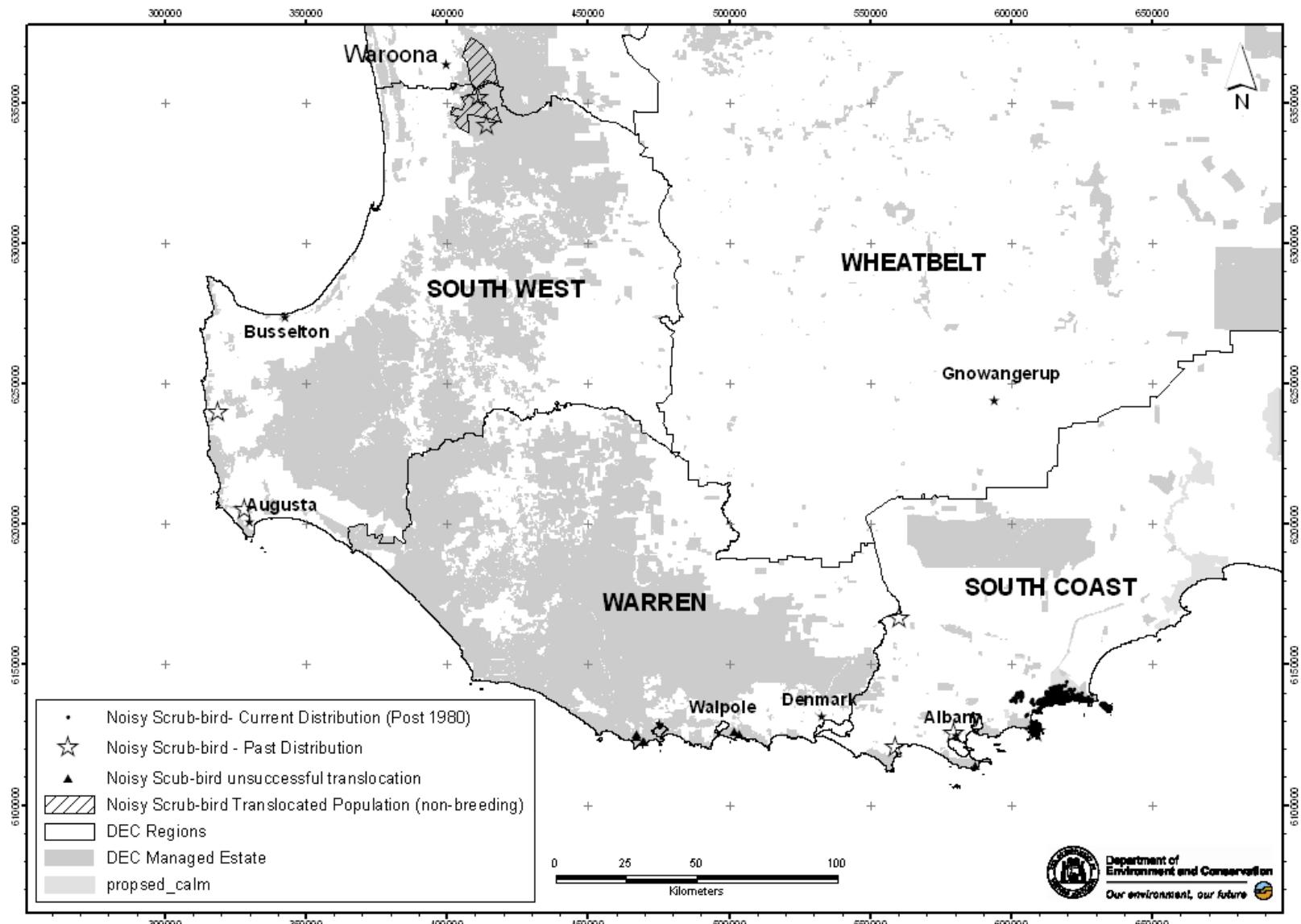
APPENDIX 1: DISTRIBUTION MAPS



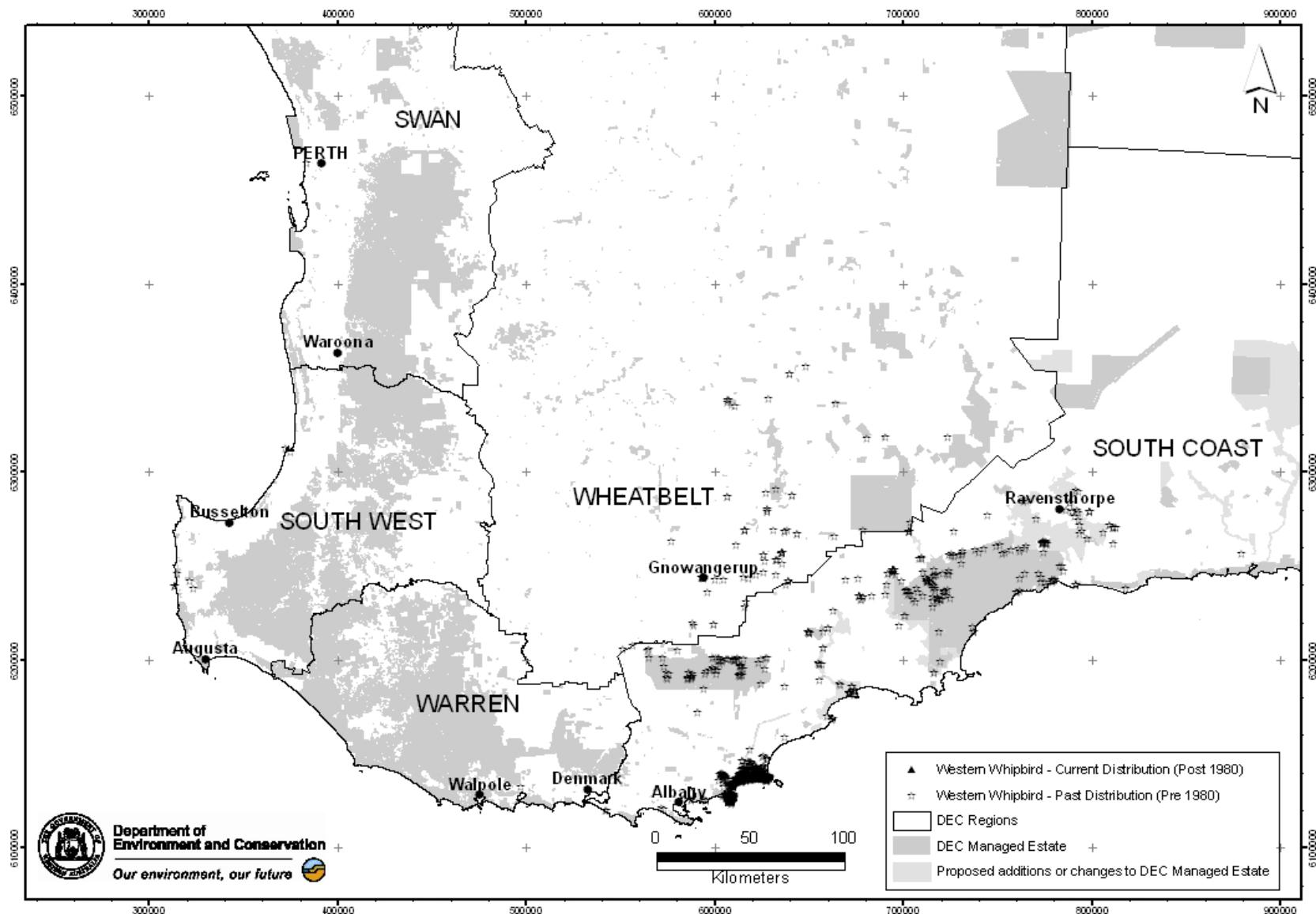
Map 1: The past and current (post-1980) distribution of the Western Ground Parrot (*Pezoporus wallicus flaviventris*).



Map 2: The past and current (post-1980) distribution of the Western Bristlebird (*Dasyornis longirostris*).



Map 3: The past and current (post-1980) distribution of the Noisy Scrub-bird, including unsuccessful translocation sites.



Map 4: The past and current (post-1980) distribution of the Western Whipbird (*Psophodes nigrogularis nigrogularis* and *P. n. oberon*).

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