ADDENDUM TO
SOUTH COAST THREATENED BIRDS
RECOVERY PLAN

South Coast Threatened Birds:

Background Information, Species-specific Recovery Plan and Area-based Management Plan

Western Ground Parrot (*Pezoporus wallicus flaviventris*)
Western Bristlebird (*Dasyornis longirostris*)
Noisy Scrub-bird (*Atrichornis clamosus*)
Western Whipbird (western heath) (*Psophodes nigrogularis nigrogularis*)
Western Whipbird (western mallee) (*Psophodes nigrogularis oberon*)
Rufous Bristlebird (western) (*Dasyornis broadbenti litoralis*)

2006

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FOREWORD

This addendum document was originally intended to be the recovery plan for the South Coast Threatened Birds but it does not the fit the Commonwealth's *EPBC Act 1999* requirements for a Recovery Plan. Therefore the endorsed Recovery Plan was written summarising this document within the EPBC requirements. This addendum supports the South Coast Threatened Birds Recovery Plan by providing detailed background information, species-specific recovery actions and area-based management actions.

The information in this document is accurate at December 2006, although the document was revised in March 2009.

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Contents

1 INTRODUCTION

The South Coast Threatened Birds Recovery Plan outlines the management and recovery actions necessary to support the recovery of five extant and one presumed extinct threatened bird taxa that occur in coastal and near-coastal habitats on the south coast of Western Australia, herein referred to as the 'south coast threatened birds'. The six taxa are:

- Western Ground Parrot (*Pezoporus wallicus flaviventris*),
- Western Bristlebird (*Dasyornis longirostris*),
- Noisy Scrub-bird (*Atrichornis clamosus*),
- Western Whipbird (western heath) (*Psophodes nigrogularis nigrogularis*),
- Western Whipbird (western mallee) (*Psophodes nigrogularis oberon*), and
- Rufous Bristlebird (western) (*Dasyornis broadbenti litoralis*).

The five extant taxa covered by this plan overlap extensively in their distributions and have declined to their current status largely due to similar factors.

This addendum supports the South Coast Threatened Birds Recovery Plan by providing detailed background information, species-specific recovery actions and area-based management actions.

1.1 Rationale

A multi-species South Coast Threatened Birds Recovery Team 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.

For the same reasons that the single species recovery teams were incorporated into a multi-species recovery team (e.g. to facilitate the integration of recovery activites between the taxa), in 2003 it was decided that a multi-species recovery plan for all the south coast threatened birds should be developed. The presumed extinct Rufous Bristlebird (western) was also included in the recovery plan due to its similarities to the other south coast threatened birds.

Because the six bird taxa occur over appoximately 66,000 square km (Figure 4.1), spanning several biogeographical regions and multiple management regions, the approach to management of threatening processes has to be tailored to local conditions, taking into account the particular mix of threatened taxa and threatening processes in each region. It was therefore necessary to provide regional specific area management actions aimed at habitat protection and threat amelioration, as well as species specific actions (Figure 1.1).

This addendum document was originally intended to be the recovery plan for the South Coast Threatened Birds but it does not the fit the Commonwealth's *EPBC Act 1999* requirements for a Recovery Plan. Therefore the endorsed Recovery Plan was written summarising this document within the EPBC requirements. This document has been kept as an addendum as it contains detailed background information and valuable recovery and management actions relevant to the management and recovery of south coast threatened birds.

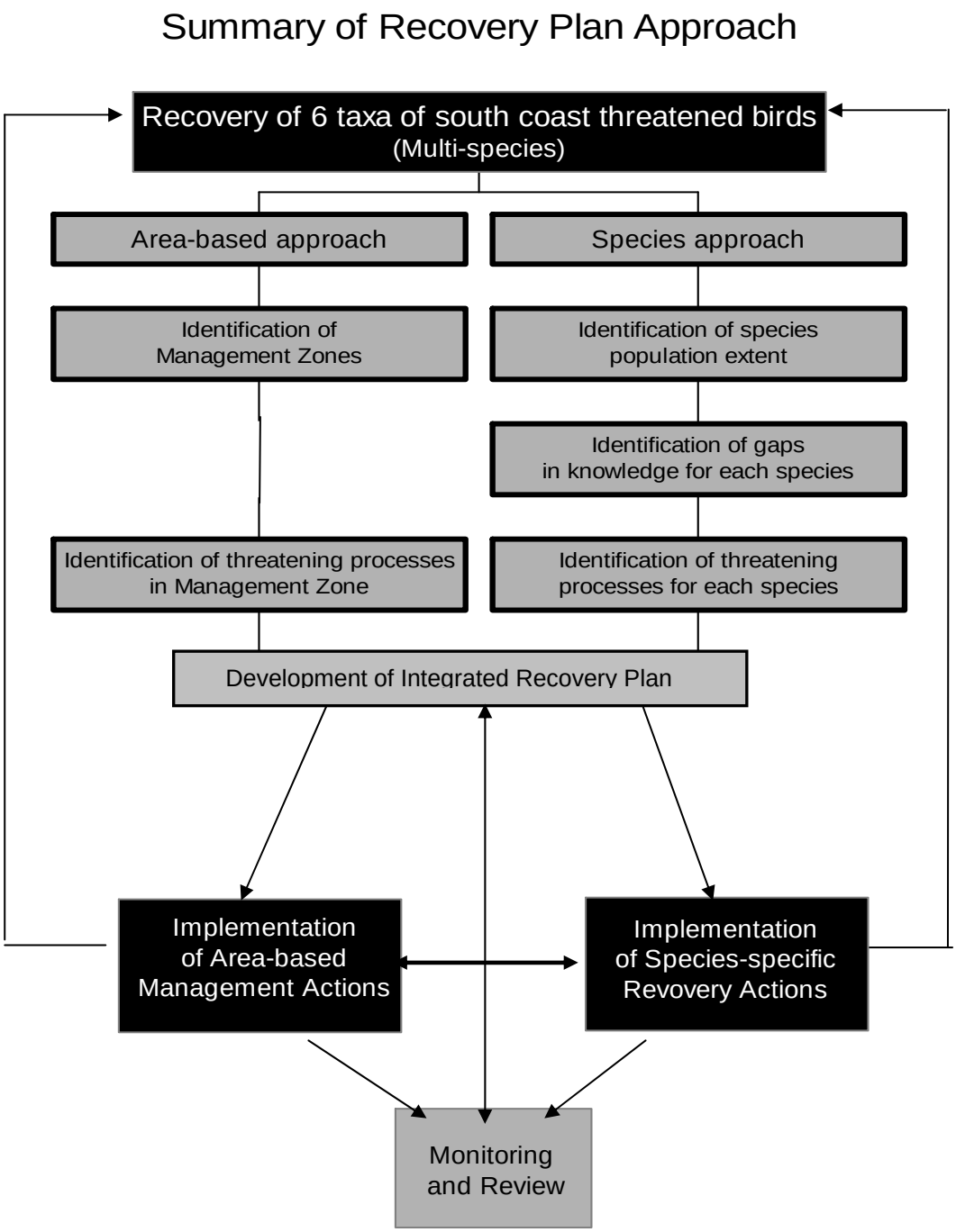

Figure 1.1: The approach to the recovery of the South Coast Threatened Birds taken in this addendum to the South Coast Threatened Birds Recovery Plan.

1.2 Document Structure

There are three components of this document: background, a species-specific recovery plan and an area-based management plan. The background has drawn together detailed information on each of the south coast threatened birds, their conservation status, historical and current distribution, population trends, habitat requirements and their biological and ecological characteristics.

The Species-specific South Coast Threatened Birds Recovery Plan of this document includes species-specific objectives, strategies and actions that are related directly to the recovery of each of the six individual bird taxa. Specific performance criteria are included for each of the objectives to provide a mechanism by which achievement of objectives are measured and reported.

The area-based South Coast Threatened Birds Area Management Plan provides management actions specific to the protection of habitat critical to the survival ('habitat critical') for south coast threatened birds and the amelioration of threatening processes for key management zones. These management zones were delineated to encompass the key areas of south coast threatened birds occupancy across the region. The six management zones that represent the main areas of occupancy of the five extant taxa of south coast threatened birds, and one management zone which incorporates the known past distribution of the presumed extinct Rufous Bristlebird (Figure 4.1) are:

- Albany Management Zone (AMZ),
- Fitzgerald Management Zone (FMZ),
- Oberon Management Zone (OMZ),
- Cape Arid Management Zone (CAMZ),
- Walpole Management Zone (WMZ),
- Darling Range Management Zone (DRMZ), and
- Leeuwin-Naturaliste Management Zone (LNMZ).

This Area Management Plan is aimed to provide a guide not only for south coast threatened bird project officers, but also for the land managers responsible for biodiversity conservation in these areas.

1.3 Definitions

In this document the following definitions of whole population, population and sub-population are used:

- Whole population – all birds within a taxon, e.g. all Western Ground Parrots.
- Population – A group of birds occurring within a discrete area that are unlikely to move freely between areas, e.g. Western Ground Parrots in the Fitzgerald River National Park.
- Sub-population – A group of birds occurring at a particular site within an area inhabited by a population that may or may not move freely between sites, e.g. Western Ground Parrots occurring at Short Road within the Fitzgerald River National Park.

2 BACKGROUND

2.1 Conservation Status

The current conservation status of each of the south coast threatened bird taxa, under both Commonwealth and State legislation, is shown in Table 2.1. The five extant south coast threatened birds are listed as threatened under National legislation. However, the Western Whipbird (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 taxa is currently managed on the basis of its State classification as a Priority species.

Table 2.1: The current (as of March 2009) conservation status of each of the taxa covered by the South Coast Threatened Bird Recovery Plan, under both Commonwealth (EPBC Act 1999) and State (WC Action 1950) legislation.

Species	Conservation Status	
	EPBC Act 1999	**WA WC Act 1950**
Western Ground Parrot (*Pezoporus wallicus flaviventris*)	Endangered	Schedule 1 (Critically Endangered)
Western Bristlebird (*Dasyornis longirostris*)	Vulnerable	Schedule 1 (Vulnerable)
Noisy Scrub-bird or Tjimiluk (*Atrichornis clamosus*)	Vulnerable	Schedule 1 (Endangered)
Western Whipbird (western heath) (*Psophodes nigrogularis nigrogularis*)	Endangered	Schedule 1 (Endangered)
Western Whipbird (western mallee) (*Psophodes nigrogularis oberon*)	Vulnerable (currently under review)	Not listed (Priority 4)
Rufous Bristlebird (western) or South-western Bristlebird (*Dasyornis broadbenti litoralis*)	Extinct	Schedule 2 (Presumed to be Extinct)

The conservation status of each of the south coast threatened bird taxa has changed considerably since settlement of the south west of Western Australia. Each of these birds was almost certainly more widely distributed prior to clearing for agriculture, with early naturalists such as Gilbert describing the Western Bristlebird and Noisy Scrub-bird as widespread or locally common in certain areas (Whittell 1941, 1951), and the Western Ground Parrot as widespread along the west and south coasts. The Noisy Scrub-bird and Western Whipbird were both listed as extinct or probably extinct during the early 1900s (Wolstenholme 1926; Chisholm 1951) due to lack of confirmed records. In later years small remnant populations of these two species were found at Two Peoples Bay; the Noisy Scrub-bird in 1961 and the Western Whipbird in 1962 (McNee 1986). F. Lawson Whitlock recorded the Western Bristlebird around Wilson's Inlet and bristlebirds were recorded in this area until at least 1912 but no further records of the species were made until it was collected at Two Peoples Bay in 1944 (Whittell 1936; Buller 1945; McNee 1986).

2.1.1 Reasons for Threatened Status

2.1.1.1 Western Ground Parrot (Pezoporus wallicus flaviventris)

King (1979) and Garnett (1992b; 1992a) considered the Western Ground Parrot as Endangered. More recently, Garnett and Crowley (2000) classified the Western Ground Parrot as Endangered (B1 + 2abcde, C2a) and this classification was accepted in Western Australia. However, Garnett and Crowley (2000) and others (Burbidge & Blyth 2002, 2003) recognised that the taxon was very close to Critically Endangered. Recent studies have provided a clearer idea of the subspecies distribution, abundance and trends and therefore the subspecies was reclassified as Critically Endangered by the Western Australian Threatened Species Scientific Committee in 2004.

The taxon meets the following IUCN criteria for Critically Endangered:

- A3 (probably): using an index of abundance appropriate to the taxon and projecting declines in two major sub-populations over the last three years.
- A4: using an index of abundance appropriate to the taxon, the time period for an 80% reduction or greater includes both the past and the future, and the reduction or its causes may not have ceased, are not understood and may not be reversible.
- C2b (probably): because the total current population may be less than or equal to 250, declines of the two main sub-populations over the last three years appear to be greater than 25% and there are extreme fluctuations in the number of mature individuals.

2.1.1.2 Western Bristlebird (Dasyornis longirostris)

The Western Bristlebird is currently listed as Vulnerable D2 (Garnett & Crowley 2000). Re-assessment of the status of this species by Burbidge and Blyth (2003) concluded that this taxon:

- does not meet the criteria for Endangered because the population is not declining or suffering extreme fluctuations, total population is estimated to be over 250 mature individuals, and quantitative analysis has not been conducted.
- still meets criterion D2 for Vulnerable because the population is restricted in terms of the number of locations such that it is prone to the effects of human activities or stochastic events and its status could decline very quickly. Does not meet other criteria for Vulnerable because it is not declining or suffering extreme fluctuations and quantitative analysis has not been conducted.

2.1.1.3 Noisy Scrub-bird (Atrichornis clamosus)

A review of the conservation status of the Noisy Scrub-bird in 1997 recommended that its status be changed from Endangered to Vulnerable. This recommendation was based on the successful establishment of new sub-populations of the species through translocations and dispersal to areas within the AMZ. Effective habitat management, and specifically the lack of any major wildfire events in areas occupied by scrub-birds, was a key factor in allowing the successful establishment of these sub-populations. The Noisy Scrub Bird remained listed as Vulnerable D2 (Garnett & Crowley 2000).

A major wildfire in December 2004 and earlier wildfires since 2001 reduced by about two thirds the area of optimal habitat for the Noisy Scrub-bird and the number of birds existing. The species was therefore reclassified as Endangered by the Western Australian Threatened Species Scientific Committee in 2004. Applying the precautionary principle, the Noisy Scrub Bird meets Criterion B2abcde, Endangered, based on projected continuing decline due to increasing fire frequency.

2.1.1.4 Western Whipbird (western heath) (Psophodes nigrogularis nigrogularis)

Prior to the 2004 Mt Manypeaks fire the Western Whipbird (western heath) was listed in Western Australia as Vulnerable D2, consistent with Garnett and Crowley (2000). After the fire, in which about one third of this Western Whipbird's population and habitat was lost, the status of this subspecies was re-assessed by the Threatened Species Scientific Committee. The Committee concluded that, applying the precautionary principle, the subspecies now meets criteria for Endangered, B2abcde, based on the current small population and projected continuing decline due to increasing fire frequency.

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

The Western Whipbird (western mallee) is listed as Vulnerable under the Commonwealth *EPBC Act 1999*, although it is not listed under State legislation, but classified as Priority 4 by DEC. Re-assessment of the status of this subspecies of the Western Whipbird by Burbidge and Blyth (2003) concluded that this taxon still meets the criteria for Near Threatened and not for Vulnerable.

2.1.1.6 Rufous Bristlebird (Dasyornis broadbenti litoralis)

The Rufous Bristlebird (western) is listed as Extinct because there have been no confirmed records since 1906, and few reports of possible sightings during that time. However there has been a lack of exhaustive surveys in known or potential habitat.

2.2 Species Descriptions, Taxonomy, Distribution and Population Trends.

2.2.1 Western Ground Parrot (*Pezoporus wallicus flaviventris*)

2.2.1.1 Description of Species and Taxonomy

The Ground Parrot (*Pezoporus wallicus*) is a cryptic, ground-dwelling parrot, endemic to Australia with a fragmented distribution along coastal south-eastern and south-western parts of the continent. It is a medium sized, slim parrot with a long, strongly graduated tail comprising narrow, pointed feathers (Forshaw 1973, 1981). The wings are short and rounded. The tarsi are long and the claws extremely long and only slightly curved. Sexual dimorphism is absent. Adults are generally rich green, strongly mottled with black and yellow. Feathers on the upper surface show black shaft streaking. Adults have a red frontal band. Three adult birds caught in Fitzgerald River National Park weighed 105-110 g with wing length 135-145 mm (Burbidge *et al.* 1989).

The Ground Parrot has often been considered the sole member of the genus *Pezoporus* and part of a relict group including two other monotypic genera: *Geopsittacus* (Night Parrot) from Australia and *Strigops* (Kakapo) from New Zealand (Mathews 1917; e.g. Condon 1975; Forshaw 1981). It has also been thought to be related to *Melopsittacus* (Budgerigar) (Forshaw 1973). However, Serventy (1953) considered *Pezoporus wallicus* and *Geopsittacus occidentalis* as members of the same genus, as did Ford (Ford 1969), who considered the major differences between the two species to be a result of adaptations to their different environments. More recent DNA work (Leeton *et al.* 1994) is consistent with this latter view, suggesting that the Ground Parrot and Night Parrot are congeneric, closely related, and only distantly related to *Strigops*.

North (1901-14) was the first to distinguish the Western Australian population of *P. wallicus* as different from those in eastern Australia, describing the western birds as *P. flaviventris*. He based this view on differences in plumage, with the western birds having broken barring on the under surface and a yellow (rather than greenish yellow) lower breast and abdomen. Mathews (1912 cited in Mathews 1917) reduced *flaviventris* to subspecific level, describing it as "... not too well differentiated when South Australian specimens are considered". This situation has persisted, despite the view of some authors that the subspecies are poorly differentiated (Ford 1969; Forshaw 1981). No genetic investigations have been made on subspecific variation in this species and morphometric investigations, based on few specimens, show little difference between the populations. On the other hand, there are some habitat differences, and possibly behavioural differences (including differences in calls) between eastern and western birds (Burbidge *et al.* 1989; Burbidge *et al.* 1990).

Western Ground Parrots are known to have good dispersal abilities and can fly long distances. For example, a dead immature individual was found approximately 40 km from the nearest known population in 1994 (P. Collins[1] personal communication 2004). However, the Western Ground Parrot is rarely seen and spends much of its day walking, feeding and resting in low heathlands. Regular flights are not made until after sunset or before sunrise when they fly between feeding and overnight roosting sites. 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). Calling generally

[1] Peter Collins, Wildlife Officer, DEC Albany

occurs 20 to 60 minutes after sunset and about 60 to 20 minutes before sunrise. Western Ground Parrots do not establish territories and feeding areas can vary from day to day (Burbidge et al. 1989) or with time of year (McNee 1999).

2.2.1.2 Discovery and Historical Distribution

At the time of European colonisation, the Western Ground Parrot 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) (Figure 2.1). It was first collected by John Gilbert near Perth in the 1840s (Ford 1969). The only other collections from other than the south coast are two nestlings and an adult (probably collected by Gilbert in October 1842) in the Gould collection at the British Museum (Tring), recorded as taken from "Wanyun Hills" (Wongan Hills) and an adult from the Swan River collected by Dr. R.B. Sharpe (Salvadori 1891). Leake (1962) commented briefly about this species being a visitor to the eastern wheatbelt, where it fed in the vicinity of granite hills, but was not seen there after 1892. Several second hand reports from sandplain country between Dongara and Watheroo up to the 1890s when the area was burnt out were recorded by Ashby (1921). Ford (1969) noted second hand reports of this species being found in stunted heath in laterite hills between Jurien Bay and Badgingarra during the 1890s and 1900s. In addition, Gilbert recorded a name for this species from Aborigines resident to the north of Perth, as well as one from Aborigines resident in the Perth area (Gould 1865; Whittell 1951). Gould (1865) listed four aboriginal names for the species and Serventy and Whittell (1976) listed an additional one: Boo-run-dur-dee (N of Perth), Djar-dong-garri and Djar-doon-gur-ree (around Perth), Djul-bat-ta (S of Perth) and Ky-lor-ing (Albany district).

Gilbert collected two specimens in the King George Sound area in 1843 on the south coast where George Masters found it to be plentiful during the 1860s, and he collected several specimens (Ford 1969). A specimen was collected at Torbay by T.P. Draper in 1906 (Western Australian Museum). Whitlock (1914) recorded the species breeding in the Denmark area during the spring of 1912 and 1913, but information from local residents at the time suggested that it had declined in abundance. S.W. Jackson saw one individual near Bow River (approximately 40 km west of Denmark) in October of 1912 (Whittell 1952). Baggs (1953) also recorded the species at Bow River during December of 1952, and there are anecdotal records from this area into at least the 1960s. Other records were made in the Augusta area, at Torbay, and in William Bay National Park (Watkins 1985). The last definite record west of Albany was at Torbay by A.R. Main who recorded the species there until 1983 (Watkins 1985).

To the east of Albany only one locality was recorded until the 1960s. This was on the eastern-most extension of the Mt Manypeaks range, where Mr. C. Allen received feathers of this species from fishermen who had shot several birds during the 1940s and where they considered it common (Ford 1969). Since the 1960s there have been reports from Two Peoples Bay, Cheyne Beach, and Cape Riche (Watkins 1985). In 1965 Mr. K. Newbey recorded it from the Fitzgerald River area and Garstone (1977) recorded the species from north of Cape Arid (Watkins 1985). In 1968 John Bannister and Alex Baynes flushed a Ground Parrot west of Mt Baring on the track to Israelite Bay (Ford 1969). These last three records extended the known range approximately 500 km to the east.

2.2.1.3 Current Distribution (Post 1980)

A survey in 1985 found Western Ground Parrots in only two areas, Fitzgerald River National Park and Cape Arid National Park (Watkins 1985). By the 1990s further studies (Burbidge *et al.* 1989; Burbidge *et al.* 1990) suggested that Western Ground Parrots were restricted to five sub-populations in the northern part of Fitzgerald River National Park and one sub-population in Cape Arid National Park (Watkins & Burbidge 1992). Surveys of Fitzgerald River National Park in 2004 confirmed sub-populations at three of the five sites and discovered one new sub-population, while the Western Ground Parrot was recorded again in Cape Arid National Park in May 2003. At that time it was re-located at the original Cape Arid site (Poison Creek Road) and at an additional site (Pasley/Telegraph Track). This survey also located at least one bird in Nuytsland Nature Reserve near Pt Malcolm, near the eastern boundary of Cape Arid National Park. It represents the most easterly record of the taxon (McNee and Newbey 2003). Surveys conducted in Cape Arid National Park in 2005 reconfirmed substantial sub-populations at Poison Creek

Rd and Pasley – Telegraph Track, and also located a small sub-population near Pt Malcolm in Nuytsland Nature Reserve (Figure 2.1).

The Western Ground Parrot was recorded in the Mt Manypeaks-Waychinicup area in the early to mid 1990s (Burbidge *et al.* 1997; McNee 1999) in an area visited only briefly by Watkins (1985). The need for surveys in the area was recognised in the Western Ground Parrot Interim Recovery Plan (Burbidge *et al.* 1997) and a further survey was conducted by McNee (1999). Taken together, these records suggested that there was a significant population inhabiting this area. However, surveys in 2001, 2002 and 2003 showed a substantial decline in numbers at this site (Newbey 2002; Newbey 2003).

An immature Western Ground Parrot found dead in a paddock on the Kalgan River was handed in to the then Department of Conservation and Land Management (now DEC) in 1994, but the cause of death was unknown (P. Collins and A.H. Burbidge unpublished). This and other records from the western side of Cape Arid National Park and further west towards Esperance (summarised in McNee 2000) together with other records east of Hopetoun, most probably represent dispersing birds and not permanent or semi-permanent populations.

A reported sighting of Western Ground Parrots in the Lowlands area, between Denmark and Torbay, in 1999 was investigated by Shapelle McNee[2] and Sarah Comer[3], and subsequently the area was surveyed twice by the Friends of the Western Ground Parrot. Although the habitat appeared suitable for Ground Parrots no birds were heard in the area. However the birds were originally observed over a period of a week feeding on *Daviesia* pods, and the record was considered to be reliable, the first probable record of the species west of Albany since 1983 (S. McNee and S. Comer, unpublished).

Another recent reliable report of sightings came from Lake Shaster Nature Reserve, east of the Fitzgerald River National Park, although a survey of the reserve in May 2002 failed to locate the species (Burbidge & Comer 2003). Lake Shaster and Jerdacuttup Lakes Nature Reserves were assessed as containing some suitable potential habitat for the Western Ground Parrot. However there have been extensive fires in these reserves in recent years and this may have reduced the suitability of the habitat for large populations of Western Ground Parrots at the present time.

There have been a number of other possible sightings of Western Ground Parrots in recent years including several along the south coast in previously unsurveyed areas, and one on the sand plains north of Perth near Jurien. All of these reports warrant further investigation, but will not be considered as populations until such time as they have been verified and the size and significance of any population established.

[2] Shapelle McNee, South Coast Threatened Bird Recovery Team
[3] Sarah Comer, Regional Ecologist, DEC Albany

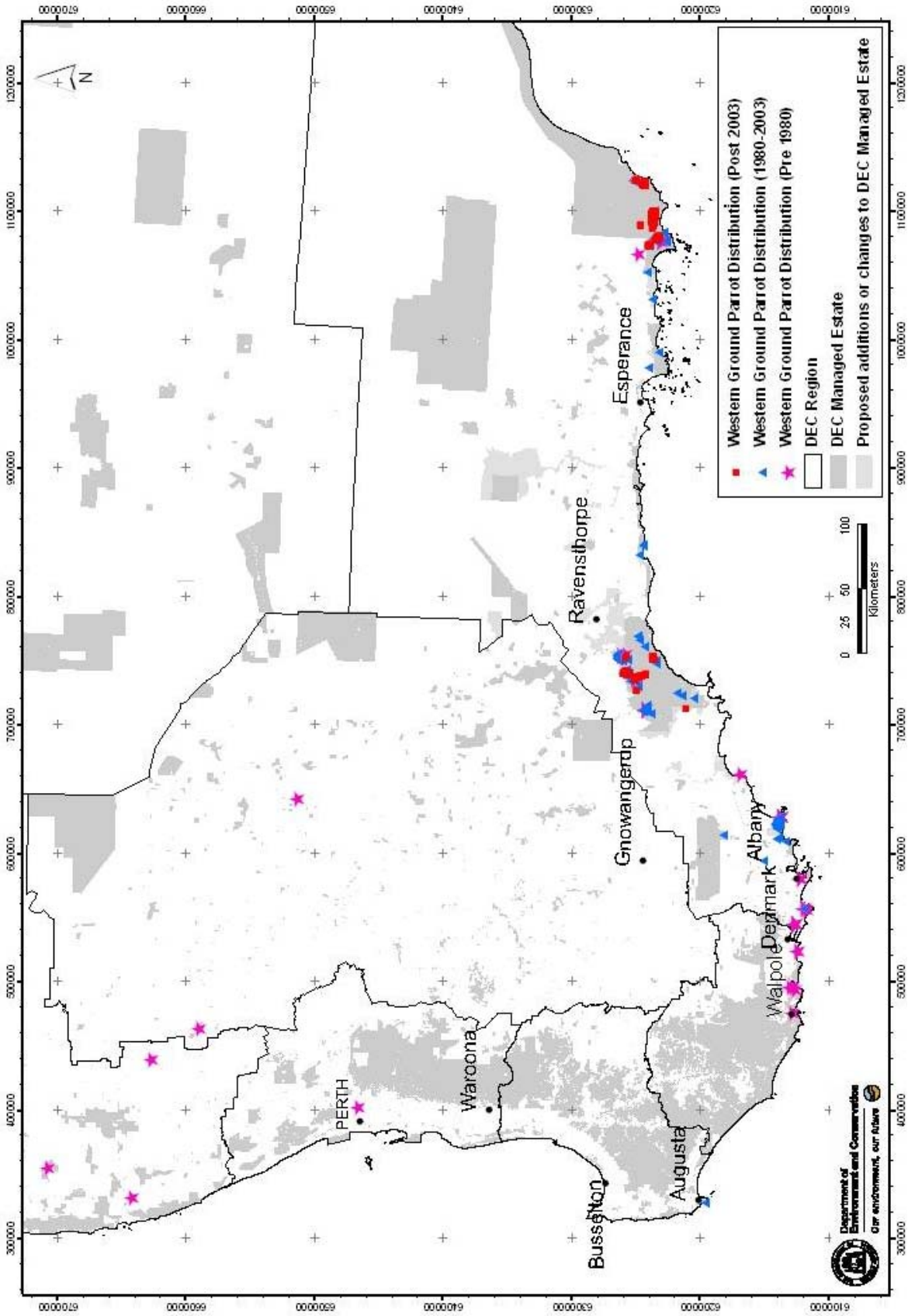

Figure 2.1: The past (pre-1980) and current (post-1980) distribution of the Western Ground Parrot (*Pezoporus wallicus flaviventris*).

2.2.1.4 Population Trends

Currently, Western Ground Parrots are known to exist in three areas (Fitzgerald River National Park, Cape Arid National Park and nearby parts of Nuytsland Nature Reserve, and the Mt Manypeaks-Waychinicup area), with the total number of birds probably being around 200.

Cale and Burbidge (1993) discussed the considerable difficulties in obtaining useful census data for Western Ground Parrots. There are two basic methods, one based on calls and the other on flushing birds. Both these methods have some degree of inaccuracy depending on listening conditions or densities of birds, and therefore reliable estimates of numbers are difficult to obtain. Walking through the heath to flush birds is used as a reliable technique in eastern Australia, but due to the low density of Western Ground Parrots, and possibly different behavioural responses, this technique has not proved to be cost effective in Western Australia (Burbidge *et al.* 1989).

In 1992 the whole population of Western Ground Parrots was estimated to be 378 birds (Watkins & Burbidge 1992). This estimate was determined using an estimate of the density at one site ('Short Road', Fitzgerald River National Park) and extrapolating to all known sub-populations, on the basis of the extent of suitable habitat associated with each. The estimate of density for the Short Road sub-population was 1-2 birds/40 ha, which is an order of magnitude lower than the densities found in some eastern Australian populations (Watkins & Burbidge 1992). Only three of the six known sub-populations were estimated to have more than 50 birds. These sub-population estimates were preliminary, because the true boundaries of the five sub-populations in Fitzgerald River National Park were not known, and the estimates were based on data from the post-breeding period, when densities would be expected to be higher than prior to breeding.

Most of the Fitzgerald Track area was burnt in October 1994 and 1997-98, and the Hamersley Drive area was burnt in 1997-98 (Burbidge 1998). The effect on the Western Ground Parrot population is unknown, but the 1997-98 fire burnt the habitat of 40-50% of the Ground Parrots thought to exist in Fitzgerald River National Park. Prior to the 1997-98 fires it was estimated that about 300 birds occurred in Fitzgerald River National Park (Watkins & Burbidge 1992), so these fires may have had a significant impact on the size of the whole population. Surveys conducted in 2004 showed very little recolonisation of the Hamersley Drive area and none in the Fitzgerald Track area.

The Short Road sub-population in Fitzgerald River National Park displayed a three-fold increase in calling rate over the 1996 to 2000 period, but by late 2003 the calling rate had decreased substantially to about an order of magnitude less than in 2000. Very low rates of calling were recorded from a survey in autumn 2004. Reasons for the decline are unknown, but fire is unlikely to be the cause as the habitat in this area comprises three different fire ages (last burnt c. 1960, 1994 and 1997-98) (Burbidge *et al.* 2007).

The Mt Manypeaks-Waychinicup area was recognised as supporting an extant population of at least 29 birds in 1998 (McNee 1999). Five years later (in autumn 2003) surveys of the same area were repeated, but despite increased survey effort and coverage only four birds were recorded (Newbey 2003). Since this survey no birds have been heard in this area, despite continued survey. The reasons for this apparent decline in Ground Parrot numbers are not known. The area of suitable habitat here is unknown but could be in excess of 1500 ha and might therefore have the potential to support about 100 birds.

In Cape Arid National Park surveys in 1996, 1998, 1999 and 2000 all proved negative (McNee 2000), as did opportunistic surveys by the DEC Ranger. However, following extensive wildfires in 2002, a survey in 2003 located a minimum of 25 birds in three different areas (McNee & Newbey 2003) (Table 2.2). Poison Creek Road, where birds were detected in 2003, had no positive records in 1996-2000. Paisley Track was inaccessible in 1998 – 2000 due to high rainfall.

The whole population of the Western Ground Parrot appears to have declined from an estimated 378 birds in 1990, to 200 in 2004 and perhaps only 180 in 2005 (Table 2.2). While the earlier estimates may have been a little optimistic there seems to be real evidence that some sub-populations, and probably the whole population, have declined. Survey of known historical locations, areas that recently have been identified

as containing suitable habitat and areas containing existing populations are currently in progress, but to date no significant new populations of Western Ground Parrots have been located.

Table 2.2: Estimates of population size at each sub-population and the whole population of the Western Ground Parrot in 1990, 2004 and 2005 (from Watkins & Burbidge 1992; B. Barrett unpublished).

Site	Area of vegetation (ha)	Proportion judged to be suitable	Sub-population estimates 1990	Sub-population estimates 2004	Sub-population estimates 2005
Fitzgerald River National Park					
Hamersley Dr (Burnt 97/98)	2,500	1.00	145	<5	<5
Short Road	1,100	1.00	67	30	30
Fitzgerald Track	800	1.00	40	<5	0
Drummond Track	900	1.00	35	20	30
Moir Track	300	1.00	3	2	0
Telegraph Track	1,500	1.00		6	10
Other	4,400	1.00	?13	15	10
Waychinicup					
	1,600	1.00		<4	0?
Cape Arid National Park					
Poison Creek Road	4,800	0.75	75	30+	30
Pasley/Telegraph Track	8,000	0.50	-	20+	40
Pt Malcolm	2,500	0.75	-	2	20
Whole population estimate			**378**	**<200**	**<180**

2.2.2 Western Bristlebird (*Dasyornis longirostris*)

2.2.2.1 Description of Species and Taxonomy

The Western Bristlebird is one of three species (*D. brachypterus*, *D. longirostris* and *D. broadbenti*) of the Australian endemic genus *Dasyornis*, in the family Dasyornithidae. It is a medium-sized and sturdy ground dwelling bird with short wings, long graduated tail, and a sturdy and slightly decurved bill. The length is *c*. 17 cm and weight 26-39 g. The sexes are alike. Adults are mainly dark brown above with distinctly paler speckling or mottling to the top of the head and mantle. They have rufous brown wings, rump and tail, and the under-body is off-white to brownish-grey, finely scalloped black-brown (Higgins & Peter 2002).

The Western Bristlebird is shy, elusive and rarely seen, though frequently heard in suitable habitat. The tail is held horizontally when moving around on the ground or through vegetation. Birds walk or hop slowly, interspersed with short fast dashes. They fly weakly and reluctantly, and then only for short distances, skimming the vegetation with tail partly or fully fanned (Higgins & Peter 2002).

Individual Western Bristlebirds occupy home ranges that may or may not overlap with other individuals. The social organisation of Western Bristlebirds is not well understood. 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. This means that population indices, based on the presence of 'A' calling birds, must be interpreted with caution.

2.2.2.2 Discovery and Historical Distribution

Gilbert collected the Western Bristlebird near Perth in 1839. He also reported hearing it near Augusta in 1842 and considered it abundant in certain districts (Whittell 1941). The species has not been recorded in west coast areas since (McNee 1986). No contemporary records of the species exist between Perth and Wilson Inlet on the south coast (McNee 1986), but Baird (1991) found fossil evidence of the species at Skull Cave approximately 10 km west north-west of Augusta.

On the south coast the the Western Bristlebird was collected in the "Vicinity of Albany, King Georges Sound" by Gilbert in 1843 (Whittell 1941), and was collected by George Masters in 1866 and again in 1868-69 (Serventy & Whittell 1976). W. Webb collected the Western Bristlebird in the King George Sound area in the 1880s (Serventy & Whittell 1976), but it has not been recorded from the area since (McNee 1986). F. Lawson Whitlock recorded the species at Wilsons Inlet in 1907, where they had apparently moved due to a fire to the east (Whittell 1936). They were observed there until at least 1912, but vanished after another fire burnt out the area. Thomas Carter was in this area in 1919 and again in 1922, but failed to find any sign of bristlebirds (Whitley 1971).

After the record by Whitlock no further records of the Western Bristlebird were made until 1944 when Buller (1945) collected it at Two Peoples Bay (Ford 1965). It was recorded on the Waychinicup River in 1961 and on the north side of Mt. Manypeaks in 1962 (Ford 1965). Its known distribution was further extended eastward along the coast in 1976, when D. James and P. de Rebeira recorded it at Beaufort Inlet (McNee 1986), and Smith and Moore (1977) recorded it in the Fitzgerald River National Park along the old telegraph line.

2.2.2.3 Current Distribution (Post 1980)

Currently the Western Bristlebird 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 2001a). The area between these two populations, a distance of 120 km, was extensively surveyed for Western Bristlebirds in 1994 and 1995. No bristlebirds were located between the two areas despite there being extensive apparently suitable habitat (Figure 2.2). It is not clear whether a recent record of two bristlebirds at Kundip Nature Reserve (Buchanan 2004) represents vagrant or dispersing birds, or a permanent sub-population. There is continuous remnant vegetation between this reserve and the neighbouring Fitzgerald River National Park. This record extends the known range approximately 15 km to the east.

The Western Bristlebird has been recorded in at least 15 sites in the Fitzgerald River National Park since 1980 (Table 2.3). As a result of wildfire and other unknown factors, birds are currently known (since 1999) from only eleven of these sites: Fitzgerald Track, most recently in 2003, East Mt Barren 1999, Sepulcralis Hill 1999, No Tree Hill 1999, Moir Track 1999, Hamersley Inlet 1999, Hamersley Drive 1999, Mt Drummond 2002, Woolbernup-Thumb Peak 2002, 2004, Water Meter Track / Farm block 1999 and Mid-Mt Barren (1 record only) 2000. They have not been relocated at Twertup Track, and surveys have not been conducted at East Telegraph Track, Dogger Swamp and Bell Track since fires in the 1990s.

2.2.2.4 Translocated Populations

A total of 15 Western Bristlebirds were translocated from Two Peoples Bay to Nuyts Wilderness in the Walpole–Nornalup National Park, near Walpole, about 130 km west of Albany in 1999 and 2000. A number of translocated birds persisted for some time despite a severe large wildfire in autumn 2001. At least seven bristlebirds were still calling in spring 2001, and at least five birds in spring 2002. However, surveys conducted from October 2003 to mid 2005 found only one bird calling, and no bristlebird calls were heard in October 2005 or later surveys despite thorough survey. Nevertheless, the trial translocation has shown that Western Bristlebirds are capable of surviving in the habitat in the Nuyts Wilderness and further translocations are being considered.

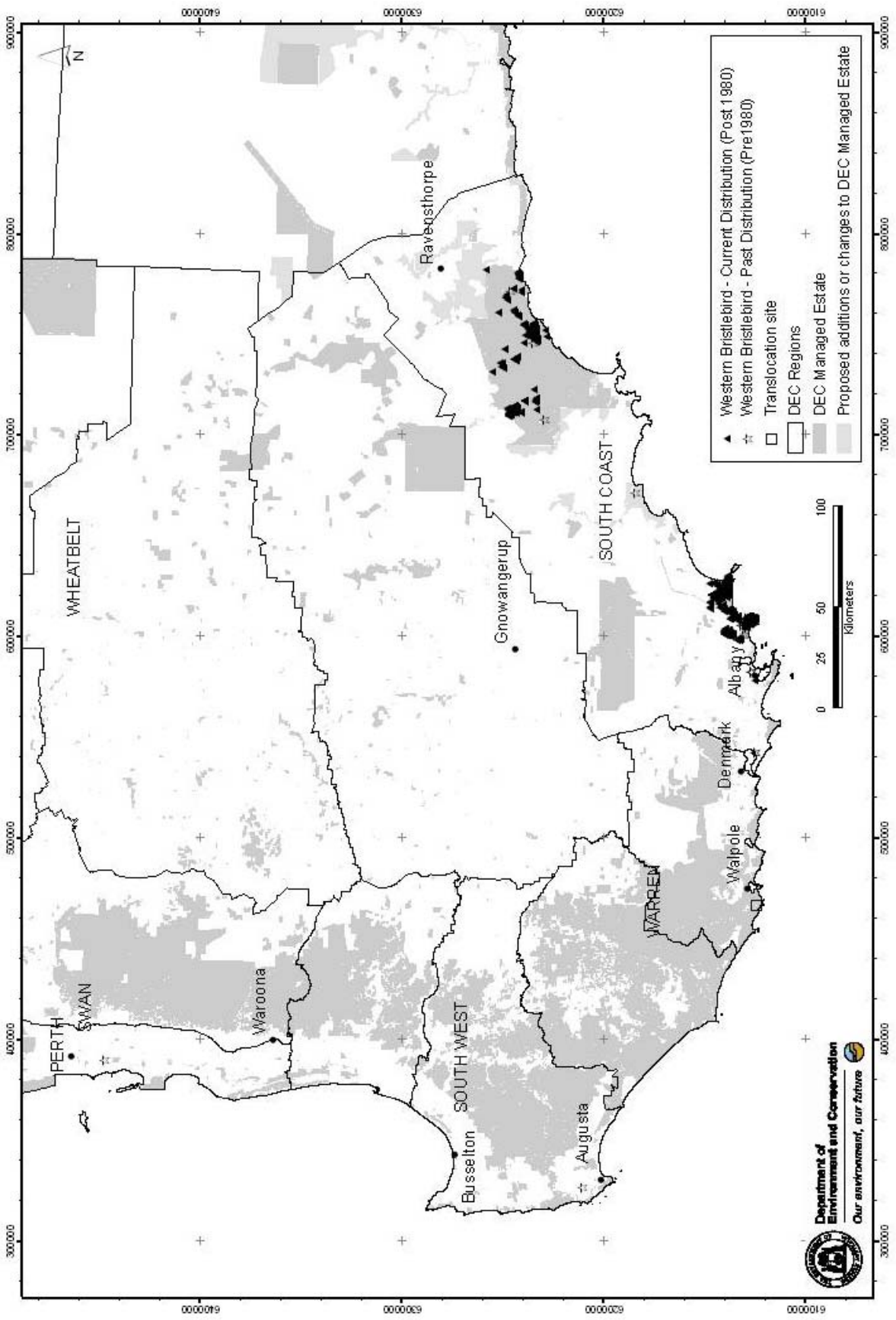

Figure 2.2: The past (pre-1980) and current (post-1980) distribution of the Western Bristlebird (*Dasyornis longirostris*)

2.2.2.5 Population Trends

The whole population number of the Western Bristlebird is not known with certainty, but as of 2005 is considered to be at least 327 pairs (202 in the Albany Management Zone (AMZ) and 125 in the Fitzgerald River National Park), with the major concentration in the Two Peoples Bay/ Waychinicup/ Manypeaks area. 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.

Results of recent surveys suggest that there are at least 125 pairs in the Fitzgerald River National Park (Table 2.3), although not all suitable habitat in the park has been surveyed. The size of the Fitzgerald River National Park (330 000 ha) has inhibited conducting a comprehensive survey for bristlebirds similar to that carried out in the AMZ.

Previously known sub-populations of Western Bristlebirds have disappeared from Twertup and Bell Track, but reasons for this are unknown. Bristlebirds disappeared from Telegraph Track and Dogger Swamp after wildfire in 1989, but these areas have not been surveyed recently to determine whether they have been recolonised. Similarly the effects of wildfire have resulted in movement of sub-populations at Woolbernup-Thumb Peak and Fitzgerald Track. Sub-populations at Moir Track, Hamersley Drive (central), Hamersley Inlet, 'Water Meter Track' and farm block, were last surveyed in 1999, and the current status of these sub-populations is unknown.

There is some data available on changes in density of 'A' calling bristlebirds in the Two Peoples Bay-Waychinicup area, although survey methods used to collect data varied. On Mt Gardner Graeme Smith mapped home ranges of Western Bristlebirds in the Tick Flat and Firebreak areas in 1976 and 1994 (Smith 1987; Smith 1994). Smith also recorded the year that a bird was first heard in a particular area or home range. Some extrapolation from these records was completed in conjunction with the results of survey work conducted in 2001 (Comer & McNee 2001a). The 2001 survey (Table 2.4) did not map home ranges, but recorded 'A' calling birds in relation to other 'A' calling birds in the same area (i.e. calls close together and heard at the same time were judged to be two birds or, if recorded at different times, recorded as a single calling bird). By extrapolating from Smith (1994) and Comer and McNee (2001a) it is evident the density of bristlebirds in the Tick Flat and Firebreak area has increased significantly since Smith's 1976 surveys (Figure 2.3). There has been a steady increase in the density of bristlebird territories or home ranges, with around twice as many 'A' calling birds heard in 2001 as there were home ranges mapped in 1976 and 1994.

In the Waychinicup area incomplete surveys conducted in 1994 and 1995 mapped the location of 'A' calling bristlebirds (McNee & Newbey 1995). These data were not directly comparable with the comprehensive survey conducted in 2001, due to the patchiness of the earlier surveys. However these records do provide information on occupancy of specific fire age vegetation and in some areas density of 'A' calling birds, and warrant further examination.

The numbers of Western Bristlebirds in the AMZ were much lower in 2005 than in 2001 (Table 2.4). This was largely a result of wildfires, particularly an extensive wildfire on Mt Manypeaks in December 2004 to January 2005 (Burbidge *et al.* 2005). Reasons for the decline on Mt Gardner are not known.

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Table 2.3: Sub-population index for Western Bristlebirds (number of 'A' calling birds) in the Fitzgerald National Park from McNee and Newbey surveys. Index is for the traditional survey area. (* = incomplete survey; blank indicates no survey carried out.

Traditional Survey area	Management Unit (see Section 2.3.2)	Year last burnt	1985	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Fitzgerald Tk	Twertup-Fitzgerald Track	1994		26	21	19	16	25	19	23	30	35	38	48	41
Twertup Tk	Twertup-Fitzgerald Track	1970s		8					3			0			
Drummond Tk	Short Rd – Drummond Tk	1989, 1997-98					7	4		3		1			
Woolbernup	Woolbernup	1997-98		4*	12*		25	23		31					
East Telegraph Tk	Woolbernup	1997-98		10				0							
Water Meter Track-Farm block	Twertup-Fitzgerald Track	Not recently burnt			23				23						
East Mt Barren	Eastern Range	1989							15						14
Moir Tk	Eastern Range	1989, 1997-98							4						
Hamersley Drive	West River	1989, 1997-98							2						2
Sepulcralis Hill	Eastern Range	1989							3						3
No Tree Hill		1985, 1989							1						
Mid Mt Barren	Woolbernup											2			
Dogger Swamp	Quaalup	1989	3	0											
Bell Track	Short Rd-Drummond Tk	Not recently burnt	3	0	0										

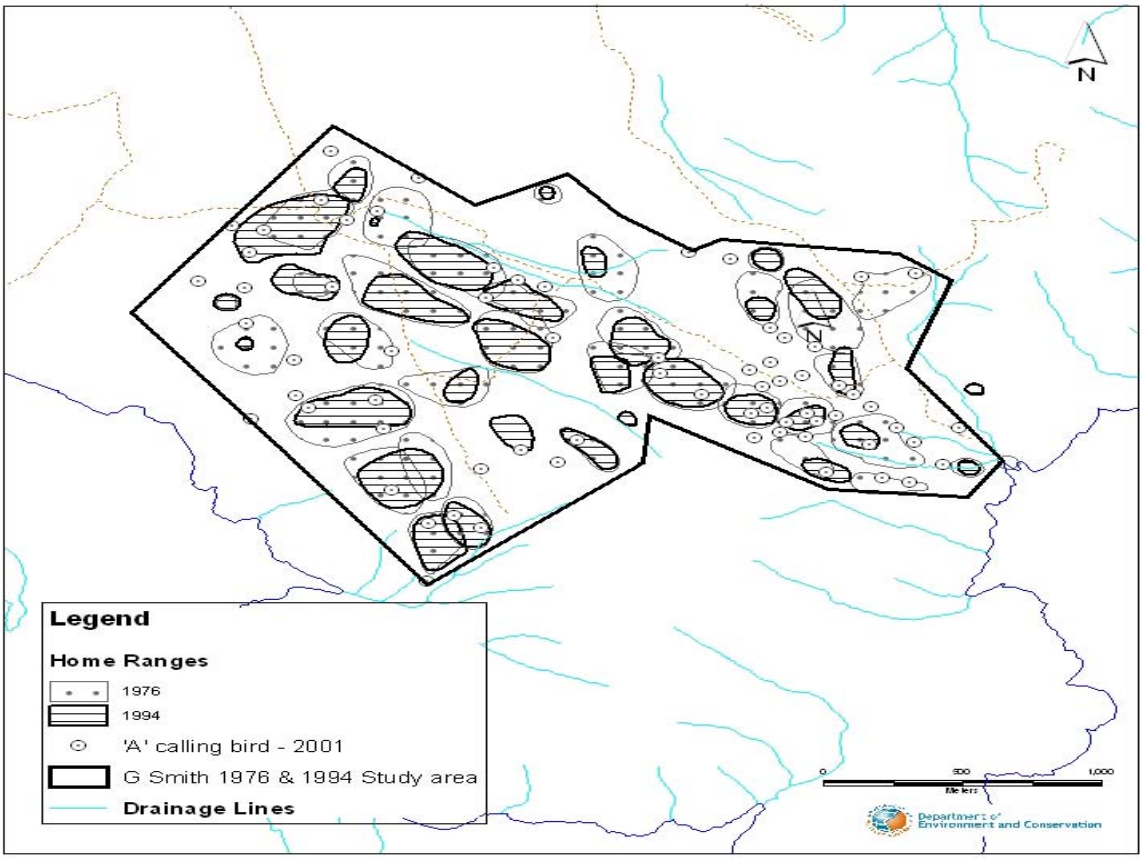


Figure 2.3: Changes in Western Bristlebird density on Mt. Gardner in Two Peoples Bay Nature Reserve in the Albany Management Zone (AMZ): 1976, 1994, 2001 (data from Smith 1994; Comer & McNee 2001a).

Table 2.4: Number of Western Bristlebirds in the Albany Management Zone (AMZ) (data from Comer & McNee 2001a; Tiller *et al.* 2006).

Sub-population / Management unit	Number of 'A' calling birds 2001	Number of 'A' calling birds 2005
Mt Gardner	158	73
Mt Manypeaks	117	32
Angove-Normans	99	9
Waychinicup	85	29
Mermaid	43	56
Goodga	7	4
Mt Martin	0	0
Total	**509**	**203**

2.2.3 Noisy Scrub-bird (*Atrichornis clamosus*)

2.2.3.1 Description of Species and Taxonomy

The Noisy Scrub-bird is a small solidly built bird 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. 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). Adult males have a dark grey band of variable width across the off white throat and prominent white side flashes. Females have cream coloured throats and lack the band.

Noisy Scrub-birds have very limited flying abilities, 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.

The territorial song of the male easily distinguishes the Noisy Scrub-bird from other birds within its range, but the cryptic colour and behaviour combined with the dense habitat make them difficult to observe. However, they are not as secretive as casual observations would suggest, but are inquisitive birds, moving quickly to investigate the cause of any disturbance in their territory.

Scrub-birds (the Noisy Scrub-bird and Rufous Scrub-bird, *A. rufescens* of north-eastern New South Wales and south-eastern Queensland) form a small endemic monogeneric family of song birds, the Atrichornithidae, whose closest relatives are the lyre-birds (Menuridae) (Bock & Clench 1985; Sibley & Ahlquist 1985; Sibley & Ahlquist 1990). Ericson *et al.* (2003) believe the lyrebirds and scrub-birds to be basal to all other oscine passerine birds. Scrub-birds, therefore, are unusual, unique and important to our understanding of avian phylogeny and evolution.

2.2.3.2 Discovery and Historical Distribution

Although the Noisy Scrub-bird with its loud call would have been known to Aboriginal people for many thousands of years, only one Aboriginal name has been recorded: Jeemuluk or Tjimiluk (pronunciation unknown: may be Djimoolook), from King George Sound area (Serventy & Whittell 1976).

John Gilbert, the first European to report the species, collected the first specimens at Drakesbrook, near Waroona, in November 1842. Later on the same journey he found it near Augusta at Cape Leeuwin (Whittell 1951). In 1843 Gilbert travelled from York to Albany along a route similar to today's Albany Highway and noted that he first heard scrub-birds around Mt. Barker, with numbers increasing as he approached Albany (Serventy & Whittell 1976; Smith 1977). He collected three more specimens in the King George Sound area. George Masters collected seven specimens near Albany between 1866 and 1869, and William Webb collected eight specimens, also in the same area in the 1870s. The final nineteenth century specimen was collected by A.J. Campbell at Torbay in October 1889, and he reported having heard scrub-birds at Boojidup Creek, about 25 km north of Karridale, in November of the same year (Whittell 1943; Smith 1977). Thus, 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 (Figure 2.4). The birds were apparently most numerous in the Albany area, which extended to Torbay 15 km to the west and to Mt Barker, 50 km to the north. The birds were probably present in the Two Peoples Bay and Mt Manypeaks area at the time and William Webb considered that they might be found as far east as the Pallinup River (100 km east of Albany) (Whittell 1943), although on current knowledge this seems unlikely.

The apparently sudden disappearance of an unusual and unstudied bird was viewed with concern by ornithologists of the day and, beginning in 1904, extensive searches were mounted for the scrub-bird in its former areas. Despite these efforts no further records of the Noisy Scrub-bird were confirmed and the species was considered by many to be extinct (e.g. Campbell 1920; Whittell 1943; Chisholm 1951; Whittell 1951) until it was rediscovered at Two Peoples Bay in 1961 (Webster 1962).

2.2.3.3 Current Distribution (Post 1980)

Since the rediscovery of the Noisy Scrub-bird at Two Peoples Bay, searches elsewhere in its former range have failed to locate further sub-populations. Following management actions including fire exclusion and translocations between 1983 and 2003, the Noisy-Scrub bird currently occurs from Two Peoples Bay Nature Reserve to Cheyne Beach, with outlying sub-populations on Bald Island and at Mt Taylor/Mt Martin (Figure 2.4). A comparison of the distribution of birds in the Albany Management Zone (AMZ) in 1966, 1986, 2001 and 2005 can be seen in Figure 2.5.

2.2.3.4 Translocated Populations

A total of 206 individual birds, 136 males and 70 females, have been released into eight translocation areas since 1983, with only Nuyts, Quarram and the current Darling Range translocation sites not within the Albany Management Zone (AMZ). Translocated birds did not persist at Nuyts or Quarram, or at Stony Hill in Torndirrup National Park (Danks *et al*. 1996).

In the AMZ the Lakes and Angove-Normans sub-populations originated from birds dispersing from Mt Gardner. A single singing male (probably dispersed from the Two Peoples Bay area) was heard at Mt Taylor in the Gull Rock Reserve in 1988 and more birds were released in this area in 1990, 1991 and 1992. Other AMZ sub-populations at Mt Manypeaks, Mermaid, Waychinicup and Bald Island were also established by the translocation of birds from Mt Gardner and the Lakes areas in Two Peoples Bay Nature Reserve (Table 2.5; Figure 2.5).

Noisy Scrub-birds were translocated to the Darling Range between 1997 and 2003. However, although a number of birds are persisting at this site, as of 2005 breeding in this sub-population had not been confirmed and the sub-population is therefore not considered established at this stage.

2.2.3.5 Population Trends

At the time of rediscovery, the Noisy Scrub-bird population was very small and confined to the Mt Gardner area at Two Peoples Bay east of Albany. As only singing, or territorial, males can be censused the census does not provide an absolute measure but, rather, an index to the actual sub-population size (Smith & Forrester 1981).

In recent years prior to December 2004 the area occupied by scrub-birds in the AMZ had increased to the point where it was no longer feasible to conduct a complete census each year, and for this reason selected sub-populations are surveyed annually and a complete survey undertaken every 3-4 years. A complete survey of the AMZ population in 2001 revealed that the total population index was 765, having increased from 590 in 1997. However, survey of the AMZ since the wildfire at Mt Manypeaks in December 2004 showed that the population in the AMZ had declined to 343 territorial males (Figure 2.6). Analyses of Noisy Scrub-bird population trends between rediscovery and 1995 are summarised in Danks *et al*. (1996) and Danks (1997).

Censusing sub-populations in the AMZ has allowed both trends and response to stochastic events (e.g. wildfire) in discrete sub-populations to be recorded, even when a count of the total population has not been feasible due to the time and resource requirements of a large scale survey (Table 2.6).

Counts of the Mt Gardner sub-population have been completed almost annually since 1970, and provide a long-term benchmark for both population trends in the AMZ and for monitoring the parent population that was used for translocations between 1983 and 1999 (Figure 2.7). Other AMZ sub-populations are surveyed in response to fire, to determine specific sub-population trends, or to confirm establishment of translocated birds, as shown for the Lakes and Bald Island sub-populations in Figure 2.8.

Recent work has indicated that song analysis, using the methods developed by Berryman (2003) and Portelli (2004), may reflect social organisation and further work is needed to establish relationships between individuals, which may provide insight to help interpret census data and to plan translocations.

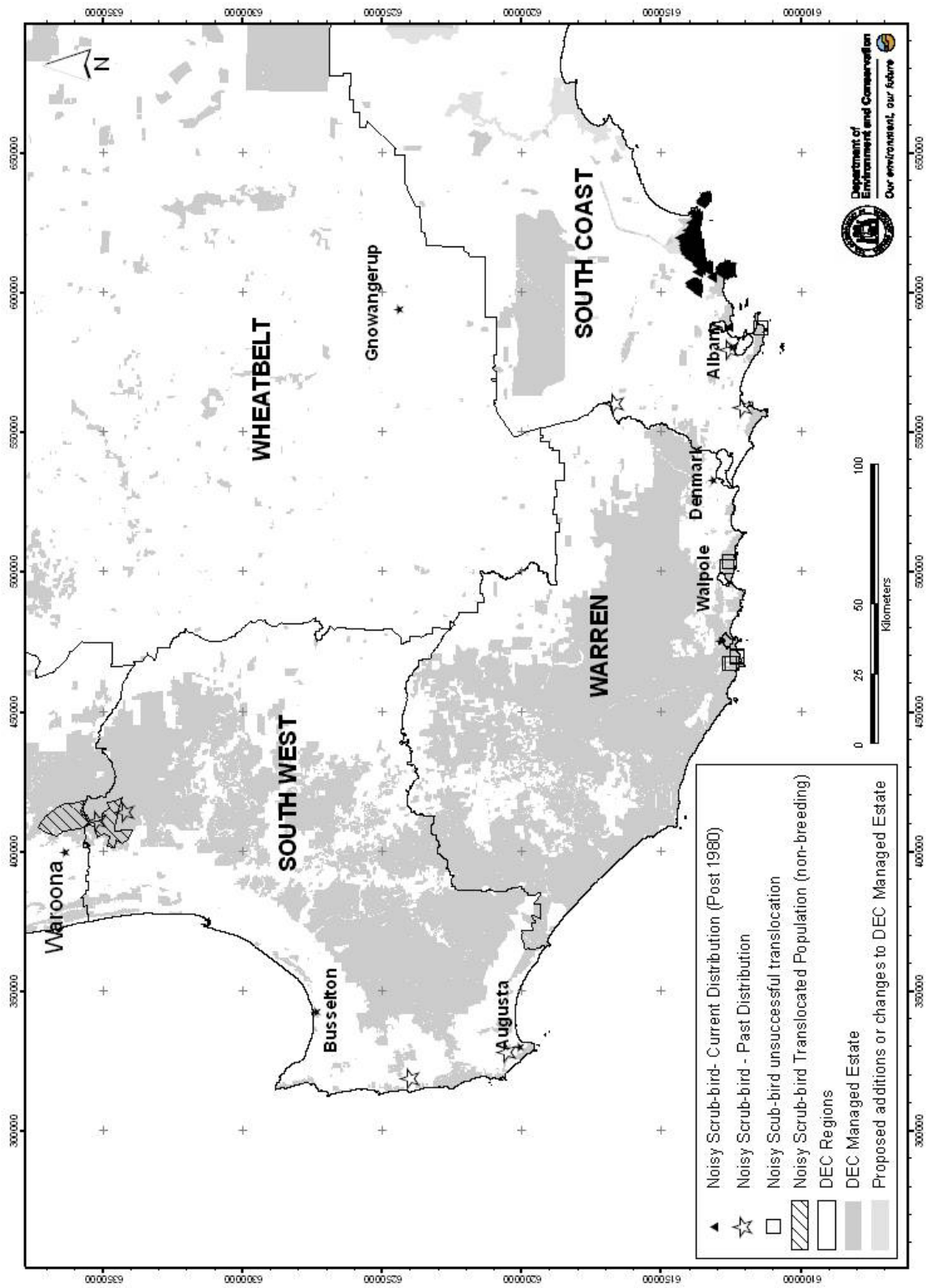


Figure 2.4: Past (pre-1980) and current (post-1980) distribution of the Noisy Scrub-bird, including non-breeding translocationed populations and unsuccessful translocation sites.

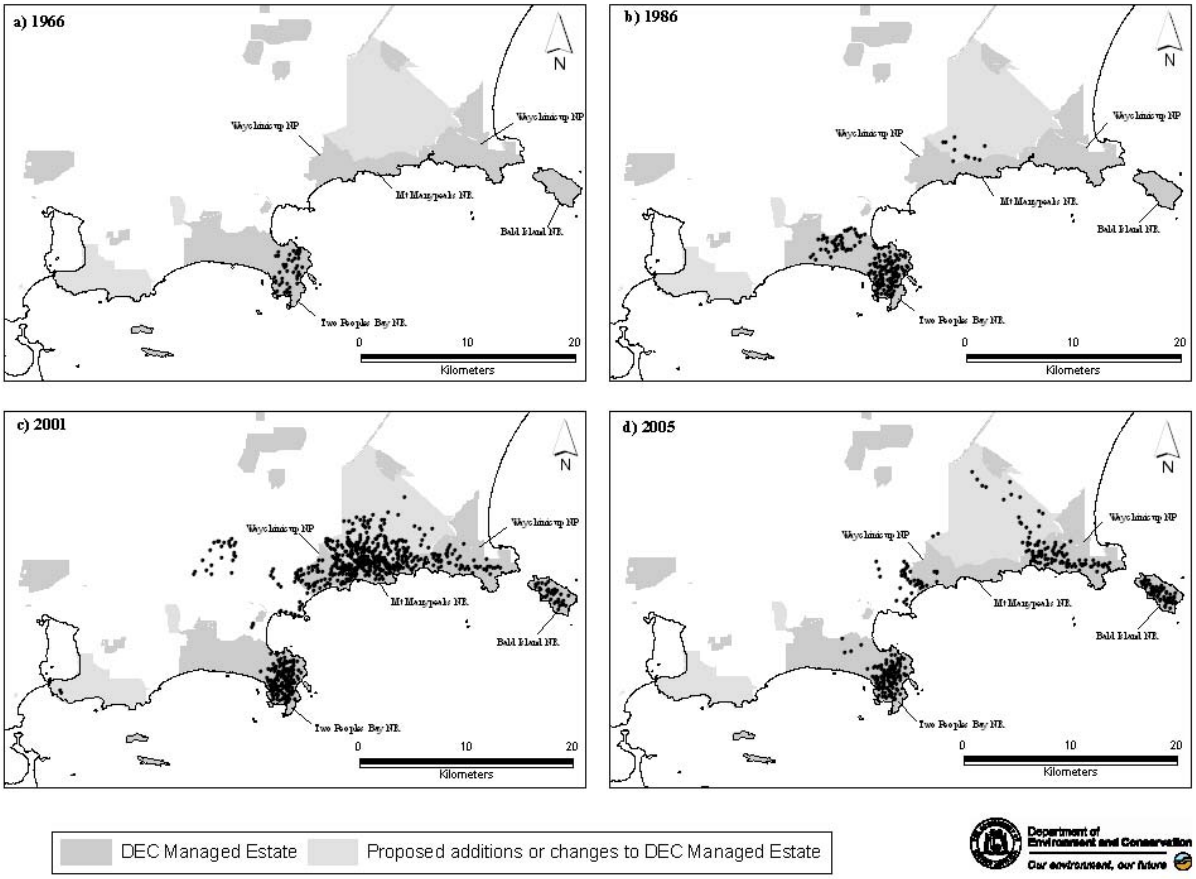


Figure 2.5: The number of singing male Noisy Scrub-birds in 1966, 1986, 2001 and 2005 in the Albany Management Zone (unpublished data).

Table 2.5: Summary of Noisy Scrub-bird translocations and ratio of male:female birds released 1983-2003. The year of breeding in successful translocation sites is indicated (based on the year the number of singing males exceeded the number of translocated males).

	Release Area And Ratio Of Male:Female Birds Released At Each (M:F)							
Year	**Many-peaks**	**Nuyts**	**Quarram**	**Mt Taylor**	**Mermaid**	**Bald Island**	**Stony Hill**	**Darling Range**
1983	10:6							
1985	8:7							
1986		8:8						
1987		8:7						
1989			11:10					
1990			4:1	5:1				
1991				0:2				
1992				1:3	5:0	5:0		
1993					3:0	2:2		
1994					0:2	1:1	5:0	
1997								13:0
1998								13:5
1999								8:3
2000								10:1
2001								14:3
2002								2:4
2003								0:4
TOTAL	**18:13**	**16:15**	**15:11**	**6:6**	**8:2**	**8:3**	**5:0**	**60:20**
Breeding Year	**1988**	**-**	**-**	**1993**	**2001***	**1997**	**-**	**Not yet**

* in 1999 the number of singing males at Mermaid was the same as the total number released (8). This area was not surveyed in 2000, but it is highly likely that breeding had occurred by this time as the number of singing males recorded in 2001 was 22.

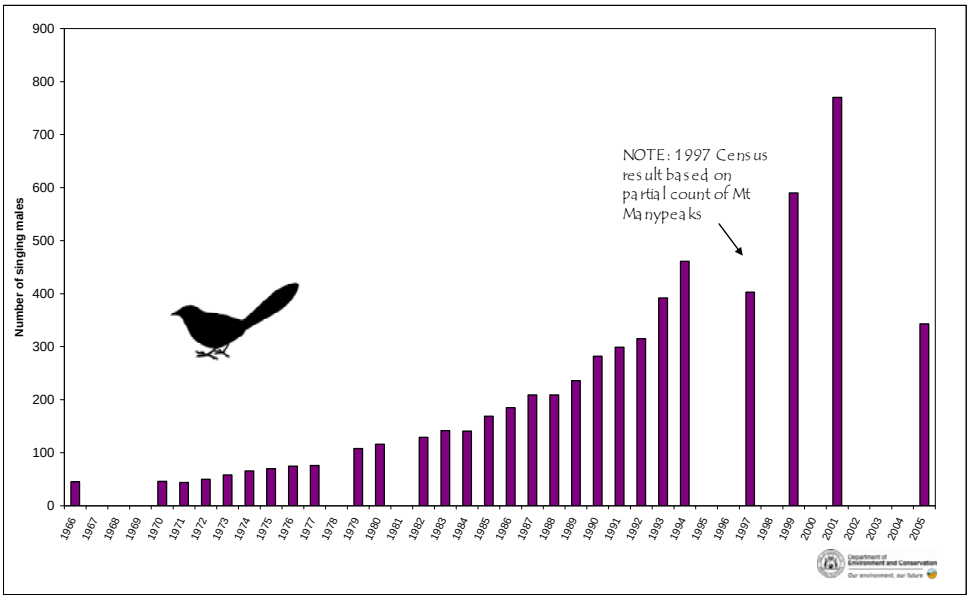


Figure 2.6: Recovery of the Noisy Scrub-bird in the Albany Management Zone.

Table 2.6: Population indices (number of singing males) for the Noisy Scrub-bird sub-populations within the Albany Management Zone (AMZ) from 1966 to 2003. Blank indicates that no survey was carried out.

Year	Albany Management Zone Sub-populations							
	Mt Gardner	Lakes	Many-peaks	Angove-Normans	Gull Rock	Waychin-icup	Mermaid	Bald Island
1966	44							
1970	46	1						
1971	44							
1972	50							
1973	58	1						
1974	66							
1975	69	1						
1976	73	2						
1977	73	2						
1979	99	9						
1980	108	8						
1982	115	16						
1983	121	18	4					
1984	112	26	4					
1985	122	35	12					
1986	122	53	10					
1987	129	64	15	2				
1988	133	46	26	4	1			
1989	144	54	32	7	1			
1990	151	59	60	9	6			
1991	164	34	81	12	6	1		
1992	163	28	100	21	5		1	
1993	172	28	156		9			2
1994	179	13	223	37	12		1	6
1995	168	4		62	5	5	3	5
1996	177	12		67	3	13	3	8
1997	167	8		58		22	4	9
1998	134							
1999	129	2	319	83	0	26	8	21
2000	133	11		113				37
2001	164	2	427	79		32	21	37
2002	172	3						44
2003	152	13		42	1			53
2004	131	2		34				59
2005	126	4		37		53	26	65

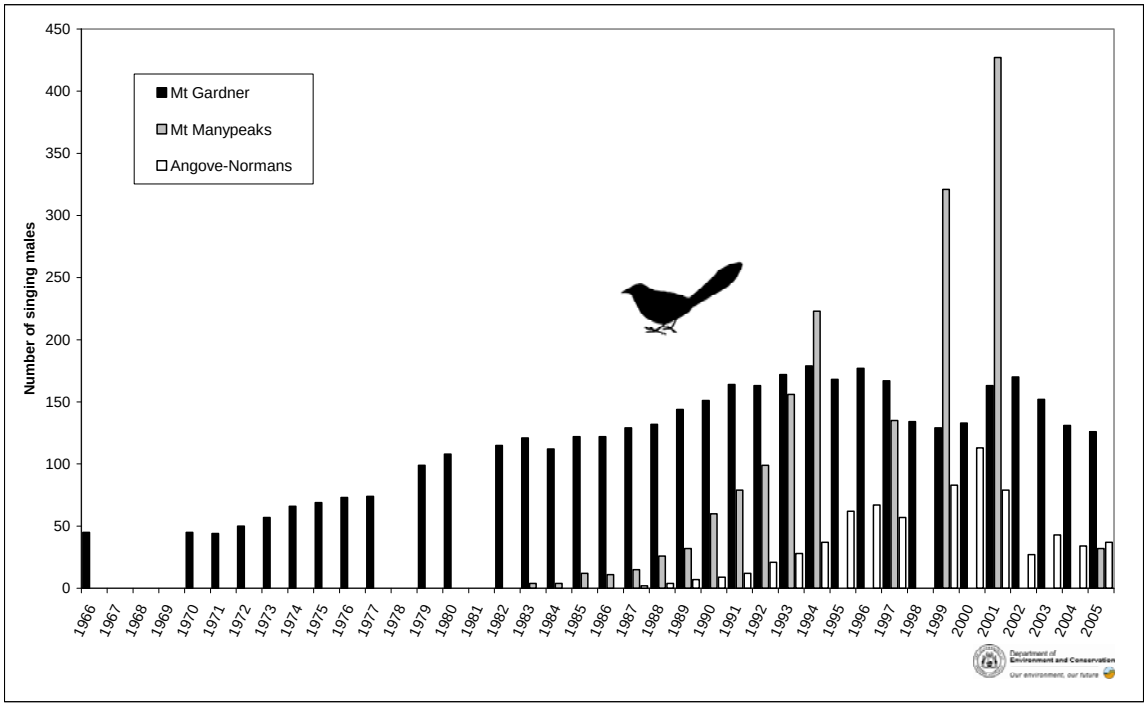


Figure 2.7: Trends in Mt Gardner, Mt Manypeaks and Angove-Normans Noisy Scrub-bird sub-populations in the Albany Management Zone (AMZ).

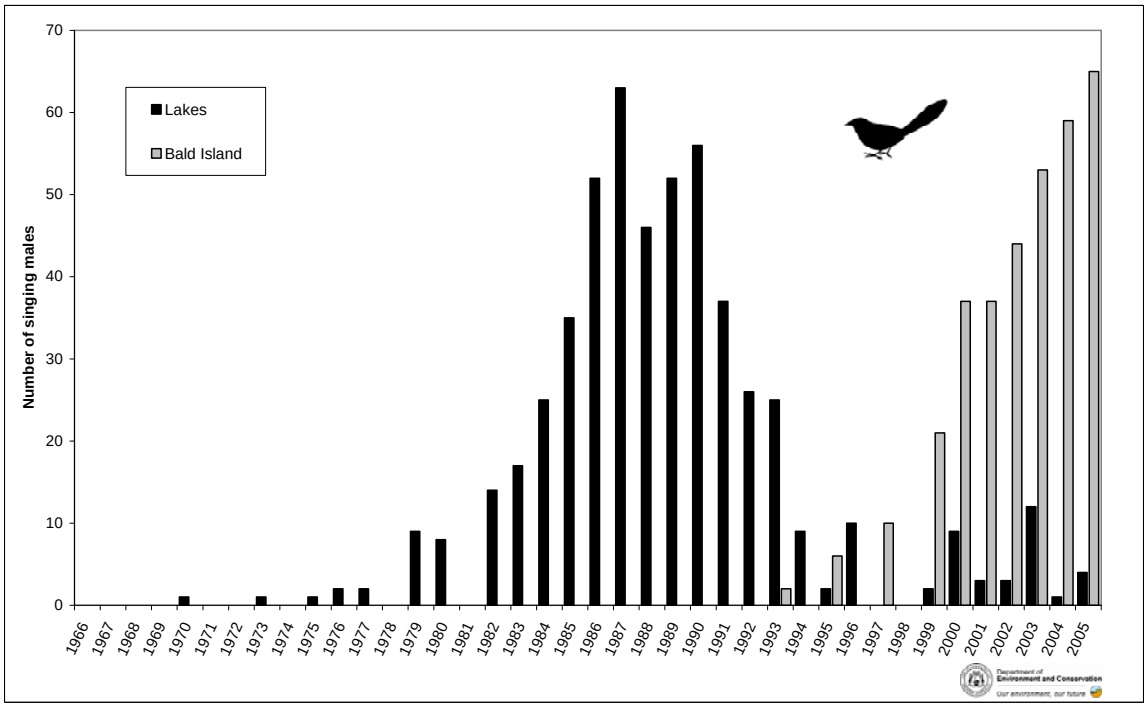


Figure 2.8: Trends in Lakes and Bald Island Noisy Scrub-bird sub-populations in the Albany Management Zone (AMZ).

2.2.4 Western Whipbird (western heath) (*Psophodes nigrogularis nigrogularis*) and Western Whipbird (western mallee) (*P. n. oberon)*

2.2.4.1 Description of Species and Taxonomy

Western Whipbirds (*Psophodes nigrogularis*) are highly elusive greyish olive-green birds with a slight crest, black throat bordered on either side by white whisker, and outer tail feathers with a subterminal black band and prominently tipped white. The species is sexually dimorphic in calls only. They run swiftly, and fly directly and quickly, but not for great distances. The song is a series of grating and creaking whistles. Some calling is antiphonal, with females replying to the male's territorial calls.

A review of the taxonomy of the Western Whipbird based on morphometric and plumage characteristics by Schodde and Mason (1991), identified four subspecies: *Psophodes nigrogularis nigrogularis* Gould, and *P. n. oberon* Schodde and Mason, in Western Australia; *P. n. lashmari* Schodde and Mason, on Kangaroo Island, South Australia; and *P. n. leucogaster* Howe and Ross, on mainland South Australia and Victoria (includes both *P. n. leucogaster* and *P. n. pondalowiensis* Condon). Schodde and Mason (1991) considered the subspecies formed two groups: one of small plain olive-grey birds with dull banded tails represented by *P. n. nigrogularis*, and the other represented by the other three subspecies, which are larger, greyer and whiter-bellied birds with brighter bands on the tail. They refer to this second group as the *leucogaster* group. Subsequently, it has been suggested (Schodde & Mason 1999) that these two groups actually represent two separate species. However, this separation is not accepted by Johnstone and Storr (2004), and recent genetic work has indicated a close relationship between *P. n. nigrogularis* and *P. n. lashmari* (from Kangaroo Island), suggesting that they may not be genetically differentiated even at subspecific level (Christidis & Norman 1999). Nevertheless, apparently the calls of the two Western Australian taxa are recognizably different (B. Newbey[4], personal communication 2004) and they differ in nest architecture (R.E. Johnstone[5] personal communication 2004) as well as plumage (Schodde & Mason 1999).

The South Coast Threatened Birds Recovery Plan follows Schodde and Mason (1991) in recognising two subspecies in Western Australia but note that further genetic and ecological studies are required to clarify the taxonomic status of Western Australian populations.

2.2.4.2 Discovery and Historical Distribution

Historical records of the Western Whipbird in Western Australia are fragmented both spatially and temporally making assessment of the species' historical distribution difficult to determine (Figure 2.9). Gilbert reported hearing the Western Whipbird at Wongan Hills in 1842 and collected a specimen later the same year in sand hills near the coast north of Perth. Less than 85 years later, given lack of records, the species was considered to be probably extinct in Western Australia (Wolstenholme 1926). No records came from the Albany region for almost one hundred years after the species was collected there by George Masters. Whipbirds were not recorded in southern inland areas until 1929, despite a number of eminent ornithologists who were familiar with the bird having investigated or lived in areas where they were later found, e.g. Stirling Ranges (Milligan 1903; Whitlock 1911), Broomehill (Carter 1921) and Lake Grace (Carnaby 1933). This suggests that the historical records for this taxon are unreliable for determining the extent of its distribution during the period of early European settlement.

2.2.4.3 Current Distribution (Post 1980)

The current distribution of the Western Whipbird in Western Australia is based on an extensive survey by McNee (1986) and a number of records reported since that survey (Figure 2.9). The survey by McNee encompassed an area from Albany to Cape Arid National Park and inland as far as Lake Grace.

[4] Brenda Newbey, Ornithological Consultant
[5] Ron Johnstone, Curator of Birds, Western Australian Museum

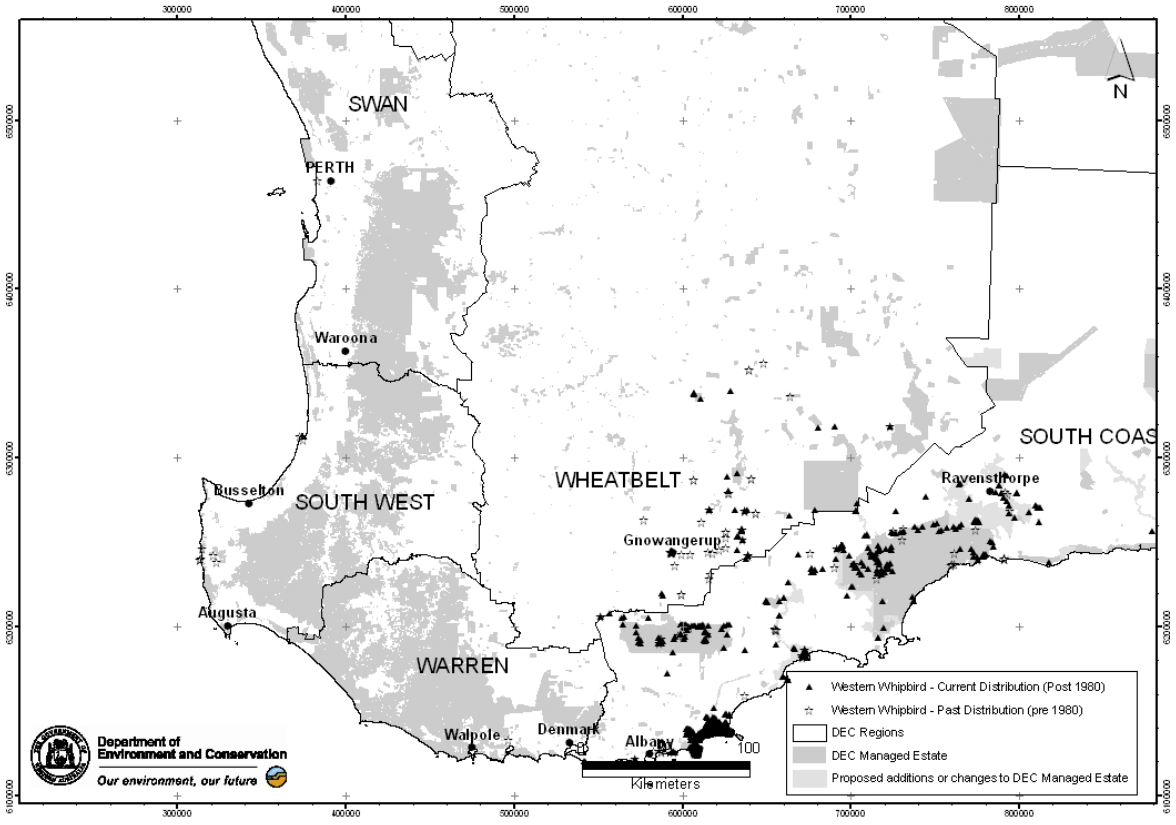


Figure 2.9: The past (pre 1980) and current (post 1980) distribution of the Western Whipbird.

McNee's (1986) survey and other more recent records indicate that the species is present on isolated remnants throughout the southern wheatbelt but the three main populations are in the Stirling Range and Fitzgerald River National Parks and the Two Peoples Bay/ Manypeaks area. It also occurs in the Pallinup River area and in the central and southern part of the Ravensthorpe Range and Bandalup Hill, which is the current eastern limit of its known range. It is scarce west of Albany with only a small number of records from the Wind Farm City Reserve and the Nullaki Peninsular. Sukey Hill, just east of Cranbrook, is the current north-western limit of the species' known distribution.

Schodde and Mason (1991) proposed that the western heath subspecies once occurred along the coast from Perth to Two Peoples Bay, while the western mallee subspecies occurred in inland areas and south coastal areas east of Two Peoples Bay. Smith (1991) considered the Mt Manypeaks population as belonging to the western heath subspecies. Western Whipbirds were recorded further east at Warriup Hill (near the coast between Mt Manypeaks and Cape Riche) in 1978 (T.E. Bush, RAOU Bird Atlas Record) and in the same general area in 1992 (A. Rose[6] personal communication 2004). Whipbirds were also found in gullies, alongside swamps and along creek lines from Manypeaks to Cape Riche and beyond in 1994-1995 (McNee & Newbey 1995) (Figure 2.9).

In their 1994-1995 survey McNee and Newbey (1995) reported that the western heath subspecies occurred as far east as Turner Road Reserve 7041 (located just west of Cape Riche). This subspecies appears to be confined to the Albany Management Zone (AMZ), especially the coastal strip from Two Peoples Bay/Mt Gardiner in the south west to about Cape Riche Road in the North east, with South Coast Highway as an approximate inland boundary. The two possible sub-populations west of Albany referred to above are also likely to be the western heath subspecies, consistent with Schodde and Mason (1991). The western mallee subspecies occurred on uncleared lands, predominantly north east of Cape Riche Road, including Mt Melville Reserve 14943 and Reserve 31240. Mallee vegetation is prominent on these two reserves, and the separation in McNee and Newbey (1995) was based largely on habitat differences

[6] Allan Rose, Senior Ranger, Cape Arid National Park

between the two areas. Based on an examination of morphology and colour, the isolated Stirling Range / Hamilla Hill population belongs to the western mallee subspecies (A.H. Burbidge and S. Comer, unpublished).

2.2.4.4 Population Trends

Population sizes for Western Whipbirds could not be determined by McNee (1986), but based on the number of sites where birds were found and the number of birds heard in an area it was estimated that the whipbirds were most abundant at Two Peoples Bay (western heath), and Beaufort Inlet, Fitzgerald River National Park (including areas outside the park to the north) and the Southern Ravensthorpe Ranges, all likely to be western mallee subspecies. McNee (1986) spent insufficient time at Cape Riche (western heath) and the Stirling Range National Park (western mallee) to determine the relative abundance of Western Whipbirds in these areas. Smith (1991) found that the population of Western Whipbirds (western heath subspecies) at Two Peoples Bay increased from approximately 70 pairs in 1970 to approximately 100 pairs in 1982 (based on the number of singing birds). This was due to an increase in the area of available habitat, believed to be a result of the policy of fire exclusion put in place when the reserve was created. In 2001, the number of pairs in the Two Peoples Bay - Manypeaks area was conservatively estimated at 415 'A' calling birds (Table 2.7). Following the 2004 Mt Manypeaks wildfire the habitat for approximately one-third of the western heath subspecies was lost, presumably resulting in a similar reduction in the numbers of the taxon. Estimates of the population of whipbirds remaining in the AMZ in 2005 were that the population index was approximately 196 (Table 2.7), indicating that at least half of the population of the western heath subspecies was impacted by the 2001 Angove and 2004 Manypeaks wildfires.

The population trend for the western mallee subspecies in the Fitzgerald River National Park is unknown, but the extensive wildfires in 1989 (123,000 ha) and 1997-98 (90,000+ ha) are likely to have resulted in significant reductions in population size. However, opportunistic searching associated with 2004-05 surveys of Western Ground Parrots recorded significant numbers of Western Whipbirds widespread within the National Park.

Extensive fires in the Stirling Range National Park in recent times are likely to have reduced the size of the local population of the Western Whipbird (western mallee). About 50 singing birds (presumed territorial males) were known from the park prior to the 1991 fire (A. Rose[7] personal communication 2004). The actual impact of the fires is unknown, but it is estimated that 53 out of 63 known territories have been burnt since 1996, and fewer than 10 territories were known to be occupied in 2000. However, opportunistic records since then suggest that whipbirds are still widespread within the Park.

The western mallee subspecies of the Western Whipbird 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.

Table 2.7: Sub-population estimates of the Western Whipbird (western heath) in the Albany Management Zone from Comer and McNee (2001) and Tiller et al. (2006).

Sub-population	Number of 'A' calling birds 2001	Number of 'A' calling birds 2005
Mt Gardner	85	60
Mt Manypeaks	155	48
Angove-Normans	30	13
Waychinicup	95	49
Mermaid	48	26
Goodga	0	0
Mt Martin/Mt Taylor	2	0
TOTAL	**415**	**196**

[7] Allan Rose, Senior Ranger, Cape Arid National Park

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

2.2.5.1 Description of Species and Taxonomy

The Rufous Bristlebird (western) (*Dasyornis broadbenti litoralis*) is one of three subspecies of *D. broadbenti* McCoy 1867, with the other two subspecies (*D. b. caryochrous* and *D. b. broadbenti)* occurring on the south west coast of Victoria and on the south east coast of South Australia, respectively.

The Rufous Bristlebird 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).

2.2.5.2 Discovery and Historical Distribution

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 the subspecies in 1940 (Serventy & Whittell 1976) and more recently in 1977 (Garnett 1992a) but subsequent attempts to find it in the Leeuwin Naturaliste area have failed (Blakers *et al.* 1984; Garnett 1992a).

2.2.5.3 Current Distribution

On the basis of the lack of confirmed records since 1906 this taxon is presumed extinct. However, there have been no systematic searches through all potential habitats.

The habitat preferences of this subspecies 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, largely restricted to the Leeuwin-Naturaliste National Park. No records of the subspecies were made during the two Birds Australia Atlas projects (Blakers *et al.* 1984; Barrett *et al.* 2003).

2.3 Habitat Requirements

Known information (published and unpublished) on the habitat requirements of the extant south coast threatened birds is summarised in Table 2.8.

The level of understanding of the biological and ecological characteristics, including habitat requirements, of south coast threatened birds varies between taxa. The Noisy Scrub-bird has been well studied since its rediscovery in 1961, and the requirements of this species for dense heath and thicket with well developed leaf litter has been recognised for some time (Danks *et al.* 1996). The Western Ground Parrot is usually found in long unburnt floristically diverse, near-coastal dry heath, usually <0.5 m high, but often up to 1 m, and providing >50% cover. The prime habitat of the Western Bristlebird is dense closed heath, or heath containing dense wide shrubs, which this near flightless species requires for protection from predators while feeding and nesting. The western heath subspecies of the whipbird prefers heath-like thicket associations on coastal dunes and in low dense mallee woodland or shrubland with an understorey of dense, stunted shrubs. The western mallee subspecies prefers open mallee eucalypt woodland with a dense, tall shrub layer up to 1.5 m tall.

All taxa utilise long unburnt habitat, but the optimal age for each species is not well understood. In general, increasing post-fire age not only provides cover, but increased complexity and structure of both vegetation and leaf litter. However, the response can vary, depending on the location and habitat. For example, Western Bristlebirds recolonised the eastern ridge of Mt Manypeaks after a fire in 1979 but subsequently disappeared from the area by the mid-1990s, apparently because the vegetation became too tall (>2 m) albeit very dense (Burbidge 2003).

2.4 Biological and Ecological Characteristics

The key aspects of the biology and ecology of the south coast threatened birds that relate to identified threatening processes and the responses to them are summarised in Table 2.9. Further details of the birds' biology and ecology can be found in relevant references.

Table 2.8: The habitat requirements of the extant south coast threatened birds.

Taxon	General habitat	Nesting habitat	Fire age	Dispersing habitat
Western Ground Parrot (*Pezoporus wallicus flaviventris*)	Floristically diverse, near-coastal dry heath (400-600 mm rainfall), vegetation structure usually <0.5 m high, but often up to 1 m; >50% cover. Sedges are frequent, making up >40% of total cover. In the Fitzgerald area, the most common sedges are *Mesomelaena*, *Restio* and *Schoenus*; shrubs with high cover values include *Allocasuarina*, *Agonis* and *Hibbertia*. Requires suite of plants providing seeds/fruit throughout the year.	Little known - nests found by Whitlock (1914) at Wilson's Inlet were both under clumps of what he described as a prickly "dwarf" *Hakea* sp. His description of the nests structure is consistent with the structure of the nests of *P. w. wallicus* in Queensland (McFarland 1991).	Preferences unknown, but has been found in vegetation unburnt for 5-40+ years. May feed in habitat 2-3 years post fire if sedges abundant and if older vegetation nearby (B. Barrett[8] personal communication 2005).	Following post-natal dispersal, individuals can occur away from known populations, sometimes in sub-optimal habitat. As Western Ground Parrot are strong flyers they may be capable of dispersing across sparse vegetation and clear areas.
Western Bristlebird *(Dasyornis longirostris*)	Floristically diverse closed near-coastal heaths up to 1-1.5 m high with a wide variety of shrubs, such as *Banksia* spp., *Melaleuca* spp., *Hakea* spp. *Lambertia* spp. Usually with abundant sedges such as *Anarthria* spp., *Lepidosperma* spp. and *Gahnia* spp. and with thickets of low eucalypts, 2-4 m tall, with either thick understorey or dense litter, sometimes with emergent *Agonis flexuosa* or thickets of *A. juniperina*. In Fitzgerald River National Park the habitat is more open, but contains dense wide shrubs.	Requires the presence of sedges and grasses for construction of the nest.	Fire requirements not well known. Response to fire at a given site depends on the vegetation community. Can survive at least mild intensity fires or fires of limited extent and in such cases set up new home ranges in the nearest available unburnt habitat, provided it is not too distant. Interval between fire and re-occupation varies. At TPB heaths are re-occupied 3-5 years after fire (breeding probably not immediate). Heaths in drier areas may not be re-occupied until 11-14 years post fire. FRNP, re-colonise 6-28 yrs after fire. McNee and Newbey (1999)have observed changes in recolonisation post-fire in the FRNP being related to post-fire recovery of vegetation. Translocated birds in Nuyts Wilderness have used long unburnt vegetation as well as vegetation 2.5-4 years post fire. On Mt Manypeaks, recolonised the eastern ridge after a fire in 1979 but subsequently disappeared from the area by the mid-1990s, apparently because the vegetation became too tall (>2 m) albeit very dense.	Unlikely to disperse across more than a few hundreds of metres of cleared land. Dispersal through vegetation two-three years post fire has been observed, but is poorly understood.

[8] Brent Barrett, Western Ground Parrot Recovery Project Team Leader, Department of Conservation and Land Management.

Taxon	General habitat	Nesting habitat	Fire age	Dispersing habitat
Noisy Scrub-bird *(Atrichornis clamosus)*	Core areas of male Noisy Scrub-bird territories are found in dense, long unburnt (>10 yrs) vegetation characterised as low forest (5-15 m high), scrub/thicket and (rarely) heath with a thick layer of leaf litter in the gullies and drainage lines of hills and granite mountains and, in low areas, in overgrown swamps, lake margins and beside streams. Feeds in open areas with thick accumulation of leaf litter and well developed litter invertebrate fauna.	Requires the presence of pliable, long-leaved sedges for construction of the nest and dense clumps of sedges, shrubs or piles of debris as nest sites. These are within dense layer of shrubs and rushes at edges of swamps, streams or other wetlands and on sides of gullies close to the ground.	Most abundant in 10+ years post fire; dependant on vegetation community type, habitat may be suitable for re-colonisation after 4-10 yrs; age at which unburnt vegetation becomes suitable unknown, although on Mt Gardner (TPB), where post-fire age of the vegetation is 45 to 50 or more years, the number of scrub-birds is still increasing.	May disperse along dense riparian vegetation or through dense coastal dune vegetation (Danks 1991). Unlikely to disperse across more than a few tens of metres of cleared vegetation. Dispersal through burned vegetation poorly understood.
Western Whipbird (western heath) (*Psophodes nigrogularis nigrogularis*)	Heath-like thicket associations on coastal dunes and in low dense mallee woodland or shrubland with understorey of dense, stunted shrubs (Higgins & Peter 2002). Floristic composition not important.	Dense shrubs in thickets or heaths.	Two Peoples Bay Nature Reserve – numbers increase where fire excluded for many years, but observed to recolonise areas of burnt vegetation 7-10 years after fire in one area and 4-6 years after fire in another, the recolonisation time being related to the growth rate of the vegetation (Smith 1985; Smith 1991)	Unlikely to disperse across more than a few hundreds of metres of cleared vegetation. Dispersal through burned vegetation poorly understood.
Western Whipbird (western mallee) (*Psophodes nigrogularis oberon*)	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). In FRNP, in mallee, very open mallee, shrubland and heath, on quartzite, phyllitic schist, upland, spongolite gorge.	Dense shrubs with prickly leaves e.g. *Banksia cayleyi* (southern wheatbelt).	14-15 years post-fire (FRNP), 25 yrs (SRNP) (Smith 1985; McNee 1986).	May be able to disperse across relatively poor habitat.

Table 2.9: Key aspects of the biology and ecology of the extant south coast threatened birds.

Species	Breeding	Habits	Diet and foraging	Activity period	Movements and social organisation
Western Ground Parrot *(Pezoporus wallicus flaviventris*)	Season: July- Dec, may vary geographically Clutch size: 2 – 3 (2 nests only); 4 egg clutches likely Parental care: unknown Chronology: unknown Fledging success: unknown Young: semi-altricial, nidicolous	Flies mainly at dawn and dusk Flies short distances, low over vegetation Nests on or close to ground Good dispersal ability	Granivorous with little specialisation (but avoids large seeds in woody fruits); may use more green fruit and vegetable material than *P. w. wallicus* (Burbidge *et al.* 1989) Forages on the ground or in low shrubs	Active from 20-60 mins before sunrise, resting from late morning to late afternoon then becomes active again c. 20 mins after sunset, for 30-40 mins when moving from feeding to roosting areas	Non-territorial, solitary (occasionally in pairs) Juvenile dispersal probably begins in late November, extending through summer
Western Bristlebird (*Dasyornis longirostris*)	Very little known Season: July-Oct Clutch size: 2 Parental care: unknown Chronology: unknown Fledging success: unknown Young: altricial, nidicolous	Mainly terrestrial Nest close to ground Fly weakly and reluctantly, only short distances skimming vegetation Shy, elusive and rarely seen Restricted dispersal ability	Mainly invertebrates and seeds Usually forage singly or in pairs Mostly forage on or close to ground, either among leaf litter or from open ground, or glean from foliage	Diurnal Call most often in 2 hours after sunrise and before sunset, rarely in middle of day except in winter (Whittell 1936; McNee 1986; Smith 1987)	Little known Appear to be sedentary, in sometimes overlapping fixed home ranges that are occupied throughout the year and from year to year Sometimes more than two singing birds occupy a home range Have been recorded surviving low intensity fire by limited local movement into nearest vegetation. Where vegetation is suitable birds recorded settling near fire edge, and moving back to preferred sites when suitable. Dynamics of this not fully understood
Noisy Scrub-bird (*Atrichornis clamosus*)	Season: April-Oct (can extend to Nov) Clutch size: 1 Parental care: female only builds nest, incubates and feeds young Chronology: *incubation* 36-38 days *fledging* 3-4 weeks *fledging to independence*; unknown Fledging success: unknown Young: altricial, nidicolous	Semi-flightless; birds stay near to ground in very dense vegetation, running very quickly and seldom flying (Higgins & Peter 2002) Nests low to the ground Poor dispersal ability	Mainly soil and litter-dwelling macro-invertebrates, occasionally small vertebrates Forage on or near ground, under dense vegetation, among leaf litter, debris and decaying wood and at bases of shrubs and clumps of rushes and sedges. Also feed from surfaces of leaves and stems of shrubs in lowest stratum (refs in Higgins & Peter 2002)	Diurnal Males move to roosting site at dusk and leave shortly after first light.	Sedentary and territorial; males defend long-term, non-overlapping territories using song (Smith 1996) Core area of territory remains constant throughout the day, between seasons and from year to year (Smith 1996) Bonds; not known, suggested to be essentially monogamous but possibly polygamous (Smith 1976, 1985, 1990, 1996)

Species	Breeding	Habits	Diet and foraging	Activity period	Movements and social organisation
Western Whipbird (western heath) (*Psophodes nigrogularis nigrogularis*)	Season: July- Oct Clutch size: 2 Parental care: both sexes brood nestlings Chronology: *incubation* 21 days *fledging* 10-12 days *fledging to independence* 2 months Fledging success: 0.85-1.45 fledglings/ nest Young: altricial, nidicolous	Flight strong but not sustained Nests in low, dense shrub Poor dispersal ability	terrestrial invertebrates (mainly insects) Forage singly or in pairs Mostly forage on ground or in low vegetation	Diurnal	Occupy sometimes overlapping home ranges throughout year and from year to year Bonds*:* appear to be monogamous Juvenile dispersal appears to occur just prior to the beginning of the next breeding season Juveniles do not move far from natal territory
Western Whipbird (western mallee) (*Psophodes nigrogularis oberon*)	Season: July to August (Gnowangerup) (Whittell 1939), eggs found in Oct at Ongerup (Howe & Ross 1933 in Higgins & Peter 2002) Clutch size: 2 Parental care: both sexes incubate (Howe & Ross 1933 in Higgins & Peter 2002) Chronology: unknown, but probably similar to western heath subspecies Fledging success: unknown, but probably similar to western heath subspecies Young: altricial, nidicolous	Flight strong but not sustained Nests in low, dense shrub Poor dispersal ability	Apparently similar to western heath subspecies Insectivorous: terrestrial invertebrates (mainly insects?) Forage singly or in pairs Mostly forage on ground or in low vegetation In Stirling Range National Park a pair, seen foraging on the ground under mallee vegetation, turned leaf litter over with bills and not seen to use feet (Rose 1991)	Diurnal	Probably similar to western heath subspecies Apparently in territories or home ranges, probably maintained throughout the year and from year to year, but details unknown

2.5 Threatening processes

2.5.1 Historical Causes of Decline

Historically, all south coast threatened birds suffered significant loss of habitat, reduction in numbers and contraction in range following European settlement and the subsequent breakdown of Aboriginal society in the late 1800s. The dramatic reduction in suitable habitat, 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 1985; 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.

2.5.2 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 renders them susceptible to a loss of genetic variation through inbreeding depression, genetic drift and founder effects. The likelihood of local extinction is also increased in small, fragmented sub-populations, as a result of demographic stochasticity (e.g. failure to breed in one year, or loss of young), and environmental stochasticity (random variation in factors such as rainfall, food, predators, occurrence of fires) (Bennett 1999).

A threatening process is considered to be significant if it has caused or is capable of causing a major reduction in the viability of a population or sub-population of one of the south coast threatened birds. Within the south-west of Western Australia, which has a classical Mediterranean climate of winter rain and hot dry summers, fire is a dominant ecological force. Too frequent and/or too extensive fire is therefore the main stochastic event that is likely to lead to the local extinction of sub-populations. This is the main current known threat for all taxa.

Other threats discussed below, for example predation by feral predators and habitat loss or degradation, can lead to local extinction, but vary in their degree of impact on particular species as a whole or on specific sub-populations of species.

2.5.2.1 Loss or Degradation of Habitat through Too Frequent and/or Too Extensive Fire

The vegetation types occupied by south coast threatened birds are extremely fire prone. The near coastal heaths, thickets and woodland thickets occupied by Western Ground Parrots, Noisy Scrub-birds, Western Bristlebirds and Western Whipbirds comprise dense vegetation associations with variable structure. In addition much of the habitat occupied by the south coast threatened bird taxa is long unburnt, resulting in large accumulation of leaf litter and high fuel loads in many areas. These habitat characteristics may increase the susceptibility of areas to wildfire, but they are also essential habitat requirements for each of the taxa.

Intensity, extent and frequency of wildfires 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 1985; McNee 1986).

All taxa of south coast threatened birds differ to some extent in their response to fire; however, in terms of managing fire to maximise the viability of sub-populations of these taxa, some broader statements can be made as follows:

All taxa 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 main current threat to south coast threatened birds is widespread fire, especially in fragmented habitat. Even infrequent fire can have significant impacts on habitat suitability for south coast threatened bird taxa. Extensive wildfire is often a problem in areas like the Fitzgerald River National Park, where conditions when lightening ignites vegetation are likely to be extreme, resulting in fire spreading rapidly through large areas.

Strategies that spread taxa into suitable new sub-areas to establish new populations are highly effective in minimising the risk of losing significant numbers of individuals or the entire population in a single wildfire. This management strategy has been extremely effective in managing Noisy Scrub-bird populations in the the Albany Management Zone (AMZ), and in the 2000 wildfires the effectiveness of this technique was clearly demonstrated when only 10% of the population was impacted by a severe wildfire event (Comer & Danks 2000). Conversely, the threat of major fires and need for additional translocations were well illustrated by the December 2004 wildfire at Mt Manypeaks, in which about two thirds of the whole population was lost.

In December 1997 45% of Western Ground Parrot habitat in the Fitzgerald River National Park was burnt in a single wildfire (Burbidge 1998). In Cape Arid National Park most potential Ground Parrot habitat was burnt during extensive wildfires in the early 1980s and in spring 2002. These fires are thought to have impacted significantly on this sub-population. The wildfire at Mt Manypeaks in December 2004 and others in the AMZ since 2001 have burnt a total of about 8,500 ha of optimal habitat for Noisy Scrub-bird, leaving around 4,500 ha of such habitat in the AMZ. Over the same period the habitat for approximately one-third of the western heath subspecies of the Western Whipbird has also been lost to wildfires.

All taxa are fire-susceptible and none of these taxa are considered fire-dependent. None need fire to create suitable habitat. Low fire frequency, enabling sufficient time for appropriate fire age habitat to establish, is an important factor in their persistence.

There are some records of Western Bristlebirds and Noisy Scrub-birds recolonising areas in the Angove Reserve three years post fire but it is not known if this habitat is 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 (Table 2.8). 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.

While habitat more than seven years post-fire is recommended for south coast threatened bird taxa there is little evidence to date of a maximum suitable post-fire age being reached. For example most of the habitat on Mt Gardner, occupied by Noisy Scrub-birds, Western Bristlebirds and Western Whipbirds has not been burnt since the early 1960s, but the population density has not dropped for any of these species. Further, 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.

All taxa are negatively impacted by extensive fire, so the aim of fire management must be to reduce the likelihood of such events. Maintaining a mosaic of different ages of vegetation will enable birds to persist or move into nearby unburnt refuges in the event of wildfire. However, the birds differ in their ability to move to unburnt areas due to differing dispersal abilities, suggesting that optimal patch size will vary between taxa.

The Western Ground Parrot and Western Whipbird have good or reasonable flight capacity and are therefore capable of moving to unburnt areas after fire. Movements up to about 40 km have been observed or inferred in several young, dispersing Western Ground Parrots (Burbidge *et al.* 1989, A. H. Burbidge & P. Collins, unpublished). It has been suggested that the maintenance of a mosaic of different fire age habitat may be more important than actual time since fire for Western Ground Parrot (Garnett & Crowley 2000) but the evidence is not clear. McNee (1986) recorded 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 poor connectivity between the two remnants.

Noisy Scrub-birds and Western Bristlebirds do not have the same capacity for flight as the Western Ground Parrot and Western Whipbirds, and are therefore more likely to be immediately impacted by the effects of wildfire. Intensity and speed of spread are likely to be key factors affecting the capacity of bristlebirds ands scrub-birds to escape fire, as is availability of unburnt habitat for birds to move into.

Bristlebirds can often survive fires. If the fire is of limited extent they set up home ranges in the nearest available unburnt habitat. However, in areas where fire has been extensive, such as in the south-western part of Fitzgerald River National Park in 1989 or that in the Angove Water Reserve in 2000, no bristlebirds persisted after fire (Burbidge 2003). Bristlebirds at the translocation site near Walpole dispersed up to about three kilometres into younger vegetation but, five years after wildfire at the site, appear not to have persisted.

Similarly, Noisy Scrub-birds have been recorded calling in habitat near recently burnt territories; however these displaced birds were only recorded on the fringes of burnt country for several months post fire (Comer & Danks 2001). Increasing post-fire age seems to favour scrub-birds, probably because successional changes result in more suitable vegetation structure and a richer leaf litter invertebrate fauna. In most habitat types scrub-birds require at least seven years post-fire before signs of recolonisation are observed (Danks *et al.* 1996). However, following the 2000 fire at Two Peoples Bay scrub-birds were recorded in the vigorous riparian regrowth surrounding Lake Gardner and Gardner Creek only three years post-fire (Comer & Danks 2003). This does not necessarily indicate that breeding has occurred, and it is too early to confirm long term establishment of scrub-bird territories in these areas.

The intensity of fire is a less important factor in the persistence of these taxa if the fire regime is of appropriate extent and frequency.

For all taxa, a fire of high intensity may destroy habitat and kill individual birds. However, as long as it is of a small size and of low frequency, it is not likely to lead to local extinction except where sub-population sizes are already very small. On the other hand, extensive fire can lead to the loss of sub-populations, or even full populations, particularly if it is an intense fire (Burbidge 2003).

All taxa dealt with in this plan have low fecundity and therefore cannot rapidly respond to a reduction in numbers after fire through the production of offspring.

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.

Management of the habitat of south coast threatened birds in relation to fire needs to be considered in the light of requirements of other threatened species and communities.

Other threatened species and communities on areas occupied by south coast threatened birds have specific fire age habitat requirement, often little understood. Only by examining those requirements for all threatened entities in a holistic manner can appropriate fire management be designed. Further work is required in all management zones to ensure that all threatened species requirements are considered when designing and implementing prescriptive burning programs, other preventative measures and wildfire suppression.

2.5.2.2 Predation by Feral Predators

The impact of predation by feral predators is poorly understood for all taxa of 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 threat to their persistence. Detailed data are lacking but observations and anecdotal evidence allow some assessment of the level of threat posed by particular predators.

Nest predation of Noisy Scrub-bird eggs has been observed at Two Peoples Bay and Mt Manypeaks, but in each case this was suspected to be by Mardo (*Antechinus flavipes*) or possibly Bush Rat (*Rattus fuscipes*) (Smith & Robinson 1976; Danks 1998; Comer & Danks 2001). Foxes and cats are not considered a major threat to the Noisy Scrub-bird, Western Bristlebird or Western Whipbird (western heath) because foxes and cats tend to utilise tracks and do not venture into areas with a thick understorey.

Feral cats may 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. Algar[9] personal communication 2005) and cats have been observed in significant numbers in Two Peoples Bay, Mt Manypeaks and Waychinicup.

For taxa that inhabit more open vegetation types in some parts of their range, fox predation is suspected to be more of a 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 possible 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 (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.

Predation on translocated populations

Birds released into unfamiliar habitat are particularly vulnerable to predation. The translocated populations of Noisy Scrub-birds in the Darling Range Management Zone (DRMZ) have not established in some areas, and it is unknown whether this is directly related to predation. During radio-tracking of released animals in 1999, two individuals were predated. Remains of one were found, within 24 hours of release and the other 11 days after release. The suspected cause of these deaths was either feral Black Rats (*Rattus rattus*) or native Chuditch (*Dasyurus geoffroii*), but confirmation was not possible.

Black Rats have been recorded in all the Darling Range Noisy Scrub-bird release sites (Johnson & Cuthbert 2000), which are close to or within old logging settlements. Black Rats are known to have a detrimental impact on ground dwelling birds elsewhere and removal is often required prior to establishment of ground dwelling avifauna (Veitch 1994). This may be practical in island situations, but very difficult to implement in mainland areas. Further, Black Rats are known to occur in mainland areas with breeding populations present, but relative densities or levels of impact are unknown.

[9] Dr David Algar, Senior Research Scientist, Science Division, DEC

Another introduced rodent, the House Mouse (*Mus domesticus*) is also present at sites where each of the south coast threatened birds occurs. The House Mouse has been implicated as a possibly significant predator of threatened birds elsewhere (Cuthbert & Hilton 2004) and may be a significant predator here, at least in those areas where it can occur in plague proportions.

The Chuditch (*Dasyurus geoffroii*) was re-introduced into the Darling Range in the 1990s and has expanded and increased in numbers due to widespread fox baiting under DEC's Western Shield Program (Morris *et al.* 2003). Chuditch have been observed near a number of Noisy Scrub-bird release sites during surveys. Chuditch are not currently known from areas occupied by scrub-birds on the south coast.

There is some limited anecdotal evidence from historical notes of the Eastern Ground Parrot (*Pezoporus wallicus wallicus*) being preyed on by quolls (species unknown), although this is speculative (Lendon 1979).

2.5.2.3 Dieback caused by Phytophthora cinnamomi

Dieback is a slow moving epidemic root rot of native vegetation caused by the introduced pathogen *Phytophthora cinnamomi*. Dieback is most virulent in the plant families Proteaceae, Epacridaceae, Papilionaceae and Myrtaceae as well as grass trees, *Xanthorrhoea* spp. (CALM 2000b). The impact of dieback on plant communities is variable between sites, being dependent on temperature, soil type, nutrient status and water (Nichols 1998). The greatest impact usually occurs where soils are infertile and drainage is poor (Weste & Marks 1987; Marks & Smith 1991; Wilson *et al.* 1992).

Within the area occupied by south coast threatened birds, the Proteaceae-dominated heathlands are particularly severely affected by dieback. There is extensive infestations of dieback in the Stirling Range National Park, Two Peoples Bay Nature Reserve, Waychinicup National Park, Cape Le Grand National Park and Cape Arid National Park (CALM 1992b). The Fitzgerald River National Park has a small infestation at Bell Track but there is a potential for wider infestation if hygiene is not observed.

Dieback results in marked changes in vegetation structure and decline in floristic diversity (Nichols 1998; Wills & Abbott 2003). Wills (1993) showed that *P. cinnamomi* infestations are associated with a general decline in total projective foliage cover, due mainly to the loss of many woody perennials. An increase in the cover of sedges (Cyperaceae and Restionaceae) may also occur. Changes in floristic composition were also observed, primarily through a decline in woody perennials of the Proteaceae. A severe impact of *P. cinnamomi* infestation was found in a study at three sites within coastal heaths in the Waychinicup area (Waychinicup, Cheyne Rd and Mermaid Point), which encompasses some areas of south coast threatened bird habitat. There was a significant loss in height and structural complexity of vegetation above 40 cm. in the infected compared with non-infected sites due to loss of biomass of *Phytophthora*-susceptible species (Whelan 2003).

The impact of dieback on faunal communities is not well understood but predicted effects include direct (e.g. seeds, pollen) or indirect (e.g. invertebrates) loss of food sources, loss of habitat in the form of thick ground cover and increased predation risk (Nichols 1998).

Although there is no direct evidence of the impact of dieback induced vegetation changes on any of the south coast threatened bird taxa it is logical to suspect that taxa which inhabit Proteaceous heath or mallee-heath communities may be at risk from dieback through loss or modification of habitat brought about by changed vegetation structure and composition. The preferred habitat of both the Western Bristlebird and Western Whipbird (western heath) is heathland or mallee-heath rich in Proteaceous and other susceptible species and therefore such vegetation changes described above could have adverse effects on habitat of these taxa. The short-term effect on these taxa is likely to result from reduced vegetation cover, which may result in increased predation pressure, with long term effects unknown.

However, the increasing sub-population trend for the Western Bristlebird, Western Whipbird and Noisy Scrub-bird in Two Peoples Bay Nature Reserve, which has been extensively infected with dieback since

the 1940s (M. Grant[10], Personal communication), suggests that, in this area at least, these taxa are able to withstand any detrimental effects within this time frame.

For Western Ground Parrot, the vegetation changes caused by dieback could have adverse effects on their habitat in some areas. On the other hand, such changes may actually improve the habitat in other areas by, for example, removing large shrubs of *Banksia* spp. and increasing the dominance of sedges with a possible increase in food availability. Nevertheless, the effects of such vegetation changes on Western Ground Parrots are unknown and cannot be assessed without better information on habitat requirements, diet and population densities, as well as better knowledge of the effects of *Phytophthora* in vegetation types used by Western Ground Parrots.

The long-term impact of dieback induced vegetation changes elsewhere remains unknown for all taxa. It is important to note that the impact of predation may be increased in more open dieback-infected areas, such that the combined effect of predation and dieback may be greater than either in isolation (Nichols 1998).

2.5.2.4 Clearing of Native Vegetation

Land clearing is no longer a major threat for the four threatened taxa that occur solely or almost entirely on conservation reserves (Western Ground Parrot, Western Bristlebird, Western Whipbird (western heath) and Noisy Scrub-bird). However the Western Whipbird (western mallee) is still under potential threat of land clearing due to its occurrence in privately owned remnants. In areas where a conservation reserve is relatively small, or non-continuous, clearing could also affect potential corridor habitat on private land linking reserves.

Under the *Environmental Protection Act 1986* and the associated Environmental Protection (Clearing of Native Vegetation) Regulations 2004, permission for the clearing of native vegetation takes into account the impact of clearing on biodiversity, water and soil resources, salinity and other environmental issues. It is envisaged that the current legislation and regulations would prevent the clearing of native vegetation that would impact on 'habitat critical' of any of the south coast threatened bird taxa, although this may be subject to other pressures such as mining leases or exploration.

The area where mining is currently most prevalent is the Darling Range Management Zone, where clearing of native vegetation for bauxite mining is largely restricted to the mid-upslope areas of the jarrah forest. However, with most operations in this area there is a relatively small amount of clearing in stream zones for infrastructure such as haul road stream crossings and sumps. Such areas are subjected to assessment and approval by the Mining and Management Program Liaison Group as the delegated authority for the Environmental Protection (Alcoa – Huntley and Willowdale Mine Sites) Exemption Order 2004. This exemption was granted under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. In the Oberon Management Zone mining of areas around Bandalup Hill may threaten local populations of the western mallee subspecies of the Western Whipbird.

2.5.2.5 Fragmentation of Remnant Vegetation

Among south coast threatened birds the effects of past fragmentation of habitat is 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 on isolated patches of remnant vegetation of less than 150 ha.

There is some evidence to suggest that Western Whipbirds (western mallee) can move between these isolated remnants. McNee (1986) reported that whipbirds 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 is likely to be consequences for genetic variability such as inbreeding depression, genetic

[10] Malcolm Grant, Senior Operations Officer, DEC, Ravensthorpe

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 (40 years), so the genetic consequences may still be developing. The small size of these remnants also increases the likelihood and impact of processes such as weed invasion and predation by feral predators.

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).

Management actions that can decrease the impact of threatening processes on small remnants and increase the connectivity between these remnants include fencing and strategic revegetation. These two practices are currently encouraged by local Natural Resource Management (NRM) groups throughout the area. At a larger scale, the Gondwana Link Project (Bradby 2004) aims to link the ecosystems of inland Western Australia with the wetter forests of the south west corner, with a focus on the Stirling Range to Fitzgerald area in the immediate future. Also, the South Coast Macro Corridor Project (Watson & Wilkins 1999) has identified potential large-scale corridors that will have the greatest benefit for re-establishing landscape connectivity within the south coast NRM region. These include the Forest to Fitzgerald Corridor and the Coastal Corridor. The Macro Corridor Project has been used in a number of community projects to target the expenditure of funds towards areas that will contribute to a strategic approach to landscape management, specifically in the context of regional connectivity. Actions targeted at increasing both large and small scale connectivity will benefit all taxa of south coast threatened birds

2.5.3 Potential Threatening Processes

2.5.3.1 Grazing or Disturbance by Non-native Animals

The potential for grazing or disturbance by non-native animals to alter the habitat of south coast threatened birds is high if exotic species are allowed to increase in numbers. Grazing by rabbits is considered to be of little threat to south coast threatened bird habitat. However, both grazing and trampling of native vegetation by domestic and feral hard hoofed animals has the potential to have a significant impact through the disturbance of native vegetation and subsequent changes in structure and/or floristic composition. Exclusion of stock from remnant vegetation supporting any of the south coast threatened birds should be sought in negotiation with land managers.

2.5.3.2 Weed Invasion

Invasion of weeds into native vegetation has the potential to cause changes in the structure and floristic composition of habitat. While small infestations are unlikely to compromise habitat for the south coast threatened birds, large stands could by creating monocultures with little structural variation and a depauperate leaf litter, thereby impinging on the value of habitat for feeding, and most likely breeding. Weed species that have the potential to alter the structure of south coast threatened bird habitat tend to be woody weeds. Key weed species that are likely to have an impact include Victorian Tea-tree (*Leptospermum laevigatum*), Sydney Golden Wattle (*Acacia longifolia*), Taylorina (*Psoralea pinnata*) and African Boxthorn (*Lycium ferocissimum*).

The impact of weed invasion is likely to be highest in small reserves where there is no internal buffer from edge effects. However, most weed species occurring within small remnants in the wheatbelt are not woody weeds and are unlikely to impact significantly on Western Whipbird (western mallee) habitat.

The spreading exotic weed Bridal Creeper (*Asparagus asparagoides*) alters components of the habitat structure that could be important to Rufous Bristlebirds, such as percentage of open ground that may affect the birds' foraging ability (Garnett 1992a; Seymour *et al.* 2003).

2.5.3.3 Climate Change

Smith (1977) believed that the distribution patterns, habitat requirements and presumed antiquity of *Atrichornis*, *Psophodes* and *Dasyornis* suggested that their ancestors historically had a wider, trans-Australian distribution. Changes in climate and associated changes in vegetation from the Pleistocene resulted in massive extinctions and range contractions for many species, and probably resulted in the small disjunct populations of relict species of south-coast threatened birds that would have been encountered by European settlers. In the 200 years of agricultural development of the south-west of Western Australia the ranges of these species contracted further in response to clearing and other modifying processes. Thus the present situation, and the broad dependence of south coast threatened birds on relatively dense vegetation, makes them particularly susceptible to increased aridity if it should occur on the south coast.

Parts of the south-west of Western Australia have experienced up to a 10-20% decline in early winter rainfall over the last 30 years (IOCI 2002). These changes have extended the dry summer and autumn seasons in the affected areas. While such rainfall declines are broadly in line with climate changes indicated by global climate change models, they occurred decades earlier than predicted by the models, suggesting they include both natural climate variability and enhanced greenhouse components (IOCI 2002).

However, the pattern of recent climate change in southern Western Australia is complex and uneven. The deepest rainfall declines have occurred in the hills east of the Indian Ocean and in the western wheatbelt. By contrast, most of the south coast between Walpole and Esperance has experienced little reduction in average annual rainfall and average maximum summer temperatures in these areas have fallen since the 1970s.

For the south west region generally, climate research indicates "that even with the most optimistic emission scenarios, southwest WA is projected to be drier and warmer later this century with increasing probability of ‘dry everywhere’ winter patterns and decreasing probability of ‘wet west and central’ weather patterns" (Ryan & Hope 2005, p. 8). It is not known whether these indications would apply to the areas close to or at the south coast, so far largely unaffected by the changes in temperature and rainfall elsewhere in the south west of Western Australia.

If long term climatic change does occur, the present geographic ranges of many species may become climatically unsuitable and changes in distribution would occur (Bennett 1999). Those groups likely to be most affected by climate change include geographically localised species, peripheral or disjunct populations, specialised species, poor dispersers, genetically impoverished species, and montane and alpine species (Peters & Darling 1985). 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.

Issues relating to climate change and the recovery of south coast threatened birds are:

- Decreasing autumn, winter and spring rainfall.

There have been slight but measurable trends towards lower autumn, winter and spring rainfall since 1970. Over time this would result in less ground water resources and fewer and smaller wetlands, affecting habitat quality and quantity. For the life of this recovery plan actions are needed to record and monitor climate in parts of the ‘habitat critical’ of threatened species and to monitor any changes in habitat quality.

- Increasing summer rainfall.

There has been a small but measurable trend towards higher summer rainfall since 1970. Increased soil moisture during warmer seasons helps promote the spread of *P. cinnamomi*. Many of the actions recommended in relation to Phytophthora control, especially strict hygiene practices, in the various management zones will help to minimise the adverse effects on south coast threatened birds if this occurs.

- A possible increasing trend of incidence of wildfire ignitions by dry lightning storms.

There has been a noticeable increase in the incidence of lightning-caused wildfires in the South Coast and South West Regions in the past four years, which has coincided with extended drought years. The

year 2003 saw a record number of lightning fires (some 250), which is about five times higher than in average years. The opposite occurred in 2004 with the incidence of lightning fires well below the average. There have been far more wildfires (mainly from lightning strikes) in the AMZ in the last five years than in any other five year period since records have been kept (Figure 2.10). It is not clear if this is a long term increase or whether what has happened over the past four years is an aberration. If climate warming does occur in southern Western Australia there will be a general increase in dry lightning storms and wildfires (R. Sneeuwjagt[11] personal communication 2005).

- The increasing of both large and small scale connectivity (e.g. Gondwana Link Project (Bradby 2004)) have the potential to enhance the opportunities for species to change distributional patterns in the event of climate change affecting current habitat.

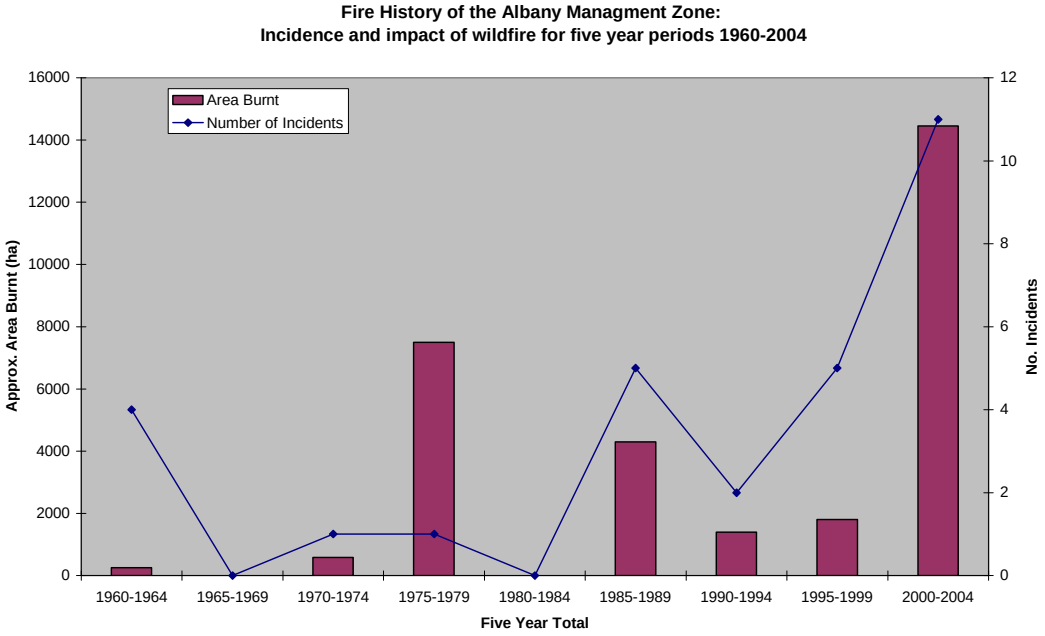


Figure 2.10: Incidence and impact of wildfire in the Albany Management Zone (AMZ) between 1960 and 2004.

2.5.3.4 Changes in Hydrological Regimes

Western Australia has the largest area of dryland salinity in Australia and the highest risk of increased salinity in the next 50 years. Currently the risk is greatest in the eastern wheatbelt, and likely salinity expansion by 2050 is mainly in the great southern and south coast regions (NLWRA 2001).

The impact of dryland salinity on south coast threatened bird habitat has not been documented. However, the potential consequences of changed hydrology on remnant native vegetation in the south-west of Western Australia have been discussed by George *et al*. (1995) and Cramer and Hobbs (2002) and comprise a change in species composition and a concomitant reduction in floristic and structural diversity caused by rising water tables and increased salinity. Such changes in the habitat of south coast threatened birds would lead to complete loss of the birds from affected sites.

Conceptual models of the of the potential impacts of shallow saline water tables on ecosystem structure and processes in remnant native vegetation in the Western Australian wheatbelt have identified the wetlands and riparian systems, and eucalypt woodlands occurring in valley floors and adjacent slopes as most at risk (Cramer & Hobbs 2002). The effects of changed hydrological regimes on the Western Whipbird (western mallee) in the wheatbelt is unknown, but the taxon's occurrence in open mallee eucalypt woodland together with the fragmented nature of Western Whipbird sub-populations in this area indicate that processes such as rising water tables and increased salinity may have a detrimental impact on this taxon.

[11] Rick Sneeuwjagt, Manager, Fire Management Services, DEC

The long-term effects of salinity on large coastal remnants are unknown but a salinity threat analysis carried out for the south coast region identified areas in the landscape at future risk of salinity based on water table depth and position in the landscape (Beetson 2001a, 2001b). Within the coastal areas the Fitzgerald River National Park is most at risk. Within the park the gorges, such as that of the Fitzgerald River, and the marine plain are at risk. Most of the ranges and uplands are not at risk, and these areas provide much of the habitat for south coast threatened birds within the park; both the Western Ground Parrot and Western Bristlebird are largely confined to the upland areas and ranges and the Western Whipbird (western mallee) occurs predominantly in areas of higher ground, even within the marine plain, and is largely absent from the valley systems, which support dense mallee, the coastal dunes and riverine woodland.

Dryland salinity is not a significant threat in the wetter or the large coastal remnants in the east of the south coast region where most catchments are natural and hydrological processes are relatively unaltered.

3 SPECIES-SPECIFIC SOUTH COAST THREATENED BIRDS RECOVERY PLAN

This Species-specific South Coast Threatened Birds Recovery Plan expands on the recovery actions in the endorsed South Coast Threatened Birds Recovery Plan by including species-specific objectives, strategies and actions that are related directly to the recovery of each of the six individual bird taxa. Specific performance criteria are included for each of the objectives to provide a mechanism by which achievement of objectives are measured and reported.

3.1 Recovery Objectives

The long-term objectives for the recovery of these 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.

Overall Strategy:
Integrate recovery strategies herein, including area-based ones, for the five extant species and oversee implementation of actions via the South Coast Threatened Birds Recovery Team.

3.2 Species Specific Recovery Actions

Below are the objectives for the management of each of the south coast threatened birds over the ten year time frame of the South Coast Threatened Birds Recovery Plan. Strategies, Recovery Actions and Preformance Criteria are detailed for each of these objectives.

3.2.1 Western Ground Parrot (*Pezoporus wallicus flaviventris*)

Objective 1
Maintain numbers at current levels in known sub-populations, and increase where possible.

Strategies

1.1. Continue habitat management and fox control within existing sub-populations within an active adaptive management framework.

Actions

1.1. Continue to implement current area-based management actions for the Fitzgerald Management Zone (FMZ), Albany Management Zone (AMZ) and Cape Arid Management Zone (CAMZ).

1.2. Continue to census known sub-populations.

1.3. Investigate and record responses of Western Ground Parrots to fire.

Performance Criteria

1.1. All known populations and sub-populations maintained at least at current densities.

1.2. Records of occurrence in relation to fire maintained, within a GIS framework.

Objective 2
Increase management options and capacity through improved understanding of those aspects of biology and ecology that limit distribution and numbers.

Strategies

2.1. Improve knowledge of current distribution and numbers.

2.2. Identify potential Western Ground Parrot habitat.

2.3. Document changes in size and distribution of population in areas known to be occupied by Western Ground Parrots.

2.4. Investigate causes of decline in sub-population densities at Short Road and Waychinicup.

2.5. Identify aspects of the biology and ecology, such as diet or breeding biology, that limit distribution and numbers.

2.6. Document response to fire.

Actions

2.1. Map the area of 'habitat critical', and estimate population densities, for each sub-population.

2.2. Investigate reported sightings of Western Ground Parrots from new locations.

2.3. Conduct surveys of potential Western Ground Parrot habitat

2.4. Monitor changes in population size that can be determined under current monitoring protocols and refine these protocols to detect changes in small populations.

2.5. Continue vegetation sampling started by Burbidge *et al*. (1989), and expand to measure food value, seed production, impacts of P*hytophthora cinnamomi*, any associated changes due to climate change, and investigate dietary requirements of the species in a selected sub-population.

2.6. Investigate how addressing factors that limit distribution may be used to increase the extent or density of populations.

2.7. Census known sub-populations and any new sub-populations that are located.

2.8. Document the Western Ground Parrot's response to fire management within the FMZ and AMZ.

2.9. Monitor numbers and re-colonisation of Western Ground Parrots in recently burnt areas and correlate with changes/differences in vegetation (as determined under 2.5 above).

2.10. Investigate ways to clarify the impact of cat predation on Western Ground Parrot numbers.

Performance Criteria

2.1. All known populations mapped and censused.

2.2. Habitat preferences documented and food plants identified.

2.3. Fire management prescriptions refined for each of the three populations.

2.4. The effects of cat predation understood or under active investigation.

Objective 3
Reduce vulnerability of population due to its small size and area of extent.

Strategies

3.1. Determine whether a suitable source population exists to allow translocation to be conducted.

3.2. Determine appropriate procedures for translocation.

3.3. Dependent on the outcomes of strategy 1 and 2, establish at least one new population of Western Ground Parrots in a suitable area within its known past range.

Actions

3.1. Map the area of extent and estimate population densities for each sub-population (see 2.1 above).

3.2. Carry out a trial translocation of Western Ground Parrots from an existing large/stable population (if a suitable source population can be found) to an appropriate area within the Western Ground Parrot's past range where known and likely threats have been abated.

3.3. Subject to the success of action 3.1 and 3.2, carry out a full translocation to establish a viable population.

3.4. Monitor the source population to determine the effects of removal for translocation.

Performance Criteria

3.1. One translocation commenced.

Objective 4
Increase community participation and stewardship in the conservation of the Western Ground Parrot.

Strategies

4.1. Engender community appreciation and concern for the future of the Western Ground Parrot.

4.2. Encourage and support greater participation of members of the public in Western Ground Parrot recovery.

Actions

4.1. Foster and encourage the 'Friends of the Western Ground Parrot'.

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

4.3. Develop a major publicity campaign to promote the Western Ground Parrot as an iconic threatened bird species in Western Australia.

4.4. Publish and distribute information to the public, landholders and scientific community relating to the management and recovery of Western Ground Parrots.

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

Performance Criteria

4.1. The newsletter, "Friends of the Western Ground Parrot update" continues to be issued at least quarterly and distributed widely throughout the species distribution.

4.2. Major publicity campaign to promote conservation of the Western Ground Parrot conducted.

4.3. Active community participation in planning and implementation of recovery actions for Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds, including at least 1000 hours per year of volunteer activity and at least two community members on the South Coast Threatened Birds Recovery Team.

4.4. Appropriate publications distributed.

Table 3.1: Implementation Table for the Western Ground Parrot (WGP).

Recovery Actions	Costs Over Five Years			Responsibility	Timing
	External Funding		DEC		
	Operational	Salary/Staff	Costs		
1.1. Continue to implement current area-based management actions for the AMZ, FMZ and CAMZ.	Not specific to WGP; refer to area management tables for AMZ, FMZ, CAMZ			SC Region Recovery Team	Ongoing
1.2. Continue to census known sub-populations.	$100,000	$181,733	$17,308	SC Region, Science Division, Friends	Ongoing
1.3. Investigate and record responses of WGPs to fire.	$120,000	$344,425	$48,462	SC Region, Science Division	2009
2.1. Map the area of 'habitat critical', and estimate population densities, for each sub-population.	$100,000	$80,770	$34,615	SC Region, Science Division	2009
2.2. Investigate reported sightings of WGPs from new locations.	$25,000	$31,731	$8,654	SC Region, Friends	Ongoing
2.3. Conduct surveys of potential WGP habitat.	$25,000	$25,962	$34,615	SC Region, Friends	Ongoing
2.4. Monitor changes in population size that can be determined under current monitoring protocols and refine protocols to detect changes in small sub-populations.	$10,000	$31,731	$51,923	Science Division, SC Region	Ongoing
2.5. Continue vegetation sampling started by Burbidge *et al.* (1989), and expand to measure food value, seed production, impacts of *Phytophthora cinnamomi*, any associated changes due to climate change, and investigate dietary requirements of the species in a selected sub-population.	$180,000	$401,540	$13,846	SC Region, Science Division	2011
2.6. Investigate how addressing factors that limit distribution may be used to increase the extent or density of populations.	$20,000	$76,154	$83,077	SC Region, Science Division	2011
2.7. Census any new sub-populations that are located.	$30,000	$31,731	$17,308	SC Region, Science Division, Friends	Ongoing
2.8. Document the WGP's response to fire management within the FMZ and AMZ.	Funded under 1.3			SC Region, Science Division	2009
2.9. Monitor numbers and re-colonisation of WGPs in recently burnt areas and correlate with changes/differences in vegetation (as determined under 2.5 above).	Funded under 2.4 and 2.5			Science Division, SC Region	Ongoing
2.10. Investigate the feasibility of determining the impact of cat predation on WGP numbers.	$150,000	$95,193	$51,923	SC Region, Science Division	2011
3.1. Map the area of extent and estimate population densities for each sub-population (see 2.1 above).	Funded under 2.1			SC Region, Science Division	2009
3.2. Carry out a trial translocation of Western Ground Parrots from an existing large/stable population (if a suitable source population can be found) to an appropriate area within the Western Ground Parrot's past range where known and likely threats have been abated.	$25,000	$76,154	$20,769	SC Region, Science Division, Friends	2011
3.3. Subject to the success of action 3.1 and 3.2, carry out a full translocation to establish a viable population.	To be determined			SC Region, Science Division, Friends	Ongoing

Recovery Actions	Costs Over Five Years			Responsibility	Timing
	External Funding		DEC		
	Operational	Salary/Staff	Costs		
3.3. Monitor the source population to determine the effects of removal for translocation	$25,000	$76,154	$15,577	SC Region, Science Division, Friends	2011
4.1. Foster and encourage the 'Friends of the Western Ground Parrot' and other interested community groups, and their participation in recovery actions	$10,000	$69,231	$34,615	Recovery Team	Ongoing
4.2. Continue to encourage appropriate community membership on the recovery team	$5,000 across the 4 SCTBs		$8,654 across the 4 SCTBs	Recovery Team	Ongoing
4.3. Develop a major publicity campaign to promote the Western Ground Parrot as an icon threatened bird species in Western Australia	$25,000	$63,462	$17,308	Recovery Team	Ongoing
4.4. Publish and distribute information to the public, landholders and scientific community relating to the management and recovery of Western Ground Parrots	Funded under 4.1 and 4.3			Science Division, SC Region, Recovery Team	Ongoing
TOTAL	**$850,000**	**$1,585,971**	**$458,654**		

Abbreviations:

Friends – Friends of the Western Ground Parrot
Recovery Team – South Coast Threatened Bird Recovery Team;
SC Region – DEC South Coast Regional staff;
Science Division – DEC Science staff.

3.2.2 Western Bristlebird (*Dasyornis longirostris*)

Objective 1
Maintain numbers of Western Bristlebirds and increase where possible in known sub-populations.

Strategies

1.1. Continue habitat management of existing sub-populations.

1.2. Determine the current sub-population size in the Albany Management Zone (AMZ).

Actions

1.1. Implement area-based management actions for the AMZ, FMZ and WMZ as outlined in Section 4.

1.2. Census sub-populations in the AMZ at least once within the time frame of the Recovery Plan.

1.3. Map 'habitat critical' in AMZ and FMZ.

Performance Criteria

1.1. More than 550 occupied home ranges.

Objective 2
Improve knowledge of distribution of Western Bristlebirds in the Fitzgerald Management Zone (FMZ).

Strategies

2.1. Identify and prioritise suitable habitat in the FMZ, to facilitate a targeted survey.

Actions

2.1. Determine and map suitable habitat by correlating factors such as vegetation and soil types with known Western Bristlebird home ranges.

2.2. Conduct census of suitable habitat.

Performance Criteria

2.1. A demonstrated increase in the knowledge of the extent of area occupied.

2.2. Census conducted and reported.

Objective 3
Increase management options and capacity through improved understanding of those aspects of biology and ecology that limit distribution and numbers.

Strategies

3.1. Continue to document the response of Western Bristlebirds to fire.

3.2. Investigate the response of Western Bristlebirds to vegetation changes caused by *Phytophthora cinnamomi* where the pathogen is observed in study sites.

Actions

3.1. Continue survey of recently burnt areas in the AMZ and FMZ.

3.2. Continue survey of long unburnt areas in the AMZ.

3.3. Extend sampling of vegetation at sites known to be occupied, to facilitate understanding of habitat preferences in relation to fire age and vegetation structure.

3.4. Increase understanding of the relationship between *Phytophthora cinnamomi* and Western Bristlebird habitat requirements including the impact of dieback on food supply and vegetation structure in affected study sites.

Performance Criteria

3.1. Habitat preferences identified in relation to fire age and vegetation structure.

Objective 4
Reduce vulnerability of Western Bristlebird population due to small number and area of sub-populations and total area of extent and occurrence.

Strategies

4.1. Continue trial translocation of birds in the Walpole Management Zone (WMZ).

4.2. Increase understanding of factors limiting Western Bristlebird survival in the WMZ.

Actions

4.1. Conduct a further release of birds in the WMZ.

4.2. Develop auditory methods for, and conduct, population censusing.

4.3. Document habitat preferences in relation to fire age and vegetation structure.

Performance Criteria

4.1. A breeding population established in WMZ.

4.2. Factors limiting population growth in the WMZ identified.

Objective 5
Increase community participation and stewardship in the conservation of the Western Bristlebird

Strategies

5.1. Engender community appreciation and concern for the future of the Western Bristlebird.

5.2. Encourage and support greater participation of members of the public in Western Bristlebird recovery.

Actions

5.1. Publish and distribute information to the public, landholders and scientific community relating to the management and recovery of Western Bristlebirds.

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

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

Performance Criteria

5.1. Appropriate publications distributed

5.2. Active community participation in planning and implementation of recovery actions for Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds, including at least 1000 hours per year of volunteer activity and at least two community members on the South Coast Threatened Birds Recovery Team.

Table 3.2: Implementation Table for the Western Bristlebird (*Dasyornis longirostris*).

Recovery Actions	Costs Over Five Years			Responsibility	Timing
	External Funds		DEC		
	Operational	Salary/Staff	Costs		
1.1. Implement area-based management actions for the AMZ, FMZ and WMZ.	Not specific to Western Bristlebird; refer to Area management tables for AMZ, FMZ, WMZ			SC Region	Ongoing
1.2. Census sub-populations in the AMZ at least once.	$5,000	$38,077	$6,923	SC Region	2011
1.3. Map 'habitat critical' in AMZ and FMZ.	$2,000	$4,904	$1,731	SC Region, Science Division	2009
2.1. Determine and map suitable habitat by correlating factors such as vegetation and soil types with known Western Bristlebird home ranges.	$60,000	$152,309	$6,923	Science Division, SC Region	2009
2.2. Conduct census of suitable habitat in the FMZ.	$120,000	$304,617	$20,769	Science Division, SC Region	2009
3.1. Continue survey of recently burnt areas in the AMZ and FMZ.	$15,000	$76,154	$20,769	Science Division, SC Region	2009
3.2. Continue survey of long unburnt areas in the AMZ.	$3,000	$17,308		Science Division, SC Region	2007
3.3. Extend sampling of vegetation at sites known to be occupied, to facilitate understanding of habitat preferences in relation to fire age and vegetation structure.	Part of costs for Action 2.1.	Part of costs for Action 2.1.	Part of costs for Action 2.1.	see Action 2.1.	2009
3.4. Increase understanding of the relationship between *Phytophthora cinnamomi* and Western Bristlebird habitat requirements including the impact of dieback on food supply and vegetation structure in affected study sites.	Part of costs for Action 2.1.	Part of costs for Action 2.1.	Part of costs for Action 2.1.	see Action 2.1.	2009
4.1. Conduct a further release of birds in the WMZ.	$40,000	$152,309	$55,385	Science Division, SC Region	2011
4.2. Develop auditory methods for population censusing.	$20,000	$0	$6,923	Science Division	2009
4.3. Document habitat preferences in relation to fire age and vegetation structure.	Part of costs for Action 2.1.	Part of costs for Action 2.1.	Part of costs for Action 2.1.	See Action 2.1.	2009
5.1. Publish and distribute information to the public, landholders and scientific community relating to the management and recovery of Western Bristlebirds.	$5,000	$69,231	$69,231	Science Division, SC Region, Recovery Team	Ongoing
5.2. Continue to facilitate participation by the community in recovery project activities	$5,000	$8,654	$1,442	Recovery Team	Ongoing
5.3. Continue to encourage appropriate community membership on the Recovery Team.	See Table 3.1			Recovery Team	Ongoing
TOTAL	**$275,000**	**$823,563**	**$190,096**		

Abbreviations:

Recovery Team – South Coast Threatened Bird Recovery Team; SC Region – DEC South Coast Regional staff; and Science Division – DEC Science staff.

3.2.3 Noisy Scrub-bird or Tjimiluk (*Atrichornis clamosus*)

Objective 1
Maintain population numbers of Noisy Scrub-birds at least at current levels, and increase where possible.

Strategies

1.1. Continue habitat management of all areas occupied by Noisy Scrub-birds.

1.2. Continue to determine population trends in the Albany Management Zone (AMZ).

Actions

1.1. Implement area-based management actions for the AMZ and Darling Range Management Zone (DRMZ) as outlined in Section 4.

1.2. Regularly monitor specific sub- populations in the AMZ.

1.3. Map 'habitat critical' in areas outside Mt Gardner and Angove sub-populations.

1.4. Complete census of entire AMZ population at least once in the 5 year time frame of this Recovery Plan.

Performance criteria

1.1. More than 850 singing males in the AMZ.

1.2. More than 150 singing males on Mt Gardner.

Objective 2
Reduce vulnerability of Noisy Scrub-Bird population due to its small size and area of extent.

Strategies

2.1. Increase the number of sub-populations.

2.2. Ensure that existing genetic variability of Noisy Scrub-birds is maintained.

2.3. Investigate the factors limiting Noisy Scrub-bird numbers in the DRMZ.

Actions

2.1. Commence establishment of a new sub-population.

2.2. If translocated populations show significant loss of genetic variability, develop procedures to minimise or prevent such loss.

2.3. Continue to obtain information on genetic variability by collecting DNA material from the original Mt Gardner sub-population, to clarify background variability, and from sub-populations derived from it.

2.4. Review Darling Range Translocation in relation to possible factors limiting successful establishment of scrub-birds in their former range.

2.5. Continue to investigate key factors in determining 'habitat critical' of Noisy Scrub-bird, including vegetation type and invertebrate food supply.

2.6. Increase understanding of the relationship between *Phytophthora cinnamomi* and Noisy Scrub-bird habitat requirements including the impact of dieback on food supply and vegetation structure.

Performance criteria

2.1. Size and/or area of extent of population increased by translocation.

2.2. Habitat factors influencing success or failure of translocations identified.

Objective 3
Increase management options through improved understanding of those aspects of Noisy Scrub-bird biology and ecology that limit distribution and numbers.

Strategies

3.1. Continue to document the response of Noisy Scrub-birds to fire.

3.2. Identify the biological attributes of Noisy Scrub-bird that can be used to interpret census data.

3.3. Conduct habitat and resource studies in core habitat.

Actions

3.1. Continue survey of recently burnt Noisy Scrub-bird habitat in the AMZ.

3.2. Investigate if song analysis using the methods of Berryman (2003) and Portelli (2004) can assist with understanding of the social organisation of Noisy Scrub-birds at a number of sites within the AMZ.

3.3. Establish dedicated miniature climate monitoring and recording stations to monitor climate trends in critical areas, such as core habitat, and closely monitor the quality and quantity of associated habitat.

3.4. Monitor the types and abundance of invertebrates in core habitat areas referred to under Action 3.3.

Performance criteria

3.1. Habitat preferences identified in relations to fire age and vegetation structure.

3.2. Improved understanding of social organisation helping to clarify status of populations.

3.3. A long term monitoring program has been established and is providing data relevant to understanding relationship between climate change and critical habitat.

3.4. Improved understanding of links between invertebrate abundance, climate and habitat condition.

Objective 4
Increase community participation and stewardship in the conservation of the Noisy Scrub-bird

Strategies

4.1. Engender community appreciation and concern for the future of the Noisy Scrub-bird.

4.2. Encourage and support greater participation of members of the public in Noisy Scrub-bird recovery.

4.3. Make widely available known information relating to the biology, management and recovery of Noisy Scrub-birds and ensure this is based on sound scientific data.

Actions

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

4.2. Promote activities in the media and other public fora and publish and distribute information to the public and landholders relating to the management and recovery of Noisy Scrub-birds.

4.3. Publish work from last 20 years relevant to Noisy Scrub-bird conservation in scientific journals.

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

Performance criteria

4.1. Active community participation in planning and implementation of recovery actions for Western Ground Parrots, Western Bristlebirds and Noisy Scrub-birds, including at least 1000 hours per year of volunteer activity and at least two community members on the South Coast Threatened Birds Recovery Team.

4.2. Appropriate publicity activities achieved and publications distributed.

4.3. Noisy Scrub-bird conservation work published in scientific journals.

Table 3.3: Implementation Table for the Noisy Scrub-bird (*Atrichornis clamosus*)

Recovery Actions	Costs Over Five Years			Responsibility	Timing
	External Funds		DEC		
	Operational	Salary/Staff	Costs		
1.1. Implement area-based management actions for the AMZ and DRMZ.	Not specific to Noisy Scrub-bird: refer to Area management tables for AMZ, DRMZ			SC Region	Ongoing
1.2. Regularly monitor specific sub-populations in the AMZ.	$50,000	$173,079	$69,231	SC Region	Ongoing
1.3. Map 'habitat critical' in areas outside of Mt Gardner and Angove sub-populations.		$5,769		SC Region	2008
1.4. Complete census of entire AMZ population at least once.	$20,000	$75,001	$13,846	SC Region	2010
2.1. Commence establishment of a new sub-population.	$5,000	$23,077	$13,846	SC Region	2010
2.2. If translocated populations show significant loss of genetic variability, develop procedures to minimise or prevent such loss.			$3,462	SC Region, Recovery Plan	Ongoing
2.3. Continue to obtain information on the genetic variability by collecting DNA material from the original Mt Gardner sub-population and from sub-populations derived from it.	$40,000	$2,885		SC Region	Ongoing
2.4. Review Darling Range Translocation in relation to possible factors limiting successful establishment of scrub-birds in their former range.	$5,000	$21,634	$25,961	SC Region, Science Division	2010
2.5. Determine the critical habitat of Noisy Scrub-bird, including vegetation type and invertebrate food supply.	$5,000	$38,077	$6,923	SC Region, Recovery Plan	2011
2.6. Increase understanding of the relationship between *Phytophthora cinnamomi* and fauna including the impact of dieback on food supply and vegetation structure.	$5,000	$32,308	$6,923	SC Region, Recovery Plan	2011
3.1. Continue survey of recently burnt Noisy Scrub-bird habitat in the AMZ.	$20,000	$46,154		SC Region	Ongoing
3.2. Determine the social organisation by song analysis of Noisy Scrub-bird.	$4,000			SC Region, Recovery Plan	2010
3.3. Establish dedicated miniature climate monitoring and recording stations to monitor climate trends in core habitat, and closely monitor the quality and quantity of associated habitat.	$40,000	$18,000	$3,000	SC Region, Recovery Plan	2008
3.4. Monitor the types and abundance of invertebrates in core habitat areas referred to under Action 3.3.		$21,000			
4.1. Continue to facilitate participation by the community in recovery project activities.		$25,960	$10,385	SC Region, Recovery Plan	Ongoing
4.2. Promote in the media etc. and publish and distribute information to the public and landholders relating to the management and recovery of Noisy Scrub-birds.		$25,960	$10,385	SC Region	Ongoing
4.3. Publish work from last 20 years relevant to Noisy Scrub-bird conservation in scientific journals.		$10,385	$17,308	SC Region	2010
4.4. Continue to encourage appropriate community membership on the Recovery Team	See Table 3.1			SC Region, Recovery Plan	Ongoing
TOTAL	**$194,000**	**$519,289**	**$181,270**		

Abbreviations:
Recovery Team – South Coast Threatened Bird Recovery Team; SC Region – DEC South Coast Regional staff; and Science Division – DEC Science Division staff.

3.2.4 Western Whipbird (western heath) (*Psophodes nigrogularis nigrogularis*)

Objective 1
Resolve taxonomic status of the Western Whipbird.

Strategy

1.1. Determine the taxonomic status of the western heath subspecies of the Western Whipbird.

Actions

1.1. Carry out genetic analysis of the two putative subspecies of Western Whipbird that occur in Western Australia.

The resolution of the subspecific status of these populations is of high priority and 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 different gene pools. It is therefore 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 the most suitable because they can be done on relatively small quantities of material that can be obtained with non-destructive sampling techniques.

Performance criterion

1.2. The taxonomic status of P. n. oberon and P. n. nigrogularis is resolved.

Objective 2
Ensure security of existing populations to allow natural increase in Western Whipbird (western heath) population size.

Strategies

2.1. Obtain census data that allow accurate assessment of population numbers and extent of areas occupied.

2.2. Determine limits to distribution of the western heath subspecies if subspecific status is substantiated.

Actions

2.1. Implement area-based management actions for the AMZ.

2.2. Conduct survey of AMZ once in five years targeting Western Whipbird distribution throughout AMZ.

In the past Western Whipbird census in the AMZ has only been carried out as incidental to Noisy Scrub-bird surveys. A complete census, targeting the distribution of the Western Whipbird in the AMZ, is needed to accurately determine the numbers and extent of populations of this taxon within the AMZ.

2.3. If it is confirmed through genetic analysis that there are two subspecies of Whipbird in Western Australia (see Objective 1), carry out survey (and perhaps collect DNA) to determine the limits to the distribution of the western heath subspecies.

2.4. If it is confirmed through genetic analysis that there are two subspecies of Whipbird in Western Australia (see Objective 1), 'habitat critical' for the western heath subspecies should be mapped so that management priorities can be set.

2.5. If the genetic results do not confirm the existence of two subspecies of Western Whipbird in Western Australia, the conservation status of the Western Whipbird should be assessed, occupied habitat in Western Australia identified, and if appropriate, recommendations made for removal from State and Commonwealth lists of threatened taxa.

Performance criteria

2.1. Complete survey of AMZ conducted, and baseline knowledge of distribution and numbers established.

2.2. Depending on results of the genetic analysis, 'habitat critical' will be mapped, or occupied habitat identified, and recommendations made as to conservation status and management.

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

Objective 1
Resolve taxonomic status of the Western Whipbird

Strategy

1.1. Determine the taxonomic status of the western mallee subspecies of Western Whipbird.

Actions

1.1. Carry out genetic analysis of the two putative subspecies of Western Whipbird that occur in Western Australia.

Performance criteria

1.2. The taxonomic status of P. n. oberon and P. n. nigrogularis is resolved.

Objective 2
Encourage security of existing populations of Western Whipbird (western mallee)

Strategies

2.1. Liaise with relevant land managers, including private landholders, with respect to the management of Western Whipbird habitat.

2.2. Clarify the distribution of the western mallee subspecies if subspecific status is substantiated.

Actions

2.1. Implement area-based management actions for the FMZ and OMZ as outlined in Section 4.

2.2. Provide information on the taxon's habitat requirements and ecology to land managers and the public within FMZ and OMZ.

2.3. If it is confirmed through genetic analysis that there are two subspecies of Whipbird in Western Australia (see Objective 1), carry out survey (and perhaps collect DNA) to determine the limits to the distribution of the western mallee subspecies.

2.4. Continue to collate data on the occurrence and abundance of all known sub-populations and assess its status.

2.5. If the genetic results do not confirm the existence of two subspecies of Western Whipbird in Western Australia, the conservation status of the Western Whipbird should be assessed, occupied

habitat in Western Australia identified, and if appropriate, recommendations made for removal from State and Commonwealth lists of threatened taxa.

Performance criteria

2.1. Information will have been provided to relevant land managers.
2.2. Depending on the results of the genetic analysis, subspecies boundaries, or the limits in Western Australia of the population of Psophodes nigrogularis, will be mapped.

Table 3.4: Implementation Table for the Western Whipbird (Western heath) (*Psophodes nigrogularis nigrogularis*).

Recovery Actions	Costs Over Five Years			Responsibility	Timing
	External Funding		DEC		
	Operational	Salary/Staff	Costs		
1.1. Carry out genetic analysis of the two subspecies	$15,000	$0	$3,462	Science Division	2008
2.1. Implement area-based management actions for the AMZ.	Not specific to Western Whipbird (western heath): refer to Area management tables for AMZ			SC Region	Ongoing
2.2. Conduct survey of AMZ once in five years targeting Western Whipbird distribution.	$5,000	$38,077	$6,923	SC Region	2011
2.3. If Action 1.1 confirmed that there are two subspecies of Whipbird in WA, carry out survey to determine the limits to the distribution of the western heath subspecies.	$20,000	$12,692	$3,462	Science Division, SC Region	2008
2.4. If Action 1.1 confirmed that there are two subspecies of Whipbird in WA, 'habitat critical' for the western heath subspecies should be mapped so that management priorities can be set.	$2,000	$4,904	$1,731	Science Division, SC Region	2009
2.5. If Action 1.1 does not confirm the existence of two subspecies in WA, the conservation status of the Western Whipbird should be assessed and occupied habitat in WA identified.	Part of costs for Action 2.3 and 2.4			Science Division, SC Region	2009
TOTAL	**$42,000**	**$55,673**	**$15,578**		

Table 3.5: Implementation Table for Western Whipbird (western mallee) (*Psophodes nigrogularis oberon*)

Recovery Actions	Costs Over Five Years			Responsibility	Timing
	External Funds		DEC		
	Operational	Salary/Staff	Costs		
1.1. Carry out genetic analysis of the two sub species.	Included in Table 3.4			Science Division	2009
2.1. Implement area-based management actions for the FMZ and OMZ as outlined in Section 4.	Not specific to Western Whipbird (western mallee): refer to Area management tables for FMZ and OMZ			SC Region	Ongoing
2.2. Provide information on the taxon's habitat requirements and ecology to land managers and the public within FMZ and OMZ.	$5,000		$8,654	Recovery Team, Wheatbelt Region	Ongoing
2.3. If Action 1.1 confirmed that there are two subspecies of Whipbird in WA, carry out survey to determine the limits to the distribution of the western mallee subspecies.	$76,154	$25,000	$20,769	Science Division, SC Region	2008
2.4. Continue to collate data on the occurrence and abundance of all known sub-populations and assess its status.	Part of costs of Action 2.3			Science Division, SC Region	Ongoing
2.5. If Action 1.1 does not confirm the existence of two subspecies, the conservation status of the Western Whipbird should be assessed and occupied habitat in WA identified.	$10,000	$9,808	$3,462	Science Division, SC Region, Wheatbelt Region	2010
TOTAL	**$91,154**	**$34,808**	**$32,885**		

Abbreviations:
Recovery Team – South Coast Threatened Bird Recovery Team; SC Region – DEC South Coast Regional staff; and Science Division – DEC Science Division staff, Wheatbelt Region – DEC Wheatbelt Regional Staff.

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

Objective 1
Locate an extant population of the Rufous Bristlebird (western).

Actions

1.1. Distribute information to the public and landholders relating to the identification, habitat and ecology of the Rufous Bristlebird (western).

1.2. Seek funding for survey to determine whether the Rufous Bristlebird (western) still exists.

1.3. Use existing knowledge (especially of the eastern subspecies) to design and conduct systematic survey of all likely habitats for the western subspecies.

Performance criteria

1.1. Relevant information distributed to landholders and the general public in areas where the taxon may have occurred.

1.2. Systematic surveys conducted.

1.3. One or more populations found of the western subspecies of the Rufous Bristlebird.

Objective 2
If a population of the Rufous Bristlebird (western) is found design and begin implementing recovery actions.

Actions

If a population of the Rufous Bristlebird (western) is found:

1.1. Assess the size and extent of the new population and make detailed observations of the habitat occupied.

1.2. Formulate and implement management actions for addition to this Recovery Plan.

Performance criteria

If a population of the Rufous Bristlebird (western) is found:

1.1. Population size and extent estimated and habitat occupied described.

1.2. Urgent management actions designed and beginning to be implemented.

Table 3.6: Implementation Table for the Rufous Bristlebird (western) (*Dasyornis broadbenti litoralis*)

Recovery Actions	Costs Over Five Years			Responsibility	Timing
	External Funding		DEC		
	Operational	Salary/Staff	Costs		
1.1. Distribute information to the public and landholders relating to the identification, habitat and ecology of the Rufous Bristlebird (western).	$4,000	$13,846	$3,462	Science Division, Recovery Team, Blackwood District	**2009**
1.2. Seek funding for survey to determine whether the Rufous Bristlebird (western) still exists.			$5,000	Recovery Team, Blackwood District	**2008**
1.3. Use existing knowledge (especially of the eastern subspecies) to design and conduct systematic survey of likely habitats for the western subspecies.	$30,000	$90,000	$6,923	Science Division, Recovery Team, Blackwood District	**2009**
If a population of the Rufous Bristlebird (western) is found: 2.1. Assess the size of the new population and make detailed observations of the habitat occupied.	To be determined if and when a population found			Science Division, Recovery Team	**2010**
If a population of the Rufous Bristlebird (western) is found: 2.2. Design urgent management actions for addition to this Recovery Plan	To be determined if and when a population found			Science Division, Recovery Team	**2011**
TOTAL	$34,000	$103,846	$15,385		

Abbreviations:
Recovery Team – South Coast Threatened Bird Recovery Team; SC Region – DEC South Coast Regional staff; and Science Division – DEC Science Division staff, Blackwood District – DEC Blackwood District Staff.

4 SOUTH COAST THREATENED BIRDS AREA MANAGEMENT PLAN

This area-based South Coast Threatened Birds Area Management Plan provides management actions specific to the protection of habitat critical to the survival of south coast threatened birds and the amelioration of threatening processes for key Management Zones. These Management Zones were delineated to encompass the key areas of south coast threatened birds occupancy across the region. The six Management Zones that represent the main areas of occupancy of the five extant taxa of south coast threatened birds, and one Management Zone which incorporates the known past distribution of the presumed extinct Rufous Bristlebird are described in Table 4.1 and shown in Figure 4.1. Within some of the Management Zones smaller Management Units, clearly identifiable and perhaps requiring management different to that for the management zone as a whole, are defined.

Table 4.1: The taxa present and location of the south coast threatened bird Management Zones that represent the main areas of occupancy of these birds.

Management Zones	Location Description	South Coast Threatened Bird Taxa Present
Albany Management Zone (AMZ)	The AMZ encompasses the area from Wilson Inlet to Bluff Creek, including the coastal area west of Albany (incorporating Torndirrup National Park and West Cape Howe National Park), Two Peoples Bay Nature Reserve, the Lakes (Angove, Moates and Gardner), Mt Manypeaks Nature Reserve, Waychinicup National Park and Bald Island.	Western Ground Parrot (pre-2005) Western Bristlebird Noisy Scrub-bird Western Whipbird (western heath)
Fitzgerald Management Zone (FMZ)	The FMZ contains the Fitzgerald River National Park, the coastal area extending east of the park to Lake Shaster Nature Reserve and the Bandalup Hill area of the Ravensthorpe Range, all of which form part of, or are associated with, the Fitzgerald Biosphere Zone of Co-operation.	Western Ground Parrot Western Bristlebird Western Whipbird (western mallee)
Oberon Management Zone (OMZ)	The OMZ encompasses the southern wheatbelt from Dumbleyung in the west to Newdegate in the east, including part of Lake Magenta Nature Reserve, (Wheatbelt management unit), the Stirling Range National Park (Stirling management unit), and Corackerup Nature Reserve, and the Pallinup River area (Pallinup management unit).	Western Whipbird (western mallee)
Cape Arid Management Zone (CAMZ)	The CAMZ encompasses the southern section of Cape Arid National Park, Cape Le Grand National Park and a small section of the western end of Nuytsland Nature Reserve.	Western Ground Parrot
Walpole Management Zone (WMZ)	The WMZ occurs west of Walpole and encompasses part of the Nuyts Wilderness in the Walpole –Nornalup National Park and the eastern end of D'Entrecasteaux National Park.	Western Bristlebird (translocated population) Potential Ground Parrot translocation sites
Darling Range Management Zone (DRMZ)	The DRMZ encompasses a section of the Darling Range occurring within the Dwellingup State Forest, north-east of Dwellingup.	Noisy Scrub-bird (translocated population)
Leeuwin-Naturaliste Management Zone (LNMZ)	The LNMZ extends from Cape Naturaliste in the north to Cape Leeuwin in the south and encompasses the Leeuwin- Naturaliste National Park.	Historical location of the Rufous Bristlebird (western)

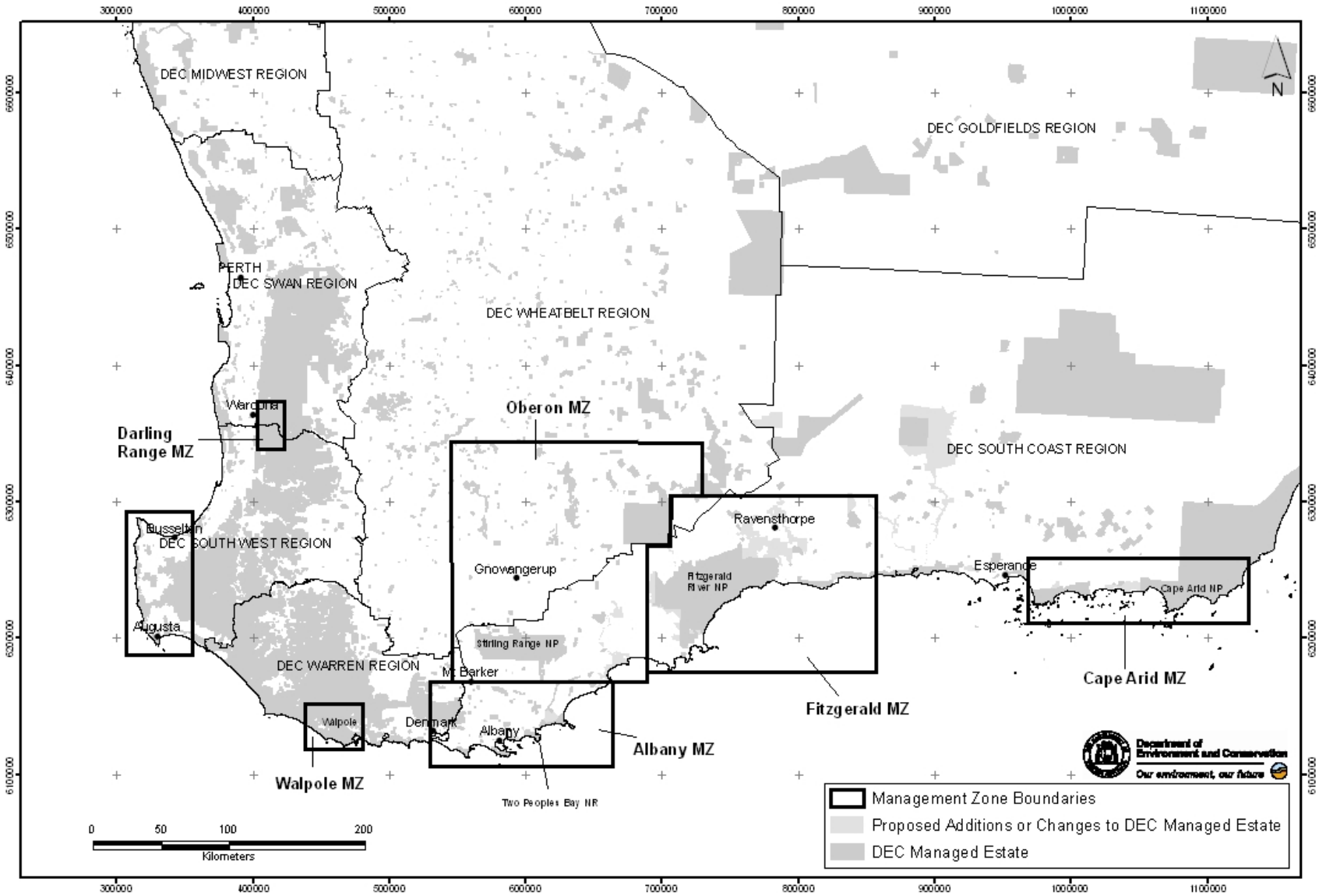


Figure 4.1: The seven south coast threatened birds Management Zones, that represent the main areas of occupancy of these birds.

For each Management Zone, this plan identifies the strategies in all the current statutory management documents that are relevant to the conservation of south coast threatened birds. Additional management strategies and actions have been developed specific to the management of south coast threatened birds, detailed in tables within each Management Zone section.

The costings provided relate to management for a whole range of conservation values (including other threatened species and communities and overall biodiversity) within that area, not just south coast threatened birds. For example, management of threatened birds in Two Peoples Bay Nature Reserve also needs to take into account, such things as the relationship between fire and Gilberts Potoroo on Mt Gardner. The intent is that management action will benefit a whole range of species and communities.

Progress towards success in meeting these objectives will be judged annually by assessment of all action-specific criteria for success and failure. Where such annual assessment suggests that failure to meet any criterion for success over the life of the plan seems likely the recovery team will consider the need for modification or addition of relevant remedial actions.

This Area Management Plan is aimed to provide a guide not only for south coast threatened bird project officers, but also for the land managers responsible for biodiversity conservation in these areas.

4.1 Albany Management Zone (AMZ)

The Albany Management Zone (AMZ) encompasses a largely coastal area from Wilson Inlet to Bluff Creek and inland to north of the Porongurup Range (Figure 4.1). DEC-managed land in this zone includes Torndirrup National Park, West Cape Howe National Park, Two Peoples Bay Nature Reserve (including the three lakes: Angove, Moates and Gardner), Porongurup National Park, Mt Manypeaks Nature Reserve, Waychinicup National Park and Bald Island. The Gull Rock Reserve was vested in the Conservation Commission in 2006, with a purpose of National Park. Mt Martin Reserve, previously managed by the City of Albany, was also vested in the Conservation Commission in 2006. Other areas of native vegetation managed by other agencies include reserves in the Lowlands and Torbay area, and Boulder Hill Reserve (City of Albany) and the Angove Water Reserve (Water Corporation).

The AMZ contains four south coast threatened bird taxa: Western Ground Parrot (though not heard since 2004), Noisy Scrub-bird, Western Bristlebird, and Western Whipbird (western heath). This management zone is particularly significant for three of the south coast threatened birds. It is the only management zone where the Western Whipbird (western heath) now occurs, contains virtually the entire Noisy Scrub-bird population (a small translocated 'population' exists in the Darling Range) and the largest known population of the Western Bristlebird (Table 4.2). The AMZ therefore contains the entire genetic diversity of the western heath subspecies of the Western Whipbird, almost all the diversity of the Noisy Scrub-bird as well as a significant proportion of the genetic diversity of the Western Bristlebird. On the other hand the Western Ground Parrot has not been heard in the AMZ since 2004 (Table 4.2) although it is thought to have supported a significant population in the recent past (Table 2.2).

The Western Bristlebird, Western Whipbird and Noisy Scrub-bird occur widely throughout the AMZ and their distributions overlap considerably (Figure 4.2). The Noisy Scrub-bird currently occurs from Two Peoples Bay Nature Reserve to Cheyne Beach, with outlying sub-populations on Bald Island and around Mt Taylor, Gull Rock and Mt Martin. Some of these sub-populations were colonised naturally from Mt Gardner, while other sub-populations are the result of translocations between 1983 and 1994 (Danks 1995).

Within the AMZ the Western Bristlebird has a broadly similar distribution to the scrub-bird, apart from its occurrence at Goodga Reserve and absence from the ridge of Mt Manypeaks and Bald Island (McNee 1986). The western heath subspecies of the Western Whipbird extends from Mt Martin to Bluff Creek (Comer & McNee 2001b). There are also isolated occurrences of this whipbird west of Albany from Sandpatch through to the Nullaki Peninsular.

In contrast to these species, within the AMZ the Western Ground Parrot is known from a relatively restricted area at the north eastern end of Waychinicup National Park on the lower slopes of the Manypeaks complex (Watkins 1985; Burbidge *et al.* 1997; McNee 1999).

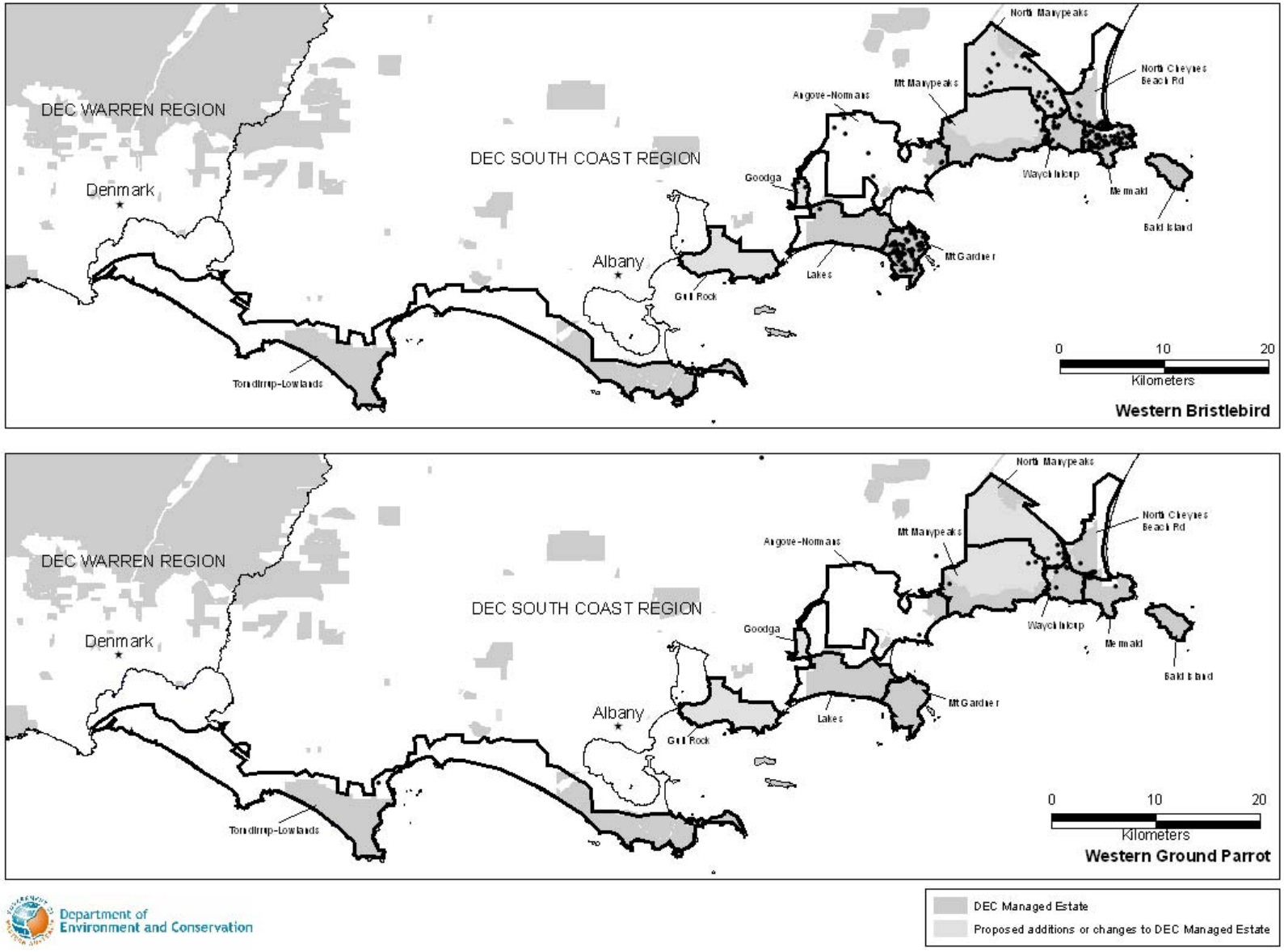
The order of priority for management within this zone is thus as follows: Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot. However, it must be emphasised that this order of priority has been determined as a guide for decision makers and land managers and will be adapted to take into account all newly generated data in the evaluation and review of research findings and management outcomes.

Table 4.2: A whole population estimate index, the percentage of this population in the AMZ, the estimated carrying capacity and the key areas of occupancy for each of the threatened bird taxa in order of priority for management in the AMZ. Note: a population index for the Noisy Scrub-bird, Western Bristlebird and Western Whipbird is the number of occupied territories or home ranges, while the index for Western Ground Parrot is the estimated number of calling birds.

Threatened Bird Taxa	Population Estimate Index (year)	Percent of Population in AMZ	AMZ Estimated Carrying Capacity Index	Key AMZ Areas Occupied
Noisy Scrub-bird	343 (2005)	100%	900	Mt. Gardner/Mt Manypeaks
Western Whipbird (western heath)	196 (2005)	100%	500	Mt. Gardner/Mt Manypeaks/Waychinicup
Western Bristlebird	202 (2005)	>80%	600	Mt Gardner/ North of Manypeaks /Mermaid /Waychinicup
Western Ground Parrot	0 (2005)	-	>50	Cheyne Rd

The carrying capacity for the Noisy Scrub-bird, Western Whipbird (western heath) and Western Bristlebird in the eastern part of the AMZ where the habitat is well known (i.e. from Gull Rock to Cheynes Beach) has been estimated (Table 4.2). However, further knowledge and understanding of Western Ground Parrot habitat and area of occupancy within the AMZ is needed before being able to determine an acturate carrying capacity for this taxon. Further investigation of habitat in the Torndirrup-Lowlands area is also needed to determine the extent of potential habitat for the Western Whipbird and Western Ground Parrot and if potential habitat exists for Noisy Scrub-birds and Western Bristlebirds.

A number of other threatened fauna species are also found in the AMZ, including the Australasian Bittern, Carnaby's Black-Cockatoo, Gilbert's Potoroo, Western Ringtail Possum and Quokka.


DEC WARREN REGION
DEC SOUTH COAST REGION
Denmark
Albany
Goodga
Gull Rock
Lakes
Mt Gardner
Angove-Normans
Mt Manypeaks
North Manypeaks
North Cheynes Beach Rd
Waychinicup
Mermaid
Bald Island
Torndirrup-Lowlands
0
10
20
Kilometers
Western Bristlebird
Western Ground Parrot
Department of Environment and Conservation
DEC Managed Estate
Proposed additions or changes to DEC Managed Estate

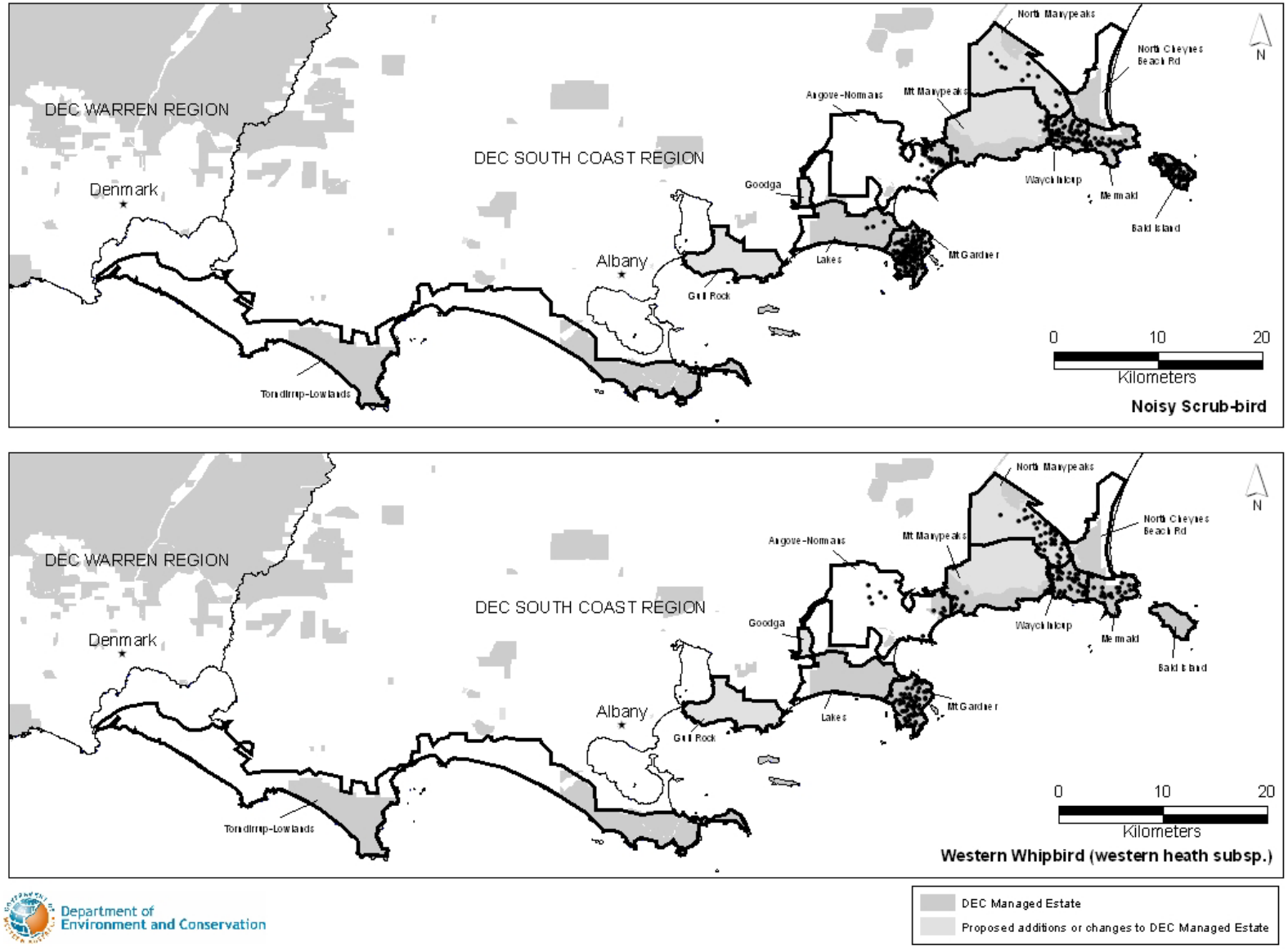


Figure 4.2: The occurance of the four south coast threatened birds in the Albany Management Zone.

4.1.1 Statutory Documents

The Statutory documents that relate to the management of the AMZ in relation to the south coast threatened birds are listed in Table 4.3. This includes management plans and interim management guidelines for National Parks and Nature Reserves, City of Albany management plans and fire plans. A brief Coordinated Conservation Plan was outlined for the Two Peoples Bay area (Two Peoples Bay to Mt Manypeaks) as part of the Action Plan for Australian Birds (Garnett & Crowley 2000). This took into account the Western Ground Parrot, Noisy Scrub-bird, Western Bristlebird, Western Whipbird (western heath subspecies) and the Australasian Bittern.

Table 4.3: Existing statutory documents that include management strategies relevant to south coast threatened bird management in the Albany Management Zone.

Statutory Documents
South Coast Region Regional Plan
Two Peoples Bay Nature Reserve Management Plan
West Cape Howe National Park Management Plan
Waychinicup National Park Interim Management Guidelines
Torndirrup National Park Interim Management Guidelines
Gull Rock National Park Interim Management Guidelines
Lowlands Coastal Reserve MP
Cosy Corner MP
Mt Martin Regional Botanic Park MP
Nullakai CMP
Sandpatch CMP
City of Albany Fire Prevention Plan Draft
Western Shield fauna Recovery Program Strategic Plan

4.1.2 Management Units

To further focus management, the AMZ has been delineated into 12 Management Units, based on areas that either have distinct sub-populations or are clearly distinguishable in terms of geographical or man-made barriers (Figure 4.2). These Management Units were assessed for management priority based on the criteria of: number of taxa present; presence of a viable sub-population; its role as a genetic stronghold for a taxon; the presence of the largest single sub-population of a taxon; fire proneness; and presence of feral predators. The allocation of the Management Units to categories of High, Medium or Low priority was also weighted on the basis of impacts of recent wildfires and the location of sub-populations that may be potential sources of recolonising birds (Table 4.4).

Table 4.4: The management priority ranking for each of the Management Units within the Albany Management Zone (AMZ)

Ranking (priority for management)	Management Unit
High	Mt Gardner Mt Manypeaks Waychinicup Mermaid Bald Island
Medium	North Cheyne Beach Rd Many peaks North Angove- Normans
Low	Lakes Mt Taylor/Gull Rock/Mt Martin Goodga River Torndirrup to Lowlands

The Mt Gardner Management Unit is particularly important. The Noisy Scrub-bird was rediscovered here in 1961 and other populations in this management zone have been derived from this population. Furthermore, scrub-birds survived on Mt Gardner (and not in neighbouring areas) despite the fires that occurred during the twentieth century, indicating that the area is an important fire refuge for the species. This is probably related to the areas of bare granite and the number and orientation of very deep gullies on the Mt Gardner headland. Western Bristlebird and Western Whipbird also survived on Mt Gardner so it probably also functions as a refuge for these species as well.

Mt Gardner was also home for the sole population of Gilbert's Potoroo (*Potorous gilbertii*), a Critically Endangered marsupial, although a small sub-population has now been established on Bald Island. The total wild population of this species (rediscovered in 1994) is considered to consist of about 30 individuals in the Mt Gardner area plus at least 6 translocated individuals on Bald Island (T. Friend[12], personal communication 2004). The continued existence of Gilbert's Potoroo depends very much on the maintenance of its habitat on Mt Gardner. The management of threatened bird habitat in this sub-area therefore must take into account the habitat requirements of Gilbert's Potoroo. For example, currently no prescription burning is possible on the Mt Gardner headland due to the associated risk to the potoroo population. Fortunately, the absence of fire over long periods does not appear to reduce the capacity of the habitat to support the threatened bird taxa on the headland. However, restrictions on prescribed burning constrain the ability to protect habitat from intense and damaging wildfire.

The Mt Manypeaks Management Unit is also very important for both scrub-birds and whipbirds. In the 2001 surveys over 55% of the whole scrub-bird population and close to 40% of the whole Western Whipbird (western heath) population were located in this Management Unit (Comer & McNee 2001b). The wildfire at Mt Manypeaks in December 2004 and others in the AMZ since 2001 burnt a total of about 8500 ha of optimal habitat for Noisy Scrub-bird, leaving around 4500 ha of such habitat in the AMZ. Over the same period the habitat for approximately one-third of the western heath subspecies of the Western Whipbird has also been lost to wildfires.

[12] Tony Friend, Senior Research Scientist, DEC, Albany

Although the Mt Gardner, Mt Manypeaks, Bald Island, Mermaid and Waychinicup Management Units are the highest priority management areas within the AMZ (Table 4.4), other areas also contain 'habitat critical' for south coast threatened bird taxa and their management is therefore also important. The Cheyne Beach area for instance supports a population of Western Ground Parrot that, although currently tiny, is very significant as it is the only population outside the Fitzgerald River NP and Cape Arid NP. Furthermore, some areas currently considered unimportant may become more significant over time through colonisation and development of new or additional sub-populations.

Medium priority Management Units (Angove-Normans, Manypeaks North and North Cheyne Beach Road) all support significant sub-populations of Western Bristlebirds, Noisy Scrub-birds and Western Whipbirds (western heath subspecies). Manypeaks North and North Cheyne Beach Road have provided habitat for Western Ground Parrots in the past and could support significant sub-populations in the future if the cause of recent declines can be found and ameliorated. Low priority Management Units contain a maximum of two taxa and have less value in terms of genetic diversity or largest sub-population of particular species. Nevertheless, there may be significant existing or potential habitat for one or more south coast threatened bird taxa in some of the low priority units.

4.1.3 Threats within the Albany Management Zone

A threat assessment of the AMZ is outlined in Table 4.5. This assessment is of the impact of threatening processes occurring within the management zone upon the total population of each taxon. Thus, three major factors were considered in this assessment. First, the likely extent and/or severity of the threat within the management zone; secondly, the proportion of the total population of a taxon occurring in the management zone; finally, any particular susceptibility of individual taxa to each threatening process.

The major threats for all taxa within AMZ are the loss or degradation of appropriate habitat through too frequent or extensive fires, and predation by feral foxes and cats. The loss of genetic variability within the AMZ, largely due to loss and fragmentation of habitat, increases the risk due to the vulnerability of the sub-populations of all taxa to stochastic events such as wildfire.

Table 4.5: A risk assessment (High, Low or Unknown) for each of the south coast threatened bird taxa of the potential impact on the whole taxa from the threatening processes in the Albany Management Zone (AMZ), and the likely extent and/or severity of the threat within AMZ.

Threatened Birds	Threatening Processes										
	Loss or degradation of appropriate habitat through:							Predation by:			Loss of genetic variability
	Too frequent or extensive fire	Clearing of native vegetation	Grazing or disturbance by non-native animals	Weed invasion	Altered hydrological regime	Climate change	*Phytophthora cinnamomi*	Foxes	Cats	Black rats	
Noisy Scrub-Bird	High	Low	Low	Low	Low	Low	Low	Low	Unknown	Unknown	High
Western Whipbird (western heath)	High	Low	Low	Low	Low	Low	High	Low	Unknown	Unknown	High
Western Ground Parrot	Low	Low	Low	Low	Low	Unknown	Low	Low	Low	Unknown	Low
Western Bristlebird	High	Low	Low	Low	Low	Unknown	Low	Low	Unknown	Unknown	High
Likelihood/extent of the threatening process in AMZ	**High**	**Low**	**Low**	**High**	**Low**	**High**	**High**	**High**	**High**	**High**	**High**

4.1.4 Management Objective for the Albany Management Zone

In the Albany Management Zone (AMZ) the Objectives for management are to:

1. Ensure the maintenance of habitat for the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot such that sub-populations within the AMZ are at or near carrying capacity for each of these taxa.
2. Control threatening processes to minimise their impact on Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot sub-populations.

The following management objectives, strategies and actions should be considered in the light of the identified hierarchy of importance of Management Units within the AMZ for south coast threatened bird conservation (Table 4.4).

4.1.5 Management of Threatening Processes

4.1.5.1 Habitat Protection

Fire Management

All four south coast threatened bird taxa within the AMZ usually occur in, and appear to require, habitat that has had long periods without fire (Danks *et al.* 1996; Burbidge 2003). Such habitat in the AMZ is considered fire prone, is often in difficult terrain, and long unburnt fuels restrict access to some priority areas. To date, wildfire control and prevention has been the most important aspect of Two Peoples Bay Nature Reserve management. Exclusion of wildfire from Mt Gardner and Mt Manypeaks has been a major strategy in the past and for Mt Gardner and much of Mt Manypeaks will continue to be important for the long term protection of the south coast threatened birds. Nevertheless, widespread fire exclusion from a fire prone environment has led to fires becoming less frequent but more intense and widespread. The major wildfire at Mt Manypeaks in December 2004 illustrates the difficulty of protecting large inaccessible areas from wildfire if the entire area contains long unburnt, highly flammable vegetation.

Since intensive management at Two Peoples Bay commenced in the 1960s there have been few fires on Mt Gardner. There have been a number of lightning strikes in the AMZ including a strike on Mt Gardner in December 1989, and a number of strikes on Mt Manypeaks. In most cases cool conditions and rapid suppression actions by DEC staff allowed the fires ignited by these strikes to be contained to small areas. Significant wildfire, burning in excess of a total of about 160,000 ha, in the Mt Manypeaks (1979, 1989, 2004), Waychinicup National Park (1992, 1994, 1996, 2003), Gull Rock (1996), Angove Water Reserve area and Lakes (2000) have impacted on habitat of south coast threatened birds (Figure 4.3).

Ironically, the recent wildfire at Mt Manypeaks came after a decision had been taken by the South Coast Threatened Birds Recovery Team, in consultation with many other stakeholders, to conduct a prescription burn to begin reducing the area of long unburnt vegetation at risk in the event of wildfire. Unfortunately, the appropriate weather conditions to conduct such a burn did not eventuate before the beginning of summer, and the opportunity was lost. Following this fire, however, there is now the opportunity to establish fire management at Mt Manypeaks of a kind that will reduce the likelihood of such large fires and the consequent loss of significant biodiversity assets. The detailed monitoring being instituted, of the outcomes of the fire and of post-fire management regime, will provide valuable guidelines for the improvement of fire management for south coast threatened birds.

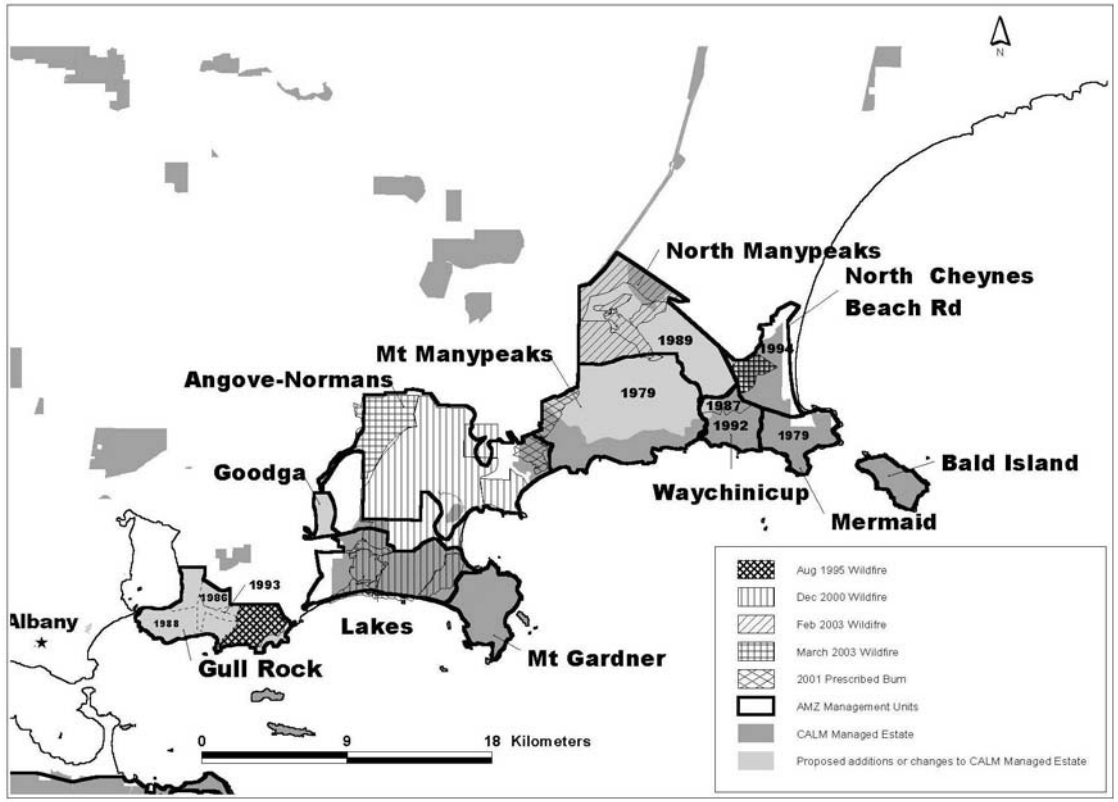


Figure 4.3: The fire history of the Two Peoples Bay/Waychinicup/Gull Rock area of the Albany Management Zone.

The similar fire age requirements (i.e. long unburnt) of all south coast threatened bird taxa in the AMZ, and other threatened species including Gilbert's Potoroo, facilitates logistic, managerial and financial efficiencies of fire management within the AMZ.

Objective

Minimise the risk that large areas of the 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot will be affected by wildfire.

Strategies and Actions

Table AMZ1: Fire management strategies (existing and new recommendations) and actions relating to the recovery of south coast threatened birds in the AMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
AMZ1:ES1. Continue to maintain, and where possible improve, existing low fuel buffer systems between management cells within the Two Peoples Bay NR, Waychinicup NP and Manypeaks NR. (Two Peoples Bay MP, Waychinicup IMGs)	AMZ1:S1. Encourage establishment of low fuel buffer systems between management cells outside the Two Peoples Bay NR, Waychinicup NP and Manypeaks NR.	AMZ1:A1. Provide input to local government and DEC with regard to strategic slashing to maintain low fuel buffer effectiveness for the protection of south coast threatened birds between management cells outside the Two Peoples Bay NR, Waychinicup NP and Manypeaks NR.	Recovery Team/ Project Officers
AMZ1:ES2. Continue to protect high conservation value of the Two Peoples Bay NR, Waychinicup NP and Manypeaks NR from a large single wildfire event. (Two Peoples Bay MP, Waychinicup IMGs)	AMZ1:S2. Develop and promote an integrated approach to fire management within the AMZ based on the requirements of south coast threatened birds.	AMZ1:A2. Provide information to all fire managers within the AMZ that will strategically improve protection of south coast threatened bird 'habitat critical'.	Recovery Team/ Project Officers/ DEC Science
AMZ1:ES3. Develop and implement fire prescriptions outlined in Two Peoples Bay MP, Waychinicup NP IMGs, West Cape Howe NP MP, Torndirrup NP IMGs, Cosy Corner MP, Lowlands Coastal Reserve MP, Mt Martin Reserve MP.	AMZ1:S3. Adjust current fire prescriptions in the light of new information on sub-population locations or species habitat requirements.	AMZ1:A3. Ensure new knowledge about the distribution, biology, ecology and habitat requirements of south coast threatened birds is promptly disseminated to fire management personnel.	
	AMZ1:S4. Continue to have input into the development of strategies for the use of prescribed fire and monitoring of its effectiveness where appropriate within the AMZ.	AMZ1:A4. Assist with the development of prescriptions for fuel reduction.	
		AMZ1:A5. Encourage and facilitate collaboration between DEC Science and DEC Albany staff in developing of monitoring and experimental procedures related to prescribed burning.	
AMZ1:ES4. Continue to maintain fire access tracks and water points. (Two Peoples Bay MP, Waychinicup IMGs, Torndirrup NP IMGs, Gull Rock IMGs, Lowlands Coastal Reserve MP)	AMZ1:S5. Consider the desirability and feasibility of developing and maintaining fire access tracks and water points in more Management Units.	AMZ1:A6. Provide up to date information to land managers on locations of south coast threatened birds and their requirements within the AMZ.	Recovery Team, Project Officers
No existing strategy.	AMZ1:S6. Ensure any new fire breaks or water points do not negatively impact on south coast threatened bird sub-populations.		

AMZ1:ES5. Contain wildfires to the smallest possible areas. Base suppression methods on values threatened, the impact of the suppression activity on these values, sensitivity to erosion, fire behaviour and resources available. (Two Peoples Bay MP, Waychinicup IMGs, Gull Rock IMGs, West Cape Howe NP MP, Torndirrup NP IMGs)	AMZ1:S7. Contain to the smallest possible area wildfires that enter or start in the Two Peoples Bay NR, Manypeaks NR, Waychinicup NP, and other habitat critical for south coast threatened birds.	AMZ1:A7. Provide advice and up to date information to incident management teams on locations of south coast threatened birds within Two Peoples Bay NR, Manypeaks NR and Waychinicup NP in wildfire situations.	Recovery Team, Project Officers
No existing strategy	AMZ1:S8. Ensure High priority Management Units are recognised in AMZ, by local brigades, FESA and DEC fire staff and in Albany Fire working documents.	AMZ1:A8. Provide information on Priority Management Units to relevant fire management bodies.	Recovery Team
AMZ1:ES6. Continue to prohibit the lighting of any fires in Two Peoples Bay NR other than those authorised for management purposes. (Two Peoples Bay MP)	AMZ1:S9. Encourage the prohibition of lighting of any fires in other DEC estate other than those authorised for management purposes.	AMZ1:A9. Provide input into fire suppression planning on DEC estate.	Recovery Team, Project Officers, DEC Albany
No Existing Strategy.	AMZ1:S10. Ensure availability of water bombers for routine suppression of fires in the Mt Gardner-Mt Manypeaks area.	AMZ1:A10. Provide input into use of water bombers for fire suppression planning in Mt Gardner-Mt Manypeaks area.	Recovery Team, Project Officers, DEC Albany
AMZ1:ES7. Continue to give the Two Peoples Bay NR highest possible priority for fire suppression in the South Coast Region. (Two Peoples Bay MP)	No additional strategy required.	No additional action required.	DEC Albany, Recovery Team
AMZ1:ES8. Close the Two Peoples Bay NR to visitors when the Reserve is threatened by wildfire, a severe fire risk or other emergency situations apply. (Two Peoples Bay MP)	No additional strategy required.	No additional action required.	DEC Albany
AMZ1:ES9. Conduct prescribed burning and suppression activities in conjunction with local fire brigades and neighbours where appropriate. (Two Peoples Bay MP, Torndirrup NP MP, Draft City of Albany Fire Prevention Plan)	AMZ1:S11. Develop strategies for the co-operative fire management of lands managed by other agencies and private landholders.	AMZ1:A11. Convene working group with relevant authorities to develop fire management arrangements in the Angove Reserve.	DEC Albany with input from Recovery Team

Criteria for Success:

- No significant area (<10%) of 'habitat critical' of Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot in the AMZ burned by wildfire.

Criteria for Failure:

- Significant area (>30%) of 'habitat critical' of Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot in the AMZ burned by wildfire.

Phytophthora cinnamomi Control

The AMZ has large areas of *Phytophthora cinnamomi* infestation. Two Peoples Bay Nature Reserve is extensively infected, with uninfected areas occurring only on the high granite areas on Mt Gardner. Most of the Waychinicup National Park and Mt Manypeaks, Cheyne Road and Arpenteur Nature Reserves are infested with *P. cinnamomi*. There are however some very important sections that are currently not infested. These are the hills containing *Banksia verticillata* behind Cheyne Beach caravan park across to and including Mermaid Point, but not past Bamboo Track within Waychinicup National Park. The other area is the seaward facing slopes and the upper portion of the mountain south of the plateau and the swamp of Mt Manypeaks, which is in the Mt Manypeaks Nature Reserve. The infestation on the plateau in the swamp has spread over the inland face of the mountain down to the flats around Circuit Rd (M. Grant[13] personal communication 2004).

Although there is some indication that the Western Bristlebird, Western Whipbird (western heath) and Noisy Scrub-bird may be able to withstand any detrimental effects of this infestation over a 40-50 year time frame, the effects of vegetation change associated with this infestation on all these taxa within the AMZ has not been quantified. Possible effects on the Western Ground Parrot are unknown. Therefore due to the lack of understanding of the effects of *P. cinnamomi* infestation on south coast threatened birds a precautionary approach to *P. cinnamomi* management is adopted in AMZ.

Objective

Minimise the spread of *Phytophthora cinnamomi* in all 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot within the AMZ.

[13] Malcolm Grant, DEC

Strategies and Actions

Table AMZ2: *Phytophthora cinnamomi* management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the AMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
AMZ2:ES1. Control access and implement strict hygiene in susceptible areas. (Two Peoples Bay MP, Waychnicup NP IMGs, Gull Rock IMGs, Torndirrup NP MP, West Cape Howe NP MP, Cosy Corner MP, Lowlands Coastal Reserve MP, Nullaki Peninsula MP)	AMZ2:S1. Ensure that existing hygiene and access restrictions are understood and adhered to by all officers working on south coast threatened birds or in their habitat within the AMZ.	AMZ2:A1. Provide information to project officers on hygiene standards.	DEC Albany
		AMZ2:A2. Liaise with relevant rangers on DEC-managed Estate within the AMZ with regard to proposed field operations.	DEC Albany, Project Officers
AMZ2:ES2. Monitor and map the rate of spread and extent of infection in the AMZ. (TPB MP, Waychnicup NP IMGs, Lowlands Coastal Reserve MP)	No additional strategy required.	No additional action required.	DEC Albany, City of Albany

Criteria for Success:

- No significant (<1%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the Western Ground Parrot, Noisy Scrub-bird, Western Bristlebird, or Western Whipbird (western heath) in the AMZ.

Criterion for Failure:

- An observed significant (>5%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the Western Ground Parrot, Noisy Scrub-bird or Western Bristlebird, or Western Whipbird (western heath) in the AMZ.

Clearing/Fragmentation of Native Vegetation

In the AMZ there are few areas considered likely to be at risk of extensive clearing in the future; the exceptions to this may be for roads, gravel pits and mining in Crown Reserve 30033 abutting Waychinicup NP. However, the existing fragmentation of habitat for the south coast threatened birds remains a threat to various sub-populations of the four taxa in the AMZ. This section introduces new actions relevant to maintaining and improving connectivity between areas of habitat. Other important management actions that reduce the adverse effects of fragmentation are aimed at specific threats such as dieback, grazing, disturbance and predation by introduced animals. These actions are dealt with under those threats themselves.

Objectives

1 No loss of any 'habitat critical' of Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot through clearing of native vegetation within the AMZ.
2 To maintain or improve the integrity of, and linkages between, areas of existing or potential habitat for the four threatened taxa.

Strategies and Actions

Table AMZ3: Clearing/fragmentation management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the AMZ.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
AMZ3:ES1. Regulation of clearing will take into account the impact of clearing on biodiversity, water and soil resources, salinity and other environmental issues. (*Environmental Protection Act 1986*)	AMZ3.S1. Ensure that information on 'habitat critical' and potential movement corridors for south coast threatened birds within the AMZ is considered in response to clearing applications.	AMZ3.A1. Provide up to date information on locations of south coast threatened bird taxa and 'habitat critical' within the AMZ in response to clearing applications.	Project Officers, Recovery Team
		AMZ3.A2. Educate/ liaise with landholders and other land managers on the importance of 'habitat critical' for south coast threatened birds within the AMZ.	Project Officers, Recovery Team
	AMZ3.S1. Expand land vested in the Conservation Commission of WA, where appropriate, to include all 'habitat critical' of the south coast threatened birds within the AMZ.	AMZ3.A3. Continue negotiations for vesting of UCL Waychinicup River Catchment area in Conservation Commission of WA.	DEC South Coast Region
No existing strategy.	AMZ3.S1. Seek opportunities to expand habitat and movement corridors for the south coast threatened birds.	AMZ3.A4. Identify areas where strategic revegetation is feasible and likely to benefit any of the four threatened birds.	Project Officers, Recovery Team
		AMZ3.A5. Liaise with the South Coast Macro Corridor project (Watson & Wilkins 1999) to bring about strategic revegetation identified in AMZ3:A4.	Project Officers, Recovery Team

Criteria for Success:

- No loss of any 'habitat critical' or potential movement corridors for the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot through clearing, including off-site effects, of native vegetation in the AMZ.

Criteria for Failure:

- Any loss of 'habitat critical' or potential movement corridors for the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot through clearing, including off-site effects, of native vegetation in the AMZ.

Grazing and Disturbance by Domestic Stock and Feral Animals

Grazing pressures in the AMZ are limited to impacts from domestic livestock (mainly cattle) and rabbits. The latter are unlikely to significantly impact habitat of south coast threatened birds. However, domestic livestock in reserves and drainage lines significantly impact on habitat, both trampling and grazing native vegetation. Most domestic stock access is due to inadequate or failed fencing, and generally the problem is rectified fairly quickly.

Objective

Minimise the impact of grazing by domestic stock on all 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath subspecies), Western Bristlebird and Western Ground Parrot within the AMZ.

Strategies and Actions

Table AMZ4: Grazing and disturbance management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the AMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
AMZ4:ES1: In conjunction with the Agriculture Protection Board of WA and nearby landholders, develop and implement programs to control grazing pests (rabbits). (Two Peoples Bay MP, West Cape Howe MP, Waychinicup IMGs, Gull Rock draft IMGs, Lowlands Coastal Reserve MP, Mt Martin Regional Botanic Park MP)	No additional strategy required.	No additional action required.	Not Applicable
AMZ4:ES2: Liaise with neighbours to ensure that domestic animals from nearby privately owned lands do not enter Two Peoples Bay NR.	AMZ4:S1: Ensure domestic grazers from private property do not enter habitat of south coast threatened birds.	AMZ4:A1: Provide information to Community Group and Natural Resource Management Groups on locations of south coast threatened bird taxa within the AMZ.	Regional Leader Nature Conservation Albany

Criterion for Success

- No degradation of any 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot through grazing by domestic livestock or feral animals in the AMZ.

Criterion for Failure

- Any measurable degradation of any 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot through grazing by domestic livestock or feral animals in the AMZ.

Weed Invasion

Key weed species that are likely to impact on habitat of south coast threatened birds in the AMZ include Blackberry (*Rubus fruticosus*), Victorian Tea-tree (*Leptospermum laevigatum*), Sydney Golden Wattle (*Acacia longifolia*), Bridal Creeper (*Asparagus asparagoides*) and Taylorina (*Psoralea pinnata*). While small infestations are unlikely to compromise habitat for the four threatened birds, large stands create monocultures with little structural variation and a depauperate leaf litter, thereby impinging on the value of habitat for feeding, and most likely breeding. Blackberry also out-competes native species of sedges necessary for Noisy Scrub-bird nests in creek lines. While most areas occupied by south coast threatened birds in the AMZ are relatively weed free there are several areas, including the Angove Water Reserve and some of the creek-lines on private property, in which weeds have the potential to cause major modification of 'habitat critical' if left unchecked.

Objective

Minimise the impact of weeds on the 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot within the AMZ.

Strategies and Actions

Table AMZ5: Weed management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the AMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
AMZ5:ES1. Monitor and control weeds causing major conservation problems. (Two Peoples Bay MP, Waychinicup IMGs, draft Gull Rock IMGs, Mt Martin Regional Botanic Park MP, Torndirrup NP MP, West Cape Howe NP MP, Cosy Corner MP, Nullaki MP, Lowlands Coastal Reserve MP)	AMZ5:S1. Monitor 'habitat critical' for south coast threatened bird taxa for invasion of weeds likely to cause a change in habitat structure.	AMZ5:A1. Record observed changes in 'habitat critical' due to invasion of weeds likely to cause a change in habitat structure.	Recovery Team, Project Officer, DEC Albany staff.
	AMZ5:S2. Ensure any observed impacts or changes in habitat structure due to weed infestation are communicated to relevant land managers.	AMZ5:A2. Liaise with relevant land managers with regard to any observations of habitat degradation or loss due to weed infestation, and encourage control.	SCTB Recovery Team, Project Officer, DEC Albany staff.
AMZ5:ES2. Identify communities of native flora and fauna which may be adversely affected by weed control programs and if necessary modify methods and chemicals used to ensure protection of susceptible species. (TPB MP, West Cape Howe NP MP, Waychinicup IMGs)	AMZ5:S3. Ensure any observed impacts on south coast threatened birds, or their habitat, resulting from weed control programs are communicated to relevant land managers.	AMZ5:A3. Liaise with relevant land managers with regard to any observations of impacts of weed control programs on individuals or habitat of south coast threatened birds.	Recovery Team, Project Officer, DEC Albany staff

Criterion for Success

- No increase in area of weed invasion of 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot in the AMZ.

Criterion for Failure

- Any increase in area covered by weeds within 'habitat critical' of the Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird or Western Ground Parrot in the AMZ.

4.1.5.2 Feral Predator Control

Baiting for foxes is currently carried out four times per year on all conservation estate within the AMZ (excluding Torndirrup National Park) with additional baits laid by hand on boundary firebreaks and tracks monthly. Additional baits are also hand distributed on Mt Gardner tracks whenever foxes are sighted or fox sign (footprints, scats) is detected. This program should be continued in its current form.

Initial investigations into the feral cat population at Waychinicup have found that, although an increasingly large number of feral cats have been observed in the vicinity of the City of Albany's Cheyne Beach waste dump over recent years, there has been some effective control by neighbouring landowners (D. Algar[14] personal communication 2005).

Objective

Minimise the impacts of feral predators on all Noisy Scrub-bird, Western Whipbird (western heath), Western Bristlebird and Western Ground Parrot sub-populations within the AMZ.

Strategies and Actions

Table AMZ6: Feral predator management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the AMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
AMZ6:ES1. Continue fox control under DEC's *Western Shield* Program on all DEC managed land within the AMZ currently included in the program. (Western Shield Fauna Recovery Program Strategic Plan)	No extra strategy required.	No extra action required.	Not Applicable
AMZ6:ES2. In conjunction with the Agriculture Protection Board of WA and neighbouring landholders develop and implement programs to control declared pests. (Two Peoples Bay MP, WCH MP, Waychinicup IMGs, Gull Rock IMGs)	AMZ6:S1. Review areas baited in the light of new information on south coast threatened bird locations.	AMZ6:A1. Maintain areas of dense vegetation in 'habitat critical' through fire exclusion and minimising the spread of dieback.	DEC Albany
	AMZ6:S2. Encourage landholders adjacent to DEC managed land within the AMZ to begin or continue cat and fox control on their land.	AMZ6:A2. Ensure all landholders in the AMZ have access to information on impacts and appropriate control methods of cats and foxes.	SCTBRT, DEC Albany

[14] Dr David Algar, Senior Research Scientist, Science Division, DEC

AMZ6:ES3. Implement cat control methods if research indicates that cats are a threat to rare fauna (Two Peoples Bay MP)	AMZ6:S3. Develop cat monitoring techniques to determine abundance and threat posed by this predator in the AMZ.	AMZ6:A3. Investigate cat numbers in 'habitat critical' of south coast threatened birds in the AMZ.	DEC Science, DEC Albany, Recovery Team
		AMZ6:A4. Support current methods of cat control within the AMZ, and investigate the possibility of using broad scale cat control methods when these techniques become operational.	
	AMZ6:S4. Promote the adoption of methods of cat control when they become operational in all priority management units within the AMZ.	AMZ6:A5. Provide land owners and managers with information on High priority Management Units, impacts of cats on south coast threatened birds and on appropriate control techniques.	DEC Science, DEC Albany, Recovery Team
		AMZ6:A6. Seek support from City of Albany to control cats at Cheyne Beach refuse site.	Recovery Team, DEC Albany
No existing strategy.	AMZ6:S5. Maintain the predator free status of Bald Island.	AMZ6:A7. Regularly monitor Bald Island for signs of foxes and cats, and immediately implement control measures if any positive sightings are made.	Recovery Team, DEC Albany
		AMZ6:A8. Develop and apply protocols to ensure black rats and house mice are not transported to Bald Island during research activities.	
No existing strategy.	AMZ6:S6. Increase knowledge of distribution of feral predators likely to impact on south coast threatened birds in the AMZ.	AMZ6:A9. Determine density of black rats on Mt Gardner and Mt Manypeaks and the density of cats on Mt Gardner.	Recovery Team, DEC Albany

Criteria for Success:

- Continuation or improvement in the level of control of introduced predators being conducted under Western Shield throughout the AMZ; and
- An understanding of the potential significance of cat predation to threatened birds; and
- Control actions for cats in place in the AMZ if necessary.

Criteria for Failure:

- Loss of area or intensity of control of introduced predators throughout the AMZ, and/or the significance of cat predation still not understood and cat control not being performed,
- Evidence that sub-populations of threatened birds in the AMZ are declining due to predation by feral predators, and
- Establishment of any feral predator on Bald Island.

4.1.5.3 Cost of South Coast Threatened Bird Actions

Table 4.6: Albany Management Zone Summary of Costs for Area Management Actions over 5 years.

South Coast Threatened Bird Threat Management in AMZ	Resources Required for Bird Actions		Existing DEC Estate Management	Completion Date
	External Funding Required	Recovery Team Input		
1. Fire	$150 000	$10 000	$296 900	Ongoing
2. *Phytophthora cinnamomi*	$80 000	$5 000	$40 000	Ongoing
3. Clearing		$5 000	$10 000	Ongoing
4. Grazing & Disturbance		$5 000	$5 000	Ongoing
5. Weed Management	$50 000	$5 000	$10 000	Ongoing
6. Feral Predator Control	$40 000	$10 000	$135 000	Ongoing
Total (Five Years)	**$320 000**	**$40 000**	**$496 900**	

4.2 Fitzgerald Management Zone (FMZ)

The Fitzgerald Management Zone (FMZ) contains the Fitzgerald River National Park, the coastal area extending east of the park to Lake Shaster Nature Reserve and the Ravensthorpe Range, all of which are part of or associated with the Fitzgerald Biosphere Zone of Cooperation (Figure 4.1).

The FMZ is an important area of occupancy of south coast threatened birds, containing three taxa, the Western Ground Parrot, Western Bristlebird and the western mallee subspecies of the Western Whipbird. The FMZ contains the most significant sub-population of the Western Ground Parrot and the second most significant sub-population of the Western Bristlebird (Table 4.7).

The order of priority for management within this zone is thus as follows: Western Ground Parrot, Western Bristlebird and Western Whipbird (western mallee subspecies).

Table 4.7: The most recent population index estimates for the FMZ for the south coast threatened birds, the percent of the whole population of these taxa that occur in the FMZ and the key areas of occupancy of each taxa **(**Table 4.8).

Species	Population Estimate Index for FMZ	Percent of Whole Population in FMZ	Key FMZ Management Units Occupied
Western Ground Parrot	<180	>75%	Short. Rd-Drummond Tk, West River, Twertup-Fitzgerald Tk
Western Bristlebird	<100	c.15%	Twertup-Fitzgerald Tk, Woolbernup, Eastern Range, Short Rd–Drummond Track
Western Whipbird (western mallee)	Unknown	~54% of current records	All except Shaster

The Fitzgerald River National Park covers an area of approximately 330 000 ha, and constitutes the bulk of the area of the FMZ. The fauna values of the Fitzgerald River National Park are richer than any other conservation area in the south-west of Western Australia, with 184 bird species, 22 native mammals, 12 frog species and 41 reptiles. The Fitzgerald River National Park is also one of the richest areas for plants in Western Australia with 1883 species recorded (Newbey & McQuoid 1997) of which around 75 are endemic and 250 are considered rare or geographically restricted. The Park contains around 15% of the State's described vascular plant species and is one of only two International Biosphere Reserves in Western Australia.

4.2.1 Statutory Documents

In the FMZ the current statutory documents from which strategies for this Recovery Plan are drawn are the Fitzgerald River National Park Management Plan (CALM 1991) and Interim Management Guidelines for Lake Shaster Nature Reserve (CALM 1995). The Fitzgerald River National Park Management Plan (CALM 1991) places restrictions on potential management actions within its Wilderness Zone (78 000 ha). This Zone is managed as a Wilderness Area with only essential management operations permissible.

4.2.2 Management Units within the Fitzgerald Management Zone

The FMZ has been divided into Management Units based on existing fire management cells within the Fitzgerald River National Park (CALM 1991), and on areas of occupancy of the Western Whipbird (western mallee) outside the National Park (Figure 4.4).

The Management Units have been designated to consolidate traditional survey sites for threatened birds within the FMZ into discrete manageable areas. These Management Units, together with the related traditional survey area and fire management cells (if the Management Unit is within the National Park), are outlined in Table 4.8.

Table 4.8: The south coast threatened birds FMZ Management Units and their related traditional south coast threatened bird survey areas and fire management cells. * indicates Priory Management Units.

Management Unit	Traditional Survey Area	Fire Management Cells
*West River	Hamersley Drive, West River (Old Ongerup Rd)	19, 11, 12
*Short Rd – Drummond Track	Short Road, Drummond Track	9, 10, 18, 20
*Twertup-Fitzgerald Track	Fitzgerald Track, Twertup, Water-metre Track west	6, 7, 8, 14, 16, 17
*Eastern Range	Moir Track, East Mt Barren, Hamersley Inlet, Sepulcralis Hill	13, 22, 23
*Woolbernup	Woolbernup-Two Bump Hill, Telegraph Track	21, 24, 25, 26, 28, 27
Fitzgerald Inlet	None	30, 29
Calyerup Rock	None	1, 15, 2
Quaalup	None	31, 32, 4, 5, 3, 33, 34
Fitzgerald River Corridor	Fitzgerald River Corridor	
Shaster	Lake Shaster NR, Jerdacuttup	
Cocanarup	UCL 1040 and Timber Reserve – adjacent NE corner FRNP	
Bandalup	Bandalup Hill	

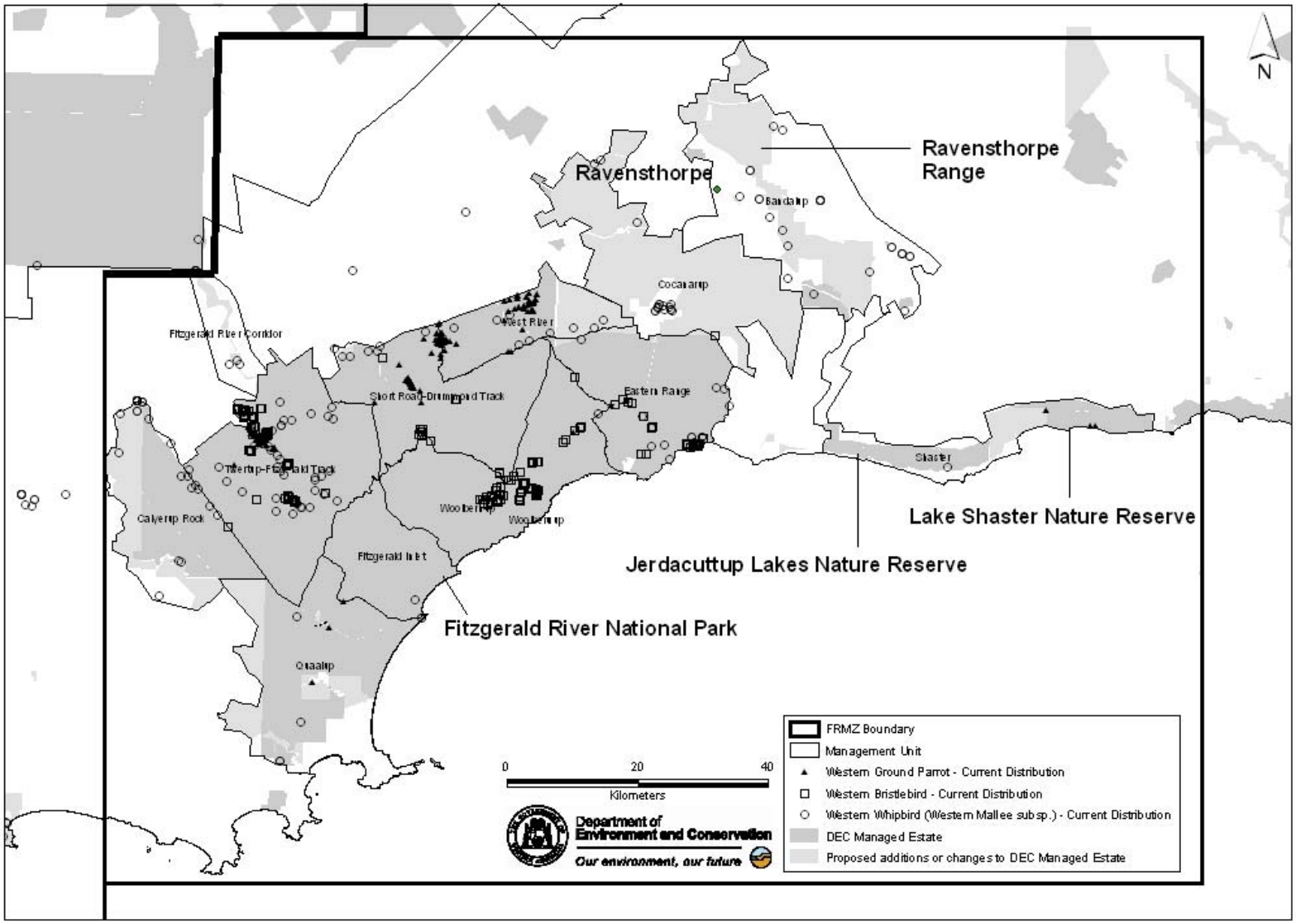


Figure 4.4: The south coast threatened birds Management Zones of the FMZ, showing the current distribution (post 1980) of south coast threatened birds across the management zone.

The Western Whipbird (western mallee) is the only taxon to occur in Management Units outside the Fitzgerald River National Park. It occurs in the Ravensthorpe Range (at Bandalup Hill and in the north of the range in the Bandalup Management Unit), in Unallocated Crown Land and Timber Reserve to the north east of the park (Cocanarup Management Unit) in the Fitzgerald River Corridor Management Unit, and in Jerdacuttup Lakes Nature Reserve (Shaster Management Unit: despite only one report of Whipbirds from this Management Unit, it contains extensive potential habitat) (Figure 4.4). Potential habitat for the Western Ground Parrot also exists in the Shaster Management Unit, in both Lake Shaster Nature Reserve and the Jerdacuttup Lakes Nature Reserve.

There is some overlap in distribution of the south coast threatened birds within the Fitzgerald River National Park. The northern upland area of the Park (West River, Short Rd.-Drummond Track and Twertup-Fitzgerald Track Management Units) contains sub-populations of all three taxa, with extensive overlap in the Twertup-Fitzgerald Track Management Unit, around the junction of the Fitzgerald River and the Fitzgerald Track (Figure 4.4). Sub-populations of all three taxa also occur in the south east section of the park within the Barren Ranges complex (Eastern Range and Woolbernup Management Units) (Burbidge *et al.* 1989; Burbidge *et al.* 1990; Chapman & Newbey 1995; McNee & Newbey 1995, 1997, 1998, 1999, 2000, 2001, 2002). Currently, only a few scattered records of the Western Ground Parrot and Western Whipbird (western mallee) have come from the south west and northwest corners of the park (Calyerup Rock and Quaalup Management Units). While this reflects low sampling effort for the Western Whipbird, the areas probably lack suitable habitat for the Western Ground Parrot.

Priority Management Units for management are thus: Short Road - Drummond Track, West River, Twertup-Fitzgerald Track , Woolbernup and Eastern Range (Table 4.8).

4.2.3 Threats within the Fitzgerald Management Zone

Assessment of the impacts of threats within the FMZ are listed in Table 4.9. This assessment is of the impact of threatening processes occurring within the management zone upon the whole population of each taxon. Thus, three major factors enter into the assessment. First, the likely extent and/or severity of the threat within the FMZ; secondly, the proportion of the total population of a taxon occurring in the FMZ; finally, any particular susceptibility of individual taxa to each threatening process.

Major threats for all taxa within FMZ are the loss or degradation of appropriate habitat through too frequent or extensive fires, plant disease caused by *Phytophthora* species, and predation by feral foxes and cats. The loss of genetic variability within the FMZ, largely due to loss and fragmentation of habitat, increases the risk due to the vulnerability of the sub-populations of all taxa to stochastic events such as wildfire. Although the FMZ lies within an area predicted to have a high dryland salinity risk (Morgan 2001) the high level of remnant vegetation in this zone means that the actual threat is limited to the river valleys, northern end of the Fitzgerald Corridor Management Unit, and Shaster Management Unit (M. Grant[15] personal communication). Further, the impacts of dryland salinity in these Management Units are not likely to be a key threat to 'habitat critical' of any south coast threatened birds in the short to medium term.

The combined effects of the major threats to south coast threatened birds in the Fitzgerald River National Park are not fully understood. In many cases the interactions of fire and predation may be causing major problems for the Western Ground Parrot and Western Bristlebird but to date no studies have specifically looked at this issue.

[15] Malcolm Grant, Senior Operations Officer, DEC, Ravensthorpe.

Table 4.9: A risk assessment of south coast threated bird sub-populations within the FMZ.

South Coast Threatened Birds	Threatening Process										
	Loss or degradation of appropriate habitat through:							Predation by:			
	Too frequent or extensive fire	Clearing of native vegetation	Grazing or disturbance by non-native animals	Weed invasion	Altered hydrological regime	Climate change	*Phytophthora cinnamomi*	Foxes	Cats	Black rats	Loss of genetic variability
Western Ground Parrot	High	Low	Low	Low	Low	Unkown	Low	Low	High	Unkown	Low
Western Bristlebird	High	Low	Low	Low	Low	Unkown	Low	Low	Unkown	Unkown	High
Western Whipbird (western mallee	High	Mod	Low	Low	Low	Low	Low	Low	Unkown	Unkown	High
Likelihood/extent of the threatening process in FMZ	**High**	**Low**	**Low**	**Mod**	**Mod**	**High**	**High**	**High**	**High**	**High**	**High**

4.2.4 Management Objectives for the Fitzgerald Management Zone

In the Fitzgerald Management Zone (FMZ) the objectives for management are to:

1. Ensure the maintenance of habitat of the Western Ground Parrot, Western Bristlebird and Western Whipbird (western mallee) such that the viability of sub-populations within the FMZ is maximised.

2. Control threatening processes to minimise their impact on sub-populations of Western Ground Parrot, Western Bristlebird and Western Whipbird (western mallee).

4.2.5 Management of Threatening Processes

4.2.5.1 Habitat Protection

Fire Management

The FMZ contains a suite of vegetation communities considered to be highly susceptible to ignition from lightning strikes. Fire behaviour throughout this zone can be erratic due to different fuel types, and wildfires often occur under extreme weather conditions that facilitate intense and fast-moving fires in all fuel types.

In recent years there have been some extremely large fires within the FMZ, with more than 157 000 ha burnt in 1989 and 50 000ha in 1997 (Figure 4.5). Less than a quarter of the FRNP remains unburnt since the 1970s.

There is a need for an urgent review of fire management within the FRNP. The current fire management component of the Fitzgerald River National Park Management Plan was prepared in 1997. It does not address the need for use of fire within the 1989 regrowth area of the National Park, nor does it take into account recent research findings.

Objective

Minimise the risk that large areas of 'habitat critical' of the Western Ground Parrot, Western Bristlebird or Western Whipbird (western mallee) will be adversely affected by wildfire and prescribed fire.

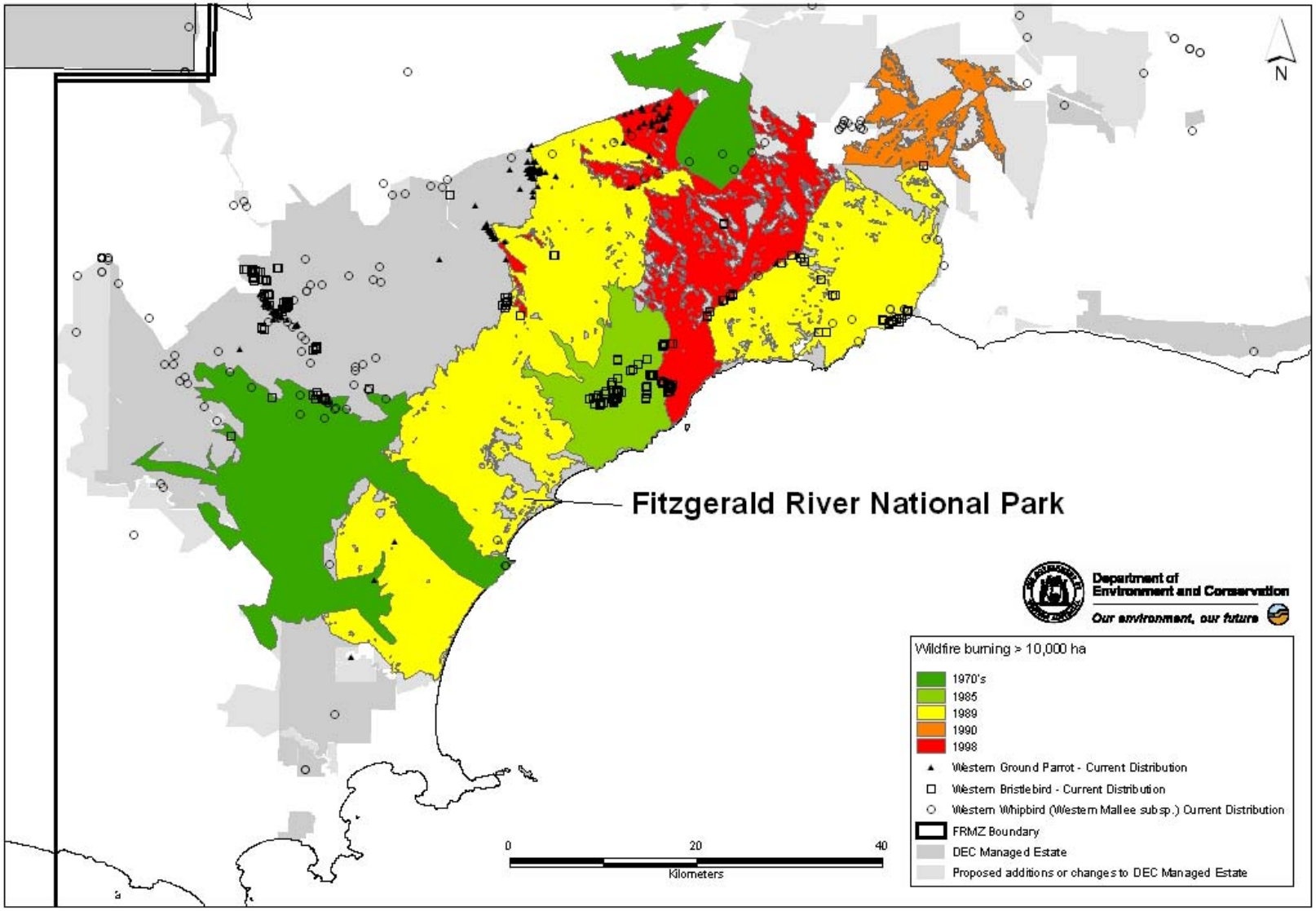


Figure 4.5: The fire history of large (>10,000 ha) wildfires in the Fitzgerald River National Park since the 1970's.

Strategies and Actions

Table FMZ1: Fire management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the FMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
FMZ1:ES1. Continue to maintain, and where possible improve, existing low fuel buffer systems between Management Units within the Fitzgerald River NP. (FRNP MP, IMG for Lake Shaster NR)	FMZ1:S1. Encourage establishment of low fuel buffer systems between Management Units outside the Fitzgerald River NP and Lake Shaster NR.	FMZ1:A1. Provide input to local government and DEC with regard to strategic scrub rolling and burning of fire breaks to maintain low fuel buffer effectiveness for the protection of south coast threatened birds between Management Units outside the Fitzgerald River NP and Lake Shaster NR.	Recovery Team, Project Officers
FMZ1:ES2. Continue to protect the high conservation value of the Fitzgerald River NP and Lake Shaster NR from a large single wildfire event. (FRNP MP, IMG for Lake Shaster NR)	FMZ1:S2. Ensure provision of up to date information and input into the larger fire management processes already implemented or coordinated by land managers in the FMZ.	FMZ1:A2. Provide information to all fire managers within the FMZ that will strategically improve protection of south coast threatened bird 'habitat critical'.	Recovery Team, Project Officers
FMZ1:ES3. Continue to maintain fire access tracks and water points. (FRNP NP MP and IMG's for Lake Shaster NR)	FMZ1:S3. Consider the desirability and feasibility of developing and maintaining fire access tracks and water points in more Management Units.	FMZ1:A3. Provide up to date information to land managers on locations of south coast threatened bird taxa within the FMZ.	Recovery Team, Project Officers
No existing strategy.	FMZ1:S4. Ensure any new fire breaks or water points do not impact on south coast threatened bird sub-populations.		
FMZ1:ES4. Endeavour to contain wildfires that enter or start in the Fitzgerald River NP within a fire cell. (FRNP MP)	No extra strategy required.	No extra action required.	Not applicable
No existing strategy	FMZ1:S5. Ensure Priority Management Units are clearly recognised in Fitzgerald River NP master burn plan, by the Fitzgerald Fire advisory group, by local brigades and in Albany Fire working document.	FMZ1:A4. Provide information on Priority Management Units to relevant fire management bodies.	Recovery Team
FMZ1:ES5. Continue to prohibit the lighting of any fires on DEC managed estate other than those authorised for management purposes.	No extra strategy required.	No extra action required.	Not applicable

FMZ1:ES6. Continue to implement fire prescriptions outlined in the Fitzgerald River NP MP and IMG's for Lake Shaster NR.	FMZ1:S6. Develop an integrated approach to fire management within the FMZ based on the requirements of south coast threatened birds.	FMZ1:A5. Provide information and input relating to south coast threatened birds in the Fitzgerald River NP fire management discussion paper and any other burn prescriptions in the FMZ.	Recovery Team, Project Officers, DEC Albany
	FMZ1:S7. Adjust current fire prescriptions in the light of new information on sub-population locations or species habitat requirements.	FMZ1:A6. Ensure new knowledge regarding south coast threatened bird biology, ecology and habitat requirements is promptly disseminated to fire management personnel.	Recovery Team, Project Officers, DEC Albany

Criteria for Success:

- No significant area (<10%) of 'habitat critical' of Western Bristlebird or Western Ground Parrot, or of occupied habitat of the Western Whipbird (western mallee) in the FMZ burned by wildfire.

Criteria for Failure:

- Significant area (>30%) of 'habitat critical' of Western Bristlebird or Western Ground Parrot, or of occupied habitat of the Western Whipbird (western mallee) in the FMZ burned by wildfire.

Phytophthora spp Control

The most serious plant diseases in the FMZ are the plant-dieback diseases caused by a number of species of *Phytophthora*. Three species of soil borne fungus occur in the FMZ: *Phytophthora megasperma, P. citricola* and *P. cinnamomi.* There are two confirmed *P. cinnamomi* infestations, multiple *P. megasperma* infestations and one *P. citricola* infestation known from within the Fitzgerald River National Park. The current infestations of *P. cinnamomi* are restricted to the Bell Track and the Jacup Ranger Station. Despite the existing infestations the Fitzgerald River National Park remains the least infected park in the South West Phytophthora risk zone (i.e. those lands receiving greater than 600 mm rainfall) at present.

Extensive infestations of *P. cinnamomi* occur within Jerdacuttup Lakes and Lake Shaster Nature Reserves and along Local Government Authority road reserves in the immediate vicinity. Outside DEC managed reserves there has been no *P. cinnamomi* identified to date in the Fitzgerald River corridor or the Ravensthorpe Range. An isolated *Phytophthora cinnamomi* infestation is located on Highway One at Hamersley River crossing (M. Grant[16] personal communication 2005).

Vegetation within the FMZ is considered to be at high risk of further infestation due to the warm relatively moist climate, significant clay component of soils (particularly duplex soils of the southern plains), impediments to drainage, and the highly susceptible vegetation types (large numbers of Proteaceae, Epacridaceae

[16] Malcolm Grant, Senior Operations Officer, DEC, Ravensthorpe.

and Myrtaceae). In addition many of the roads in the FMZ, including access to the Fitzgerald River National Park, are made of gravel and are of uncertain dieback status and management (CALM 1991).

There is concern that an increasing spread of *Phytophthora* spp. in the FMZ may result in alteration of vegetation structure, adversely affecting 'habitat critical' for the Western Ground Parrot, Western Bristlebird and Western Whipbird. However, there has been no research to obtain data to determine actual impacts on birds.

Objective

Minimise the spread of *Phytophthora* species in all 'habitat critical' of the Western Ground Parrot and Western Bristlebird, or occupied habitat of the Western Whipbird (western mallee) within the FMZ.

Strategies and Actions

Table FMZ2: Phytophthora management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the FMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
FMZ2:ES1. Control access, implement strict hygiene (Billiton Nickel (Ravensthorpe) Pty. Ltd. Exploration and Mining Lease Conditions, Managing Phytophthora dieback guidelines for local government, Draft Management Concept for the Ravensthorpe Range). Where appropriate investigate use of phosphite in susceptible areas. (Fitzgerald River NP MP, IMG's Lake Shaster NR)	FMZ2:S1. Ensure that existing hygiene and access restrictions are understood and adhered to by all officers working on south coast threatened birds within the FMZ.	FMZ2:A1. Provide information to project officers on hygiene standards.	DEC Albany
		FMZ2:A2. Liase with relevant rangers on DEC Estate within the FMZ with regard to proposed field operations.	DEC Albany, DEC Science
No existing strategy	FMZ2:S2. Ensure Priority Management Units receive the greatest amount of protection from the impacts of *Phytophthora* spp.	FMZ2:A3. Provide information on priority Management Units to relevant land managers.	Recovery Team
FMZ2:ES2. Develop a comprehensive description of infected areas, including information on species affected, vegetation association, area and rate of spread, soil profile topography and threat to ground and surface waters. (Fitzgerald River NP-MP, Lake Shaster NR IMGs)	FMZ2:S3. Ensure any information on the impacts of Phytophthora spp. on south coast threatened bird habitat is made available to all appropriate land managers.	FMZ2:A4. Record and monitor any changes to habitat of south coast threatened bird species, and their use of infected areas.	Recovery Team, Project Officers

Criteria for Success

- No significant (<0.1%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the Western Ground Parrot or Western Bristlebird, or of occupied habitat of the Western Whipbird (western mallee) in the FMZ.

Criteria for Failure

- An observed significant (>1%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the Western Ground Parrot or Western Bristlebird, or of occupied habitat of the Western Whipbird (western mallee) in the FMZ.

Clearing/Fagmentation of Native Vegetation

Clearing of native vegetation historically was a major threat to the south coast threatened birds, but the concentration of most habitat in conservation reserves and new controls on clearing should result in this no longer being a threat to remaining 'habitat critical'. An exception to this in the FMZ is where mining operations in the Ravensthorpe Range, including Bandalup Hill, may result in clearing of occupied habitat of the Western Whipbird (western mallee).

However, the existing fragmentation of habitat for the south coast threatened birds remains a threat to various subpopulations of the three taxa in the FMZ. This section introduces new actions relevant to maintaining and improving connectivity between areas of habitat. Other critical management actions that reduce the adverse effects of fragmentation are aimed at specific threats such as dieback, grazing, disturbance and predation by introduced animals. These actions are dealt with under those threats themselves.

Objectives

1. Keep intact all 'habitat critical' of the Western Ground Parrot and Western Bristlebird, and occupied habitat of the Western Whipbird (western mallee).
2. Maintain or improve the integrity of, and linkages between, areas of existing or potential habitat for the four threatened taxa.

Strategies and Actions

Table FMZ3: Clearing/fragmentation management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the FMZ.

	South Coast Threatened Bird Management		
Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	**Strategies**	**Action**	**Responsibility**
FMZ3:ES1. Regulation of clearing will take into account the impact of clearing on biodiversity, water and soil resources, salinity and other environmental issues (*Environmental Protection Act 1986*)	FMZ3:S1. Ensure that information on 'habitat critical' and potential movement corridors for south coast threatened birds within the FMZ is considered in response to clearing applications.	FMZ3:A1. Provide up to date information on locations of south coast threatened birds and 'habitat critical' within the FMZ in response to clearing applications.	DEC Albany, DEC Ravensthorpe

No existing strategy	FMZ3:S2. Seek opportunities to expand habitat and movement corridors for any of the three threatened birds	FMZ3:A2. Identify areas where strategic revegetation is feasible and likely to benefit any of the three threatened birds	Project Officers, Recovery Team
		FMZ3:A3. Liaise with the South Coast Macro Corridor project to bring about strategic revegetation identified in A4 above	Project Officers, Recovery Team

Criteria for Success:

- No loss of any 'habitat critical' or potential movement corridors of the Western Ground Parrot or Western Bristlebird, or occupied habitat or potential movement corridors of Western Whipbird (western mallee) through clearing, including off-site effects, of native vegetation within the FMZ.

Criteria for Failure:

- Any loss of 'habitat critical' or potential movement corridors of the Western Ground Parrot or Western Bristlebird, or occupied habitat or potential movement corridors of Western Whipbird (western mallee) through clearing, including off-site effects, of native vegetation within the FMZ.

Grazing or Disturbance by Non-Native Animals

Grazing pressures in the FMZ are likely to be limited to impacts from feral goats, horses, cattle, deer, sheep and rabbits. The latter is unlikely to affect habitat of south coast threatened birds. Some problems have been encountered with goats in the Fitzgerald River National Park in recent years, but control measures currently have this species under control (M. Grant[17] personal communication 2005).

Objective

Minimise the impacts of grazing or disturbance by non-native animals on 'habitat critical' of the Western Ground Parrot and Western Bristlebird, or occupied habitat of the Western Whipbird (western mallee) within the FMZ.

[17] Malcolm Grant, Senior Operations Officer, DEC, Ravensthorpe.

Strategies and Actions

Table FMZ4: Grazing and disturbance management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the FMZ. Note: NP – National Park, MP – Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
FMZ4:ES1. Remove feral cattle and horses where possible. (Fitzgerald River NP MP)	No extra strategy required.	No extra strategy required.	Not applicable
FMZ4:ES2. Prevent invasion of the park by pest animals (eg. pigs and goats). (Fitzgerald River NP MP)	No extra strategy required.	No extra action required.	Not applicable
FMZ4:ES3. Control feral and domestic animals formally Declared as vermin. (Agriculture WA).	No extra strategy required.	No extra action required.	Not applicable
No existing strategy	FMZ4:S1. Endorse/Advocate broad-scale reduction of grazing pressure on 'habitat critical' of south coast threatened birds on non-DEC managed land.	FMZ4:A1. Provide up to date information to Community Groups and Natural Resource Management Groups on locations of south coast threatened bird taxa within the FMZ.	Recovery Team, Project Officers, Agriculture WA

Criteria for Success

- No degradation of any 'habitat critical' of the Western Bristlebird or Western Ground Parrot, or permanent loss of occupied habitat of the Western Whipbird (western mallee) through grazing by domestic livestock or feral animals in the FMZ.

Criteria for Failure

- Any measurable degradation of any 'habitat critical' of the Western Bristlebird or Western Ground Parrot or permanent loss of occupied habitat of the Western Whipbird (western mallee), through grazing by domestic livestock or feral animals in the FMZ.

Weed Invasion

There are a limited number of weeds in the FMZ that are believed likely to impact on the habitat of south coast threatened bird taxa. The major species that are likely to cause major changes to habitat structure for these species are Myrtle-leafed Milkweed (*Polygala myrtifolia*) (currently known from Hopetoun and Gordon Inlet), Bridal Creeper (*Asparagus asparagoides*), Victorian Tea Tree (*Leptospermum laevigatum*), and African Boxthorn (*Lycium ferocissimum*) (currently restricted to moist habitats along water courses).

Objective

Minimise the impact of weeds on the 'habitat critical' of the Western Ground Parrot and Western Bristlebird, or occupied habitat of the Western Whipbird (western mallee) within the FMZ.

Strategies and Actions

Table FMZ5: Weed management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the FMZ. Note: NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
FMZ5:ES1. Control or if possible eradicate weeds causing major conservation problems. (Fitzgerald River NP MP and Lake Shaster IMGs)	FMZ5:S1. Monitor 'habitat critical' of south coast threatened birds for invasion of weeds likely to cause a change in habitat structure.	FMZ5:A1. Record observed changes in 'habitat critical' due to invasion of weeds likely to cause a change in habitat structure.	Recovery Team, Project Officer, DEC Albany staff.
	FMZ5:S2. Ensure any observed impacts or changes in habitat structure due to weed infestation are communicated to relevant land managers.	FMZ5:A2. Liaise with relevant land managers with regard to any observations of habitat degradation or loss due to weed infestation.	Recovery Team, Project Officer, DEC Albany staff.

Criteria for Success

- No increase in area of weed invasion of 'habitat critical' of the Western Ground Parrot and Western Bristlebird, or occupied habitat of the Western Whipbird (western mallee) in the FMZ.

Criteria for Failure

- Any increase in area covered by weeds within 'habitat critical' of the Western Ground Parrot and Western Bristlebird, or occupied habitat of the Western Whipbird (western mallee) in the FMZ.

Altered Hydrology

There are only limited areas within the FMZ where salinity is likely to be a key threat to 'habitat critical' for south coast threatened birds in the short to medium term.

Objective

Minimise the impacts of salinity on 'habitat critical' of the Western Ground Parrot, Western Bristlebird and Western Whipbird (western mallee).

Strategy and Actions

Table FMZ6: Dryland salinity management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the FMZ.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
No exisiting strategy	FMZ6:S1. Monitor south coast threatened bird taxa 'habitat critical' for impacts of dryland salinity.	FMZ6:A1. Record observed changes in vegetation health in south coast threatened bird habitat where likely to be the result of dryland salinity.	Recovery Team, Project Officer, DEC Albany staff.
	FMZ6:S2. Ensure any observed impacts of salinity are communicated to relevant land managers.	FMZ6:A2. Liaise with catchment groups and land managers with regard to any observations of salinity in south coast threatened bird habitat.	Recovery Team, Project Officer, DEC Albany staff.
		FMZ6:A3. Work with catchment groups and land managers to develop solutions to halt or reverse the effects of salinity on south coast threatened bird habitat.	Recovery Team, Project Officer, DEC Albany staff.

Criteria for Success

- No loss of 'habitat critical' of Western Ground Parrot and Western Bristlebird, or occupied habitat of the Western Whipbird (western mallee) from dryland salinity in the FMZ.

Criteria for Failure

- Any loss of 'habitat critical' of Western Ground Parrot and Western Bristlebird, or occupied habitat of the Western Whipbird (western mallee) from dryland salinity in the FMZ.

4.2.5.2 Feral Predator Control

Feral foxes and cats are well established in the FMZ, and dogs are present in small numbers. Under DEC's Western Shield Program 385,000 ha in the Fitzgerald River National Park, Ravensthorpe Range Predator Control Region and the Lake Shaster and Jerdacuttup Lakes Nature Reserves are aerially baited for foxes four times a year. In addition ground baits for foxes are distributed in the Fitzgerald River National Park and Jerdacuttup Lakes Nature Reserve four times per year. There is no registered cat bait currently available for broad scale usage.

There are few records of black rats in the Fitzgerald River National Park, but these are highly likely to be present and are known nest predators. The house mouse could have negative impacts on south coast threatened birds during plagues.

Native predators, including Bush Rat, Dibbler and Chuditch exert predation pressure with which populations of south coast threatened birds have evolved.

Objective

Minimise the impacts of feral predators on all sub-populations of Western Ground Parrot, Western Bristlebird and Western Whipbird within the FMZ.

Strategy and Actions

Table FMZ7: Feral predator management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the FMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
FMZ7:ES1. Continue fox control under DEC's *Western Shield* Program on all lands within the FMZ currently included in the program. (Western Shield Fauna Recovery Program Strategic Plan)	FMZ7:S1. Ensure all landholders in the FMZ have access to information on impacts and appropriate control methods of cats and foxes.	FMZ7:A1. Communicate information on impacts and appropriate methods for control of cats and foxes.	DEC Albany, Recovery Team.
FMZ7:ES2. Implement cat control methods if research indicates that cats are a threat to rare fauna. (Fitzgerald River NP MP, Lake Shaster IMGs)	FMZ7:S2. Develop cat monitoring techniques to determine abundance and threat posed by this predator in the FMZ.	FMZ7:A2. Investigate cat numbers in 'habitat critical' of south coast threatened birds in the FMZ.	DEC Science, DEC Albany, Recovery Team.
	FMZ7:S3. Promote the adoption of available methods of cat control in all Priority Management Units within the FMZ.	FMZ7:A3. Provide land owners and managers with information on priority Management Units and impacts of cats on south coast threatened bird taxa and on appropriate control.	DEC Science, DEC Albany, Recovery Team.

Criteria for Success:

- Continuation or improvement in the level of control of introduced predators being conducted under Western Shield throughout the FMZ; and
- An understanding of the potential significance of cat predation to threatened birds; and
- Control actions for cats in place in the FMZ if necessary.

Criteria for Failure:

- Loss of area or intensity of control of introduced predators throughout the FMZ, and/or the significance of cat predation still not understood and cat control not being performed; and
- Evidence that populations of threatened birds in the FMZ are declining due to predation by feral predators.

4.2.5.3 Cost of South Coast Threatened Bird Actions

Table 4.10: Fitzgerald Management Zone Summary of Costs for Area Management Actions over 5 years

South Coast Threatened Bird Threat Management in FMZ	Resources Required for Bird Actions		Existing DEC Estate Management	Completion Date
	External Funding Required	Recovery Team Input		
1. Fire		$10,000	$349,900	Ongoing
2. Phytophthora cinnamomi	$80,000	$5,000	$75,300	Ongoing
3. Clearing	-	$5,000	$10,000	Ongoing
4. Grazing & Disturbance		$5,000	$15,000	Ongoing
5. Weed Management	$20,000	$5,000	$20,000	Ongoing
6. Salinity	$2000	$2,000	$10,000	Ongoing
7. Feral Predator Control	$40,000	$10,000	$100,000	Ongoing
Total (Five Years)	**$142,000**	**$42,000**	**$820,200**	

4.3 Cape Arid Management Zone (CAMZ)

The Cape Arid Management Zone (CAMZ) encompasses the southern section of Cape Arid National Park, Cape Le Grand National Park and a small section of the western end of Nuytsland Nature Reserve (Figure 4.1). The Western Ground Parrot is the only south coast threatened bird known to occupy this management zone. Isolated records of the species come from Cape Le Grand National Park and Alexander Nature Reserve but the most significant population occurs within Cape Arid National Park and the Nuytsland Nature Reserve where it is confined to the southern near-coastal heaths (Figure 4.6).

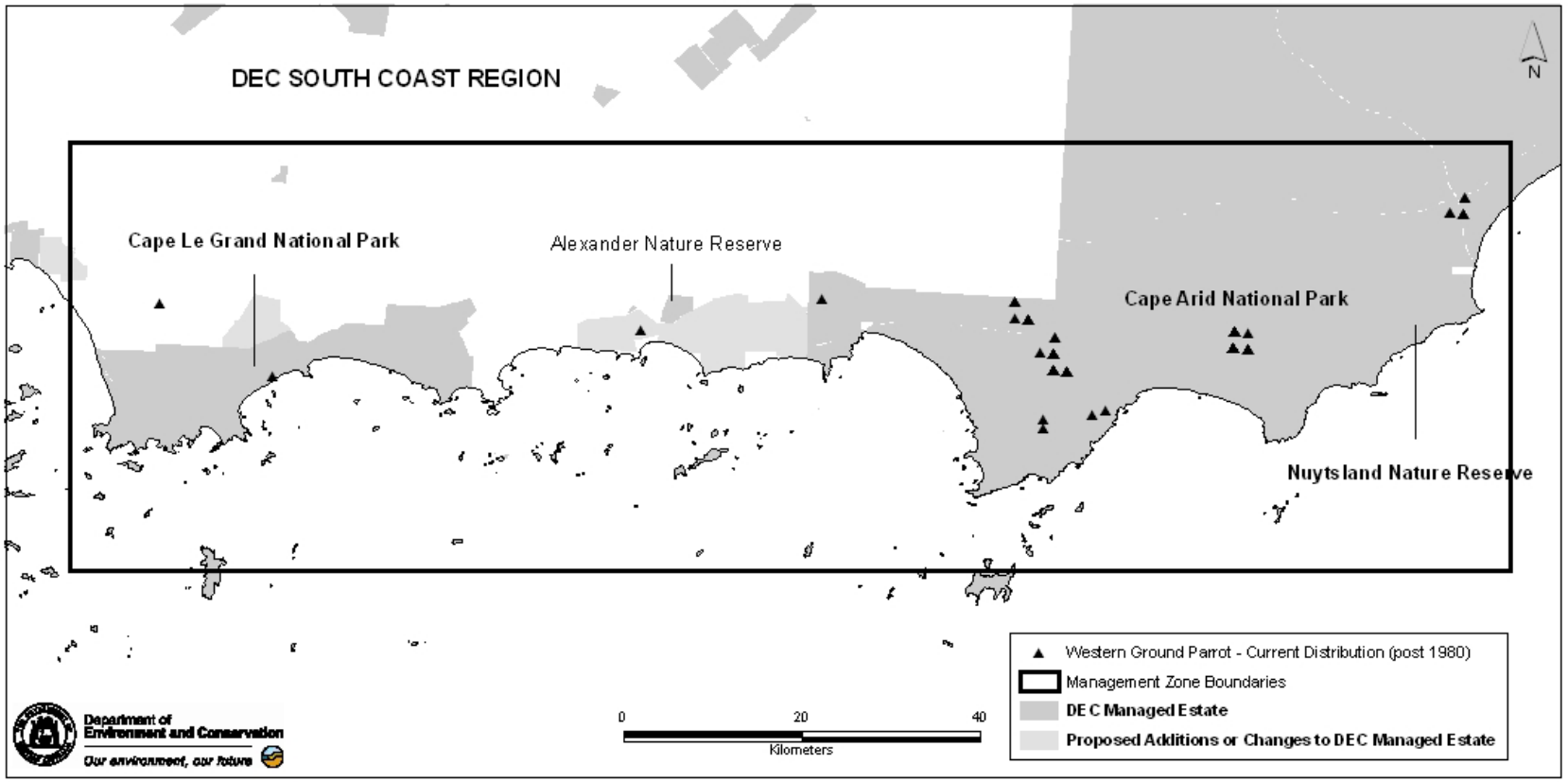


Figure 4.6: The distribution of the Western Ground Parrot in the CapeArid Management Zone (CAMZ).

4.3.1 Statutory Documents

The current management plans relevant to the CAMZ are the Interim Management Guidelines for Cape Arid National Park (CALM 2000a) and Cape Le Grand National Park (CALM 1992a). There is currently a Draft Esperance Coastal Reserves Management Plan in preparation.

4.3.2 Threats within the Cape Arid Management Zone

A risk assessment of the impacts of threats within the CAMZ is provided in Table 4.11. This assessment is of the impact of threatening processes occurring within the management zone upon the whole population of the Westerrn Ground Parrot. Thus, three major factors enter into the assessment. First, the likely extent and/or severity of the threat within the CAMZ; secondly, the proportion of the total population of a taxon occurring in the CAMZ; finally, any particular susceptibility of individual taxa to each threatening process.

Table 4.11: Risk assessment of south coast threatened bird sub-populations within the Cape Arid Management Zone (CAMZ).

South Coast Threatened Birds	Threatening Process										
	Loss or degradation of appropriate habitat through:							Predation by:			
	Too frequent or extensive fire	Clearing of native vegetation	Grazing or disturbance by non-native animals	Weed invasion	Altered hydrological regime	Climate change	*Phytophthora cinnamomi*	Foxes	Cats	Black rats	Loss of genetic variability
Western Ground Parrot	High	Low	Low	High	Low	High	High	High	High	High	High
Likelihood/extent of the threatening process in FMZ	**High**	**Low**	**Low**	**Low**	**Low**	**Unknown**	**Low**	**Low**	**Unknown**	**Unknown**	**Low**

The major threats within CAMZ are the loss or degradation of appropriate habitat through too frequent or extensive fires, predation by feral foxes and cats and changes in vegetation structure brought about by *Phytophthora cinnamomi* infection. The loss of genetic variability of the Western Ground Parrot, largely due to loss and fragmentation of habitat, increases the risks due to the vulnerability of the sub-populations within the CAMZ to stochastic events such as wildfire.

4.3.3 Management Objective for the Cape Arid Management Zone

In the Cape Arid Management Zone (CAMZ) the objectives for management are to:

1. Ensure the maintenance of habitat of the Western Ground Parrot such that the viability of sub-populations within the CAMZ are maximised.
2. Control threatening processes to minimise their impact on Western Ground Parrot sub-populations.

4.3.4 Management of Threatening Processes

4.3.4.1 Habitat Protection

Fire Management

Extensive fires in the CAMZ in 2002 resulted in over 220 000 ha of Cape Arid National Park and Nuytsland Nature Reserve being burnt in a single wildfire event (Figure 4.7). Although the impacts of this wildfire were devastating in terms of the area burnt it did result in the first positive records of Western Ground Parrots for over ten years. This was most likely due to the concentration of birds into remaining suitable habitat after the fire, resulting in a reduced search area. Areas that were previously unsurveyed (burnt in 2002) may still provide suitable habitat for Western Ground Parrots in the future.

A wildfire in February 2004 burnt over 700 ha of coastal heath near that found to contain birds in 2003, however this area had not been surveyed prior to the fire and the suitability for Western Ground Parrots has not been determined.

Objective

Minimise the risk that large areas of the 'habitat critical' of the Western Ground Parrot will be affected by wildfire, and minimise the extent of large wildfires.

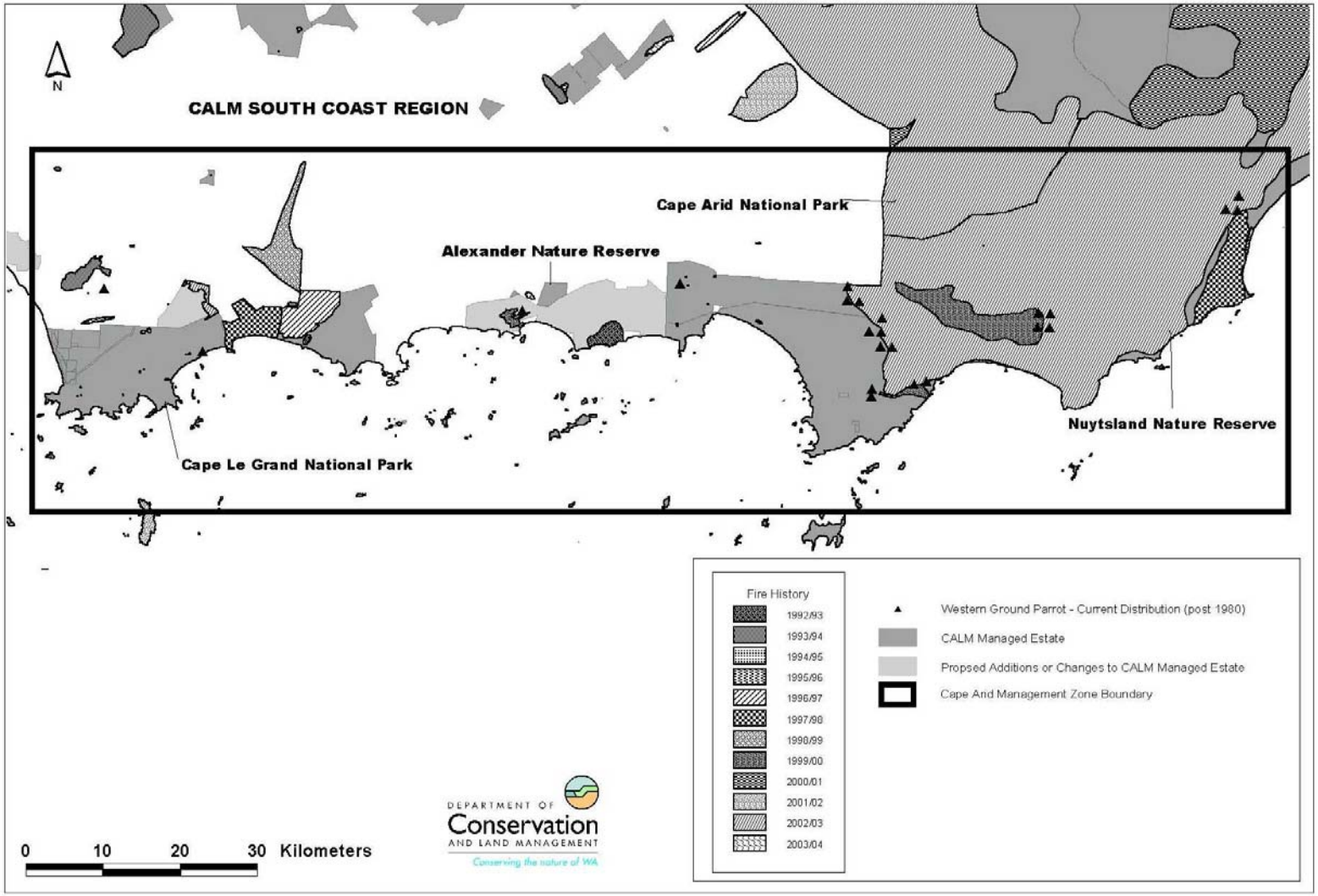


Figure 4.7: The fire history of DEC managed estate within the Cape Arid Management Zone (CAMZ).

Strategies and Actions

Table CAMZ1: Fire management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the CAMZ. Note: NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
CAMZ1:ES1. Protect environmental values in and around the park from damage or destruction from wildfire. (Cape Arid NP IMGs).	CAMZ1:S1. Ensure those responsible for the ongoing management of the Western Ground Parrot provide up to date information and input into the larger fire management processes already implemented or co-ordinated by land managers in the CAMZ.	CAMZ1:A1. Provide information to fire managers within the CAMZ that will strategically improve protection of Western Ground Parrot 'habitat critical'.	Recovery Team, Project Officers, DEC Esperance.
CAMZ1:ES2. Confine fires to the smallest possible area. (Cape Arid and Cape Le Grande NPs IMGs).	CAMZ1:S2. Confine fires to the smallest possible area in other known or potential habitat for Western Ground Parrots in the CAMZ.	CAMZ1:A2. Provide information on occupied/potential Western Ground Parrot habitat in CAMZ to fire managers.	Recovery Team, Project Officers, DEC Esperance
CAMZ1:ES3. Maintain firebreaks, low fuel buffers and tracks. (Cape Arid NP IMGs)	CAMZ1:S3. Encourage establishment of low fuel buffer systems to protect Western Ground Parrot 'habitat critical' throughout CAMZ.	CAMZ1:A3. Provide input into DEC's fire planning with regard to strategic placement of low fuel buffers to increase effectiveness of protection for Western Ground Parrot habitat.	Recovery Team, Project Officers, DEC Esperance.
No existing strategy	CAMZ1:S4. Develop an integrated approach to fire management within the CAMZ based on the requirements of the Western Ground Parrot.	CAMZ1:A4. Provide information and input relating to Western Ground Parrots in any burn prescriptions for the CAMZ.	Recovery Team, Project Officers, DEC Esperance.
	CAMZ1:S5. Adjust current fire prescriptions in the light of new information on Western Ground Parrot sub-population locations or habitat requirements.	CAMZ1:A5. Ensure new knowledge regarding Western Ground Parrot biology, ecology and habitat requirements is promptly disseminated to fire management personnel.	Recovery Team, Project Officers, DEC Esperance.

Criteria for Success

- No significant area (<10%) of 'habitat critical' of Western Ground Parrot in the CAMZ burned by wildfire.

Criteria for Failure

- Significant area (>30%) of 'habitat critical' of Western Ground Parrot in the CAMZ burned by wildfire.

Phytophthora spp. Control

Both Cape Le Grand and Cape Arid National Parks have extensive infestations of *Phytophthora cinnamomi*. In Cape Le Grand National Park the scrub heaths within the western half of the park are severely affected by dieback disease whereas the eastern half of the park has few tracks and is largely free of dieback. Areas at future risk of infestation need to be identified.

Objective

Minimise the spread of *Phytophthora* spp. in all 'habitat critical' of the Western Ground Parrot within the CAMZ.

Strategies and Actions

Table CAMZ2: Phytophthora management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the CAMZ. Note: NP – National Park, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	Strategies	Actions	Responsibility
CAMZ2:ES1. Control access and implement strict hygiene in susceptible areas. (Cape Arid NP IMGs)	CAMZ2:S1. Ensure that existing hygiene and access restrictions are understood and adhered to by all officers working on Western Ground Parrots within the CAMZ.	CAMZ2:A1. Provide information to project officers on hygiene standards.	DEC Albany
CAMZ2:ES2. Implement departmental policies and strategies listed in the South Coast Dieback Protection Plan. (Cape Le Grande NP IMGs)		CAMZ2:A2. Liaise with relevant rangers on DEC Estate within the CAMZ with regard to proposed field operations.	Project Officers
No existing strategy	CAMZ2:S2. Ensure Western Ground Parrot 'habitat critical' receives the greatest amount of protection from the impacts of *Phytophthora* spp.	CAMZ2:A3. Provide information on Western Ground Parrot 'habitat critical' to relevant land managers.	Recovery Team
	CAMZ2:S3. Ensure any information on the impacts of *Phytophthora* spp. on Western Ground Parrot 'habitat critical' is recorded and made available to land managers.	CAMZ2:A4. Record and monitor any changes to habitat of Western Ground Parrot use of infected areas and monitor impacts on Western Grounds Parrot populations in areas being affected.	Recovery Team, Project Officers

Criteria for Success

- No significant (<1%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the Western Ground Parrot in the CAMZ.

Criteria for Failure

- An observed significant (>5%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the Western Ground Parrot in the CAMZ.

Clearing of Native Vegetation

Most of the currently known 'habitat critical' of the Western Ground Parrot occurs within DEC managed land and therefore destruction of habitat through clearing of native vegetation is unlikely to occur. However an area of Unallocated Crown Land along Balladonia Rd may contain some suitable Western Ground Parrot habitat, and further work is needed to confirm both the extent of the area and if it is being used by Western Ground Parrots (McNee and Newbey 2003).

Objective

No loss of 'habitat critical' of the Western Ground Parrot through clearing of native vegetation within the CAMZ.

Strategies and Actions

Table CAMZ3: Clearing management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the CAMZ.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
CAMZ3:ES1. Regulation of clearing will take into account the impact of clearing on biodiversity, water and soil resources, salinity and other environmental issues. (*Environmental Protection Act 1986*)	CAMZ3:S1. Ensure that information on 'habitat critical' of the Western Ground Parrot within the CAMZ is considered in response to clearing applications.	CAMZ3:A1. Provide up to date information on locations of Western Ground Parrot and 'habitat critical' within the CAMZ in response to clearing applications.	Recovery Team, DEC Esperance

Criteria for Success

- No loss of any 'habitat critical' of the Western Ground Parrot through clearing, including off-site effects, of native vegetation within the CAMZ.

Criteria for Failure:

- Loss of any 'habitat critical' of the Western Ground Parrot through clearing, including off-site effects, of native vegetation within the CAMZ.

Grazing or Disturbance by Non-Native Animals

Non-native animals which have the potential to impact on Western Ground Parrot habitat through grazing or disturbance include goats, horses, rabbits. Goats that escaped from Thomas River Station are still evident in Cape Arid National Park around the Thomas River valley. Rabbits occur in Cape Arid National Park but in relatively low numbers. Horses, camels and feral cattle occur in insignificant numbers in Cape Arid National Park, and are at present limited to the northern section, but drought years may result in these animals being seen closer to the coast. Brumbies have also been found in the Park and deer occur in the coastal corridors to the west of Esperance but it is unknown if they have established to the east of Esperance.

Objective

Minimise the impacts of grazing and disturbance by non-native animals on 'habitat critical' of the Western Ground Parrot in the CAMZ.

Strategies and Actions

Table CAMZ4: Grazing and disturbance management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the CAMZ. Note: NP – National Park, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Birds		
	Strategies	**Actions**	**Responsibility**
CAMZ4:ES1. Where feral animals are considered to be a threat to nature conservation values a suitable control program may be approved. (Cape Arid NP IMGs, Cape Le Grand IMGs)	CAMZ4:S1. Ensure that Park managers are aware of location of 'habitat critical' of the Western Ground Parrot.	CAMZ4:A1. Provide land managers with information of Western Ground Parrots and advise on possible impact by feral animals.	Recovery Team, Project Officer
CAMZ4:ES2. Feral Goats within the Park will be destroyed as the opportunity arises. (Cape Arid NP IMGs)	No extra strategy required	No extra action required.	Not applicable
CAMZ4:ES3. Management of fire, feral animals and weeds on UCL is now DEC responsibility. DAFWA will assist in controlling feral and domestic animals outside the conservation reserve system if declared as pests.	CAMZ4:S2. Endorse/ advocate broad-scale reduction of grazing pressure on 'habitat critical' of the Western Ground Parrot on non-DEC managed land.	CAMZ4:A2. Provide up to date information to Community Groups and Natural Resource Management Groups on locations of Western Ground Parrot within the CAMZ.	Recovery Team, Project Officers

Criteria for Success

- No degradation of 'habitat critical' of the Western Ground Parrot as a result of the impact of introduced grazers in the CAMZ.

Criteria for Failure

- Any measurable degradation of 'habitat critical' of the Western Ground Parrot as a result of the impact of introduced grazers in the CAMZ.

Weed Invasion

Only one weed species, Victorian Tea Tree (*Leptospermum laevigatum*), that has the potential to cause or has caused major structural changes to vegetation occurs in the CAMZ. Cape Le Grand National Park contains *L. laevigatum*, which is currently being controlled.

Objective

Minimise the impact of weeds on the 'habitat critical' of the Western Ground Parrot within the CAMZ.

Strategies and Actions

Table CAMZ5: Weed management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the CAMZ. Note: NP – National Park, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
CAMZ5:ES1. Prevent the introduction of and control the abundance and spread of environmental weeds. (Cape Arid NP and Cape Le Grand NP IMGs)	CAMZ5:S1. Monitor Western Ground Parrot 'habitat critical' for invasion of weeds likely to cause a change in habitat structure.	CAMZ5:A1. Record observed changes in 'habitat critical' due to invasion of weeds likely to cause a change in habitat structure.	Recovery Team, Project Officer, DEC Esperance staff
	CAMZ5:S2. Ensure any observed impacts or changes in habitat structure due to weed infestation are communicated to relevant land managers.	CAMZ5:A2. Liaise with relevant land managers with regard to any observations of habitat degradation or loss due to weed infestation and advise on potential impacts.	Recovery Team, Project Officer, DEC Esperance staff

Criteria for Success

- No increase in area of weed invasion of 'habitat critical' of the Western Ground Parrot in the CAMZ.

Criteria for Failure

- Any increase in area covered by weeds within 'habitat critical' of the Western Ground Parrot in the CAMZ.

Altered Hydrology

Most hydrological processes are unaltered within existing or potential ground parrot habitat in the CAMZ, and therefore this threat is considered insignificant (T. Massenbauer[18] personal communication 2006).

4.3.4.2 Feral Predator Control

Feral foxes and cats are present in the CAMZ. Under DEC's Western Shield Program almost 250,000 ha in the Cape Le Grand, Cape Arid National Parks and Nuytsland Nature Reserve are aerially baited four times a year, with supplementary ground-baiting conducted as required. These baits are generally only effective in control of fox numbers, and there is no registered cat bait available for broad-scale usage. Fox numbers are relatively low under present control programs but cats are probably moderately high.

Objective

Minimise the impacts of feral predators on all Western Ground Parrot sub-populations within the CAMZ.

Strategy and Actions

Table CAMZ6: Feral predator management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the CAMZ. Note: NP – National Park, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Managmenet		
	Strategies	**Actions**	**Responsibility**
CAMZ6:ES1. Continue fox control under DEC's *Western Shield* Program on all DEC managed land within the Cape Arid NP and Cape Le Grand NP currently included in the program. (Western Shield fauna Recovery Program Strategic Plan)	CAMZ6:S1. Ensure all landholders in the CAMZ have access to information on impacts and appropriate control methods of cats and foxes.	CAMZ6:A1. Communicate information on impacts and appropriate control methods of cats and foxes.	DEC Esperance, Recovery Team
CAMZ6:ES2. Where feral animals are considered a significant threat to conservation values the Regional Manager may approve a suitable control program. (Cape Arid NP IMGs)	CAMZ6:S2. Develop cat monitoring techniques to determine abundance, and threat posed, by this predator in the CAMZ.	CAMZ6:A2. Investigate cat numbers in 'habitat critical' of south coast threatened birds in the CAMZ.	DEC Science, DEC Esperance, Recovery Team
	CAMZ6:S3. Promote the adoption of available methods of cat control in all 'habitat critical' of the Western Ground Parrot within the CAMZ.	CAMZ6:A3. Provide land owners and managers with information on impacts of cats on Western Ground Parrots and appropriate control methods.	DEC Science, DEC Albany, Recovery Team

[18] Tilo Massenbauer, Recovery Catchment Officer, DEC Esperance

Criteria for Success:

- Continuation or improvement in the level of control of introduced predators being conducted under Western Shield throughout the CAMZ; and
- An understanding of the potential significance of cat predation to threatened birds; and
- Control actions for cats in place in the CAMZ if necessary.

Criteria for Failure:

- Loss of area or intensity of control of introduced predators throughout the CAMZ, and/or the significance of cat predation still not understood and cat control not being performed, and
- Evidence that sub-populations of Western Ground Parrots are declining within the CAMZ due to predation by feral predators.

4.3.4.3 Cost of South Coast Threatened Bird Actions

Table 4.12: Cape Arid Management Zone Summary of Costs for Area Management Actions over 5 years

South Coast Threatened Bird Threat Management in CAMZ	Resources Required for Bird Actions		Existing DEC Estate Management	Completion Date
	External Funding Required	Recovery Team Input		
1. Fire		$5,000	$349,900	Ongoing
2. *Phytophthora cinnamomi*	$5000	$2,500	$75,300	Ongoing
3. Clearing	-	$2,500	$10,000	Ongoing
4. Grazing & Disturbance		$2,500	$15,000	Ongoing
5. Weed Management	$5000	$2,500	$20,000	Ongoing
6. Feral Predator Control	$5000	$5,000	$100,000	Ongoing
Total (Five Years)	**$15,000**	**$20,000**	**$810,200**	

4.4 Oberon Management Zone (OMZ)

The Oberon Management Zone (OMZ) covers the area of occupancy of the Western Whipbird (western mallee) that occurs outside the FMZ (Figure 4.1). It encompasses the southern wheatbelt from Dumbleyung in the west to Newdegate in the east, the Stirling Range National Park, part of Lake Magenta Nature Reserve, Corackerup Nature Reserve, and the Pallinup River area.

4.4.1 Statutory Documents

A number of different existing statutory documents deal with management strategies within this Management Unit (Table 4.13).

Table 4.13: Existing statutory documents that include management strategies relevant to south coast threatened bird management in the Oberon Management Zone.

Statutory Documents	Life of Plan	Reference
Cheyne Bay Management Plan: Cape Riche to Pallinup River	-	Unpublished, CALM
Corackerup Nature Reserve and Unvested Peniup Reserve Interim Management Guidelines	2002-2007	CALM
Stirling Range and Porongurup National Parks Management Plan	1999-2009	CALM
Lake Magenta Nature Reserve Management Plan	1982	CALM

The Action Plan for Australian Birds (Garnett & Crowley 2000) inclues a brief co-ordinated Conservation Plan has been outlined for the “Western Wheatbelt” in. This Plan covers the section of the OMZ that is north of approximately Gnowangerup. The Garnett and Crowley (2000) plan also covers thirteen other threatened or near threatened bird taxa in addition to the Western Whipbird (western mallee subspecies). Garnett and Crowley (2000) identify the primary threat in this area as negative impacts associated with the fragmentation and degradation of habitat, such as weed invasion, rising soil salinity and grazing by sheep. Management actions relevant to the whipbird recommended by Garnett and Crowley (2000) relate to improving conservation and management of remnant vegetation and improving connectivity between remnants.

4.4.2 Management Units within the Oberon Management Zone

The OMZ was delineated into three Management Units on the basis of centres of occurrence of the Western Whipbird, Stirling, Pallinup and Wheatbelt (Figure 4.8). The Stirling Management Unit includes the Stirling Range National Park and surrounding small vegetation remnants, the Pallinup Management Unit encompasses the Pallinup River area, Corackerup Nature Reserve and Peniup Proposed Nature Reserve, and the Wheatbelt Management Unit contains all known records of the whipbird within DEC’s Wheatbelt Region.

Within the OMZ, the most significant population of whipbirds occurs in the Stirling Range National Park (Stirling Management Unit) (Figure 4.8), where it is widely distributed in suitable habitat (McNee 1986; Cale & Burbidge 1993). North of the Stirling Range the taxon occurs on a number of isolated remnants within an extensively cleared landscape (Wheatbelt Management Unit). To the east of the Stirling Range there is a concentration of records along the Pallinup River and within the Corackerup Nature Reserve (Pallinup Management Unit).

Current knowledge suggests that the Stirling and Pallinup Management Units would be highest priority in the OMZ. This is based on current records, but no comprehensive survey of Western Whipbirds has been completed in this Management Zone, and it is possible that there may be other areas within the OMZ of high importance, either for sub-populations or for maintenance of genetic diversity of the subspecies. Thus all three Management Units are considered important, and no ranking for management is given in this Management Zone.

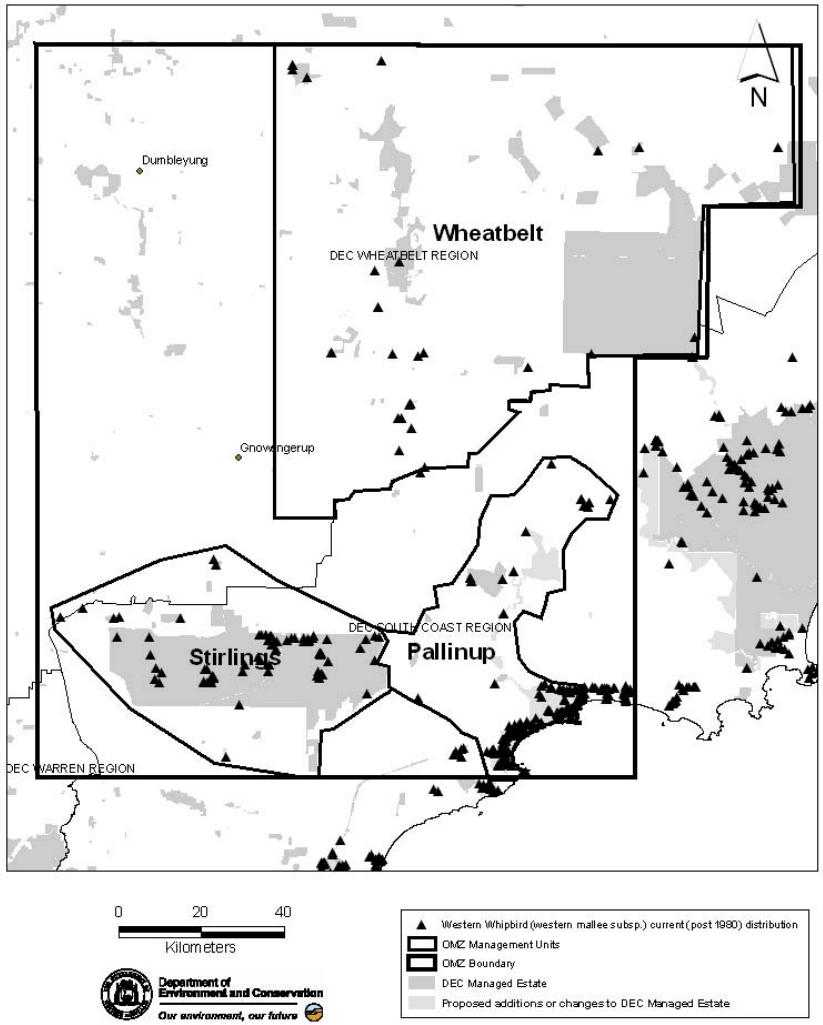


Figure 4.8: The distribution of the Western Whipbird (western mallee) in the three Management Units of the Oberon Management Zone.

4.4.3 Threats within the Oberon Management Zone

A risk assessment of the impacts of threats within the OMZ is shown in Table 4.14. The large area and diverse landscapes covered by this Management Zone dictates that the risk of threats will differ between Management Units, and is therefore assessed separately for each. This assessment is of the impact of threatening processes occurring within the management zone upon the whole population of each taxon. Thus, three major factors enter into the assessment. First, the likely extent and/or severity of the threat within the OMZ; secondly, the proportion of the total population of a taxon occurring in the OMZ; finally, any particular susceptibility of individual taxa to each threatening process.

Table 4.14: Risk assessment of the impacts of threats on the Western Whipbird (western mallee) within each of the three Management Units of the Oberon Management Zone.

	Threatening Process										
	Loss or degradation of appropriate habitat through:							**Predation by:**			
	Too frequent or extensive fire	**Clearing of native vegetation**	**Grazing or disturbance by non-native animals**	**Weed invasion**	**Altered hydrological regime**	**Climate change**	***Phytophthora cinnamomi***	**Foxes**	**Cats**	**Black rats**	**Loss of genetic variability**
Likelihood/extent of occurrence of TP in Stirling MU	High	Low	Low	Low	Low	High	High	High	High	Mod	High
Potential impact on whole taxon if TP unmanaged in Stirling MU	High	Low	Low	Low	Low	Unknown	Mod/ Unknown	Unknown	Unknown	Unknown	Unknown
Likelihood/extent of occurrence of TP in Pallinup MU	High	Mod	Mod	Mod	Low	Mod	High	High	High	Low	High
Potential impact on whole taxon if TP unmanaged in Pallinup MU	Mod	Mod	Low	Low	Low	Unknown	Low	Unknown	Unknown	Unknown	Unknown
Likelihood/extent of occurrence of TP in Wheatbelt MU	High	Mod	Low	High	High	Mod	Low	High	High	Low	High
Potential impact on whole taxon if TP is unmanaged in Wheatbelt MU	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low

Within the Stirling Management Unit major threats are the loss or degradation of appropriate habitat through too frequent or extensive fires and plant disease caused by *Phytophthora cinnamomi*. The impacts of predation by feral cats on the whipbird in Stirling Range National Park is unknown, although cats are identified as being present in significant numbers in this Park (CALM 1999). Small vegetation remnants surrounding the Stirling Range National Park that contain whipbirds are likely to be affected by weed invasion, and grazing or disturbance by non-native animals.

The Pallinup Management Unit contains a significant number of whipbird records on private remnants. These are at threat from weed invasion, grazing, clearing of native vegetation and predation by feral predators (foxes and cats). These threats also apply to the corridor of vegetation along the Pallinup River, which includes the Proposed Pallinup Nature Reserve. Too frequent and extensive fire is a threat within the large Corackerup and Peniup Reserves. *Phytophthora cinnamomi* is present in Corackerup Nature Reserve and significant infestation also occurs within the coastal reserves of this Management Unit.

Within the Wheatbelt Management Unit most whipbirds occur in small vegetation remnants, on private land, UCL or DEC reserves, but they also occur in the large Lake Magenta and Lake Chinocup Nature Reserves. Cat predation is thought to be a major threat in Lake Magenta (M. Davies[19] personal communication 2005). The small size of many remnants significantly increases the impact of threats such as weed invasion, predators and grazing, particularly on private remnants. Land clearing or disturbance may also be a risk in remnants on private property, despite current land clearing legislation and education on preservation of remnant vegetation.

The vulnerability of the sub-populations of the Western Whipbird (western mallee) to loss of genetic variability within the OMZ is likely to be significant due to both the fragmentation of habitat (Wheatbelt Management Unit) and to stochastic events such as extensive wildfire (Stirling Management Unit).

4.4.4 Management Objectives for the Oberon Management Zone

In the Oberon Management Zone (OMZ) the objectives for management are to:

1 Ensure the maintenance of habitat of the Western Whipbird (western mallee) such that the viability of sub-populations within the OMZ are maximised.
2 Control threatening processes to minimise their impact on sub-populations of Western Whipbird (western mallee) in the OMZ.

[19] Mitchell Davies Operations Officer DEC Katanning

4.4.5 Management of Threatening Processes

4.4.5.1 Habitat Protection

Fire Management

The OMZ has a diverse range of vegetation types, many of which are susceptible to fire. In addition, the impact of the scale or size of a fire in the OMZ varies depending of the size of the reserve or remnant in question. In the larger reserves (Stirling Range, Corackerup, Peniup, Lake Magenta) a wildfire is unlikely to burn the entire reserve, whereas the smaller wheatbelt reserves and other remnants are likely to be burnt quickly and completely, often before any suppression activities can be implemented. Size of reserve and management category for fire suppression is being addressed in the draft Wheatbelt Region Plan. Whipbirds occur in all reserve size categories, and may be susceptible to loss of habitat and sub-populations resulting from wildfire events that burn entire, isolated reserves with poor connectivity.

Relief also varies enormously throughout the OMZ. In the Stirling Range National Park, where there are large and rapid changes in altitude and topography, extreme fire behaviour that restricts suppression opportunities is not uncommon. Extensive wildfires are therefore common despite best efforts to suppress them. A large percentage of whipbird habitat in the Stirling Range National Park has been burnt since Autumn 1996 (Figure 4.9), but no comprehensive searches have been carried out since then to determine the number of birds still persisting.

Objective

Minimise the risk that large areas of the occupied habitat of the Western Whipbird (western mallee) will be affected by wildfire.

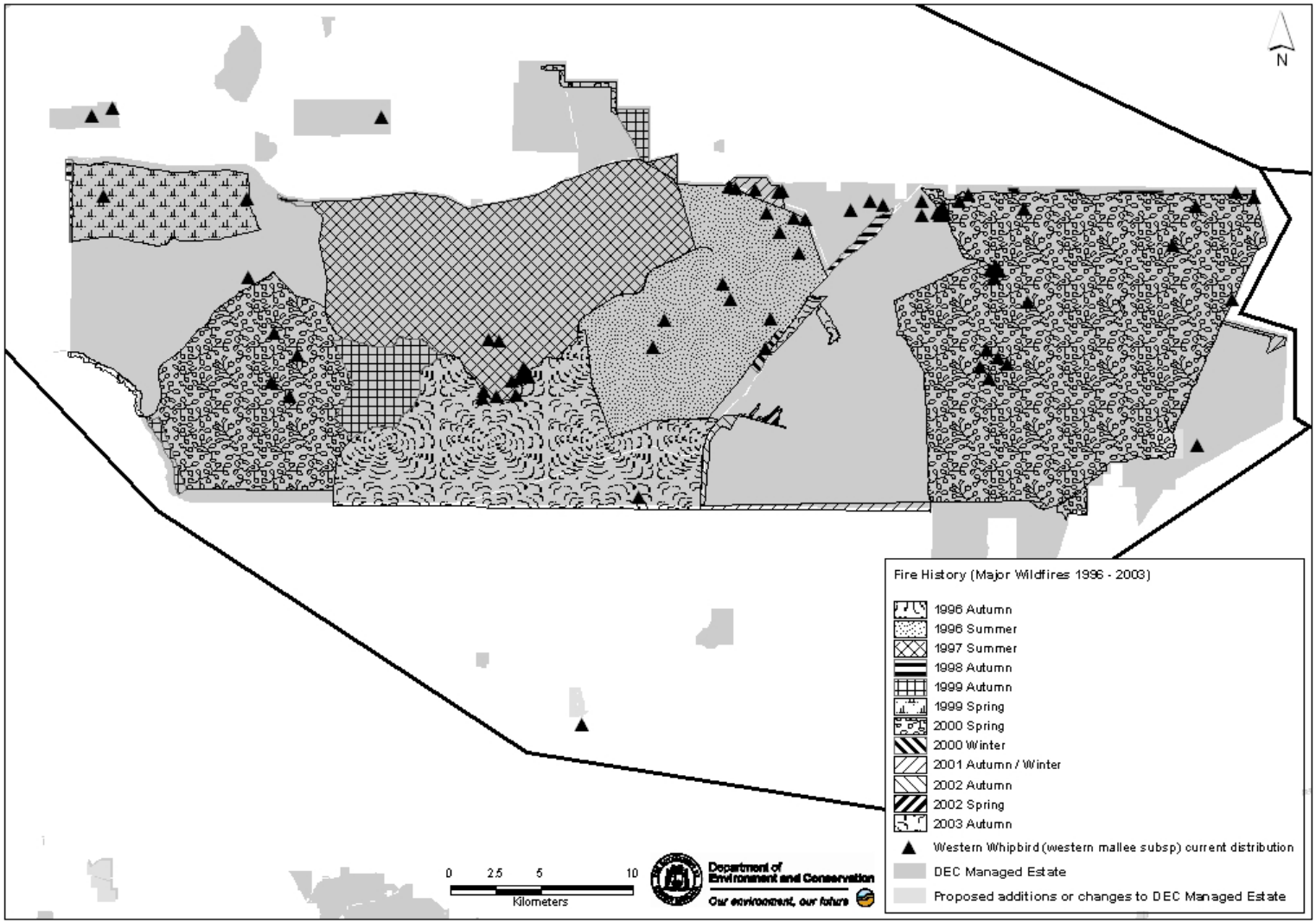


Figure 4.9: The fire history from Autumn 1996 to Autumn 2003 of the Stirling Range National Park within the Stirlings Management Unit of the Oberon Management Zone, and the distribution of Western Whipbird (western mallee). Note: Most of the Western Whipbird (western mallee) records are from 1992 and 2000, pre the Spring 2000 fire. No comprehensive surveys have been carried out since that Spring 2000 fire.

Strategies and Actions

Table OMZ1: Fire management strategies (existing and supporting) and actions relating to the recovery of the Western Whipbird (western mallee) in the OMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
OMZ1:ES1. Continue to maintain, and where possible improve, existing low fuel buffer systems. (Stirling Range and Porongurup NPs MP, IMG's for Corackerup NR and Unvested Peniup Reserve, Lake Magenta NR MP, Cheyne Bay MP)	No extra strategy required.	No extra action required.	Not applicable
OMZ1:ES2. Manage intensity and interval between fires to assist in preserving habitat and survival of threatened fauna species. (Stirling Range and Porongorup NPs MP, Corackerup Peniup IMGs, Cheyne Bay MP)	OMZ1:S1. Ensure that the people responsible for the ongoing management of the Western Whipbird provide up to date information and input into all fire management processes implemented or coordinated by land managers in the OMZ.	OMZ1:A1. Provide information to all fire managers within the OMZ that will strategically improve protection of Western Whipbird 'habitat critical'.	Recovery Team, Project Officers.
OMZ1:ES3. Continue to maintain fire access tracks and water points. (Stirling Range and Porongurup NPs MP, IMG's for Corackerup NR and Unvested Peniup Reserve, Lake Magenta NR MP)			Recovery Team, Project Officers.
No existing strategy	OMZ1:S2. Ensure any new fire breaks or water points do not impact on Western Whipbird sub-populations.		
OMZ1:ES4. Endeavour to contain wildfires that enter or start in the Stirling Range NP, Corackerup or Peniup reserves within a fire cell, or smallest possible area.. (Stirling Range NP MP, Corackerup Peniup IMGs)	OMZ1:S3. Encourage containment of wildfires impacting on Western Whipbird habitat in the Wheatbelt and Pallinup MUs to smallest possible area.		Not applicable
OMZ1:ES5. Continue to prohibit the lighting of any fires on DEC managed estate other than those authorised for management purposes. (Stirling Range NP MP)	No extra strategy required.	No extra action required.	Not applicable
OMZ1:ES6. Continue to implement fire prescriptions outlined in the Stirling Range and Porongurup NPs MP and IMG's for Corackerup NR and Unvested Peniup Reserve, Lake Magenta NR MP and the Cheyne Bay MP.	OMZ1:S4. Develop and implement an integrated approach to fire management within the OMZ based on the requirements of the Western Whipbird.	OMZ1:A2. Provide information and input relating to western whipbirds in any burn prescriptions in the OMZ.	Recovery Team, Project Officers, DEC Albany, Esperance and Katanning.
	OMZ1:S5. Adjust current fire prescriptions in the light of new data on location of Western Whipbird sub-populations or habitat needs.	OMZ1:A3. Ensure new knowledge regarding western whipbird biology, ecology and habitat requirements is promptly disseminated to fire management personnel.	Recovery Team, Project Officers, DEC Albany, DEC Fire Management Services.

Criteria for Success:

- No significant area (<10%) of occupied habitat of the Western Whipbird (western mallee) in the OMZ burned by wildfire.

Criteria for Failure:

- Significant area (>30%) of occupied habitat of Western Whipbird (western mallee) in the OMZ burned by wildfire.

Phytophthora spp. Control

Phytophthora cinnamomi is only considered as a likely threat to the Western Whipbird in the Stirling and Pallinup Management Units, as the majority of the Wheatbelt Region is considered too dry to support the disease.

The Stirling Range National Park (Stirling Management Unit) has been extensively infested with *P. cinnamomi* since the 1970s and major changes in the floristic composition and structure of many vegetation communities has already occurred. Despite areas of Western Whipbird habitat being infested with *P. cinnamomi*, the birds still persist in these areas.

Within the Pallinup Management Unit *P. cinnamomi* infestation is present in a small area of the Corackerup Nature Reserve but to date is absent from the unvested Peniup Reserve. Only a small percentage of each reserve containing the mallee heaths and heaths growing on sand plains is considered at risk if *Phytophthora* were introduced. The coastal reserves of the Pallinup Management Unit have significant dieback infections.

Objective

Minimise the impact of *Phytophthora cinnamomi* on occupied habitat of the Western Whipbird (western mallee) within the OMZ.

Strategies and Actions

Table OMZ2: Phytophthora cinnamomi management strategies (existing and supporting) and actions relating to the recovery of the Western Whipbird (western mallee) in the OMZ. Note: NR – Nature Reserve, NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
OMZ2:ES1. Control access, implement strict hygiene, and where appropriate investigate use of phosphite, in susceptible areas. (Stirling Range and Porongurup NPs MP, IMG's for Corackerup NR and Unvested Peniup Reserve, Cheyne Bay MP)	OMZ2:S1. Ensure that existing hygiene and access restrictions are understood and adhered to by all officers working on western whipbird within the OMZ.	OMZ2:A1. Provide information to project officers on hygiene standards.	DEC Albany and Katanning
		OMZ2:A2. Liaise with relevant rangers on DEC Estate within the OMZ with regard to proposed field operations.	DEC Albany and Katanning, Recovery Team, Project Officers.
OMZ2:ES2. Continue to ensure DEC staff and visiting scientists working in the Park follow dieback disease hygiene procedures. (Stirling Range and Porongurup NPs MP)			
OMZ2:ES3. Identify Priority areas within Stirling Range NP for protection from dieback disease based on conservation values, risk of introduction and predicted impact. (Stirling Range and Porongurup NPs MP)	OMZ2:S2. Ensure information on Western Whipbird locations is considered when identifying priority areas for protection.	OMZ2:A3. Provide up-to-date information on Western Whipbird locations to all relevant land managers within the OMZ.	DEC Albany, Recovery Team, Project Officers.
OMZ2:ES4. Review management prescriptions in the light of any new research findings on the introduction, spread, impact or control of plant diseases in the Park. (Stirling Range NP MP)	OMZ2:S3. Ensure any information on the impacts of *Phytophthora* spp. on Western Whipbird habitat is made available to DEC operations staff and other relevant managers.	OMZ2:A4. Record and monitor any changes to the use of infected areas by Western Whipbird.	Recovery Team, Project Officers.

Criteria for Success:

- No significant (<1%) increase in area infested by *P. cinnamomi* of occupied habitat of the Western Whipbird (western mallee) in the OMZ.

Criteria for Failure:

- An observed significant (>5%) increase in area infested by *P. cinnamomi* of occupied habitat of the Western Whipbird (western mallee) in the OMZ.

Clearing/Fragmentation of Native Vegetation

The Western Whipbird (western mallee) occurs on DEC-managed Estate, Crown Reserves and private remnants within the OMZ. Over half of the records from the Wheatbelt Management Unit and a quarter of records from the Pallinup Management Unit are on private property. While clearing laws have been adjusted to increase protection of remnant vegetation there remains the potential for further clearing to occur in occupied habitat of the Western Whipbird in the OMZ.

In addition, the existing fragmentation of habitat in the OMZ remains a threat to various sub-populations of the Western Whipbird (western mallee). This section introduces new actions relevant to maintaining and improving connectivity between areas of habitat. Other critical management actions that reduce the adverse effects of fragmentation are aimed at specific threats such as dieback, grazing, disturbance and predation by introduced animals.

Objectives

1 No loss of occupied habitat of the Western Whipbird (western mallee) through clearing of native vegetation within the OMZ.
2 Maintain or improve the integrity of, and linkages between, areas of existing or potential habitat for the four threatened taxa.

Strategies and Actions

Table OMZ3: Clearing/fragmentation management strategies (existing and supporting) and actions relating to the recovery of Western Whipbird (western mallee) in the OMZ.

Existing statutory strategy relevant to south coast threatened bird conservation (relevant document)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
OMZ3:ES1. Regulation of clearing will take into account the impact of clearing on biodiversity, water and soil resources, salinity and other environmental issues. (*Environmental Protection Amendment Act 2003*)	OMZ3:S1. Ensure that information on occupied habitat of the Western Whipbird throughout the OMZ is considered in response to clearing applications.	OMZ3:A1: Provide up to date advice on locations and occupied habitat of the Western Whipbird within the OMZ in response to clearing applications.	Recovery Team, Project Officers, DEC Katanning.
No existing strategy	OMZ3:S1. Liaise with landowners and landcare groups on recommended species composition for revegetation of habitat suitable for Western Whipbirds.	OMZ3:A2. Prepare list of recommended species for revegetation of habitat suitable for Western Whipbirds.	DEC Katanning, Recovery Team.
No existing strategy	OMZ3:S3. Seek opportunities to expand habitat and movement corridors for Western Whipbirds.	OMZ3:A3. Identify areas where strategic revegetation is feasible and likely to benefit Western Whipbirds.	Project Officers, Recovery Team
		OMZ3:A4. Liaise with any projects seeking to bring about strategic revegetation.	Project Officers, Recovery Team

Criteria for Success:

- No significant loss (<1%) of any occupied habitat or potential movement corridors for the Western Whipbird (western mallee) through clearing of native vegetation, including off-site effects, within the OMZ.

Criteria for Failure:

- Significant loss (>5%) of any occupied habitat or potential movement corridors of the Western Whipbird (western mallee) through clearing of native vegetation, including off-site effects, within the OMZ.

Grazing or Disturbance by Non-Native Animals

Non native animals that have the potential to impact on Western Whipbird (western mallee) habitat through grazing or disturbance include rabbits and domestic stock. In the Wheatbelt Management Unit grazing by stock and rabbits is a common form of disturbance, particularly on farmland remnants. High densities of grazing rabbits in remnant vegetation may inhibit regeneration. In the Wheatbelt Management Unit significant investment is made into revegetation programs and, without appropriate and adequate rabbit control, this investment may be lost or reduced. DEC Katanning District currently has a rabbit control program that targets known heavy rabbit infestations. Adjoining landowners are encouraged to bait also, but this rarely occurs except when Department of Agriculture and Food (DAFWA) officers are involved (M. Davies[20] personal communication 2005).

Objective

Minimise the impacts of grazing and disturbance by non-native animals on occupied habitat of the Western Whipbird (western mallee) in the OMZ.

[20] Mitchell Davies Operations Officer DEC Katanning

Strategies and Actions

Table OMZ4: Grazing and disturbance management strategies (existing and supporting) and actions relating to the recovery of the Western Whipbird (western mallee) in the OMZ. Note: NR – Nature Reserve, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	Strategies	Actions	Responsibility
OMZ4:ES1. Continue current arrangement of undertaking rabbit control on external firebreaks in conjunction with adjoining landholder programs. (Corackerup NR and Unvested Peniup Reserve IMGs)	No extra strategy required.	No extra action required.	Not Applicable
OMZ4:ES2. Develop and maintain a program of rabbit control with cooperation between agencies (DEC, Landgate, DAFWA) and the community (Cheyne Bay MP).	OMZ4:S1. Ensure that information about Western Whipbird locations and occupied habitat within the OMZ is used in design of rabbit control programs.	OMZ4:A1. Provide information to DAFWA, DEC, Landgate and community about Western Whipbird locations and occupied habitat within the OMZ.	Recovery Team, DEC Albany, DEC Katanning

Criteria for Success:

- No significant (<1%) degradation of any occupied habitat of Western Whipbird (western mallee) through grazing or disturbance by non-native animals.

Criteria for Failure:

- Significant (>5%) degradation of occupied habitat of Western Whipbird (western mallee) through grazing or disturbance by non-native animals.

Weed Invasion

The weed species that are likely to cause major changes to habitat structure for the Western Whipbird (western mallee) are Tagasaste (*Chamaecytisus palmensis*), Myrtle-leafed Milkweed (*Polygala myrtifolia*), Victorian Tea Tree (*Leptospermum laevigatum*), and African Boxthorn (*Lycium ferocissimum*). Most of these are found in the wetter areas of the OMZ, and are not currently known to be a problem in the Wheatbelt Management Unit or Stirling Management Unit. In the Pallinup Management Unit these weeds are only known from areas close to the coast, in the Pallinup River reserve and other remnants.

Objective

Minimise the impact of weeds on the occupied habitat of the Western Whipbird (western mallee) within the OMZ.

Strategies and Actions

Table OMZ5: Weed management strategies (existing and supporting) and actions relating to the recovery of the Western Whipbird (western mallee) in the OMZ. Note: NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
OMZ5:ES1. Prevent the introduction and spread of noxious or environmental weeds (Corackerup and Peniup IMGs)	OMZ5:S1. Monitor Western Whipbird occupied habitat for invasion of weeds likely to cause a change in habitat structure.	OMZ5:A1. Record observed changes in occupied habitat due to invasion of weeds likely to cause a change in habitat structure.	Recovery Team, Project Officer, DEC Albany staff.
OMZ5:ES2. Develop and implement appropriate control programs for declared and non-declared weeds (Stirling Range NP MP)	OMZ5:S2. Ensure any observed impacts or changes in habitat structure due to weed infestation are communicated to relevant land managers.	OMZ5.A2. Liaise with relevant land managers with regard to any observations of habitat degradation or loss due to weed infestation.	Recovery Team, Project Officer, DEC Albany staff.

Criteria for Success:

- No significant (<1%) increase in area of weed invasion of occupied habitat of the Western Whipbird (western mallee).

Criteria for Failure:

- Any significant (>5%) increase in area covered by weeds within occupied habitat of the Western Whipbird (western mallee).

Altered Hydrology

In the Pallinup and Stirling Management Units the risk of dryland salinity within the next 50 years is low (NLWRA 2001). A possible exception to this is in the upper reaches of the Pallinup River, where the impacts of dryland salinity could become apparent in a shorter time frame.

Large areas of the Wheatbelt Management Unit are at threat from dryland salinity, with current risk particularly in woodland communities associated with valley floors that includes favourable Western Whipbird habitat.

The upper reaches of the Fitzgerald River within the Lake Magenta Nature Reserve are being managed as a focal management area, where strategies are being put in place on the reserve and adjoining private land to try and alleviate the rate of vegetation decline caused by salinity. These include:

- Constructing surface water management structures on adjacent farmland and within the Reserve to reduce waterlogging and inundation within the reserve;
- Revegetation of drainage lines on adjacent farmland to stabilize sediment and reduce their transfer into the reserve; and

- Monitoring the hydrological regime and vegetation health within the Reserve to determine long term trends and evaluate the success of these management actions.

Objective

Minimise the impacts of altered hydrology on occupied habitat of the Western Whipbird (western mallee subspecies) in the OMZ

Strategies and Actions

Table OMZ6: Strategies (existing and supporting) to minimise effects of dryland salinity on the Western Whipbird (western mallee subspecies), and actions relating to the taxon's recovery in the OMZ.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
OMZ6:ES1 Improving the protection and management of remnant native vegetation. (Salinity Action Plan).	Monitor western whipbird habitat for impacts of dryland salinity.	Record observed changes in vegetation health in western whipbird habitat where likely to be the result of dryland salinity.	DEC Katanning, Recovery Team
	Ensure any observed impacts of salinity are communicated to relevant land managers.	Liaise with catchment groups and land manager with regard to any observations of salinity in western whipbird habitat.	DEC Katanning, Recovery Team

Criteria for Success:

- No loss of occupied habitat of Western Whipbird (Western Mallee) to the effects of dryland salinity.

Criteria for Failure

- Loss of occupied habitat of Western Whipbird (Western Mallee) to the effects of dryland salinity.

4.4.5.2 Feral Predator Control

A large percentage of DEC managed land in the Oberon Management Unit is currently baited under *Western Shield*, with the aerial delivery of fox baits four times per year to Stirling Range National Park, Corackerup Nature Reserve, unvested Peniup Reserve, and Lake Magenta Nature Reserve. Hand-baiting also occurs on Corackerup Nature Reserve and unvested Peniup Reserve on internal and external access tracks and in the Stirling Range National Park on external firebreaks every 3 months if conditions are dry.

Tarin Rock Nature Reserve has been baited twice for foxes, in conjunction with adjoining landowners, as part of a focal management area under the Tarin Rock Representative Landscape Project's Biodiversity Implementation Plan. No other reserves, within the Wheatbelt Management Unit and in which Western Whipbirds have been recorded, are currently baited for foxes.

Cats are thought to be a significant threat to whipbirds and occur in significant numbers in the large Lake Magenta Nature Reserve within the Wheatbelt Management Unit. However, there is no current program or trial of cat control within this nature reserve because Chuditch (*Dasyurus geoffroii*) have been released into it and would be susceptible to the cat bait currently used (M. Davies[21] personal communication 2005). Cats may also threaten whipbirds elsewhere in the Wheatbelt Management Unit but nothing is known about such effects and cat control is not currently conducted anywhere in this Management Unit.

Cats are present in the Stirling Range National Park (Stirling Management Unit) but their numbers and distribution are unknown. They are trapped around recreation sites and ranger facilities and are shot if sighted by the park rangers.

Within the Pallinup Management Unit cats are present within the coastal reserves and have been recorded in sand pad trials in both Corackerup Nature Reserve and Peniup Unvested Reserve (DAFWA research project – M. Grant[22] personal communication 2005).

Black Rats (*Rattus rattus*) have been identified as significant pests in the Stirling Range National Park, but the impact of this species on Western Whipbirds (western mallee) is unknown. Black rats have also been recorded in the Pallinup Management Unit, but again little is know about their impact on the Western Whipbird.

Objective

Minimise the impacts of feral predators on all Western Whipbird (western mallee) within the OMZ.

[21] Mitchell Davies Operations Officer DEC Katanning
[22] Malcolm Grant, Senior Operations Officer, DEC, Ravensthorpe

Strategy and Actions

Table OMZ7: Feral predator management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the OMZ. Note: NP – National Park, MP – Management Plan, IMPs – Interim Management Guidelines.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
OMZ7:ES1. Carry out monitoring and control programs on feral animals (Stirling Range NP MP, Corackerup and Peniup IMGs, Lake Magenta MP)	No supporting strategy required.	No further action required.	Not Applicable
	OMZ7:S1. Review areas baited in the light of new information on Western Whipbird response to baiting and/or additional threats posed by cats.	OMZ1:A1. Provide new information on Western Whipbird response to baiting and/or additional threats posed by cats to appropriate land managers.	Recovery Team
No existing strategy	OMZ7.S2. Develop monitoring techniques to determine abundance and threat of Black Rats in the OMZ.	OMZ1:A2. Investigate Black Rat numbers in Western Whipbird habitat in the OMZ.	Recovery Team, Project Officers.

Criteria for Success:

- Continuation or improvement in the level of control of introduced predators being conducted under Western Shield throughout the OMZ;
- An understanding of the potential significance of cat predation to threatened birds; and
- Control actions for cats in place in the OMZ if necessary

Criteria for Failure:

- Decrease in area or intensity of control of introduced predators throughout the OMZ, and/or the significance of cat predation still not understood and cat control not being performed; and
- Evidence that populations of threatened birds are declining in the OMZ due to predation by feral predators.

4.4.5.3 Cost of South Coast Threatened Bird Actions

Table 4.15: Oberon Management Zone Summary of funds for Area Management Actions

South Coast Threatened Bird Threat Management in OMZ	Resources Required for Bird Actions		Existing DEC Estate Management	Completion Date
	External Funding Required	Recovery Team Input		
1. Fire		$10,000	353 900	Ongoing
2. Phytophthora cinnamomi	$100,000	$10,000	$400,000	Ongoing
3. Clearing	$5,000		$46,150	Ongoing
4. Grazing & Disturbance			$114 500	Ongoing
5. Weed Management	$100,000	$10,000	$20,500	Ongoing
6. Salinity	$500,000	$10,000	$500,000	Ongoing
7. Feral Predator Control	$200,000	$25,000	$210,000	Ongoing
Total (Five Years)	**$905,000**	**$65,000**	**$1,645,050**	

4.5 Walpole Management Zone (WMZ)

The Walpole Management Zone (WMZ) occurs west of Walpole and encompasses the Nuyts Wilderness in the Walpole –Nornalup National Park and the eastern end of the of D'Entrecasteaux National Park (Figure 4.1). This management zone contains the Western Bristlebird translocation site and a proposed Western Ground Parrot translocation site (Figure 4.10).

The Western Bristlebird translocation site is within the Nuyts Wilderness Area. This is an area that was zoned as wilderness in 1987 and comprises an area of about 4500 ha (CALM 1992c). Its designation as wilderness requires that there will be no evidence of management or humans. However, a limited amount of management is needed to prevent degradation of the environment.

4.5.1 Statutory Documents

The two current statutory documents that cover this management zone are the Walpole-Nornalup National Park Management Plan (CALM 1992c) and the Shannon Park and D'Entrecasteaux National Park Management Plan (CALM 1987) which is currently being reviewed.

A new reserve system, the 'Walpole Wilderness Area', comprises of four new and three existing national parks and, together with the D'Entrecasteaux National Park, will be one of the largest contiguous reserve systems within the south west of Western Australia. There is a draft "Walpole Wilderness Area" Management Plan, which will replace the current Walpole-Nornalup National Park Management Plan (CALM 1992c).

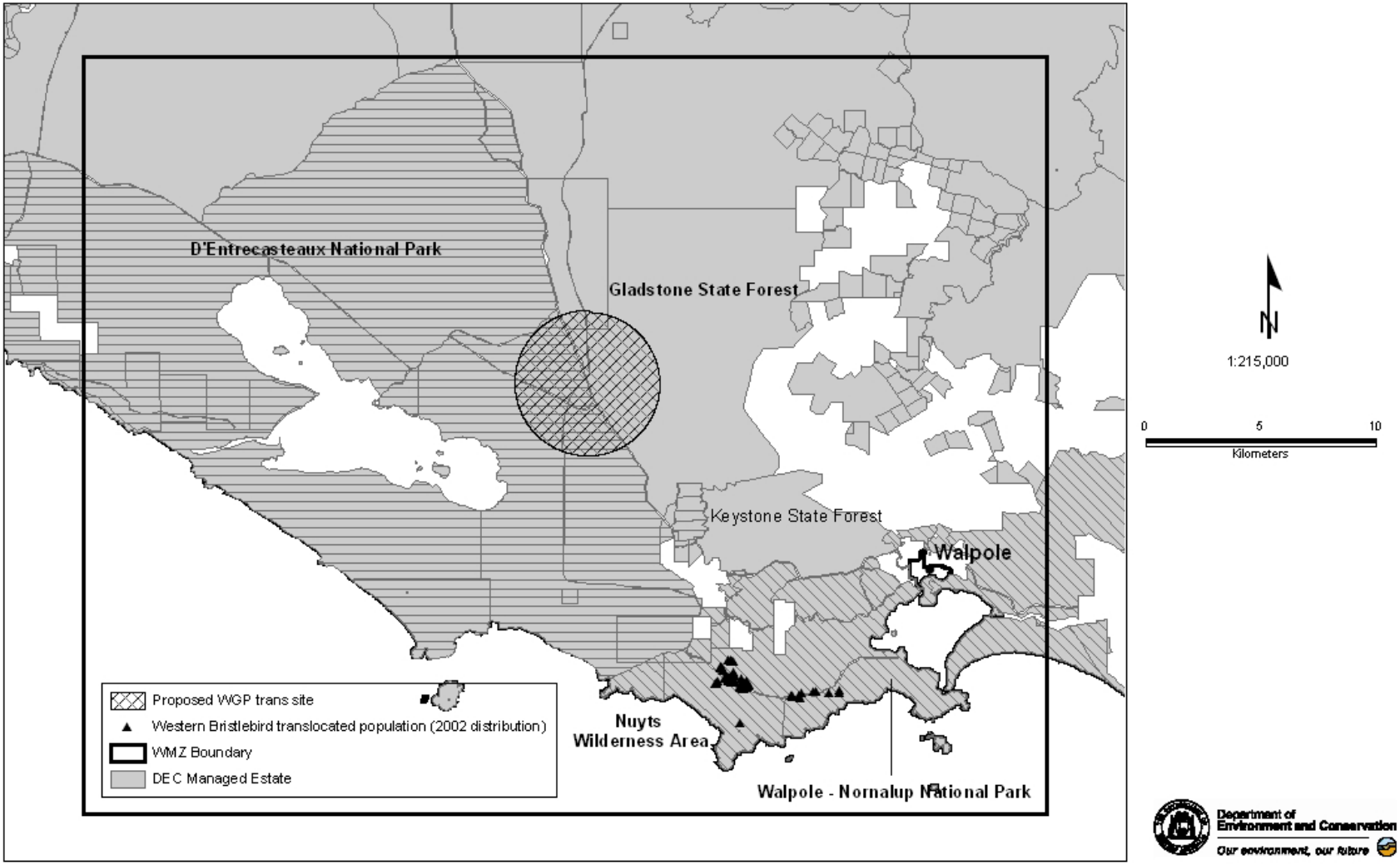


Figure 4.10: The Walpole Management Zone (WMZ) showing the current distribution (post 1980) of the translocated Western Bristlebird population, and the proposed Western Ground Parrot translocation site.

4.5.2 Threats within the Walpole Management Zone

A risk assessment of the impacts of threats within the WMZ are listed in Table 4.16. This assessment is of the impact of threatening processes occurring within the management zone upon the whole population of each taxon. Thus, three major factors enter into the assessment. First, the likely extent and/or severity of the threat within the WMZ; secondly, the proportion of the total population of a taxon occurring in the WMZ; finally, any particular susceptibility of individual taxa to each threatening process.

The main threats operating within the WMZ are extensive wildfire, changes in vegetation structure brought about by *Phytophthora cinnamomi* infection, and feral predators.

As all of the Western Bristlebird translocation habitat and the potential Western Ground Parrot translocation site occurs within DEC managed land, threats such as land clearing and grazing by domestic stock are considered to be of little threat to these birds in this management zone.

Table 4.16: A risk assessment for the translocated Western Bristlebird population and potential translocated Western Ground Parrots within the WMZ.

South Coast Threatened Birds	**Threatening Processes**										
	Loss or degradation of appropriate habitat through:							**Predation by:**			**Loss of genetic variability**
	Too frequent or extensive fire	**Clearing of native vegetation**	**Grazing or disturbance by non-native animals**	**Weed invasion**	**Altered hydrological regime**	**Climate change**	***Phytophthora cinnamomi***	**Foxes**	**Cats**	**Black rats**	
Western Ground Parrot	High	Low	Low	Low	Low	Unknown	Low	Low	High	Unknown	Low
Western Bristlebird	High	Low	Low	Low	Low	Unknown	Low	Low	Unknown	Unknown	High
Likelihood/extent of the threatening process in AMZ	**High**	**Low**	**Low**	**Mod**	**Low**	**High**	**High**	**High**	**High**	**High**	**High**

4.5.3 Management Objective for Walpole Management Zone

In the Walpole Management Zone (WMZ) the objectives for management are to:

1 Ensure the maintenance of habitat for the Western Bristlebird and potential habitat of the Western Ground Parrot such that the potential for expansion of translocated sub-populations within the WMZ is maximised.
2 Control threatening processes to minimise their impact on Western Bristlebird habitat and potential Western Ground Parrot habitat.

4.5.4 Management of Threatening Processes

4.5.4.1 Habitat Protection

Fire Management

The risk of wildfire within the Western Bristlebird translocation site and proposed Western Ground Parrot translocation site is high. In 2001 an extensive wildfire burnt all the long-unburnt area surrounding the bristlebird translocation site. If the fire had not been stopped in a narrow buffer strip, the whole of the translocated population would have been lost.

Objective

Minimise the risk that large areas of the 'habitat critical' of the Western Bristlebird and potential Western Ground Parrot translocation sites will be affected by wildfire.

Strategies and Actions

Table WMZ1: Fire management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the WMZ. Note: NP – National Park, W-N NP MP – Walpole-Nornalup National Park Management Plan, S-D'E NP MP - Shannon Park and D'Entrecasteaux National Park Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	Actions	Responsibility
WMZ1:ES1. Continue to maintain, and where possible improve, existing low fuel buffer systems. (W-N NP MP, S-D'E NP MP)	WMZ1:S1. Encourage establishment of low fuel buffer systems to protect south coast threatened bird 'habitat critical'.	WMZ:A1. Provide input with regard to strategic management of fire breaks to maintain effectiveness of low fuel buffers to protect south coast threatened birds.	Recovery Team, Project Officers.

WMZ1:ES2. Ensure the survival of sustainable populations of rare, endangered or restricted flora and fauna species by the protection and maintenance of their required habitat. (W-N NP MP, S-D'E NP MP)	WMZ1:S2. Ensure up to date information and input is provided to the larger fire management processes already implemented or coordinated by land managers in the WMZ.	WMZ:A2. Provide information to all fire managers within the WMZ that will strategically improve protection of south coast threatened bird 'habitat critical'	Recovery Team, Project Officers.
WMZ1:ES3. Minimise the risk of large wildfires burning out large portions of the parks by confining them to a single block or cell. (W-N NP MP, S-D'E NP MP)	No additional strategy required.	No additional action required.	Not applicable
WMZ1:ES4. Enforce the ban on wood fires in the Nuyts Wilderness Area and encourage the use of camp stoves. (W-N NP MP)	No additional strategy required.	No additional action required.	Not applicable
WMZ1:ES5. Continue to implement fire prescriptions outlined in the Walpole-Nornalup NP MP and Shannon Park-D'Entrecasteaux NP MP.	WMZ1:S3. Develop an integrated approach to fire management within the WMZ based on the requirements of south coast threatened birds.	WMZ:A3. Provide information and input relating to south coast threatened birds in any burn prescriptions in the WMZ.	Recovery Team, Project Officers, DEC Albany.
	WMZ1:S4. Adjust current fire prescriptions in the light of new information on south coast threatened bird sub-population locations or habitat requirements.	WMZ:A4. Ensure new knowledge about the biology, ecology and habitat requirements of south coast threatened birds is promptly disseminated to fire management personnel.	Recovery Team, Project Officers, DEC Albany.

Criteria for Success:

- No significant area (<10%) of Western Bristlebird habitat or potential Western Ground Parrot translocation sites in the WMZ burned by wildfire.

Criteria for Failure:

- Significant area (>30%) of Western Bristlebird habitat and/or potential Western Ground Parrot translocation sites in the WMZ burned by wildfire.

Phytophthora spp. Control

Dieback disease caused by *Phytophthora cinnamomi* is the most important management concern in the Walpole-Nornalup National Park Management Plan (CALM 1992c).

The coastal heath areas in the WMZ that provide suitable habitat for the Western Bristlebird and Western Ground Parrot contain large numbers of dieback susceptible species. The impact of dieback on south coast threatened birds in management zones where *P. cinnamomi* has been established for some time is not well known (refer to AMZ and FMZ). Due to the lack of understanding of the effects of *P. cinnamomi* infestation on the habitat of Western Bristlebirds and potential habitat of Western Ground Parrots a precautionary approach to *P. cinnamomi* management with regard to these species is adopted within this management zone.

Objective

Ensure that *Phytophthora cinnamomi* does not spread to currently unaffected areas, and where it does exist, minimise its impact on the habitat of the Western Bristlebird and potential Western Ground Parrot translocation sites within the WMZ.

Strategies and Actions

Table WMZ2: Phytophthora cinnamomi management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the WMZ. Note: NP – National Park, W-N NP MP – Walpole-Nornalup National Park Management Plan, S-D'E NP MP - Shannon Park and D'Entrecasteaux National Park Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	Strategies	Actions	Responsibility
WMZ2:ES1. All management activities in the Park will be carried out according to DEC's *Phytophthora cinnamomi* Management Guidelines (CALM 2000b). (W-N NP MP, S-D'E NP MP)	WMZ2:S1. Ensure that existing hygiene and access restrictions are understood and adhered to by all officers working on south coast threatened birds within the WMZ.	WMZ2:A1. Provide information to project officers on hygiene standards.	Project Officers, DEC Walpole.
		WMZ2:A2. Liaise with relevant rangers on DEC managed lands within the WMZ with regard to proposed field operations.	Project Officers, DEC Walpole.
WMZ2:ES2. New roads and firebreaks will only be created if absolutely necessary and be constructed in a way that will minimise the risk of disease introduction and additional spread. (S-D'E NP MP)	WMZ2:S2. Ensure any new roads or fire breaks do not impact on south coast threatened bird sub-populations.	WMZ2:A3. Provide up to date information to land managers on locations of south coast threatened birds within the WMZ.	Recovery Team, Project Officers.

Criteria for Success:

- No Western Bristlebird habitat or potential Western Ground Parrot translocation sites affected by *P. cinnamomi*.

Criteria for Failure:

- Any Western Bristlebird habitat or potential Western Ground Parrot translocation sites affected by *P. cinnamomi*.

Clearing of Native Vegetation

As all identified 'habitat critical' of the Western Bristlebird and the proposed Western Ground Parrot translation site is within DEC Managed land it is unlikely that clearing of native vegetation will impact on these taxa. However, a strategy is included to ensure any possible future clearing applications take into account south coast threatened bird 'habitat critical'.

Objective

No loss or modification (for example, by off-site effects) of 'habitat critical' of the Western Bristlebird and potential Western Ground Parrot translocation sites through clearing of native vegetation within the WMZ.

Strategies and Actions

Table WMZ3: Clearing management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the WMZ.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
WMZ3:ES1. Regulation of clearing will take into account the impact of clearing on biodiversity, water and soil resources, salinity and other environmental issues. (*Environmental Protection Act 1986*)	WMZ3:S1. Ensure that information on 'habitat critical' of south coast threatened birds within the WMZ is considered in response to clearing applications.	WMZ3.A1. Provide up to date information on locations of south coast threatened birds and 'habitat critical' within the WMZ in response to clearing applications.	Recovery Team, DEC Walpole

Criteria for Success:

- No loss through clearing, including associated off-site effects, of native vegetation of native vegetation of any 'habitat critical' of the Western Bristlebird or potential habitat for translocation of Western Ground Parrot within the WMZ.

Criteria for Failure:

- Any loss through clearing, including associated off-site effects, of native vegetation of any 'habitat critical' of the Western Bristlebird or potential habitat for translocation of Western Ground Parrots within the WMZ.

Grazing or Disturbance by Non-Native Animals

Non-native animals that have the potential to impact on south coast threatened bird habitat through grazing or disturbance include feral pigs and rabbits. These species occur throughout WMZ and are capable of causing extensive soil and habitat degradation in moist areas where they aggregate throughout the drier months between August and May. D'Entrecasteaux National Park in particular has a high incidence of pig activity in creek systems and swampy areas. Rabbits are also widespread throughout WMZ but at this stage are most abundant at the interface between private property and conservation estate and cause minimal problems in the habitat favoured by the birds. Deer are not currently present in this zone, however they have been recorded further east and could potentially move into this area if control operations are not effective.

Objective

Minimise the impacts of grazing and disturbance by non-native animals on 'habitat critical' of the Western Bristlebird and potential Western Ground Parrot translocation sites in the WMZ.

Strategies and Actions

Table WMZ4: Grazing and disturbance management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the WMZ. Note: W-N NP MP – Walpole-Nornalup National Park Management Plan, S-D'E NP MP - Shannon Park and D'Entrecasteaux National Park Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
WMZ4:ES1. Continue to liaise with Agriculture Protection Board of WA to control feral animals (pig and rabbit). (W-N NP MP, S-D'E NP MP)	WMZ4:S1. Endorse/advocate broad-scale reduction of grazing pressure on 'habitat critical' of south coast threatened birds on non-DEC managed land.	WMZ4:A1. Provide up to date information to Community Groups and Natural Resource Management Groups on locations of south coast threatened bird taxa within the WMZ.	Recovery Team, Project Officers
WMZ4:ES2. Continue and increase control programs for pigs. (W-N NP MP, S-D'E NP MP)	No additional strategy required.	No additional action required.	Not Applicable
WMZ4:ES3. Instigate a rabbit control program (W-N NP MP), if it becomes necessary. (S-D'E NP MP)	No additional strategy required.	No additional action required.	Not Applicable

Criteria for Success:

- No degradation of any Western Bristlebird or Western Ground Parrot 'habitat critical' through grazing or disturbance by non-native animals.

Criteria for Failure:

- Any degradation of Western Bristlebird or Western Ground Parrot 'habitat critical' through grazing or disturbance by non-native animals.

Weed Invasion

Weed species that have the potential to cause major structural changes to vegetation in the Walpole-Nornalup National Park include *Pinus pinaster*, *P. radiata*, *Eucalyptus globulus* and *Leptospermum laevigatum*. Within the D'Entrecasteaux National Park, *Pinus pinaster* is spreading from a trial plot (this is well north of WGP translocation site), but most other weed species present (e.g. *Zantedeschia aethiopica*, *Asparagus asparagoides*, *Agapanthus praecox*, *Watsonia* spp., *Pelargonium* spp. and *Senecio* spp.) are unlikely to cause major changes in the structure of habitat for Western Ground Parrots or Western Bristlebirds.

Objective

Minimise the impact of weeds on the 'habitat critical' of the Western Bristlebird and potential Western Ground Parrot translocation sites within the WMZ.

Strategies and Actions

Table WMZ5: Weed management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the WMZ. Note: W-N NP MP – Walpole-Nornalup National Park Management Plan, S-D'E NP MP - Shannon Park and D'Entrecasteaux National Park Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
WMZ5:ES1. Control or if possible eradicate introduced plants (S-D'E NP MP), that have the potential to cause major environmental problems (W-N NP MP).	WMZ5:S1. Monitor 'habitat critical' of south coast threatened bird taxa for invasion of weeds likely to cause a change in habitat structure.	WMZ5:A1. Record observed changes in 'habitat critical' due to invasion of weeds likely to cause a change in habitat structure.	Recovery Team, Project Officers, DEC Walpole.
	WMZ5:S2. Ensure any observed impacts or changes in habitat structure due to weed infestation are communicated to relevant land managers.	WMZ5:A2. Liaise with relevant land managers with regard to any observations of habitat degradation or loss due to weed infestation.	Recovery Team, Project Officers, DEC Walpole.

Criteria for Success:

- No increase in area of weed invasion of 'habitat critical' of the Western Bristlebird or potential habitat for translocation of the Western Ground Parrot in the WMZ.

Criteria for Failure:

- Any increase in area covered by weeds within 'habitat critical' of the Western Bristlebird or potential habitat for translocation of the Western Ground Parrot in the WMZ.

4.5.4.2 Feral Predator Control

Foxes, feral dogs and cats occur throughout the WMZ area, and the D'Entrecasteaux National Park also contains Black Rats. All of the Walpole-Nornalup and D'Entrecasteaux National Parks within the WMZ is currently baited under *Western Shield*, with the aerial delivery of fox baits four times per year. The Nuyts Wilderness and Mt Clare are currently being ground baited every two months in addition to the aerial baiting program. However, foxes are considered unlikely to be a major threat to bristlebirds in this Management Zone. Cats and Black Rats are considered more likely to impact on threatened birds (especially ground nesting species) in this area, but as yet broad scale control of these feral predators is not feasible.

Feral Pigs also have the potential to be destructive predators as well as grazers. Actions for their control are listed in Table WMZ4 above.

Objective

Minimise the impacts of feral predators on all Western Bristlebird sub-populations and any future translocated Western Ground Parrot populations within the WMZ.

Strategy and Actions

Table WMZ6: Feral predator management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the WMZ. Note: W-N NP MP – Walpole-Nornalup National Park Management Plan, S-D'E NP MP - Shannon Park and D'Entrecasteaux National Park Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
WMZ6:ES1. Continue fox control under DEC's *Western Shield* Program on all DEC managed land within the WMZ currently included in the program. (Western Shield fauna Recovery Program Strategic Plan)	WMZ6:S1. Ensure all landholders in the WMZ have access to information on impacts and appropriate control methods of cats and foxes.	WMZ6:A1. Communicate information on impacts and appropriate control methods of cats and foxes.	DEC Albany, Recovery Team.
WMZ6:ES2. Continue and increase cat control programs (W-N NP MP, S – D'E NP MP)	WMZ6:S2. Develop cat monitoring techniques to determine abundance and threat posed by this predator in the WMZ.	WMZ6:A2. Investigate cat numbers in 'habitat critical' of south coast threatened birds in the WMZ.	DEC Science, DEC Walpole, Recovery Team.

	WMZ6:S3. Promote the adoption of methods of cat control when they become operational in all 'habitat critical' of south coast threatened birds.	WMZ6:A3. Provide land owners and managers with information on impacts of cats on south coast threatened bird taxa and on appropriate control techniques when available.	DEC Science, DEC Walpole, Recovery Team.
No existing strategy.	WMZ6:S4. Ensure any information on the impact of Black Rat predation on south coast threatened birds is made available to land managers.	WMZ6:A4. Communicate and provide any information on the impact of Black Rat predation on south coast threatened birds to land managers.	DEC Walpole, Recovery Team.

Criteria for Success:

- Continuation or improvement in the level of control of introduced predators being conducted under Western Shield throughout the WMZ; and
- An understanding of the potential significance of cat predation to threatened birds; and
- Control actions for cats in place in the WMZ if necessary

Criteria for Failure:

- Loss of area or intensity of control of introduced predators throughout the WMZ, and/or the significance of cat predation still not understood and cat control not being performed, and
- Evidence that populations of threatened birds are declining in the WMZ due to predation by feral predators.

4.5.4.3 Cost of South Coast Threatened Bird Actions

Table 4.17: Walpole Management Zone Summary of funds for Area Management Actions.

South Coast Threatened Bird Threat Management in WMZ	Resources Required for Bird Actions		Existing DEC Estate Management	Completion Date
	External Funding Required	Recovery Team Input		
1. Fire			$16,200	Ongoing
2. *Phytophthora cinnamomi*			$10,800	Ongoing
3. Clearing			$3,600	Ongoing
4. Grazing & Disturbance			$5,400	Ongoing
5. Weed Management	$15,865	$5,000	$9,900	Ongoing
6. Feral Predator Control	$200,000	$12,500	$120,000	Ongoing
Total (Five Years)	**$215,000**	**$17,500**	**$165,900**	

4.6 Darling Range Management Zone (DRMZ)

The Darling Range Management Zone (DRMZ) encompasses an area of approximately 7500 ha of potential Noisy Scrub-bird habitat in the Darling Range. This habitat occurs within State Forest and Lane Poole Reserve south of Dwellingup and north-east of Harvey (Figure 4.1). The DMZ contains a number of translocated Noisy Scrub-birds, with 80 birds released in eight release sites between 1997 and 2003 (Table 4.18). These release sites comprise approximately 1600 ha of potential habitat with adjoining habitat that may be suitable for birds to expand into if and when breeding has occurred (Figure 4.11).

At the time of writing no breeding had been recorded but male scrub-birds were calling persistently in three of the eight release sites. Despite the lack of persistence in some sites, habitat in all eight sites is still managed for scrub-birds. Released scrub-birds have persisted in some of these sites for up to four years post release. However, it is important that factors limiting successful establishment are clarified, and it has been demonstrated that scrub-birds can successfully establish breeding populations in the Darling Range, before more releases are planned. A review of the Darling Range translocation program will be conducted as an action under this plan before further decisions are taken in regard to the future of this population.

The DRMZ spans two DEC regions – Swan (Dwellingup District) and South West (Wellington District). A Darling Range Noisy-Scrub-bird sub-group of the South Coast Threatened Birds Recovery Team was formed to deal with management issues specifically applicable to translocation sites in the Darling Range. In addition four release sites are contained within the current Alcoa Willowdale mining envelope.

Table 4.18: The locations Noisy Scrub-bird translocations within the DRMZ and numbers of birds released at each location.

	1997		1998		1999		2000		2001		2002		2003		TOTAL (m:f)
Release Area	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	
Samson Brook	6			4											10 (6:4)
Upper Harvey	7		8	1	8	3		1							28 (23:5)
Falls Brook			5												5 (5:0)
Sixty-one Form							5			2	1	1		2	11 (6:5)
King Jarrah West							5			1	1	1		1	9 (6:3)
Chasede Rd									5						5 (5:0)
Samson West									4			1		1	6 (4:2)
Tiger Rd									5			1			6 (5:1)
TOTAL	**13**	**0**	**13**	**5**	**8**	**3**	**10**	**1**	**14**	**3**	**2**	**4**	**0**	**4**	**80 (60:20)**

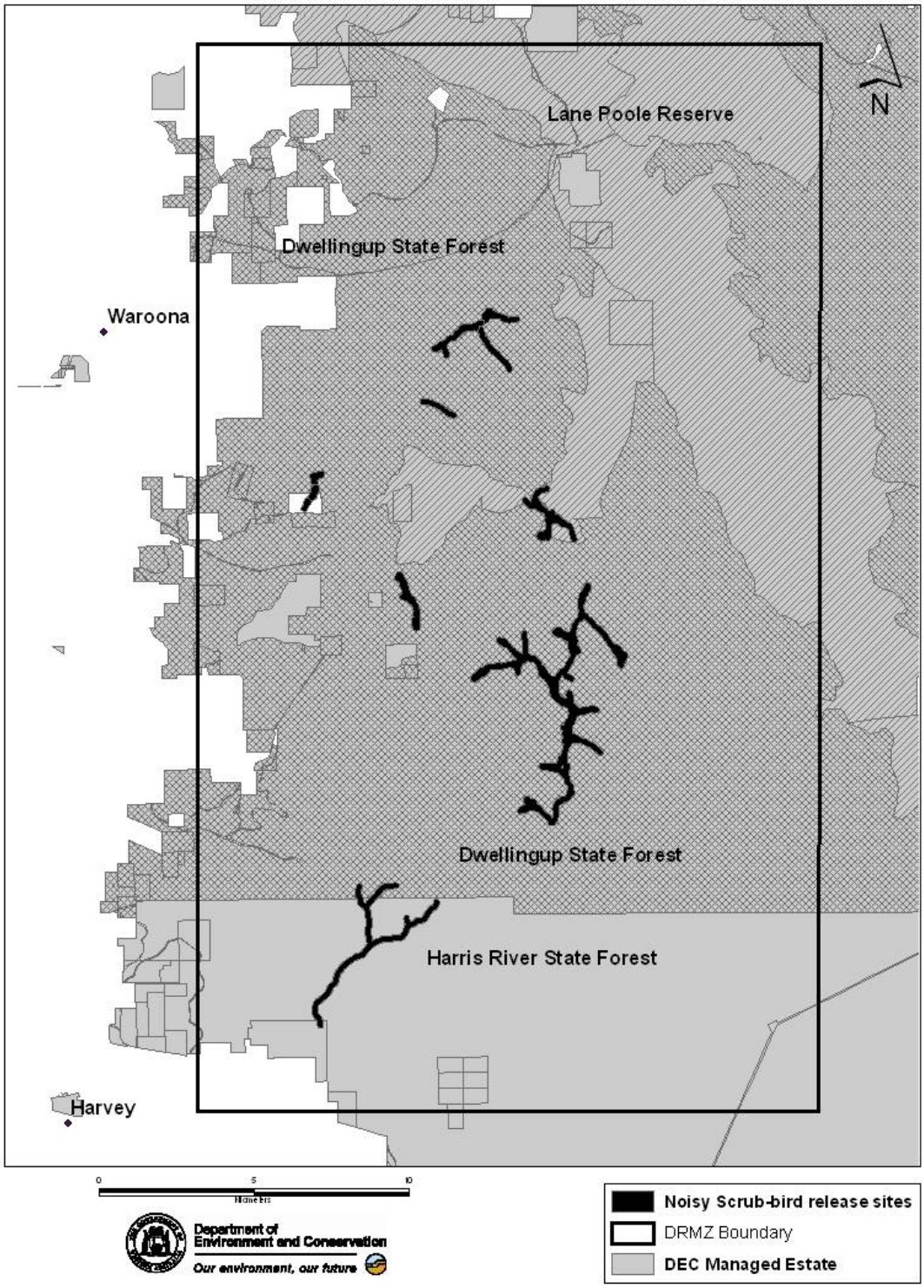


Figure 4.11: The Noisty Scrub-bird translocation release sites within the Darling Range Management Zone (DRMZ).

4.6.1 Statutory Documents

Existing DEC statutory documents that address management of habitat in the Darling Range Management Zone are limited to the Lane Poole Reserve Management Plan (CALM 1990). Only one of the eight Noisy Scrub-bird release sites (King Jarrah West) occurs within the existing boundaries of this Reserve. The Lane Poole Reserve Management Plan is currently being revised, and the protection of the Noisy Scrub-bird release areas from fire and impacts of clearing , black rats and pigs were identified in the Issues Paper. The Falls Brook site is included in proposed additions to the Conservation Estate (Nature Reserve), and all other sites lie within the State Forest and timber Reserve Tenure detailed in the Forest Management Plan 2004-2013 (CCWA 2004).

4.6.2 Threats within the Darling Range Management Zone

A risk assessment of the inmpacts of threats within the DRMZ is outlined in Table 4.19. This assessment is made on sub-populations within the DRMZ only.

Table 4.19: A risk assessment for the translocated sub-populations of Noisy Scrub-bird within the Darling Range Management Zone.

Threatened Birds	**Threatening Processes**										
	Loss or degradation of appropriate habitat through:							**Predation by:**			**Loss of genetic variability**
	Too frequent or extensive fire	**Clearing of native vegetation**	**Grazing or disturbance by non-native animals**	**Weed invasion**	**Altered hydrological regime**	**Climate change**	***Phytophthora cinnamomi***	**Foxes**	**Cats**	**Black rats**	
Potential impact on sub-population in DRMZ if unmanaged	High	Low	Low	Low	Low	Unknown	Mod/ Unknown	Low	Unknown	Unknown	Low
Likelihood/extent of the threatening process in AMZ	High	Low	Low	Low	Low	High	High	High	High	Mod	High

4.6.3 Management Objectives for the Darling Range Management Zone

In the Darling Range Management Zone (DRMZ) the objectives for management are to:

1 Protect all potential Noisy Scrub-bird habitat, including release sites, in the DRMZ.

4.6.4 Management of Threatening Processes

4.6.4.1 Habitat Protection

Fire Management

Habitat suitable for Noisy Scrub-birds in the DRMZ is generally restricted to the riparian zones. These areas have traditionally not been burnt on the same rotation as the upland forests that have been subject to long term logging operations. As a result many of the creekline systems contained long-unburnt vegetation when investigated as potential release sites (Danks 1997) and have been maintained without fire since translocations commenced in 1997.

DEC's Wellington and Dwellingup District coordinate fire management in Noisy Scrub-bird habitat in the DRMZ. Fire management within the Alcoa Willowdale mining envelope is managed by DEC Dwellingup.

Objective

Minimise the risk that Noisy Scrub-bird release sites and areas of potential habitat will be affected by wildfire.

Strategies and Actions

Table DRMZ1: Fire management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the DRMZ. Note: MP – Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
DRMZ1:ES1. Low fuel areas will be strategically located adjacent to high value areas. (Lane Poole Reserve MP)	DRMZ1:S1. Encourage establishment and maintenance of low fuel buffer systems around and between Noisy Scrub-bird release sites.	DRMZ1:A1. Provide input to DEC with regard to maintenance of low fuel buffer systems for the protection of Noisy Scrub-bird release sites.	Project Officer, Recovery Team, DEC Wellington and Dwellingup.
No Existing Strategy	DRMZ1:S2. Ensure that any new firebreaks, roadworks or water points do not impact on Noisy Scrub-bird habitat.	DRMZ1:A2. Provide up to date information to land managers on locations of scrub-birds within the DRMZ.	Project Officer, Recovery Team, DEC Wellington and Dwellingup.
No Existing Strategy	DRMZ1:S3. Ensure that Noisy Scrub-bird release sites are clearly recognised in all DEC District Fire Control Working Plans, ALCOA operational plans and FPC operational plans.	DRMZ1:A2. Provide information on Noisy Scrub-bird release areas to all relevant fire management bodies.	Project Officer, Recovery Team, DEC Wellington and Dwellingup.

Criteria for Success:

- No significant area (<10%) of 'habitat critical' of Noisy Scrub birds in the DRMZ burned by wildfire.

Criteria for Failure:

- Significant area (>30%) of 'habitat critical' of Noisy Scrub-birds in the DRMZ burned by wildfire.

Phytophthora spp Control

Much of the upland area surrounding Noisy Scrub-bird release sites in the Darling Range is already infected by *Phytophthora cinnamomi*, and it is likely that many of the release sites are either already infected or at high risk of infection due to their low lying positions in the landscape. All relevant areas due for forestry operations are inspected and interpreted for the presence of dieback prior to work beginning. A high priority for land managers in the DRMZ is to minimise the risk of new infestations in areas that are currently uninfected.

In the Alcoa Willowdale and Huntly mining envelopes *P. cinnamomi* management is rigorous and was originally developed in consultation with DEC (Colquhoun & Hardy 2000). All stream zones (and therefore the scrub bird release sites and potential habitats) within the northern Jarrah forest are thought to be infected with *P. cinnamomi* (Colquhoun & Hardy 2000).

Objective

Minimise the spread of *Phytophthora cinnamomi* in all Noisy Scrub-bird translocation sites in the DRMZ.

Strategies and Actions

Table DRMZ2: *Phytophthora cinnamomi* management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the DRMZ. Note: MP – Management Plan

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
DRMZ2:ES1. Minimise the impact of pathogens and their associated diseases on health and vitality of forest ecosystems. (Forest MP 2004, Lane Pool Reserve MP1990)	DRMZ2:S1. Ensure that existing hygiene and access restrictions are understood and adhered to by all officers working in Noisy Scrub-bird release areas in the DRMZ	DRMZ2:A1. Provide information to staff and volunteers on hygiene standards.	Recovery Team, Project Officers, DEC Wellington and Dwellingup

Criteria for Success:

- No significant (<1%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the Noisy Scrub-bird in the Darling Range Management Zone

Criteria for Failure:

- An observed significant (>5%) increase in area infested by *P. cinnamomi* of 'habitat critical' of the noisy Scrub-bird in the Darling Range Management Zone

Clearing of Native Vegetation

Future clearing of native vegetation in the DRMZ is most likely to be restricted to upland areas, for the purpose of logging and bauxite mining. However it is possible that clearing due to these operations may impact low-lying areas containing suitable scrub-bird habitat. The Forest Products Commission generally request translocation site information prior to any operations and aim to minimise any disturbance to stream or priority areas during road upgrades.

Clearing of native vegetation for bauxite mining is largely restricted to mid - upslope areas. However, there is a relatively small amount of clearing in stream zones for infrastructure such as haul road stream crossings and sumps. Such areas are subjected to Mining and Management Program Liaison Group approval as part of Alcoa's Clearing Advice process.

Objective

No loss of 'habitat critical' of the Noisy Scrub-bird through clearing of native vegetation within the WMZ.

Strategies and Actions

Table DRMZ3: Clearing management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the DRMZ.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
DRMZ3:ES1. Regulation of clearing will take into account the impact of clearing on biodiversity, water and soil resources, salinity and other environmental issues *Environmental Protection Act 1986* and *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*	DRMZ3:S1. Ensure that information on Noisy Scrub-bird habitat within the DRMZ is considered in response to clearing applications.	DRMZ3:A1 Provide up to date information on locations of Noisy Scrub-bird translocation sites in the DRMZ.	Project Officers, Recovery Team
		DRMZ3:A2 Liaise with, and provide information to, land holders and managers on the importance of maintaining habitat and corridors for Noisy Scrub-birds in the DRMZ.	Project Officers, Recovery Team, DEC Wellington and Dwellingup

Criteria for Success:

- No loss of any 'habitat critical' of the Noisy Scrub-bird through clearing, including off-site effects, of native vegetation within the DRMZ.

Criteria for Failure:

- Any loss of any 'habitat critical' of the Noisy Scrub-bird through clearing, including off-site effects, of native vegetation within the DRMZ.

Grazing and Disturbance by Non-Native Animals

Introduced grazing animals in the DRMZ include rabbits and feral pigs. Rabbits are likely to have little or no impact on Noisy Scrub-bird release areas. Of greater concern in this Management Zone is the presence of feral pigs, which cause widespread environmental damage to riparian zones. Their impacts on Noisy Scrub-bird habitat are either direct, through the destruction of habitat, or less direct, by spreading weeds and spores of disease such as *Phytophthora cinnamomi*.

Objective

Minimise the impacts of grazing and disturbance by non-native animals on 'habitat critical' in Noisy Scrub-bird translocation sites in the DRMZ.

Strategies and Actions

Table DRMZ4: Grazing and disturbance management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the DRMZ. Note: MP – Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	South Coast Threatened Bird Management		
	Strategies	**Actions**	**Responsibility**
DRMZ4:ES1. Control weeds and pests in forest ecosystems. (Forest MP 2004, Lane Poole Reserve MP1990)	DRMZ4:S1. Ensure any observed impacts or changes in habitat structure due to pig damage are communicated to land managers responsible for implementation of control programs.	DRMZ4:A1. Liaise with relevant land managers with regard to any observations of habitat degradation or loss due to pigs.	Recovery Team, Project Officer, DEC Wellington and Dwellingup

Criteria for Success:

- No degradation of any Noisy Scrub-bird 'habitat critical' through grazing or disturbance by non-native animals.

Criteria for Failure

- Any degradation of any Noisy Scrub-bird 'habitat critical' through grazing or disturbance by non-native animals.

4.6.4.2 Feral Predator Control

Feral foxes, cats and Black Rats are widely distributed throughout the DRMZ, although foxes are currently baited through the Management Zone under the Western Shield Program. The DEC baiting program extends to land within the Alcoa Willowdale lease. Foxes are not considered to be a threat to Noisy Scrub-birds. Cats and black rats are more likely to be impacting on translocated birds, but the extent of this impact has not been quantified. Radio-transmitters were found attached to the remains of two translocated male scrub-birds being tracked in 2000, but the identity of the predator remains unknown.

Objective

Minimise the impacts of feral predators on translocated Noisy Scrub-bird in the DRMZ.

Strategies and Actions

Table DRMZ5: Feral predator management strategies (existing and supporting) and actions relating to the recovery of south coast threatened birds in the DRMZ. Note: MP – Management Plan.

Existing Statutory or DEC Strategies Relevant to South Coast Threatened Birds (Relevant Documents)	Strategies	Actions	Responsibility
DRMZ5:ES1 Control weeds and pests in forest ecosystems. (Forest MP 2004, Lane Poole Reserve MP1990)	No additional strategy required.	No additional action required.	Not applicable.
No existing strategy.	Develop monitoring techniques to determine abundance and threat posed by cats and black rats in the DRMZ.	Investigate cat and black rat numbers in translocation sites in the DRMZ.	Recovery Team, Project Officers, Alcoa, DEC Wellington and Dwellingup

Criteria for Success:

- Continuation or improvement in the level of control of introduced predators being conducted under Western Shield throughout the DRMZ; and
- An understanding of the potential significance of cat predation to threatened birds; and
- Control actions for cats in place in the DRMZ if necessary.

Criteria for Failure:

- Loss of area or intensity of control of introduced predators throughout the DRMZ, and/or the significance of cat predation still not understood and cat control not being performed, and
- Evidence that populations of threatened birds are declining in the DRMZ due to predation by feral predators.

4.6.4.3 Cost of South Coast Threatened Bird Actions

Table 4.20: Darling Range Management Zone Summary of funds for Area Management Actions

South Coast Threatened Bird Threat Management in DRMZ	Resources Required for Bird Actions		Existing DEC Estate Management	Completion Date
	External Funding Required	Recovery Team Input		
1. Fire			$50,000	Ongoing
2. *Phytophthora cinnamomi*			$20,000	Ongoing
3. Clearing				Ongoing
4. Grazing & Disturbance			$20,000	Ongoing
5. Weed Management			$10,000	Ongoing
6. Feral Predator Control			$50,000	Ongoing
Total (Five Years)			**$150,000**	

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