South Coast Threatened Birds

Recovery Plan

Western ground parrot	*Pezoporus 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*

Western Australian Wildlife Management Program **No. 44**

Department of Parks and Wildlife

September 2014

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September 2014

Department of Parks and Wildlife
Locked Bag 104, Bentley Delivery Centre WA 6983

Foreword

This recovery plan has been developed within the framework laid down in the Western Australian Department of Parks and Wildlife (The Department of Parks and Wildlife) Policy Statements Nos. 44 and 50 (CALM 1992, 1994), and the Australian Government Department for Sustainability, Environment, Water, Population and Communities Recovery Planning Compliance Checklist for Legislative and Process Requirements (DEWHA 2008).

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

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

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

Information in this Plan is accurate as of September 2014.

Recovery plan preparation: This recovery plan was prepared by Janet Newell of The Department of Parks and Wildlife, Albany, adapted in part from Gilfillan *et al*. (2006) and addition of current information, for the SCTBRT. Sarah Comer, Cameron Tiller and Abby Berryman (South Coast Region, The Department of Parks and Wildlife), Allan Burbidge (Science Division, The Department of Parks and Wildlife) and John Blyth (SCTBRT) provided assistance and advice in the preparation of this recovery plan. The preparation of this recovery plan was funded by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities, and The Department of Parks and Wildlife.

Citation: Department of Parks and Wildlife (2014). *South Coast Threatened Birds Recovery Plan*. Department of Parks and Wildlife, Perth, Western Australia.

Cover photographs: Top left: western ground parrot (Alan Danks), top right: western bristlebird (Scott McGregor), bottom left: noisy scrub-bird (Alan Danks), bottom right: western whipbird (Scott McGregor).

Abbreviations

CALM	Department of Conservation and Land Management, Western Australia (changed to Department of Environment and Conservation July 2006)
CANP	Cape Arid National Park
CITES	Convention on International Trade of Endangered Species
DEC	Department of Environment and Conservation, Western Australia (formerly CALM, changed to Department of Parks and Wildlife July 2013)
DFES	Department of Fire and Emergency Services, Western Australia (formerly FESA)
DPAW	Department of Parks and Wildlife, Western Australia (formerly part of DEC)
DRF	Declared Rare Flora
DSEWPaC	(Department of, or Minister for) Sustainability, Environment, Water, Population and Communities
EPBC	Environment Protection and Biodiversity Conservation Act 1999
FRNP	Fitzgerald River National Park
IUCN	International Union for Conservation of Nature
NP	National Park
NR	Nature Reserve
SCTBRT	South Coast Threatened Birds Recovery Team
SRNP	Stirling Range National Park
SWALSC	South West Aboriginal Land and Sea Council
TPBNR	Two Peoples Bay Nature Reserve
UCL	Unallocated Crown Land
WA	Western Australia

Contents

Summary

Western ground parrot or kyloring (*Pezoporus flaviventris*)

Family: Psittacidae

IBRA Region: Esperance Plains

Department of Parks and Wildlife Region: South Coast

Department of Parks and Wildlife Districts: Albany, Esperance

Current status of taxon:

- *Environment Protection and Biodiversity Conservation Act 1999*: Critically Endangered
- *Wildlife Conservation Act 1950* (WA) Schedule 1. Rare or likely to become extinct. Threatened: ranked Critically Endangered.
- Garnett *et al*. (2011) Critically Endangered (IUCN criteria)

Distribution and habitat: Western ground parrots occur in Fitzgerald River National Park (FRNP) and Cape Arid National Park (CANP) and nearby parts of Nuytsland Nature Reserve. They occur in long unburnt (5 to 40 plus years); floristically diverse, near-coastal dry heath (400-600 millimetres rainfall).

Western bristlebird (*Dasyornis longirostris*)

Family: Dasyornithidae

IBRA Regions: Esperance Plains, Jarrah Forest

Department of Parks and Wildlife Region: South Coast

Department of Parks and Wildlife District: Albany

Current status of taxon:

- *Environment Protection and Biodiversity Conservation Act 1999*: Vulnerable
- *Wildlife Conservation Act 1950* (WA) Schedule 1. Rare or likely to become extinct. Threatened: ranked Vulnerable.
- Garnett *et al*. (2011) Endangered (IUCN criteria)

Distribution and habitat: The western bristlebird occurs at Two Peoples Bay Nature Reserve (TPBNR), Betty's Beach, Mount Manypeaks to Bluff Creek, and in the FRNP (McNee 1986, Comer and McNee 2001). They occur in floristically diverse, closed, near-coastal heaths 1-1.5 metres high with a wide variety of shrubs, usually with abundant sedges and thickets of low eucalypts 2-4 metres tall. In FRNP the habitat is more open, but generally contains patches of dense shrubs (McNee 1986).

Noisy scrub-bird or tjimiluk (*Atrichornis clamosus*)

Family: Atrichornithidae

IBRA Regions: Esperance Plains, Jarrah Forest

Department of Parks and Wildlife Region: South Coast

Department of Parks and Wildlife District: Albany

Current status of taxon:

- *Environment Protection and Biodiversity Conservation Act 1999*: Vulnerable
- *Wildlife Conservation Act 1950* (WA) Schedule 1. Rare or likely to become extinct. Threatened: ranked Endangered.
- Garnett *et al*. (2011) Endangered (IUCN criteria)

Distribution and habitat: The noisy scrub-bird occurs from TPBNR to Cheyne Beach, with an outlying translocated sub-population on Bald Island. They are found in dense vegetation, including low forest, scrub thicket and (rarely) heath. These vegetation formations generally occur in the gullies and drainage lines of hills and granite mountains and in the lowland areas, in overgrown swamps, lake margins and beside streams.

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

Family: Psophodidae

IBRA Regions: Esperance Plains, Jarrah Forest

Department of Parks and Wildlife Region: South Coast

Department of Parks and Wildlife District: Albany

Current status of taxon:

- *Environment Protection and Biodiversity Conservation Act 1999*: Endangered
- *Wildlife Conservation Act 1950* (WA) Schedule 1. Rare or likely to become extinct. Threatened: ranked Endangered.
- Garnett *et al*. (2011) Endangered (IUCN criteria)

Distribution and habitat: Restricted to a small coastal strip east of Albany from Two Peoples Bay and Mount Gardner in the south west to about Cape Riche Road in the north east, with the South Coast Highway as an approximate inland boundary. In this area it occurs in heath-like thicket associations on coastal dunes and in low, dense mallee woodland or shrubland with understorey of dense, stunted shrubs.

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

Family: Psophodidae

IBRA Regions: Esperance Plains, Mallee

Department of Parks and Wildlife Regions: South Coast, Wheatbelt

Department of Parks and Wildlife Districts: Albany, Great Southern

Current status of taxon:

- *Environment Protection and Biodiversity Conservation Act 1999*: Not listed
- *Wildlife Conservation Act 1950* (WA) Schedule 3. Other specially protected fauna. Ranked: Priority 4.
- Garnett *et al*. (2011) Least Concern (IUCN criteria)

Distribution and habitat: Restricted to scattered locations throughout the Southern Wheatbelt and Central South Coast Regions, with the majority in FRNP and Stirling Range National Park (SRNP). It occurs in open mallee eucalypt woodland with a dense, tall shrub layer up to 1.5 metres tall, dominated by such species as *Hakea*, *Lambertia* or *Banksia*.

Rufous bristlebird (western) or south-western bristlebird (*Dasyornis broadbenti litoralis*)

Family: Dasyornithidae

IBRA Regions: Warren, Jarrah Forest

Department of Parks and Wildlife Region: South West

Department of Parks and Wildlife District: Blackwood

Current status of taxon:

- *Environment Protection and Biodiversity Conservation Act 1999*: Extinct
- *Wildlife Conservation Act 1950* (WA) Schedule 2. Presumed to be extinct.

Distribution and habitat: Was known only from the coast between Cape Mentelle and Cape Naturaliste at the south-western tip of WA. Habitat preferences are poorly known, but it was reported to be an inhabitant of dense coastal heath about 40 centimetres high.

Habitat critical for survival:

Habitat critical to the survival of these taxa is defined as:

- the current area of occupancy of one or more taxa;
- areas possibly used by the taxa; and
- potential habitat into which one or more of the taxa could disperse or be translocated.

Recovery plan objectives:

1. Maintain population numbers of south coast threatened birds, at least at current levels, and increase where possible.
2. Continue to improve knowledge of the current distribution of south coast threatened birds.
3. Improve knowledge of those aspects of south coast threatened birds that limit their distribution and numbers and inform management actions accordingly.
4. Reduce vulnerability of south coast threatened bird populations due to their small size and area of extent, in particular western ground parrots, western bristlebirds and noisy scrub-birds.
5. Increase community participation and stewardship in the conservation of south coast threatened birds.

Recovery team:

Recovery teams provide advice and assist in coordinating actions described in recovery plans. They include representatives from organisations with a direct interest in the recovery of the species, including those involved in funding and those participating in actions that support the recovery of the species. The South Coast Threatened Bird Recovery Team (SCTBRT) has the responsibility of providing advice, coordinating and directing the implementation of the recovery actions outlined in this recovery plan. Background information and further recovery action details are provided in Gilfillan *et al.* (2006).

Criteria for success:

This recovery plan will be deemed successful if, within 10 years, all of the following have been achieved:

1. All known populations of the extant south coast threatened birds have remained stable or increased in numbers from baseline data, where reliable data exists.
2. All known locations/sites and any new sites of the extant south coast threatened birds have been surveyed.
3. A systematic survey for the rufous bristlebird (western) in all likely habitats has been completed.
4. The habitat critical for survival for each species of south coast threatened birds is identified, mapped, and extent maintained.
5. There is an increase in knowledge of the factors limiting population growth for south coast threatened birds.
6. Translocations of western ground parrots, western bristlebird and noisy scrub-birds have resulted in the establishment of at least one additional breeding population of each species.
7. There is the formation of, or maintenance of, a friends group for the western ground parrot, western bristlebird and noisy scrub-bird, and there were at least two community members on the SCTBRT.

Criteria for failure:

This recovery plan will be deemed to have failed if; within 10 years any of the following are achieved:

1. Any of the five extant taxa of the south coast threatened birds have become extinct or declined.
2. All of the known sites of the extant south coast threatened birds have not been surveyed at least once.
3. The habitat critical for survival for each species of the south coast threatened birds has not been mapped.
4. A systematic survey for the rufous bristlebird (western) in all likely habitats has not been completed.
5. There is no increase in knowledge of the factors limiting population growth for south coast threatened birds.
6. No translocations of any taxa of south coast threatened birds were conducted.
7. Friends groups for the western ground parrot, western bristlebird and noisy scrub-bird were not formed or maintained, and there was no community representation on the SCTBRT.

Recovery actions:	
1.	Coordinate implementation of the multi-species recovery actions.
2.	Refine, locate and map the area of habitat critical for the survival of each of the south coast threatened birds.
3.	Continue habitat management and threat abatement of all areas occupied by south coast threatened birds within an adaptive management framework.
4.	Develop survey and monitoring protocols for south coast threatened birds to improve detection of population changes, in particular small changes in populations.
5.	Continue to monitor sites where species are known to occur and survey any new sites of all extant south coast threatened birds.
6.	Continue existing translocation programs and develop a western ground parrot translocation and captive breeding program.
7.	Conduct genetic research to resolve the taxonomic status of the two western whipbird subspecies.
8.	Publish and distribute south coast threatened birds information and facilitate community participation in recovery and management activities.

1 Introduction

This recovery plan covers five taxa of threatened and priority birds that occur in coastal and near-coastal habitats on the south coast of WA (Table 1) and one taxon that is presumed to be extinct. The taxa considered in this plan are herein referred to as the 'south coast threatened birds'.

The south coast threatened birds overlap extensively in their distributions and have largely declined to their current status because of similar factors. Six other non-marine threatened bird taxa also occur in the same South Coast Region: Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*C. baudinii*), forest red-tailed black-cockatoo (*C. banksii naso*), western long-billed or Muir's corella (southern) (*Cacatua pastinator pastinator*), malleefowl (*Leipoa ocellata*) and Australasian bittern (*Botaurus poiciloptilus*), but are not covered by this plan because they have far more widespread distributions, occur largely in different habitat or are covered by other recovery plans.

This recovery plan provides background information on the south coast threatened birds, threatening processes affecting them, and integrated actions for the recovery of these taxa. Through an adaptive management approach, new information and the evaluation of previous actions will be used to inform and improve the recovery program. Further background information, species-specific recovery actions, and area-based management actions are provided in Gilfillan *et al.* (2006).

1.1 Conservation status

Four of the south coast threatened birds considered in this recovery plan are listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and listed as Schedule 1 (rare or likely to become extinct) in the Western Australian *Wildlife Conservation Act 1950* (Table 1). The western whipbird (western mallee) is not listed under state legislation and was delisted from 'vulnerable' under the (EPBC Act) in July 2009. This taxon is included in this recovery plan and managed on the basis of its state classification as a 'priority 4' species (in need of monitoring). The rufous bristlebird (western) is considered extinct and presumed extinct, but is included in the plan because of unconfirmed reports of this subspecies and the lack of a systematic survey.

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

Species	Conservation Status	
	National[1]	**Western Australia**[2]
Western ground parrot or kyloring (*Pezoporus flaviventris*)	Critically 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*)	Not listed	Not listed (Priority 4)
Rufous bristlebird (western) or south-western bristlebird (*Dasyornis broadbenti litoralis*)	Extinct	Schedule 2 (Presumed to be Extinct)

Relevant legislation:

[1] *Environment Protection and Biodiversity Conservation Act 1999*

[2] *Wildlife Conservation Act 1950 (WA)*

1.2 South Coast Threatened Birds Recovery Team

The recovery program for south coast threatened birds is coordinated by the multi-species SCTBRT, which was formed in 1996. This recovery team replaced three single species (noisy scrub-bird, western bristlebird and western ground parrot) recovery teams and also assumed responsibility for the two western whipbird subspecies and the rufous bristlebird. This multi-species recovery team was formed because membership of all three single species teams was similar, to improve cost-effectiveness and facilitate the integration of recovery activities for the south coast threatened bird taxa, all affected by the same threatening processes, especially where their geographic ranges overlap.

The membership of the SCTBRT currently includes individuals with relevant expertise from the Department of Parks and Wildlife, BirdLife Australia, independent researchers and veterinarians, Friends of the Western Ground Parrot and the Albany Bird Group; however, membership may change over time.

The SCTBRT provides advice and assists in coordinating the recovery actions outlined in this recovery plan. This recovery plan replaces the current national recovery plan for the noisy scrub-bird (Danks *et al.* 1996) and the WA interim recovery plan for the western ground parrot (Burbidge *et al.* 1997).

2 Species information

Table 2 summarises the current known distribution of each of the south coast threatened bird species, and the key threats at each location (refer to Section 3 for further details of threats). Distribution maps for each species are presented as Appendix 1.

Table 2: Current distribution of south coast threatened species and key threats at each location.

Common name	Scientific name	Subpopulation Location	Tenure	Major Threats	Population estimate
Western ground parrot	(*Pezoporus flaviventris*)	FRNP, CANP and nearby parts of Nuytsland Nature Reserve	DPaW managed estate	• Fire • Predation by foxes & feral cats • Phytophthora dieback • Climate change	<140 (Gilfillan *et al*. 2006; Bondin *et al*. 2011)
Western bristlebird	(*Dasyornis longirostris*)	TPBNR to Bluff Creek	DPaW managed estate, private property, shire reserve, UCL	• Fire • Predation by foxes & feral cats • Phytophthora dieback • Introduced herbivores • Weed invasion • Climate change	203 pairs in 2005 (Tiller *et al*. 2006)
		FRNP	DPaW managed estate	• Fire • Predation by foxes & feral cats • Phytophthora dieback • Climate change	<160 pairs in 2005 (A.H. Burbidge unpubl.)
Noisy scrub-bird	(*Atrichornis clamosus*)	TPBNR to Cheyne Beach	DPaW managed estate, private property, shire reserve, UCL	• Fire • Predation by feral cats • Introduced herbivores • Weed invasion • Climate change	379 singing males in 2011 (S. Comer unpubl.)

Common name	Scientific name	Subpopulation Location	Tenure	Major Threats	Population estimate
		Bald Island (translocation)	DPaW managed estate	• Fire • Biosecurity	115 singing males in 2012 (S. Comer unpubl.)
Western whipbird (western heath)	(*Psophodes nigrogularis nigrogularis*)	TPBNR to Cape Riche Road	DPaW managed estate, private property, shire reserve, UCL	• Fire • Phytophthora dieback • Introduced herbivores	196 pairs in 2005 (Tiller *et al*. 2006)
Western whipbird (western mallee)	(*Psophodes nigrogularis oberon*)	Reserves and remnants of the southern wheatbelt and south coast including FRNP and SRNP	DPaW managed estate, private property, shire reserve, UCL	• Fire • Predation by foxes & feral cats • Fragmentation/degradation of remnants • Introduced herbivores • Weed invasion	unknown

2.1 Western ground parrot (*Pezoporus flaviventris*)

2.1.1 Description

The western ground parrot also known as kyloring by the Ngoongar aboriginal people is a medium-sized, slim parrot (105-110 grams, wing length 135-145 millimetres (Burbidge *et al.* 1989)) with a long, strongly graduated tail comprising narrow, pointed feathers (Forshaw 1973, 1981) and short, rounded wings. The adults are generally rich green, strongly mottled with black and yellow, with a red frontal band above the beak.

Conventionally, three subspecies of ground parrot (*P. wallicus*) have been recognised, with the western ground parrot differing from the other subspecies with slight morphological differences (the western ground parrot has a yellow, rather than greenish yellow, lower breast and abdomen), some habitat differences, and possibly behavioural differences (including differences in calls) (Burbidge *et al.* 1989, 1990). Recent genetic work indicates that the western ground parrot differs significantly from the eastern birds, has been separated for about two million years, and is best treated as a full species in its own right (Murphy *et al.* 2009, 2010).

2.1.2 Distribution and habitat

At the time of 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 WA (Watkins 1985).

Western ground parrots are known to exist in only FRNP and CANP and nearby parts of Nuytsland Nature Reserve (Appendix 1: Map 1). They occur in long unburnt (5 to 40 or more years); floristically diverse, near-coastal dry heath (400 to 500 millimetres rainfall). This vegetation is usually less than 0.5 metres high, though often up to one metre high, with more than 50 per cent cover. Sedges are generally abundant, making up 40 per cent of total cover. Although these parrots are usually found in long unburnt vegetation, they have been observed to feed in habitats two to three years post-fire, provided there is older vegetation nearby.

The whole population of western ground parrots was estimated in 2004 and 2005 to be fewer than 200 individuals, having declined from an estimated 378 birds in 1990. Although reliable estimates of numbers are difficult to obtain because of the parrots' cryptic nature and low population densities (Cale and Burbidge 1993), it does appear that this decline in numbers is real for at least some locations. There has been a rapid decline in numbers in the FRNP between 2000 and 2011 (Burbidge *et al.* 2007).

2.1.3 Biology and ecology

Western ground parrots are known to have good dispersal abilities and can fly long distances. However, they are rarely seen, and spend much of the day walking, feeding and resting in the low heathlands. These parrots eat seeds, fruits and flowers with little specialisation (although they avoid big seeds in woody fruits) and forage on the ground or in low shrubs (Table 3). In 2009, the analysis of video footage of a wild ground parrot feeding resulted in the identification of several flora species

utilised by this bird (A. Berryman pers. comm. 2012). Regular flights are not made until after sunset or before sunrise when they fly between feeding and overnight roosting sites.

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

The call of the western ground parrot is a distinctive series of high-pitched whistling notes and an occasional buzzing call. Buzzing calls have not been reported for the eastern ground parrot and have only been recorded in western birds. Calling generally occurs 20 to 60 minutes after sunset and about 20 to 60 minutes before sunrise (Burbidge *et al*. 2007).

2.2 Western bristlebird (*Dasyornis longirostris*)

2.2.1 Description

The western bristlebird is a medium-sized (weight 26-39 grams, length around 17 centimetres), ground dwelling bird with short wings, long graduated tail and a sturdy, slightly decurved bill. The adults have rufous brown wings, rump and tail, and the under-body is off-white to brownish-grey and finely scalloped black-brown (Higgins and Peter 2002).

2.2.2 Distribution and habitat

Historic records of the western bristlebird suggest that it occurred in coastal areas from Perth to Augusta and from Albany to FRNP (Burbidge 2007). The western bristlebird occurs at TPBNR, Betty's Beach, Mount Manypeaks to Bluff Creek, and in FRNP (McNee 1986, Comer and McNee 2001; Appendix 1: Map 2). No bristlebirds have been located in the area between these two locations, a distance of 120 kilometres, despite extensive apparently suitable habitat.

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

The total population size of the western bristlebird is not known with certainty. The most recent population estimate was at least 327 pairs in 2005. The density of birds appears to be far greater in the Manypeaks-Waychinicup areas than in the FRNP, but reasons for this are unknown. The number of birds in the Albany to Mount Manypeaks area was found to have declined from 2001 to 2005, largely because of bushfires, although the cause for the decline in some areas is unclear and may be an artefact of survey effort (Comer and McNee 2001, Tiller *et al.* 2006). Recent translocations of the western bristlebird to the west of Albany have not been successful (Burbidge *et al*. 2010).

2.2.3 Biology and ecology

The western bristlebird is shy, elusive and rarely seen, though frequently heard in suitable habitat. They forage mostly on or close to the ground for invertebrates and seeds. They fly weakly and reluctantly, and then only for short distances, skimming the vegetation (Higgins and Peter 2002, Table 3).

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

2.3 Noisy scrub-bird (*Atrichornis clamosus*)

2.3.1 Description

Noisy scrub-birds, also known as tjimiluk, are small, solidly built birds with a strong pointed bill, powerful legs, graduated tail and short, round wings. They are brown above with dark cross-barring extending from the head to the tip of the tail. The dark bars are fine on the head, broader and more obvious on the back, and form irregular bands on the tail feathers. The underparts are paler with a buff-coloured abdomen grading to bright rufous around the vent. The species is sexually dimorphic in size and plumage, with adult males having a dark grey band of variable width across the off-white throat and prominent white side flashes, and with females having cream-coloured throats, lacking the dark grey band present on males. During the breeding season, females have a mean weight of around 34 grams while males have a mean weight of 51 grams (DEC 2011).

2.3.2 Distribution and habitat

The noisy scrub-bird was recorded from three separate areas in the south west of WA in the first 50 years after it was discovered. Mount William-Drakesbrook, Augusta-Margaret River, and the Albany area. By the early 1900s it was suggested that it may be extinct, until its rediscovery at Two Peoples Bay in 1961 (Webster 1962, Danks *et al.* 2011). Despite searches elsewhere in its former range, it has not been located.

The noisy scrub-bird occurs in two subpopulations, one occurring on the mainland in coastal areas from TPBNR to Cheyne Beach and the other, a translocated population offshore on Bald Island (Danks *et al.* 1996, Gilfillan *et al.* 2007; Appendix 1: Map 3).

The mainland subpopulation is comprised of local populations at Moates Lake-Gardner Lake, Mount Gardner, Angove River-Normans Inlet, Mount Manypeaks, Waychinicup and Mermaid Point, but is considered to represent a single subpopulation because the local populations are connected to each other by corridors of suitable habitat that have been observed to facilitate the movement of birds (Danks 1991, Danks *et al.* 1996, S. Comer pers. comm. 2012).

Noisy scrub-bird populations are censused by recording the number of singing territorial males. This is therefore an index of the actual population size, rather than an absolute measure (Smith and Forrester

1981). A complete survey of the noisy scrub-bird in 2001 revealed a population index of 765 (increased from 590 in 1997). However, a survey in 2005 recorded only 343 territorial males. The decline was primarily due to loss of habitat associated with a large bushfire at Mount Manypeaks in 2004 (Comer *et al.* 2005). Subsequent surveys of the Albany Management Zone in 2011 recorded a population index of 494, with some recolonisation of habitat on the southern slopes and gullies of Mt Manypeaks.

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

Noisy scrub-birds occur in long unburnt vegetation and are most abundant in vegetation more than 10 years post fire. It is thought that habitat may be suitable for re-colonisation 4-10 years after fire, depending on the habitat type. The maximum post-fire age at which vegetation can support these birds is unknown (Danks *et al.* 1996), however, vegetation on Bald Island which has not burnt for over 120 years supports a healthy population of scrub-birds (Burbidge 2003, Comer *et al.* 2010b).

2.3.3 Biology and ecology

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

Noisy scrub-birds have limited capacity for flight, being unable to sustain flight for more than a few metres. However, they frequently use their small wings to assist in rapid manoeuvring and short runs on the ground and in leaping from shrub to shrub. They are also agile climbers, moving quickly from shrubs and sedges to the low canopy. Noisy scrub-birds feed mostly on or near the ground, foraging in leaf litter, the bases of sedge clumps, dense shrubs and decaying wood, primarily on invertebrates and occasionally on small frogs and lizards (Danks and Calver 1993, Danks *et al.* 1996). Males are territorial, defending long-term, non-overlapping territories with a loud, directional song that can be heard throughout the year, but which is more frequent during the breeding season of May to October (for more information see Table 3).

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

2.4.1 Description

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

There are four subspecies of western whipbird, two of which occur in WA. *P. n. nigrogularis* (western heath) are plain olive-grey birds with dull banded tails while *P. n. oberon* (western mallee) are slightly bigger, greyer and whiter-bellied birds with brighter bands on the tail (Schodde and Mason 1991). These two subspecies also have recognisably different calls (B. Newbey pers. comm.) and different nest architecture (R Johnstone pers. comm.). Schodde and Mason (1999) suggested that they may be two separate species, although preliminary genetic analyses (Christidis and Norman 1999, Toon *et al.* 2013*)* do not support species level separation.

2.4.2 Distribution and habitat

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

The western whipbird (western mallee) previously occurred between Cape Arid and Cape Riche, extending inland in the west to about 30 degrees south (Schodde and Mason 1991). This bird is now restricted to a scattered distribution throughout the southern wheatbelt and central south coast region, with the majority in FRNP and SRNP (McNee 1986, Cale and Burbidge 1993, Garnett and Crowley 2000) (Appendix 1: Map 4). It occurs in open mallee eucalypt woodland with a dense, tall shrub layer up to 1.5 metres tall, dominated by such species as *Hakea, Lambertia*, or *Banksia* (Higgins and Peter 2002).

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

2.4.3 Biology and ecology

Both subspecies of western whipbird are insectivorous, mostly foraging on the ground or in low vegetation (Higgins and Peter 2002) but small vertebrates are sometimes taken (Elson 2008). They occupy sometimes overlapping home ranges and their breeding season is July to October (Table 3). Their flight is strong but not for great distances, and they therefore have a fairly poor dispersal ability. These birds are sexually dimorphic in calls, which are made up of a series of grating and creaking whistles. Some calling is antiphonal, with females replying to the male's territorial calls (Smith 1991).

2.5 Rufous bristlebird (western) (*Dasyornis broadbenti litoralis*)

2.5.1 Description

The rufous bristlebird (western) is one of three subspecies of *D. broadbenti*; the others, being the extant coorong (*D. b. broadbenti*) and otways (*D. b. caryochrous)* rufous bristlebirds from South Australia and Victoria. The rufous bristlebird (western) shows slight sexual dimorphism, is a medium-sized and sturdy bird, similar to the western bristlebird but larger (around 25 centimetres long and weighing about 75 grams) (Schodde and Mason 1999). It has a more rufous colour, especially around the head, and a noticeably large, broad tail (Schodde and Mason 1999).

2.5.2 Distribution and habitat

The rufous bristlebird (western) was known only from the coast between Cape Mentelle and Cape Naturaliste at the south-western tip of WA (Milligan 1901, Burbidge 2007, Appendix 1: Map 5), where it was last recorded reliably from specimens collected between 1901 and 1906 (Smith 1977). There were unconfirmed reports of this subspecies in 1940 (Serventy and Whittell 1976) and more recently in 1977 (Garnett 1992a) but subsequent attempts to find it in the Leeuwin Naturaliste area have not been successful (Blakers *et al.* 1984, Garnett 1992a). On the basis of the lack of confirmed records since 1906, this taxon is presumed to be extinct.

The habitat preferences of the rufous bristlebird (western) are poorly known, but it was reported to be an inhabitant of dense coastal heath around 40 centimetres high (Milligan 1901, Garnett and Crowley 2000). This type of habitat is still found on the Leeuwin-Naturaliste ridge, and is largely restricted to the Leeuwin-Naturaliste National Park. The rufous bristlebird (western) is considered to have become extinct because of the burning and clearing of its habitat for pasture (Carter 1924). Predation by feral cats may also have adversely affected the population of this ground foraging bird.

2.5.3 Biology and ecology

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

Table 3: Key aspects of the biology and ecology of extant south coast threatened birds. (Habitat requirements are summarised in Table 4).

Species	Breeding	Habits	Diet and foraging	Activity period	Movements and social organisation
Pezoporus flaviventris, western ground parrot or kyloring	• 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 big seeds in woody fruits); may use more green fruit and vegetable material than *P. wallicus* (Burbidge *et al*. 1989) •Forages on the ground or in low shrubs	Active from 20-60 mins before sunrise, resting late morning to late afternoon, 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 Nov. extending through summer
Dasyornis longirostris, western bristlebird	• 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 alone or in pairs •Mostly forage on or close to the 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 •Sedentary, sometimes overlapping fixed home ranges •Sometimes >two singing birds occupy home range, •Recorded surviving low intensity fire by limited movement into nearest vegetation. Where habitat suitable birds recorded settling near fire edge, and moving back to preferred sites.
Atrichornis clamosus,	• Season: April-Oct (can extend	•Semi-flightless; birds	•Mainly soil and litter-	Diurnal; males	• Sedentary and territorial; males

Species	Breeding	Habits	Diet and foraging	Activity period	Movements and social organisation
noisy scrub-bird or tjimiluk	to Nov) • Clutch size: 1 • Parental care: only female 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	stay near to ground in dense vegetation, running quickly and seldom flying (Higgins *et al.* 2001) •Nests low to the ground •Poor dispersal ability	dwelling macro-invertebrates, occasionally small vertebrates •Forage on or near ground; under dense vegetation, among leaf litter, debris, decaying wood and at base of shrubs and clumps of rushes/sedges; also feed from surfaces of leaves and stems of shrubs in lowest stratum (Higgins *et al.* 2001)	move to roosting site at dusk and leave shortly after first light	defend long-term, non-overlapping territories using song (Smith, 1996) • Core area of territory remains constant (Smith, 1996) • Bonds; not known, suggested to be essentially monogamous but possibly polygamous (Smith 1976, 1985, 1990, 1996).
Psophodes nigrogularis nigrogularis, western whipbird (western heath)	• 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 alone or in pairs •Mostly forage on the ground or in low vegetation	Diurnal	•Occupy sometimes overlapping home ranges •Bonds: appear to be monogamous •Juvenile dispersal appears to occur just before the beginning of the next breeding season •Juveniles do not move far from natal territory

Species	Breeding	Habits	Diet and foraging	Activity period	Movements and social organisation
Psophodes nigrogularis oberon, western whipbird (western mallee)	• Season: July to Aug (Whittell 1939, Elson 2008), eggs found in Oct at Ongerup (Howe and Ross 1933) • Clutch size: 2 • Parental care: both sexes incubate (Elson 2008) • 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: mainly terrestrial invertebrates • Forage alone or in pairs • Mostly forage on the ground or in low vegetation • In Stirling Range a pair, were seen foraging on the ground under mallee vegetation, they turned leaf -litter over with their bills and were not seen to use their feet (Rose 1991)	Diurnal	•Probably similar to western heath subspecies •Apparently in territories or home ranges, probably maintained but are details unknown

3 Threatening processes

3.1 Historical causes of decline

Historically, all south coast threatened birds suffered significant reduction in numbers and contraction of range following colonial settlement in the late 1800s. The dramatic reduction in suitable habitat in the region, through land clearing and inappropriate fire regimes that followed, has been implicated as the most significant cause of population decline for all taxa (Ashby 1921, Condon 1966, Smith 1977, 1985a, McNee 1986, Garnett 1992a, 1992b, Watkins and Burbidge 1992, Danks *et al.* 1996, Burbidge 2003).

3.2 Current threatening processes

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

The key threats to the south coast threatened birds are loss or degradation of habitat through too frequent and extensive fires, predation by introduced predators, fragmentation and degradation of habitat through introduced species and disease, and climate change. The effects of the key threats on the south coast threatened birds are summarised below. Further details on all the threatening processes and their effects on the birds are summarised in Gilfillan *et al.* (2006), while some of the challenges in managing these threats are outlined in Comer *et al.* (2010a) and Bondin *et al.* (2011).

3.3 Loss or degradation of habitat through too frequent and extensive fires

All the south coast threatened birds occur in a low number of small or fragmented sub-populations and therefore extensive fire, even if infrequent, is the single most significant threat to their persistence in all areas. The significance of the threat of large bushfires on these taxa was demonstrated by the Mount Manypeaks fire in December 2004, which resulted in the loss of more than half of the population of noisy scrub-birds and a significant proportion of the populations of both western bristlebirds and western whipbirds (western heath) (Comer *et al.* 2005). A more recent fire started by lightning in CANP in January 2011 had a significant impact on the western ground parrot population, with about 30 per cent of the known population impacted by a single bushfire event (Comer *et al.* 2011).

The intensity, extent and frequency of fires are likely to be critical factors in determining survival and post-fire colonisation by south coast threatened bird taxa, and all are considered to be fire sensitive to some degree (Burbidge *et al.* 2005, Barrett *et al.* 2009). The species-specific responses of the western bristlebird, western ground parrot and noisy scrub-bird to fire have been discussed by Burbidge (2003)

and Burbidge *et al*. (2007), although much is still to be learnt. The response of the western whipbird to fire is less well known, but it has been suggested that the species requires long unburnt vegetation (Smith 1985a, McNee 1986).

All south coast threatened bird taxa use long unburnt habitat, but the optimal age of specific habitat types for each species is not well-understood. Habitat more than seven years post-fire is recommended for south coast threatened bird taxa (Gilfillan *et al*. 2006) but there is little evidence to date of a maximum suitable post-fire age being reached. For example, noisy scrub-birds translocated to Bald Island, which has been unburnt for more than 120 years, have successfully established despite a small founder group of only eight males and three females (Burbidge 2003, Comer *et al*. 2010b).

There are some records of western bristlebirds and noisy scrub-birds recolonising areas in Angove Reserve and Mount Manypeaks within three years of fire, but in the case of the Angove Reserve, noisy scrub-birds failed to persist. This was not the case on Mount Manypeaks, where rapid post-fire regeneration of gullies on the south side provided good nesting substrate and cover in south facing gullies, and several scrub-bird nests were found three years after the bushfire (Manson 2008). No data was obtained on successful recruitment from these, but the population on Mount Manypeaks has increased significantly, suggesting that some of these early post-fire breeding attempts are likely to have been successful. Burbidge *et al*. (2007) showed that western ground parrots can use recently burnt vegetation where it is immediately next to an established population. However, it should be noted this species is not dependent on fire to create habitat, at least in the timescale of 40 years.

Rebuilding, or establishing a population after fire is dependent 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. The age at which vegetation becomes suitable as breeding habitat is unknown, but is likely to vary between species and habitats. All taxa produce only one clutch per year of between one and three eggs, which is restricted to a specific season. The time taken for regeneration of habitat and food sources, combined with the low fecundity of the south coast threatened bird taxa, results in extreme vulnerability to local extinction because rapid build-up and recolonisation post fire is not possible. Until such information becomes available, it is best to assume that, in most instances, a post-fire age of at least seven years is required by all taxa (Gilfillan *et al*. 2006).

3.4 Predation by feral cats and foxes

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

For those taxa that inhabit relatively open vegetation types in parts of their range, European fox (*Vulpes vulpes*) predation is suspected to be a significant threat. These include the western ground parrot and the western whipbird (western mallee) and the western bristlebird populations in the FRNP.

The western ground parrot is thought to be susceptible because of their low numbers, the dry and relatively open habitats they use, a scent that is easily found by dogs (Mattingley 1918, Edwards 1924), and the known threat of foxes to ground-dwelling mammals (for example Kinnear *et al.* 1988). 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 threat.

Predation by feral cats (*Felis catus*) has possibly been a factor in the recent decline of western ground parrots. There are historical anecdotal reports of feral cats killing ground parrots and the closely related night parrots (*Pezoporus occidentalis)* (see Ashby 1924). In February 2004 a brief survey of cats at sites at which western ground parrots had declined in FRNP was conducted. Five cats were trapped, which is considered to indicate a high density of cats in this area. More recently trapping of cats in ground parrot habitat in CANP has had high yields with 21 cats trapped in nine days in 2011 and 21 in eight days in 2012 (Burbidge *et al*. 2011, S. Comer pers. comm. 2012). Cat numbers are thought to have increased in many of the reserves in the south coast since regular fox baiting began in 1996 (S. Comer pers. comm. 2012).

Feral cats may also be more of a threat than foxes to those bird taxa that inhabit dense vegetation because of their 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 pers. comm. 2012) and cats have been observed in significant numbers in the Fitzgerald River, Cape Arid, Two Peoples Bay, Mount Manypeaks and Waychinicup areas.

3.5 Fragmentation and degradation of remnant vegetation

The effects of fragmentation of habitat, and degradation of remnants (i.e. salinity) are most pronounced for habitat of the western whipbird (western mallee) in the Wheatbelt Region. Within this region more than half of the whipbirds occur in isolated patches of remnant vegetation of less than 150 hectares.

There is some evidence to suggest that individuals can move between these isolated remnants. McNee (1986) reported that western whipbirds (western mallee) were found to have established themselves in a reserve near Ongerup, where they had not been recorded previously. The nearest known source of birds was 4.5 kilometres away and there was little connectivity between the two remnants. It is unknown if birds can move between remnants that are a greater distance apart given their presumed low dispersal capability. If birds at some locations are effectively isolated there are likely to be consequences for genetic variability such as inbreeding depression, genetic drift and founder effects, all of which can lead to a loss of genetic variation. The complete isolation of most of these remnants is still quite a recent event (over the last 40 years), so the genetic consequences may still be developing.

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 (for example failure to breed in one year, or loss of young), and

environmental stochasticity (for example random variation in factors such as rainfall, food or predators) (for example 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).

3.6 Habitat degradation by introduced herbivores

Domestic and feral herbivores have the potential to cause significant impacts through the disturbance of native vegetation and subsequent changes in structure 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.

Cattle regularly disturb Angove Lake, and occasionally disturb the riparian vegetation around Lake Gardner. Goats are known to impact the western end of FRNP and areas around Pallinup. Horses are known to cause degradation to the east of Esperance. Deer are known to be present in the coastal area through Lake Shaster and Stokes NP (S. Comer pers. comm. 2013).

3.7 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 create 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)* blackberry (*Rubus fruticosus* aggregate) 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. Most weed species occurring within small remnants in the wheatbelt are not woody weeds and are less likely to impact significantly on western whipbird (western mallee subspecies) habitat. However, non-woody annual weed species may lead to higher fuel load for fires that may burn hotter and more frequently.

3.8 Phytophthora dieback

The impact of *Phytophthora* dieback on south coast threatened birds is unknown. Habitat used by the western bristlebird, western whipbird and noisy scrub-bird in TPBNR has been infected by *P. cinnamomi* since the 1940s, suggesting that these taxa are able to withstand any detrimental effects within this time frame (Gilfillan *et al.* 2006). However, longer term impacts of *Phytophthora* dieback remain unknown. For example the potential impact of *Phytophthora* dieback on western ground parrots is likely to vary depending on the specific location of the occupied habitat. In the FRNP occupied areas are dominated by dieback sensitive species, whereas some habitat in the wetter areas

of CANP, and the area previously occupied by this species at Waychinicup, is already infested by dieback. The loss of vegetation structure because of *Phytophthora* dieback is likely to have a significant impact on the cover provided in these areas.

3.9 Climate change

The South Coast Region between Walpole and Esperance has experienced little reduction in average annual rainfall. Spring and summer rainfall has even increased in the eastern part of this region. Average maximum summer temperatures over the region have fallen, however mean temperature and overall maximum temperature have increased (BOM 2011).

Increased temperatures associated with climate change may lead to a loss of remnant vegetation and further habitat loss for all of the south coast threatened bird species. It also has the potential to reduce the food source for those that rely on specific floristic species and invertebrates. Climate change may lead to changes in distribution because of changing suitability of habitat (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 and 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 (Gilfillan *et al*. 2006). The other aspect of climate change that needs to be considered is the potential for invasive species to be favoured, for example, predators, weeds and potentially grazing species.

Globally numerous climate model simulations have shown that lightning activity will increase in a warmer climate (Price and Rind 1994, Grenfell *et al*. 2003, Shindell *et al*. 2006). Del Genio *et al*. (1997) showed that in certain regions the drying in a warmer climate reduces the frequency of thunderstorms, but the strongest storms occur more often. As climate change continues to occur in southern WA it is likely that there will be a general increase in dry lightning storms and bushfires (R. Sneeuwjagt pers. comm.). There has been a noticeable increase in the incidence of lightning-caused bushfires in the South Coast and South West Regions (see Fig. 1), which has coincided with extended drought years. If storms occur less often but with greater intensity this will have implications for fire management in the region. Larger storms will mean more lightning strikes and therefore potentially more fires starting at the same time in different locations, to control the fires there will be a need for larger contingency teams and more fire suppression equipment.

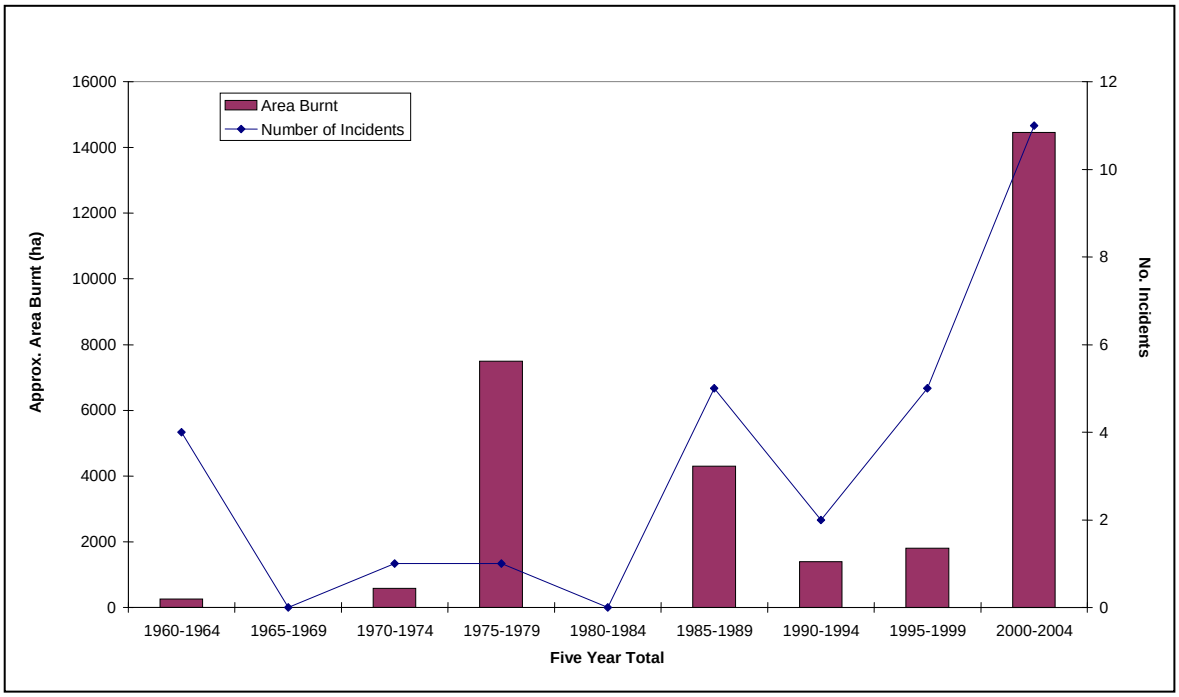

Figure 1: Incidence and impact of bushfire in the Albany Management Zone* 1960-2004.

*Includes the coastal area from Gull Rock National Park to Cheyne Beach and Bald Island.

3.10 Biosecurity

Noisy scrub-birds have been translocated and established on Bald Island. This island is currently free from introduced predators such as cats, foxes and rats. There is a biosecurity risk that such predators may arrive on the island and cause significant impact to the population. As such quarantine and surveillance measures are recommended.

4 Habitat critical to the survival of the taxa

Habitat critical to the survival of these taxa is broadly defined as:

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

Defining and mapping habitat critical to survival, including the area of occupancy of all populations of each species, and their potential habitat, are included as recovery actions. Table 4 summarises the current knowledge about the habitat requirements for each taxon.

Table 4: Habitat requirements of extant south coast threatened birds.

Taxon	General habitat	Nesting habitat	Fire age	Dispersing habitat
Pezoporus flaviventris, western ground parrot	Usually long unburnt (age varies - 5-40+ years) floristically diverse, near-coastal dry heath (400-500mm rainfall), vegetation structure usually <0.5m high, but often up to 1m; >50% cover. Sedges are frequent, making up >40% of total cover. In the Fitzgerald area, the most common sedges are *Mesomelaena*, *Restio* and *Schoenus spp.*; shrubs with high cover values include *Allocasuarina*, *Agonis* and *Hibbertia spp.* May feed in habitat 2-3 years post fire if sedges are abundant and if older vegetation is nearby. (B. Barrett pers. comm.). Requires suite of plants providing seeds/fruit throughout the year.	Little known - nests found by Whitlock (1914) at Wilson's Inlet were under clumps of what he described as a prickly "dwarf" *Hakea* sp., and his brief description of their structure is consistent with the description by McFarland (1991) for Queensland nests.	Preferences unknown, but have been found in vegetation unburnt for 5-40+ years, and can feed in vegetation as young as 2-3 years post-fire.	Following post-natal dispersal, western ground parrots can occur away from known populations, sometimes in sub-optimal habitat. Strong flyer and is capable of dispersing across sparse vegetation and clear areas.
Dasyornis longirostris, western bristlebird	Floristically diverse closed near-coastal heaths up to 1-1.5m high with a wide variety of shrubs (such as *Banksia* spp.*, Melaleuca* spp.*, Hakea* spp. and *Lambertia* spp.*),* usually with abundant sedges and similar plants (such as *Anarthria* spp.*, Lepidosperma* spp. and *Gahnia* spp.*),* and with thickets of low eucalypts (2-4m tall), with either thick understorey or dense litter, sometimes with	Requires the presence of sedges and grasses for construction of the nest.	Fire requirements are not well known. Response to fire at a given site depends on the vegetation community. They can survive at least mild intensity fires or fires of limited extent and in some cases set up new home ranges in the nearest available unburnt habitat, provided it is not too distant. Interval between fire and	Unlikely to disperse across more than a few hundreds of metres of cleared land. Dispersal through vegetation 2-3 years post fire has been observed, but is poorly understood.

Taxon	General habitat	Nesting habitat	Fire age	Dispersing habitat
	emergent *Agonis flexuosa* or thickets of *Taxandria juniperina*. In FRNP the habitat is more open, but contains dense wide shrubs. Known to eat insects and may eat seeds.		re-occupation varies. At TPBNR 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. At FRNP birds re-colonised 6-28 years 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, birds recolonised the eastern ridge after a fire in 1979 but subsequently disappeared from the area by mid-1990s, apparently because the vegetation became too tall (>2m) albeit dense.	

Atrichornis clamosus, noisy scrub-bird or tjimiluk	Core areas of male noisy scrub-bird territories are found in dense, long unburnt (>10 yrs) vegetation characterised as low forest (5-15m 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 a dense layer of shrubs and rushes at the edges of swamps, streams or other wetlands and on the sides of gullies close to the ground	Most abundant in 10+ years post fire and is dependent on vegetation community type, habitat may be suitable for re-colonisation after 4-10 years however the age at which unburnt vegetation becomes suitable is unknown, although on Bald Island, where post-fire age of the vegetation is over 120 years, the number of scrub-birds is still increasing.	May be 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 is poorly understood.
Psophodes nigrogularis nigrogularis, western whipbird (western heath subspecies)	Heath-like thicket associations on coastal dunes and in low dense mallee woodland or shrubland with understorey of dense, stunted shrubs (Higgins and Peter 2002). Floristic composition not important	dense shrubs in thickets or heaths	At TPBNR, numbers increase where fire was excluded for many years (Smith 1991), but they have been observed to recolonise areas of burnt vegetation 7-10 years after fire in one area (Smith 1985) and 4-6 years after fire in another, the recolonisation time being related to the growth rate of the vegetation (Smith 1991)	

Psophodes nigrogularis oberon, western whipbird (western mallee subspecies)	Open mallee eucalypt woodland with dense, tall shrub layer up to 1.5m tall, dominated by such species as *Hakea*, *Lambertia*, or *Banksia* (Higgins and 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 caleyi* (southern wheatbelt).	14-15 years post-fire (FRNP), 25 yrs (SRNP) (Smith 1985, McNee 1986)	May be able to disperse across relatively poor habitat.

5 Guide for decision makers

Under the EPBC Act, any person proposing to undertake actions which may have a significant impact on any listed threatened species or ecological community should refer the action to the Minister for the Environment. The Minister will then determine whether the action requires EPBC Act assessment and approval. As these provisions relate to proposed (i.e. future) actions, they can include:

- actions which may result in increased impact from existing threat/s or potential threat/s; and
- actions which may result in a new threat.

Actions which could have a significant impact on one or more of the south coast threatened birds include any action that may result in any of the following in habitat critical to survival of the species:

- disturbance of the soil or native vegetation
- removal of native vegetation
- increase in fire frequency or likelihood of bushfire
- spread of *Phytophthora* dieback
- increase in feral predators or the likely impact of feral predators
- increase fragmentation of habitat patches, decrease in patch size, or reductions in connectivity
- climate change
- weed invasion
- disturbance by feral and domestic herbivores.

6 International obligations

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

The noisy scrub-bird, western bristlebird and rufous bristlebird are listed under Appendix 1 (most endangered) in the *United Nations Environment Program World Conservation Monitoring Centre* (UNEP-WCMC) *Convention on International Trade in Endangered Species* (CITES), while the western ground parrot is listed under Appendix 2. The actions proposed in this recovery plan are consistent with these listings.

7 Affected interests

Most of the current area of occupancy of the south coast threatened bird taxa is within land managed by the Department of Parks and Wildlife, primarily national parks and nature reserves. The Department of Parks and Wildlife will be primarily responsible for the implementation of this recovery plan under the guidance of the SCTBRT.

Small numbers of western whipbirds (both subspecies), western bristlebirds and noisy scrub-birds also occur on private land, and the whipbird (western mallee) occurs within the former BHP Billiton Ravensthorpe Nickel Operation Mining Lease and on unallocated crown land (UCL). This suggests there may be some interests potentially affected by this plan, although in most cases, little impact upon current land use is likely as a result of this recovery plan. Landholders and land management agencies may be affected when seeking to alter the landscape or undertake actions that may affect south coast threatened birds as outlined in *Guide to Decision Makers*. Where populations or sub-populations occur on lands other than those managed by the Department of Parks and Wildlife, permission has been, or will be, sought from the managers prior to recovery actions being undertaken.

8 Role and interests of Aboriginal people

In the preparation of this plan the important role Aboriginal people of the south coast have played in land management was recognised, and the impact of colonial settlement on this role acknowledged.

The Noongar people are the traditional owners of the South West of Australia. The local Aboriginal groups in the area covered in this recovery plan include Minang, Koren, Wudjari and Njunga. The interests of these groups are partially represented by the South West Aboriginal Land and Sea Council. There has been communication with the Department of Indigenous Affairs (southern region and goldfields), SWALSC (South West Aboriginal Land and Sea Council) and the Southern Aboriginal Corporation for input into this plan and implementation of the recovery actions.

Implementation of this plan will involve:

- knowledge sharing
- participation in education and training relevant to threatened species management
- engagement in recovery actions where relevant to aboriginal land management and communities.

None of the recovery actions covered under this recovery plan are believed to have the potential to adversely impact on aboriginal heritage.

9 Biodiversity impacts and benefits

As insectivorous or granivorous and largely ground-dwelling taxa, south coast threatened birds are likely to play an important role in maintaining the broad ecological functioning within the communities of which they are apart. The implementation of this plan will provide biodiversity benefits to other threatened and priority flora and fauna taxa, and threatened and priority ecological communities that occur within the area of occupancy of the taxa considered under this plan.

Threatened and other important fauna: Dibbler (*Parantechinus apicalis*), red-tailed phascogale (*Phascogale calura*), western mouse (*Pseudomys occidentalis*), heath mouse (*Pseudomys shortridgei*), Gilbert's potoroo (*Potorous gilbertii*), quokka (*Setonix brachyurus*), western ringtail possum (*Pseudocheirus occidentalis*), malleefowl (*Leipoa ocellata*), Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*C. baudinii*), forest red-tailed black-cockatoo (*C. banksii naso*), Australasian bittern (*Botaurus poiciloptilus*), the threatened freshwater fish western trout minnow (*Galaxias truttaceus hesperius),* mud minnow or western dwarf galaxias *(Galaxiella munda),* Balston's pygmy perch *(Nannatherina balstoni),* the Stirling Range Moggridgea spider (*Moggridgea* sp. (BY Main 1990/24,25)), the Stirling Range rhytidid snail (*Rhytidid* sp. Undescribed (WAM2295-69)) McCarthy's plant louse (*Acizzia* sp. (WAM E82757), Vesk's plant louse (*Acizzia veski*), 16 species of millipedes (*Atelomastix* species) with restricted distributions along the south coast and an extremely rich aquatic invertebrate fauna at TPBNR.

Threatened flora: A large number of declared rare flora (DRF) species occur throughout the area covered by the plan, particularly in the floristically rich FRNP and SRNP. DRF species in SRNP include *Banksia brownii, Gastrolobium luteifolium* and *Leucopogon gnaphalioides*; in FRNP include *Ricinocarpos trichophorus*, *Verticordia crebra*; in Waychinicup and Many peaks area include *B. Brownii* and *Isopogon uncinatus, B. verticillata*; and in CANP include *Andersonia pinaster*.

Threatened and priority ecological communities: The western whipbird (western mallee) and the western bristlebird occur within or adjacent to the threatened ecological communities 'Montane thicket of the eastern Stirling Range' (listed as Eastern Stirling Range Montane Heath and Thicket under the EPBC Act), and 'Thumb Peak, Mid mount Barren, Woolburnup Hill (Central Barren Ranges) *Eucalyptus acies* mallee heath', respectively.

South coast threatened birds are known to occur within or adjacent to the 'Proteaceae dominated kwongkan shrublands of the southeast coastal floristic province of WA' threatened ecological community (EPBC listed), which includes the following WA priority ecological communities:

- '*Banksia coccinea Shrubland/Eucalyptus staeri/Sheoak* open woodland';
- '*Melaleuca striata /Banksia* spp. coastal heath';
- '*Banksia coccinea* shrubland*/Melaleuca striata/Leucopogon flavescens* heath';
- '*Taxandria spathulata* heath'; and,
- Thumb Peak, Mid mount Barren, Woolburnup Hill (Central Barren Ranges) *Eucalyptus acies* mallee heath.

South coast threatened birds are also known to occur within or adjacent to the WA PECs:

- '*Eucalyptus purpurata* woodlands (Bandalup Hill)';
- 'Melaleuca sp. Kundip heath';
- 'Montane mallee of the Stirling Range'; and,
- 'Heath on Komatiite of the Ravensthorpe area'.

10 Social and economic impacts and benefits

The implementation of this recovery plan may have some minimal social and economic impact, as several species inhabit private property or mining tenements. However, most landholders are amenable to managing the habitat of the species for conservation. Some proponents of particular land uses (mining, quarrying and infrastructure) may be required to take measures to reduce the impact of their activities on south coast threatened birds. Where proposed development activities coincide with south coast threatened bird habitat, developers may be required to demonstrate that there will be no impact on south coast threatened birds or that any impacts can be adequately mitigated. Such requirements would be in place irrespective of this plan, and this plan will provide some clear direction for the implementation of such measures. The actions in this plan will be implemented in co-operation with private landholders or with leaseholders, including in relation to mining tenements.

11 Management practices and policies

Management practices (policies, strategies, plans) that have a role in the protection of the species include but are not limited to the following:

- *Western Shield* Fauna Recovery Program Draft Interim Strategic Plan 2009-2010 (DEC 2008)
- Policy Statement No. 29 Translocation of Threatened Flora and Fauna (CALM 1995)
- Policy Statement No. 33 Conservation of endangered and specially protected fauna in the wild (CALM 1991)
- Policy Statement No. 3 Management of *Phytophthora* disease (DPaW 2014)
- Two Peoples Bay Nature Reserve Management Plan (CALM 1995b)
- Fitzgerald River National Park Management Plan (CALM 1991b)
- Esperance and Recherche Parks and Reserves Draft Management Plan (DEC 2012a)
- South Coast Regional Fire Management Plan 2009-2014 (DEC 2009)
- Gilbert's Potoroo Recovery Plan 2004 (Courtenay and Friend 2004)
- Noisy Scrub-Bird Recovery Plan 1996 (Danks *et al.* 1996)
- Western Ground Parrot Interim Recovery Plan 1996-1999 (DEC 1997)
- Research plan for the Western Ground Parrot, Western Whipbird and Western Bristlebird (Cale and Burbidge 1993)
- The Action Plan for Australian Birds (Garnett and Crowley 2000)
- South Coast Threatened Birds Recovery Plan (Gilfillan *et al.* 2007)
- Fitzgerald Biosphere Recovery Plan (DEC 2012b)
- South Coast Threatened Species and Ecological Communities Strategic Management Plan (Gilfilan *et al.*, 2009)

12 Previous and existing management actions

This recovery plan replaces the former noisy scrub-bird recovery plan (Danks *et al.* 1996). The recovery objectives in the previous plan were to achieve and maintain a population size indicated by more than 300 singing males in the Albany Management Zone, and to commence the establishment of populations in a western management zone. Recovery actions aimed at achieving these objectives included the development and implementation of a management plan for Two Peoples Bay Nature Reserve, habitat management, translocation activities, monitoring and public education. Population monitoring of this species as a result of these recovery actions has shown a fluctuating population index of territorial males, however the baseline has remained above 300 singing males, thus achieving the objective. Translocation activities during the time span of this recovery plan included four attempts to successfully establish a population of noisy scrub-birds in eleven sites to the west of Albany (Comer *et .al*, 2010b). Birds translocated to the Darling Range area bred in one of eight sites, but the population did not persist. Two translocations to western management zones after 2002 also failed, one due to wildfire and one due to predation. Therefore the previous plan was deemed unsuccessful due to its inability to establish translocated populations. Further detail on the outcome and the effectiveness of each recovery action for the noisy scrub-bird from the previous recovery plan, see Appendix 2. The south coast threatened birds recovery plan aims to improve on the recovery of the noisy scrub-bird by presenting recovery actions that address the current needs of this species, for conservation and ultimately recovery.

Previous and existing management actions aimed at conserving and recovery of the south coast threatened bird species covered in this recovery plan, especially in the South Coast Region include population monitoring, biological and ecological research, translocations and threat abatement. A summary is provided below but further details are given in Danks *et al.* (1996), Burbidge *et al.* (1997), Gilfillan *et al.* (2006), Comer *et al.* (2009, 2010a) and Bondin *et al.* (2011).

12.1 Coordination of recovery program

The coordination of the recovery of the south coast threatened birds has been driven by the South Coast Threatened Bird Recovery Team that formed in 1996, and the development of this multi-species recovery plan.

12.2 Monitoring

There are annual population monitoring programs for some sub-populations of the western ground parrot and noisy scrub-bird, surveys of some western bristlebird sub-populations and only limited surveys for the western whipbirds. Monitoring has also gathered basic biological and distributional information on each of the south coast threatened bird taxa. These monitoring programs use similar methods for each species, but are dependent on the location of the site and factors being monitored.

12.3 Fire management

One of the considerations of fire management for the Department of Parks and Wildlife's' south coast threatened birds has been to develop and implement a program and bushfire response protocol to minimise the impact on habitat critical for south coast threatened bird species. At present it is assumed that, in most instances, post-fire age of at least seven years is required by all south coast threatened bird taxa. Current fire protocols for south coast threatened birds generally involve fire exclusion in habitat critical for these taxa. Interaction between nature conservation staff and fire management officers in the Department of Parks and Wildlife has been effective in:

- fire exclusion in habitat critical for these taxa
- planning for the mitigation of bushfire and prescription burning
- inclusion of nature conservation staff in the bushfire response incident control team
- preparation of Fire Management Guidelines for south coast threatened bird taxa (see Comer *et al*. 2009).

12.4 Introduced feral predator management

The impact of feral predators on south coast threatened birds has been managed by the *Western Shield Fauna Recovery Program* since 1996, which has successfully contributed to the reduction of foxes at a landscape scale. However, the standard baits and baiting regimes have proved ineffective in targeting cats which, with the reduction in fox competition, are thought to have increased in number (Onus *et al.* 2004). The differences in hunting capabilities of these two predators, suggests it is likely that each constitutes a different level of threat to south coast threatened bird taxa, although this exact level is unknown.

Planning efforts for south coast threatened bird recovery have concentrated on the development of a program to manage feral cat numbers on a landscape scale (Burbidge *et al.* 2010), including habitat critical to survival (Comer *et al*. 2010a, Bondin *et al*. 2011). It is expected that benefits from this program will flow on to other small to medium-sized native fauna species, with the knowledge obtained also to be used in the preparation of future translocation sites. This program has employed telemetry devices to study cats and has provided information on the success of baiting using Eradicat© baits (Burbidge *et al*. 2011). This information will be used to plan strategic baiting and trapping of feral cats in CANP and FRNP.

12.5 Phytophthora dieback hygiene protocols and control

Primary direction and guidance for managing the risk of introducing or spreading *Phytophthora* disease in natural areas in Western Australia is provided by the Department of Parks and Wildlife Policy Statement 3 (DPAW 2014). The South Coast Natural Resource Management Phytophthora Dieback Management Plan provides strategic context for investment in *Phytophthora* dieback (SCNRM 2010). Containment and eradication project activities underway throughout the region include removal of host plants, control of water drainage, installation of silt membranes to contain dieback spores and infected material, targeted chemical application to kill the pathogen, fencing to reduce the spread by animals, and regular application with the fungicide phosphite (SCNRM 2010).

Hygiene protocols have been developed by the Department of Parks and Wildlife to ensure that hygiene standards and instructions are consistent for all staff and contractors, with a 'Green Card' induction required before working in the conservation reserve system. Dry soil conditions are a prerequisite for all field operations, and adhered to by project staff. Park rangers restrict movement in and out of dieback affected areas in wet conditions by closing access tracks, and other information on dieback hygiene is provided to reserve visitors through signage and interpretation material.

Other dieback plans include the Esperance Stakeholder Engagement and Phytophthora Dieback Action Plan, which is a behavioural change action plan to reduce the spread of dieback due to human activities, and the Dieback Local Area Management Plans for Mt Lindesay and for Walpole Wilderness Area East which further guide on ground actions and community education (SCNRM 2012).

12.6 Translocation and captive breeding

The past fragmentation of remnant vegetation and the subsequent increase in threat caused by inappropriate fire and feral predators has restricted the distribution and dispersal capacity of the south coast threatened birds. Translocations are a tool that can assist in overcoming these issues.

There has been an active noisy scrub-bird translocation program since the early 1980s, which has resulted in the establishment of new individuals at sites, most significantly on Mount Manypeaks and Bald Island (Comer *et al*. 2010). As a precursor to larger translocation efforts, male only translocations of noisy scrub-birds were conducted to assess habitat suitability before introducing breeding females. Noisy scrub-birds were translocated to the Darling Range between 1997 and 2003, but this translocation was deemed unsuccessful as no birds have been heard calling since 2009. However, the noisy scrub-bird translocation program overall has been effective in increasing the population size and distribution of this species by assisting its dispersal and managing threats at translocation sites (Comer *et al*. 2010b). The genetic diversity of translocated populations has also been investigated (Cowan *et al*. 2013; Cowan *et al.* in prep).

Translocations of western bristlebirds in 1999 and 2000 saw 15 birds released from TPBNR to Nuyts Wilderness in the Walpole-Nornalup National Park (Burbidge *et al*. 2010). Some birds persisted in the release area for at least two years, but a major bushfire impacted on large areas of habitat. Predation was also suspected to have been a factor limiting successful establishment. Until issues of habitat management have been resolved further translocations of this species are not planned.

There are seven western ground parrots held in captivity, as part of a program initiated to establish husbandry techniques for this species. These birds have been maintained in captivity since 2010 and a captive breeding program for the species is a proposed recovery action.

12.7 Communication and education activities

Public awareness and understanding, updates on recovery actions, population trends and awareness raising activities of south coast threatened birds, is facilitated through the publication of information brochures, regular newsletters such as the South Coast Threatened Birds Newsletter and Western Ground Parrot Newsletter, and on the Friends of the Western Ground Parrot website. The results of research are also regularly presented at scientific workshops and conferences.

Private landholders in the Albany Region have for some years been aware of, and invited to participate in, noisy scrub-bird recovery actions where this taxon occurs on their lands. Information on habitat requirements of the taxon and appropriate management has been provided. Invitations to participate in surveys for the scrub-bird and other south coast threatened bird taxa are always extended when surveys are carried out on private property.

12.8 Weed control

Weeds of national significance and other environmental weeds control initiatives continue to be a source of strategic management activity for the South Coast NRM. Weed control work has been focused on containing larger infestations, eradication of small infestations and mapping new weed areas as they are discovered. Collectively work across the region has controlled more than 342 hectares of blackberry (*Rubus fruticosus*), gorse, lantana (*Lantana camara*), willows and bridal creeper (*Asparagus asparagoides*). Other environmental weed control works were undertaken on more than 193 hectares within the South Coast Region, weeds treated include; Sydney golden wattle, arum lily (*Zantedeschia aethiopica*), tagasaste (*Chamaecytisus palmensis*), broom bush and other problem weed species (SCNRM 2012).

Many community groups are tackling weed control on reserves and roadsides managed by Local Government Authorities. Control methods include physical removal, selective use of herbicides and the release of biological control agents such as leaf-hoppers and rusts to control blackberry and bridal creeper. Weed control is part of routine management in most national parks and nature reserves in the region (Danks 2004).

13 Recovery objectives and criteria

13.1 Recovery objectives

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

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

The objectives of this recovery plan are to:

1. Maintain population numbers of south coast threatened birds, at least at current levels, and increase where possible.
2. Continue to improve knowledge of the current distribution of south coast threatened birds.
3. Improve knowledge of those aspects of south coast threatened birds that limit their distribution and numbers and inform management actions accordingly.
4. Reduce vulnerability of south coast threatened bird populations due to their small size and area of extent, in particular western ground parrots, western bristlebirds and noisy scrub-birds.
5. Increase community participation and stewardship in the conservation of south coast threatened birds.

13.2 Criteria for success

This recovery plan will be deemed successful if, in 10 years all of the following are achieved:

1. All known populations of the extant south coast threatened birds have remained stable or increased in numbers from baseline data, where reliable data exists.
2. All known locations/sites and any new sites of the extant south coast threatened birds have been surveyed.
3. A systematic survey for the rufous bristlebird (western) in all likely habitats has been completed.
4. The habitat critical for survival for each species of south coast threatened birds is identified,mapped, and extent maintained.
5. There is an increase in knowledge of the factors limiting population growth for south coast threatened birds.
6. Translocations of western ground parrots, western bristlebird and noisy scrub-birds have resulted in the establishment of at least one additional breeding population of each species.
7. There is the formation of, or maintenance of, a friends group for the western ground parrot, western bristlebird and noisy scrub-bird, and there were at least two community members on the SCTBRT.

13.3 Criteria for failure

This recovery plan will be deemed to have failed if; within 10 years any of the following are achieved:

1. Any of the five extant taxa of the south coast threatened birds have become extinct or declined.
2. All of the known sites of the extant south coast threatened birds have not been surveyed at least once.
3. The habitat critical for survival for each species of the south coast threatened birds has not been mapped.
4. A systematic survey for the rufous bristlebird (western) has not been completed.
5. There is no increase in knowledge of the factors limiting population growth for south coast threatened birds.
6. No translocations of any taxa of south coast threatened birds were conducted.
7. Friends groups for the western ground parrot, western bristlebird and noisy scrub-bird were not formed or maintained, and there was no community representation on the SCTBRT.

13.4 Implementation and evaluation

This recovery plan will operate from the date of adoption and will remain in force until withdrawn or superseded. The SCTBRT will report annually to the Department of Parks and Wildlife on progress against the criteria for success and failure and will review and revise the plan every five years. Through the adaptive management approach, new information and the evaluation of previous actions will be used to inform and improve the recovery program.

This South Coast Threatened Birds Recovery Plan will operate within a 10-year time-frame, though it will remain in force unless reviewed and updated or replaced. This recovery plan replaces the current national plan for the noisy scrub-bird (Danks *et al.* 1996) and the Western Australian interim recovery plan for the western ground parrot (Burbidge *et al.* 1997).

14 Recovery actions

The following recovery actions are not necessarily in order of priority, but have been classified as 'high', 'medium' or 'low' priority. However, this should not constrain addressing any of the recovery actions if new information warrants re-prioritisation or funding is available for 'lower' priorities and other opportunities arise.

1. Coordinate implementation of the multi-species recovery actions.

The SCTBRT will continue to coordinate recovery programs for these and other threatened birds within the South Coast Region. A minimum of two community recovery team members will be maintained.

Tasks to be undertaken by the recovery team include seeking funding for recovery actions, and regularly reviewing the recovery program elements, such as the need and opportunities for translocations. All the translocations will be subject to approval as laid down in the Department of Parks and Wildife Policy Statement No. 29 'Translocation of threatened flora and fauna' (CALM 1995).

Cost: $4,000 p.a.
Priority: High
Completion date: Ongoing

2. Refine, locate and map the area of habitat critical for survival for each of the south coast threatened birds.

The habitat requirements for each of the extant south coast threatened birds will be further investigated to refine the definition of habitat critical to survival for each species. This will include determining the area of occupancy of all populations, and potential habitat, using existing data, desktop GIS surveys or where this information is not already available, from field surveys. This will be mapped in a GIS format available to stakeholders. Up to date locations of habitat critical for south coast threatened birds and their fire requirements will be regularly provided to the Department of Parks and Wildlife and Department of Fire and Emergency Services of WA (DFES) to ensure the consideration of south coast threatened birds in all fire management planning. This information will be kept in an easily accessible format (e.g. GIS map) to provide advice in bushfire situations.

In locating and mapping areas of potential suitable habitat, priority will be given to locating suitable habitat for the western ground parrot, noisy scrub-bird and western bristlebird, taxa for which translocations are a current recovery action (14.6). Although translocations to some areas may not be conducted for some time, early identification of areas with suitable habitat will allow appropriate management for preparation of those areas.

Tasks include:

- Continue to investigate the habitat requirements for south coast threatened birds, in particular in relation to fire age, vegetation structure and food availability.
- Map potential suitable habitat through habitat modelling using a combination of GIS derived variables and variables ground-truthed in the field.
- Map extent of occurrence and area of occupancy based on new survey results.
- GIS maps to be provided to the Department of Parks and Wildlife and FESA staff for situation mapping at bushfire incidents.

Cost: $200,000 p. a. for the first three years
Priority: High
Completion date: Year 3

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

Predation by feral cats and foxes is thought to be a significant threat to all south coast threatened birds. The impact of cat and fox predation on south coast threatened birds; in particular the western ground parrot will be investigated. Fox baiting through the *Western Shield* program is regularly conducted throughout most of 'habitat critical' for south coast threatened birds. While the Department of Parks and Wildlife has been successful at eradicating or controlling cats in arid areas, cats at present cannot be controlled effectively in mesic areas. Projects relating to the development of a suitable cat eradication or control method in this region will be a priority and encouraged, but it is worth noting that it may be difficult to provide rigorous evaluation within the life of this plan, due to the expected lag time between any reduction in cat numbers and expected response in ground parrot population numbers.

The conservation of habitat critical to the survival (of one or more of the south coast threatened birds) will be included in all land use and fire management planning for the relevant areas. Gilfillan *et al.* (2006) provides management actions specific to the protection of habitat critical to survival and the amelioration of threatening processes in key south coast threatened birds management zones. Most current populations of south coast threatened birds occur in long unburnt habitat, although the responses of these taxa to fire and post-fire regeneration are not fully understood. Further understanding of the birds' responses to fire is required for adequate fire management. The responses of south coast threatened birds will be regularly monitored following a fire for example, as in the Project Phoenix program following the 2004 Mount Manypeaks fire (S. Comer pers. comm. 2012).

Tasks include:

- Develop a formal monitoring program for threats identified in this recovery plan.
- Continue the integrated feral predator control program for FRNP and CANP, including monitoring numbers of vertebrate predators and native prey species, and expand this work to include the Two Peoples Bay – Manypeaks area.
- Monitor density and relative abundance of feral cat and fox populations in south coast threatened bird habitat.
- Develop an effective cat bait and cat control and baiting protocols for use in south coast habitat.
- Continue fire management, investigate and document the responses of all south coast threatened birds to fire and post-fire regeneration, and update fire management guidelines as new information becomes available.
- Continue implementing hygiene protocols and field interpretation and mapping of *Phytophthora* dieback and exclude access to areas affected through fencing and signage.

Cost: $410,000 p.a. additional to existing Parks and Wildlife Department estate management
Priority: High
Completion date: Ongoing

4. Develop survey and monitoring protocols for south coast threatened birds to improve detection of population changes, in particular small changes in populations.

The cryptic nature of south coast threatened birds means that these birds are rarely seen; therefore surveys are completed through the identification of their distinctive calls. For the western ground parrot, this technique requires several observers to listen for calls during the two calling periods (before sunrise and after sunset), from which the numbers of parrots can be estimated. There are considerable difficulties with this technique, as discussed by Cale and Burbidge (1993), including being time and labour intensive. For the western bristlebird, noisy scrub-bird and western whipbirds, such surveys only give a population index of the number of territories, and as the social organisation of these taxa is not fully understood, these indices need to be interpreted with caution. A better understanding of the social organisation of these taxa would likely improve current survey protocols.

For noisy scrub-birds, recent work has indicated that analysis of individual variation in song, using methods developed by Berryman (2003, 2007) and Portelli (2004), may reflect social organisation. Continuation of this work will be encouraged to attempt to establish the relationships between individual birds, which may provide insight to help interpret survey data.

Analysis of ground parrot survey data (Burbidge *et al.* 2007) indicates that the current monitoring protocol can detect about a 13 per cent annual change, provided that the local population is not too sparse. Early detection of a decline would require much more effort than is possible with available resources.

Tasks include:

- Analyse data, specifically aural detections, to estimate relative abundance.
- Facilitate research on birds' social organisation.
- Develop less labour and time intensive survey methods to accurately estimate relative abundance using social organisation data and autonomous recording units.

Cost: $50,000 for three years

Priority: Medium (high for the western ground parrot)

Completion date: Year 4

5. Continue to monitor sites where species are known to occur and survey any new sites of all extant south coast threatened birds.

Monitoring of the western ground parrot, noisy scrub-bird and western bristlebird will be continued and expanded where possible, using protocols developed in action 13.4. The aim of monitoring is to determine distribution and estimate population densities of each species, to evaluate the success of recovery actions.

Specific sub-populations of noisy scrub-birds will be monitored annually using standard protocols, with a complete census of this species completed about every five years. Complete census of the western bristlebird and western whipbird will also be completed about every five years.

Any reported sightings of south coast threatened birds from areas with no known population will be investigated to identify potential new populations. Priority will be given to sightings of the western ground parrot, western bristlebird and rufous bristlebird (western). Intensive, systematic surveys for western ground parrots and western bristlebirds will be conducted in areas where previously known populations occurred, or other areas identified as potential suitable habitat under action 13.2.

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

Tasks include:

- Monitor birds at known sites.
- Investigate reported sightings of species at sites and subsequently survey these sites if presence is confirmed.
- Undertake systematic surveys of western ground parrots, western bristlebirds and rufous bristlebird (western) in former or potential habitat.

Cost: $240,000 p.a. plus $150,000 every five years

Priority: High (low for rufous bristlebird (western))

Completion date: Ongoing

6. Continue existing translocation programs and develop a western ground parrot translocation and captive breeding program.

Although the trial translocation of western bristlebirds from TPBNR to Walpole-Nornalup National Park in 1999 and 2000 was unsuccessful in the long-term, it showed that translocated birds were able to persist for some time in that habitat (Burbidge *et al*. 2010). Further translocations to Walpole-Nornalup National Park and other suitable habitat (identified through action 13.2) will be considered and implemented if feasible.

Further translocations of the noisy scrub-bird to other suitable areas will be considered, and implemented if feasible. A review and comparison of the Darling Range translocation with successful translocations will be conducted to determine the factors that prevented the successful establishment of noisy scrub-birds into this area within their former range. The translocation program will consider the outcomes of investigations of post-translocation genetic diversity which provide recommendations on sourcing animals for future translocations and the need to promote admixture between sites (Weeks *et al*. 2011; Cowen *et al*. 2013; Cowen *et al*. in prep.).

As western ground parrots are only known from two areas, establishing additional populations would be an important step in their recovery. A captive management program has been commenced, with the intent of eventually breeding birds for release once threats have been mitigated. A trial translocation to suitable habitat will be conducted if the known populations are considered sufficiently viable to allow the removal of enough birds for a translocation (as determined by action 13.5). If birds are removed from a population for translocation, the source population will be closely monitored to determine if the removals have had any impact.

Western ground parrots are primarily granivorous, foraging on the ground or in low shrubs. The dietary requirements of the western ground parrot will be investigated, as a greater understanding of this will help in the identification of habitat requirements, selection of potential translocation sites and be valuable for potential future captive husbandry programs. Captive husbandry techniques have been developed with ground parrots held in captivity since 2010. These birds were removed from the wild to establish husbandry techniques and to determine the viability of maintaining wild birds. In the longer term this program should be developed to establish a captive breeding population with the aim of using captive-bred birds for translocations.

Tasks include:

- Evaluation of past translocations and contributing factors to success or failure.
- Aural survey of translocation sites, including survey for territorial males during breeding season.
- Genetic analysis of individuals from different sites to determine genetic variability.
- Investigate the dietary requirements of western ground parrots.
- Development of a western ground parrot captive breeding program and trial translocation of western ground parrot.
- Surveys of western ground parrot source population and translocation population post translocation.

Cost: $665,000 first year, then $360,000 p.a. plus $50,000 for review of the noisy scrub-bird translocation

Priority: Medium

Completion date: Ongoing

7. Conduct genetic research to resolve the taxonomic status of the two western whipbird subspecies.

The resolution of the sub specific status of the two subspecies of western whipbirds in WA will greatly influence further priorities for the management of this species in WA. The importance to conservation of the different subspecies is that they may represent significantly different gene pools. Molecular genetic analyses appear to be the most suitable method to determine this, because they can be done on relatively small quantities of material which can be obtained with non-destructive sampling techniques.

Cost: $20,000

Priority: Low

Completion date: Year 2

8. Publish and distribute south coast threatened birds information and facilitate community participation in recovery and management activities.

The Department of Parks and Wildlife, the SCTBRT and friends groups will continue to publish and distribute information to the public, landholders and scientific community relating to the management and recovery of south coast threatened birds.

The community is strongly involved in volunteer activities for south coast threatened birds, in particular the western ground parrot and noisy scrub-bird. Community involvement in recovery activities for all these bird taxa will continue to be facilitated through 'friends' groups, Birds Australia WA and volunteer activities. There is a 'Friends of the Western Ground Parrot' group which is active in volunteering for field trips and profile-raising for the conservation of the parrot. The involvement of this and other interested community groups in the recovery of all the south coast threatened birds will continue to be encouraged.

Tasks include:

- Continue and increase distribution of the South Coast Threatened Birds, and the Western Ground Parrot Newsletters.
- Press release important achievements in south coast threatened birds' recovery.
- Produce updated fact sheets on all species of south coast threatened birds.
- Publish journal articles on scientific findings.
- Encourage and increase member participation of 'friends' groups in surveys and field trips.
- Maintain community participation and representation on the recovery team.

Cost: $7,000 p.a.
Priority: Medium
Completion date: Ongoing

15. Implementation schedule

Table 5: Summary of the recovery actions, their priority, responsibility and estimated costs in ($000's) for the first five years of implementation. These estimated costs do not take into account inflation over time.

Action	Priority[#]	Responsibility	Cost					
			Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. Coordinate implementation of the multi-species recovery actions.	High	DPaW	4	4	4	4	4	**20**
2. Refine, locate and map the area of 'habitat critical'.	High	DPaW	200	200	200			**600**
3. Continue habitat management and threat abatement.	High	DPaW	410	410	410	410	410	**2,050**
4. Develop survey and monitoring protocols.	High/ Medium	DPaW/ Researchers		50	50	50		**150**
5. Continue to monitor known and survey any new sites.	High/ Low	DPaW	240	240	240	240	390	**1,350**
6. Continue existing translocation programs and develop a western ground parrot translocation and captive breeding program.	Medium	DPaW / Perth Zoo	665*	360*	410*	360*	360*	**2,155***
7. Conduct genetic research to resolve the status of the two western whipbird subspecies.	Low	DPaW/ Researchers		20				**20**
8. Publish and distribute information and facilitate public participation in recovery and management activities	Medium	DPaW/ Friends Groups	7	7	7	7	7	**35**
TOTAL			**1,526**	**1,291**	**1,321**	**1,071**	**1,171**	**6,380**

* - action may not be implemented as it is dependent on either a decision based on the results of other actions, or an unplanned event e.g. bushfire

[#] - there are multiple levels of priority for actions 4 and 5 because the level of prority is varied between species (see section14 for details)

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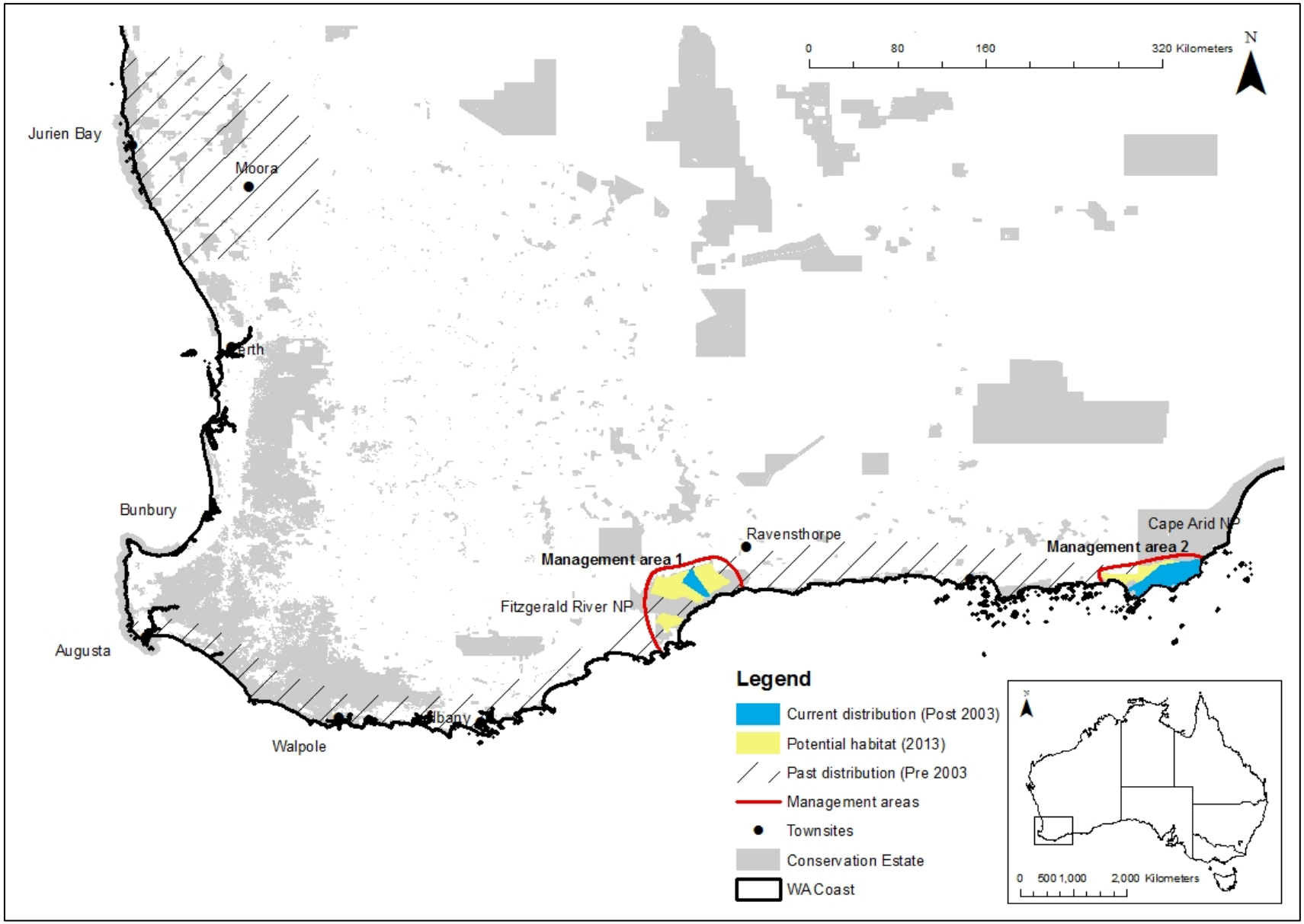
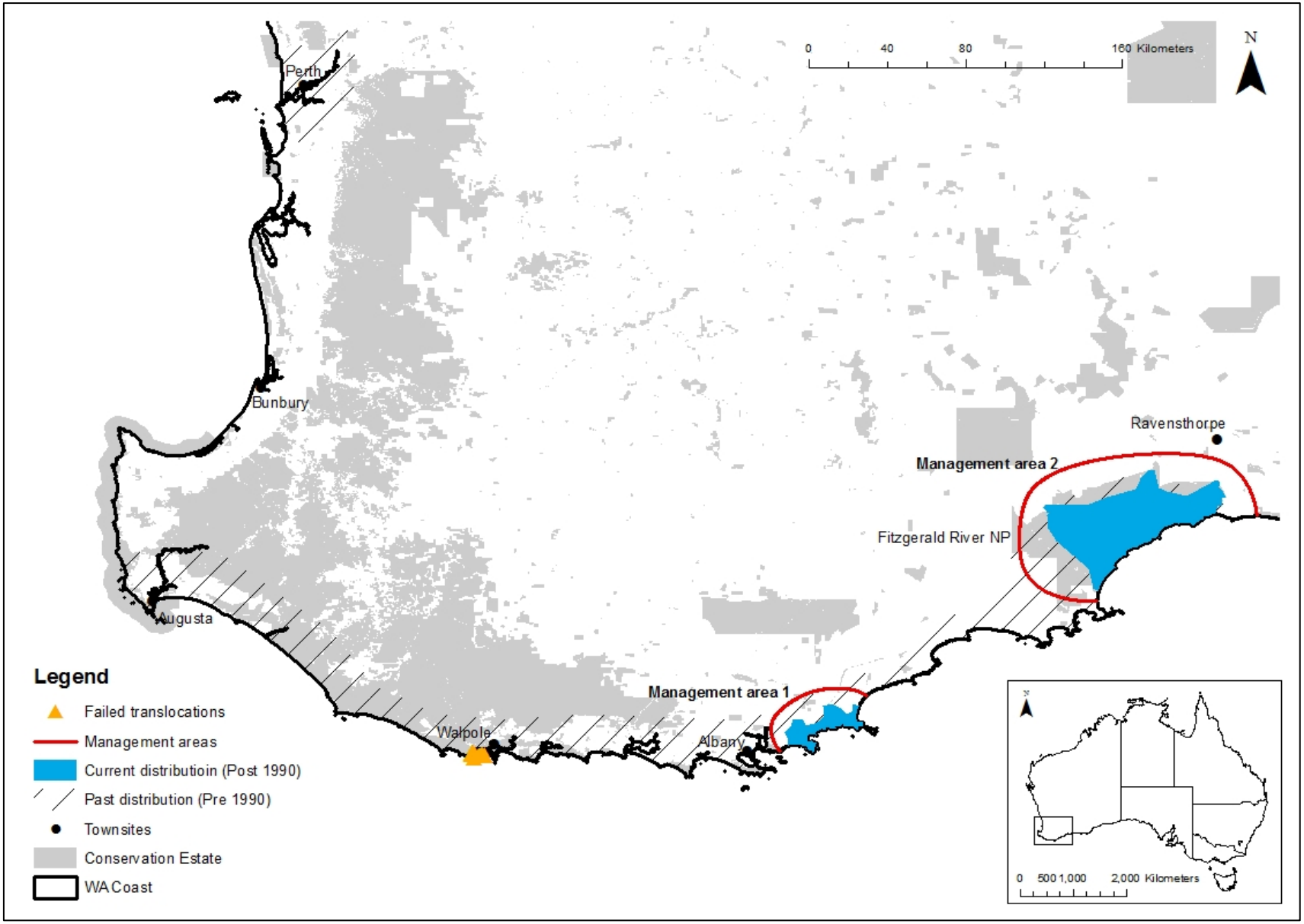
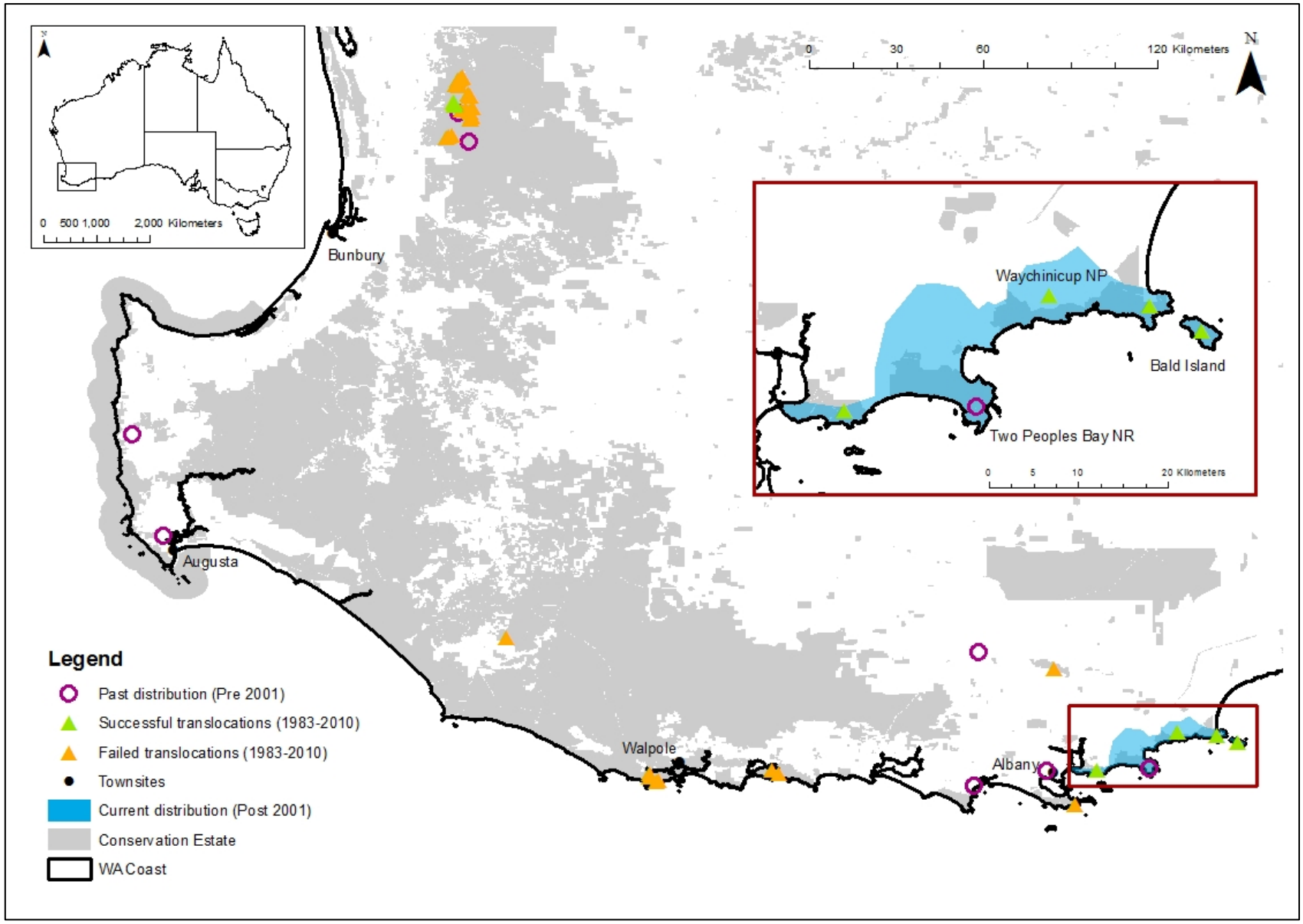
Appendix 1: Distribution Maps



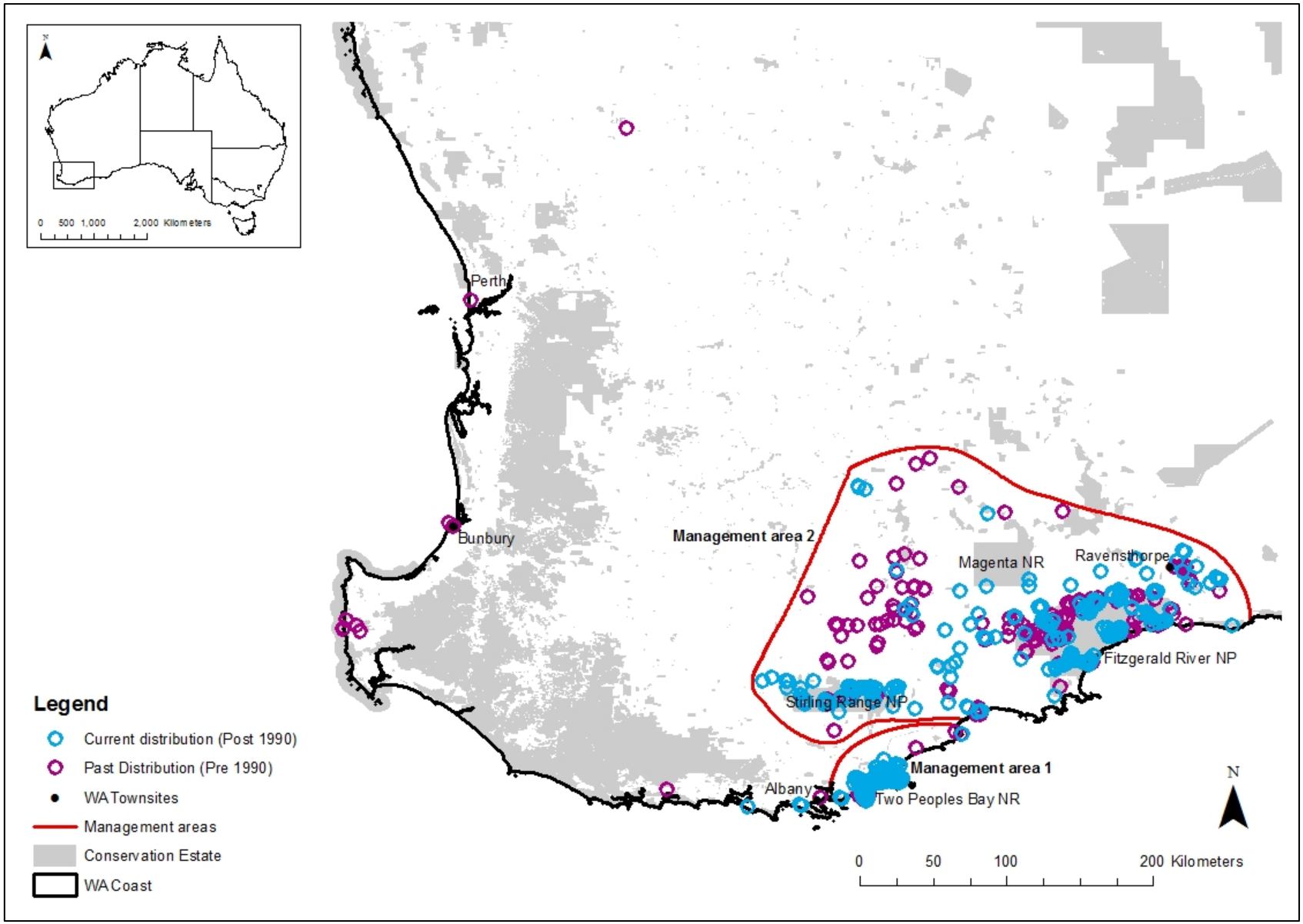
Map 1: The past and current (post-2003) distribution of the western ground parrot (*Pezoporus flaviventris*), including areas of potential habitat.



Map 2: The past and current (post-1990) distribution of the western bristlebird (*Dasyornis longirostris*).



Map 3: The past and current (post-2001) distribution of the noisy scrub-bird (*Atrichornis clamosus*), including unsuccessful translocation sites.



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

Appendix 2: Evaluation Table

Table 6: Evaluation of noisy scrub-bird recovery program against recovery criteria set in the previous noisy scrub-bird recovery plan (Danks *et al.* 1996).

Recovery Criteria	Status*	Comments
1. Within the Albany Management Zone: a) the achievement and maintenance of the total number of singing males at above 300, b) the presence of corridors which allow migration and gene flow between all the subpopulations within the management zone, and c) wildfires do not significantly affect both the Mt Gardner and Mt Manypeaks subpopulations within the period of this Recovery Plan.	3 Further action required to maintain	a) Numbers of Noisy Scrub-birds in the Albany Management Zone have been maintained above the target of 300 singing males. Population monitoring has shown a fluctuating population index of territorial males from 590 in 1997, to 765 in 2001 to 343 in 2005 after a wildfire and then back up to 494 in 2011. b) The management plan for Two Peoples Bay Nature Reserve identified several uncleared strips of native vegetation on private property that were proposed for additions to the reserve. Change of tenure has not occurred. c) Despite several fires occurring in the life of the plan, these have not had a long term impact on total population numbers.
2. Establishment of at least two subpopulations within a new management zone west of Albany, each with at least 20 singing males and with sufficient habitat for them to increase to at least 40 singing males	1 Substantial attempts have failed	There were four failed attempts to establish a population of noisy scrub-birds in eleven sites to the west of Albany (Comer *et al.*, 2010b). Birds translocated to the Darling Range area bred in one of eight sites, but the population did not persist. Two translocations to western management zones after 2002 also failed, one due to wildfire and one due to predation.
3. Completion and implementation of a Management Plan for the Two Peoples Bay Reserve that provides for the protection and maintenance of extensive areas of habitat suitable for noisy scrub-birds	3	The management plan for Two Peoples Bay Nature Reserve was gazetted on the 7th of June 1996 and providing guidance on key management issues in the park relating to noisy scrub-bird populations.
4. For CALM-managed public lands outside the Two Peoples Bay Reserve on which other subpopulations exist or are established, ensuring that areas of potential or occupied habitat are protected through the preparation and implementation of Interim Guidelines for Necessary Operations or Area Management Plans.	2	Significant populations of noisy scrub-birds outside of Two Peoples Bay Nature Reserve occur on conservation estate at Gull Rock National Park, Waychinicup National Park, Mount Manypeaks Nature reserve, Bald Island Nature Reserve and a translocated population in Dwellingup State Forest. These reserves and parks currently do not have gazetted management plans. Management actions are guided by regional plans including the Nature Conservation Service South Coast Regional Plan (2009-2014), South Coast Threatened Species and Ecological Communities Strategic Management Plan (Gilfillan *et al.,* 2009) and South Coast Regional Fire Management Plan 2009-2014

		(DEC 2009).
5. Implementation of a program that encourages, assists and provides advice to relevant owners and managers of other lands where scrub-birds occur, to enable them to maintain scrub-bird habitat and/or corridors.	2	Informal program only with one-on-one liaison where relevant.
6. The identification, mapping and protection of corridors of native vegetation which allow scrub-birds to move between subpopulations in each management area, including corridors between Angove and Manypeaks subpopulation concentrations and the Lakes and My Taylor subpopulations.	3	Habitat identified and mapped. Capacity to formally protect is limited.
7. Implementation and finalisation of research into site suitability to assist the selection of translocation sites and increase the chances of successful translocations. This will include research into food availability in relation to habitat and radio-tracking of translocated birds.	2	Methods for assessing translocation sites have continued to develop. The focus during the life of the plan was on leaf litter food resources and capacity to manage habitat for fire. Post-2002 assessment and control of predators has also been a major consideration in assessing release site suitability assessment. (See Archer 2001, Danks and Whisson 1997, Bain and Heaton, 2002)
8. Measurement of genetic variability for the Mt Gardner and Lakes area subpopulations in the Two Peoples Bay Reserve and for the translocated subpopulation at Mt Manypeaks.	3	Genetic variability in the noisy scrub-bird was investigated by Cowen *et al.* (2013). This work has highlighted the limited genetic variability in the species, and has identified management actions that could be implemented to assist in the maintenance of genetic diversity in the species (Cowan *et al.* in prep).
9. Implementation of a program to continue to disseminate and improve the quality of information on noisy scrub-bird biology and conservation.	2	While no formal program was developed, the noisy scrub-bird is a high profile species and there have been numerous articles and talks in popular media and the scientific community. Volunteer participation and input into recovery has been significant, through assistance with translocation and monitoring, and participation in the recovery team.

*Status: 0 = No progress / cannot be assessed, 1= Insufficient action to meet criteria, 2 = Action underway / most elements met. 3 = Criteria met (further action may or may not be required)