Commonwealth of Australia

Environment Protection and Biodiversity Conservation Act 1999

Section 269A

Instrument Revoking and Making Recovery Plans

I, Greg Hunt, Minister for the Environment:

a) pursuant to subsection 33(3) of the *Acts Interpretation Act 1901* and subsection 269A(2) of the *Environment Protection and Biodiversity Conservation Act 1999,* hereby revoke the making of the following Commonwealth recovery plan:

- Menkhorst, P., N. Schedvin & D. Geering (1999). *Regent Honeyeater Recovery Plan - 1999-2003*. Department of Natural Resources and Environment, Melbourne.

b) under section 269A(2) of the *Environment Protection and Biodiversity Conservation Act 1999*, hereby make a recovery plan for the listed threatened species specified below, entitled "National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia)*. Department of the Environment, Canberra (2016)."

Listed Threatened Species
Anthochaera phrygia

This instrument will come into force on the day after it is registered on the Federal Register of Legislation.

Dated this 14 day of April 2016

Greg Hunt

Greg Hunt

Minister for the Environment

Australian Government
Department of the Environment

National Recovery Plan for the Regent Honeyeater *(Anthochaera phrygia)*

April 2016

Authorised Version F2016L00635 registered 03/05/2016

The Species Profile and Threats Database pages linked to this recovery plan is obtainable from: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

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Image credits

Front Cover: Regent honeyeaters in the Capertee Valley, NSW. (© Copyright, Dean Ingwersen).

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Acronyms

ACT	Australian Capital Territory
ANU	Australian National University
DotE	Department of the Environment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
IUCN	International Union for Conservation of Nature
NSW	New South Wales
Recovery Team	Regent Honeyeater Recovery Team
ZAA	Zoo and Aquarium Association (Australia)

1 Summary

Regent Honeyeater *(Anthochaera phrygia)*

Family: Meliphagidae

Current status of taxon:

Environment Protection and Biodiversity Conservation Act 1999: Critically Endangered
Threatened Species Conservation Act 1995 (NSW): Critically Endangered
Nature Conservation Act 1980 (ACT): Endangered
National Parks and Wildlife Act 1972 (SA): Endangered
Nature Conservation Act 1992 (Qld): Endangered
Flora and Fauna Guarantee Act 1988 (Vic): Threatened
IUCN Red List of Threatened Species: Critically Endangered

Distribution and habitat:

The regent honeyeater is endemic to mainland south-east Australia. It has a patchy distribution which extends from south-east Queensland, through New South Wales (NSW) and the Australian Capital Territory (ACT), to central Victoria. However, it is highly mobile, occurring only irregularly in most sites, and in variable numbers, often with long periods with few observation anywhere. It is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation and lowland coastal forest. In addition it can be found in a range of other habitats including remnant trees in farmland, roadside reserves and travelling stock routes, and in planted vegetation in parks and gardens. Principally a canopy bird, it is reliant on select species of eucalypt and mistletoe which provide rich nectar flows. Rapid declines have been observed in recent decades, thought to be mainly due to the clearing, fragmentation and degradation of its habitat.

Habitat critical for survival:

Habitat critical to the survival of the regent honeyeater includes:

- Any breeding or foraging areas where the species is likely to occur.
- Any newly discovered breeding or foraging locations.

Recovery plan objectives:

The objectives of this recovery plan are to:

- Reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years; and to
- Enhance the condition of habitat across the regent honeyeaters range to maximise survival and reproductive success, and provide refugia during periods of extreme environmental fluctuation.

Recovery strategies:

The strategies to achieve the recovery plan's objectives are to:

- Improve the extent and quality of regent honeyeater habitat.
- Bolster the wild population with captive-bred birds until the wild population becomes self-sustaining.
- Increase understanding of the size, structure, trajectory and viability of the wild population.
- Maintain and increase community awareness, understanding and involvement in the recovery program.

Criteria for success:

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

- A robust population estimate and trend have been established for the regent honeyeater, and the population is increasing.
- There has been an increase in the area of regent honeyeater habitat protected and restored throughout the species' range.
- The captive population, including its genetic diversity, has been effectively maintained and there have been successful releases into the wild population.
- Understanding of the species' ecology has increased, in particular knowledge of movement patterns, habitat use and post-breeding dispersal.
- There is participation by key stakeholders and the public in recovery efforts and monitoring.

Criteria for failure:

This recovery plan will be deemed to have failed if, within 10 years, the following have occurred:

- Population estimates and trends have not been determined or are unreliable.
- Regent honeyeaters have not increased in numbers.
- Key regent honeyeater sites have not increased in quality and extent.
- Understanding of the species' ecology, in particular knowledge of movement patterns, habitat use and post-breeding dispersal, has not improved.
- The health and genetic diversity of the captive population have not been maintained, and releases into the wild population have been unsuccessful.

2 Introduction

This document constitutes the National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*). The plan considers the conservation requirements of the species across its range and identifies the actions that need to be taken to improve the species' long-term viability in nature. This recovery plan is a revision of the 1999-2003 Regent Honeyeater Recovery Plan (Menkhorst et al., 1999). The 1999-2003 Recovery Plan was reviewed by the Regent Honeyeater Recovery Team in 2012. The review concluded that the previous plan resulted in: 1) increased protection of regent honeyeater habitat; 2) extensive restoration plantings in key regent honeyeater breeding areas; 3) the establishment of a successful captive breeding program; and 4) increased knowledge of regent honeyeater ecology. However, despite the conservation gains made for the regent honeyeater as a result of the implementation of the 1999-2003 Recovery Plan, the review concluded that all key threats to regent honeyeaters remained and that there had been no improvement in the species conservation status (Regent Honeyeater Recovery Team, unpublished report). The review recommended that future recovery actions focus on a landscape approach to habitat protection and regeneration, coupled with ongoing releases of captive birds to bolster the wild population until such time as the wild population became self-sustaining (and while other threat mitigation such as habitat restoration took effect).

The regent honeyeater has recently been upgraded to Critically Endangered on the list of threatened species under the *Environment Protection and Biodiversity Conservation Act 1999.* The species is believed to have undergone a population decline of > 80% within three generations (Garnett et al., 2011). The probable major cause of long-term decline is the clearing and fragmentation of woodland and forest habitat containing the bird's preferred eucalypt species. The major continuing threat is habitat degradation, particularly on-going reductions in habitat quality, lack of regeneration of key habitat types, and potentially altered flowering patterns of preferred habitat. The species also faces increased competition from larger, more aggressive nectivores, such as the noisy friarbird (*Philemon corniculatus*), red wattlebird (*Anthochaera carunculata*) and the noisy miner (*Manorina melanocephala*). Recent research also suggests nest predation is impacting the species' ability to recruit sufficiently in favourable years. Improvement in the extent and quality of preferred regent honeyeater habitat is the key conservation objective of this recovery plan.

There has been an ongoing captive breeding and release program for regent honeyeaters. Ideally birds should not be released to supplement wild populations until suitable and available habitat has been restored. However, the fact that several of the birds released in 2008, 2010 and 2013 have been subsequently resighted up to seven years post-release suggests that they were able to find suitable habitat in which to survive, and in a few cases breed. This could be due to recovery in health of semi-natural habitat, or the maturation of replanted habitat, or because the ongoing decline is due to some other cause, such as high nest predation or competition with large honeyeaters. Releasing captive-bred regent honeyeaters probably increases the chances of them forming aggregations, which may reduce the risk of nest predation and interspecific competition. Further, it provides potential mates, as shown by pairing of wild and released birds, and may reduce the risk of inbreeding and loss of genetic variability in small populations. The maintenance and expansion of the current captive breeding program is critical to the success of this recovery plan, as without supplementation the wild population may not survive in sufficient numbers to enable recovery after habitat issues and other threats have been resolved.

The accompanying Species Profile and Threats Database (SPRAT) provides additional background information on the biology, population status and threats to the regent honeyeater. SPRAT pages are available from: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

2.1 Conservation status

The regent honeyeater is listed as threatened under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and in all parts of its range.

Table 1**:** *National and state conservation status of the regent honeyeater*

Legislation	Conservation Status
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Critically Endangered
Threatened Species Conservation Act 1995 (New South Wales)	Critically Endangered
Nature Conservation Act 1992 (Queensland)	Endangered
National Parks and Wildlife Act 1972 (South Australia)	Endangered
Flora and Fauna Guarantee Act 1988 (Victoria)	Threatened
Nature Conservation Act 1980 (Australian Capital Territory)	Endangered
IUCN Red List of Threatened Species: (2015)	Critically Endangered

2.2 Regent Honeyeater 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 recovery program for the regent honeyeater is coordinated by the Regent Honeyeater Recovery Team (the Recovery Team). Membership of the Recovery Team (which may change over time) currently includes individuals with relevant expertise from BirdLife Australia, Taronga Zoo, the Australian Government, the New South Wales and Victorian state governments, as well as independent researchers and community groups.

3 Background

3.1 Species description

The regent honeyeater is a medium-sized honeyeater, about 200–230 mm long and weighing 31–50 grams as an adult. Plumage is predominantly black with bright yellow edges to the tail and wing feathers. Body feathers, except for the head and neck, are broadly edged in pale yellow or white. A large patch of yellowish to pinkish, bare, warty skin surrounds each eye. The overall visual impression is of a blackish bird boldly embroidered with yellow and white, with brilliant yellow flashes in wings and tail (Pizzey, 1981; Menkhorst, 1993).

3.2 Distribution

The current distribution of the regent honeyeater is extremely patchy, with a small number of known breeding sites. Formerly distributed in south-eastern Australia from the Adelaide region (South Australia) to 100 km north of Brisbane (Queensland), there has been a clear contraction in the regent honeyeater's range. Bendigo, in central Victoria, is now its western limit (Franklin et al., 1989). On the western edge of its New South Wales range it occurs as far inland as Narrabri, Warrumbungle National Park, Dubbo, Parkes and Finley (Figure 1).

Regent honeyeaters may use different areas in different years depending on food resources. They may move large distances to do this although more research is required to confirm the regularity and extent of this behaviour.

Within its current distribution there are four known key breeding areas where the species is regularly recorded. These are the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria. Breeding has also been regularly recorded in the Cement Mills-Durakai area west of Warwick, southern Queensland and in the Australian Capital Territory. Table 2 lists the regularly used areas, and surrounding subsidiary areas, used by the species.

3.3 Population trends

The regent honeyeater comprises a single population, with some exchange of individuals between regularly used areas (Garnett et al., 2011). The first population estimates for the regent honeyeater were formulated based on surveys conducted in the late 1980s; at the time it was thought there were approximately 1500 individuals across south-east Australia (Webster and Menkhorst 1992). As at 2010, the total population size is estimated at 350–400 mature individuals (Garnett et al., 2011; Regent Honeyeater Recovery Team, unpublished data), which represents a significant decline over the last 15-20 years.

Formerly distributed throughout the temperate woodlands and forests in south-eastern Australia, from the Adelaide region (South Australia) to 100 km north of Brisbane (Queensland). Current distribution shows that there has been a clear and continuing contraction in the regent honeyeater's range with species northern extent primarily restricted to the Gore-Karara region south of Brisbane and the species no longer being found in South Australia (Franklin et al., 1989; Regent Honeyeater Recovery Team, unpublished data). The distribution of the regent honeyeater is now extremely patchy with a small number of known breeding sites (Figure 1).

3.4 Biology and Ecology

3.4.1 Longevity

Generation length is estimated at eight years, but this estimate is considered to be of low reliability (Garnett et al., 2011). Observations of banded birds indicate that the regent honeyeater can live for over 10 years in the wild (Geering 2005, pers. comm.; Higgins et al., 2001; Recovery Team, unpublished data).

3.4.2 Diet

Like other species of honeyeater, the regent honeyeater utilises a variety of food resources. Its diet primarily consists of nectar, but also includes invertebrates (mostly insects) and their exudates (e.g. lerps and honeydew), and occasionally fruit. Its time spent foraging for nectar ranges from 10% to 90% depending on availability. Nectar is obtained chiefly from eucalypts and mistletoe, and regent honeyeaters appear reliant on select species which provide reliable nectar flows. Regent honeyeaters prefer taller and larger diameter trees for foraging, as these typically produce more nectar (Franklin et al., 1989; Webster & Menkhorst 1992; Menkhorst et al., 1999; Oliver 2000).

3.4.3 Movement patterns and habitat use

There appears to be regular movements by the species but there is also a high level of variability in the timing and pattern of movements between years, with seasonal patterns of abundance and breeding related to regional patterns in the flowering of key species (Franklin et al., 1989; Ley et al., 1996; Menkhorst 1997). Accumulated evidence from banded birds has shown that individuals may return to the same area in successive breeding seasons (Ley et al., 1996; Geering & French 1998). Conversely, some birds also change breeding sites from one season to another. For example, two of seven birds banded as breeding adults in Canberra in December 1995 were found breeding at Capertee Valley, NSW, during the summer of 1997/98, and another breeding male banded in Gippsland, Victoria, in 2009 was found breeding in the Capertee Valley in late 2011. Birds have also been known to breed in the Capertee Valley and then at Mudgee-Wollar and vice versa (Regent Honeyeater Recovery Team, unpublished data). Use of other areas appears to be related to good flowering events. Better understanding of movement patterns is one of the planned outcomes of this recovery plan. Current knowledge is based on limited re-sightings of banded birds. Radio tracking studies have been used but the use of transmitters is limited by the weight that the bird can carry. Future radio-tracking studies may benefit from focussing on larger surrogate species that are known to share similar habitat requirements and also undertake long distance movements. The advantages of focussing tracking studies on larger surrogate species is that those species can carry a larger battery, which will extend the life of the tracker and may allow satellite tracking techniques to be employed.

Historically, the regent honeyeater infrequently occurred in large aggregations at nectar sources, mostly during autumn and winter (Franklin et al., 1989; Webster & Menkhorst 1992). The species was also known to roost communally in small groups or large flocks, in both mature trees and saplings, but only in trees with dense foliage. Foraging trees are rarely used as roosting sites (Higgins et al., 2001). Larger aggregations (greater than 100 birds) of regent honeyeaters have not been seen in recent times, as numbers are now likely to be too small to support such aggregations.

It is likely that many historically used areas are no longer utilised due to the loss of important foraging habitat or habitat fragmentation resulting in the inability of regent honeyeaters to access these areas and because the areas have been colonised by larger more aggressive honeyeaters, such as the noisy miner.

3.4.4 Breeding

The timing of breeding varies between regions, and appears to correspond with the flowering of key eucalypt and mistletoe species (Franklin et al., 1989; Geering & French 1998). Breeding mostly occurs during spring and summer, from August to January (Franklin et al., 1989). While nectar flows are important for breeding, some pairs have been recorded to successfully fledge their young using insects and lerps only (Geering & French 1998).

Breeding effort, location and the timing of breeding also vary between years. While there is some fidelity to nesting sites, pairs may change breeding sites between seasons. Re-nesting may occur after nest failure, but not necessarily in the same location (Oliver et al., 1998; Geering & French, 1998; Roderick et al., 2014). Breeding territories, which usually consists of the nest-tree and surrounding feeding areas, may extend 5-40 m or more from the nest-tree (Higgins et al., 2001).

Nests are usually placed in the canopy of mature trees with rough bark, e.g. ironbarks, sheoaks (*Casuarina*) and rough-barked Apple (*Angophora*). A cup-shaped nest is constructed in which two to three eggs are laid. Nests may be near or far from food resources; one nest has been recorded 700 m from a resource tree (Geering & French, 1998). Pairs now mostly nest solitarily, but historical records show in the past they often nested in loose aggregations.

3.4.5 Habitat

Most records of regent honeyeaters come from box-ironbark eucalypt associations, where the species seems to prefer more fertile sites with higher soil water content, including creek flats, broad river valleys and lower slopes. Other forest types regularly utilised by regent honeyeaters include wet lowland coastal forest dominated by swamp mahogany (*Eucalyptus robusta),* spotted gum-ironbark associations and riverine woodlands (where it is known to feed on nectar from *Amyema cambagei*) (Menkhorst, 1997; Geering & French, 1998; Oliver et al., 1998; Oliver et al., 1999). This riparian habitat is also selected as breeding habitat in some years (Geering and French, 1998; Oliver et al., 1998; Oliver et al., 1999). Often this is adjacent to box-ironbark woodland. Remnant stands of timber, roadside reserves, travelling stock routes and street trees also provide important habitat for regent honeyeaters at certain times (Franklin et al., 1987, 1989; Ley & Williams, 1992; Webster & Menkhorst, 1992; Oliver, 1998).

Key tree and mistletoe species for the regent honeyeater include:

- Mugga (or Red) Ironbark, *Eucalyptus sideroxylon*
- Yellow Box, *E. melliodora*
- White Box, *E. albens*
- Yellow Gum, *E. leucoxylon*
- Spotted Gum, *Corymbia maculata*
- Swamp Mahogany, *E. robusta*
- Needle-leaf Mistletoe, *Amyema cambagei* on River Sheoak, *Casuarina cunninghamiana*
- Box Mistletoe, *A. miquelii*
- Long-flower Mistletoe*, Dendropthoe vitellina*

Other tree species may be regionally important. For example the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events of regent honeyeaters. Flowering of associated species such as thin-leaved stringybark (*E. eugenioides)* and other stringybark species, and broad-leaved ironbark (*E. fibrosa)* can also contribute important nectar flows at times.

Mature, large individual trees tend to be more important as they are more productive, particularly on highly fertile sites and in riparian areas (Webster & Menkhorst 1992; Oliver 2000). Trees in such areas tend to grow larger (Soderquist & MacNally 2000) and produce more flowers (Wilson & Bennett 1999).

3.4.6 Habitat critical to survival

Habitat critical to the survival of the regent honeyeater includes:

- Any breeding or foraging habitat in areas where the species is likely to occur (as defined by the distribution map provided in Figure 2); and
- Any newly discovered breeding or foraging locations.

Key areas include the Bundarra-Barraba, Pilliga Woodlands, Mudgee-Wollar and the Capertee Valley and Hunter Valley areas in New South Wales, and the Chiltern and Lurg-Benalla regions of north-east Victoria (Table 2; Figure 1).

Habitat critical to the survival of the regent honeyeater occurs in a wide range of land ownership arrangements, including on private land, travelling stock routes and reserves, state forests and state reserves, and National Parks. It is essential that the highest level of protection is provided to these areas and that enhancement and protection measures target these productive sites.

Table 2: *Regular and subsidiary areas used by regent honeyeaters for foraging and breeding*

Regularly used areas	Subsidiary areas
1. Bundarra-Barraba	a. Inverell-Ashford-Emmaville b. Pilliga c. Warrumbungles
2. Hunter Valley / Central Coast	a. Central Coast b. Central Hunter Valley c. Lower Hunter Valley d. Upper Hunter Valley e. Goulburn River f . Widden Valley
3. Capertee Valley	a. Mudgee-Munghorn Gap-Wollar b. Burragorang River Valleys
4. Chiltern	a. Albury-Thurgoona b. Killawarra-Glenrowan c. Bobinawarrah-Carboor d. Lurg-Benalla district

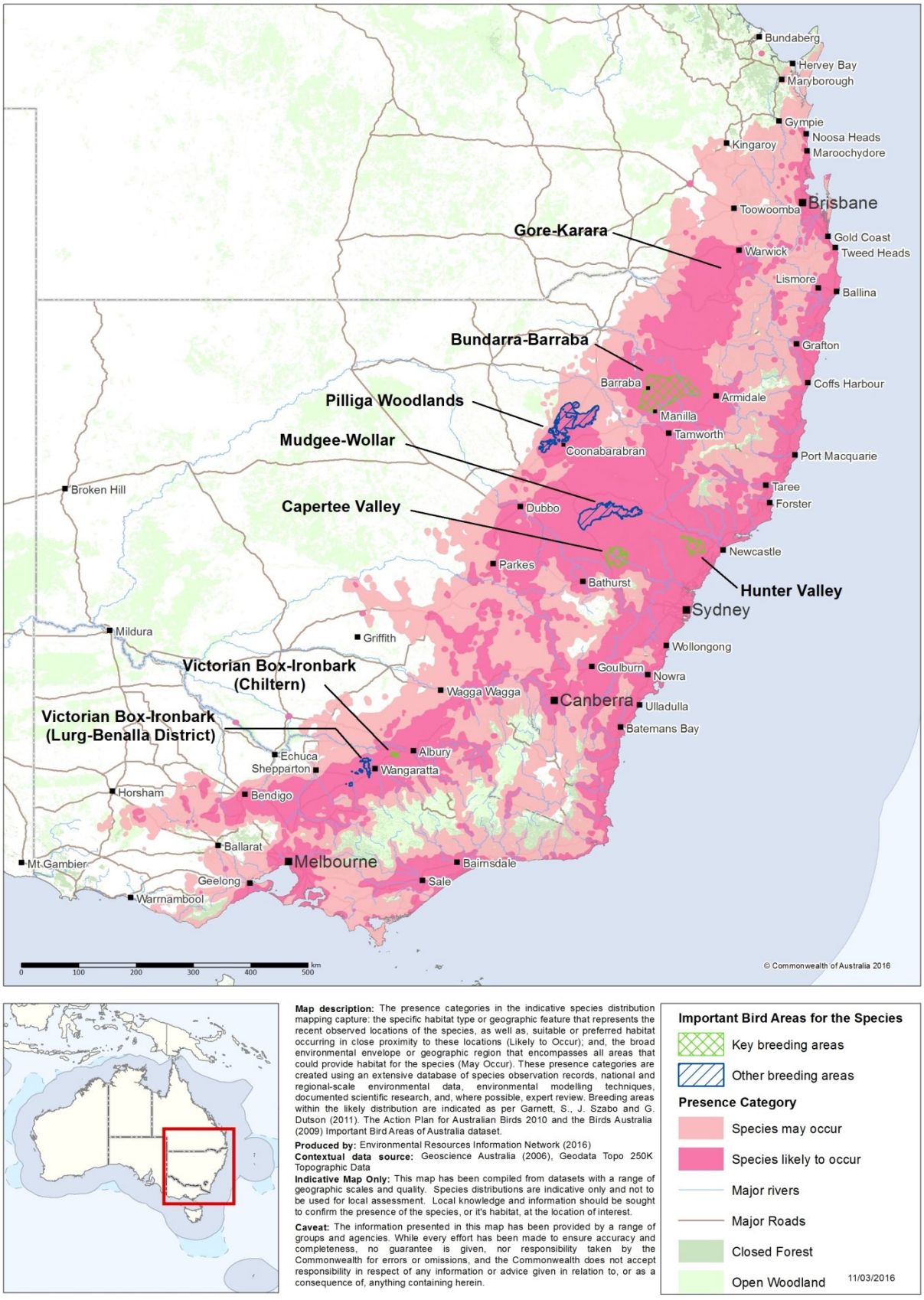

Figure 1. *Regent honeyeater distribution*

4 Threats

4.1 Historical causes of decline

The major cause for the decline in the regent honeyeater population has been the clearing and fragmentation of woodland and forest containing the bird's preferred eucalypt species. Whilst clearing directly reduces the amount of available habitat, it can also make remaining remnants unsuitable as they become too small or isolated. The major continuing threat is further degradation of habitat, particularly on-going reductions in habitat quality and lack of regeneration. Noisy miners become more common in fragmented and degraded habitat, due to their preference for open areas adjoining woodland, and exclude birds, including regent honeyeaters, from many native vegetation remnants.

4.2 Current threatening processes

The primary threats to the regent honeyeater relate to the species' small population size, habitat loss and fragmentation, competition, and degradation of remnant habitat. These are discussed below, presented in the order of highest to lowest threat.

4.2.1 Small population size

The first population estimate for the regent honeyeater was formulated based on surveys conducted in the late 1980s; at the time it was thought there were approximately 1500 individuals across south-east Australia (Webster and Menkhorst, 1992). A more recent revision suggests that the population may currently be as low as 350–400 mature individuals (Recovery team unpublished data; Garnett et al., 2011). This population is spread across millions of hectares of south-eastern Australia, meaning that the density of the regent honeyeater would be extremely low across the vast majority of their range.

Ford et al. (1993) postulated that the tendency for regent honeyeaters to nest together in aggregations (e.g. Franklin et al., 1989; Geering & French 1998) allowed them to exclude larger honeyeaters from a nectar source without requiring excessive energy or time spent by individual pairs. With a decreasing population, regent honeyeaters may no longer be in sufficient numbers in nesting aggregations to effectively exclude other birds, or to be able to coalesce into nesting aggregations in the first place. The result is postulated to be lower reproductive output of individual pairs (Ford et al., 1993). Further, recent research suggests that nest predation may be limiting the ability of the species to recruit well in good breeding conditions. Species such as sugar glider (*Petaurus breviceps*), squirrel glider (*P. norfolcensis*), and magpie (*Cracticus tibicen*) have been recorded attempting to prey on adults and/or successfully preying on eggs, and the impacts of this may be significant (Ingwersen 2015, pers. comm.).

In addition, there are inherent issues related to small population size which may be acting to exert pressure on recovery of the species, such as the potential impact of stochastic events such as wildfire or disease, and the loss of genetic diversity. Population bottlenecks, where a population's size is reduced for at least one generation, can significantly reduce genetic diversity through genetic drift (random changes in the gene frequencies of a population from generation to generation). A small population size can also lead to inbreeding depression, where the biological fitness (survival and fertility) of the population is reduced due to mating between related individuals.

4.2.2 Habitat loss and fragmentation

Ongoing clearing of woodland and forest containing the key eucalypt species preferred by regent honeyeaters is a major threat. The historical clearance of foraging and nesting habitat has been extensive and dramatic in many areas, reducing the available nesting and foraging habitat to small remnants of what previously existed. These remnants are continuing to decline in area through residential, agricultural and industrial developments.

The widespread loss of mature paddock trees throughout agricultural areas of the regent honeyeater's range also affects the species. Many records of the species are from areas of scattered paddock trees or stands (Webster and Menkhorst, 1992; Recovery Team, unpublished data), and loss of these from the landscape represents an ongoing loss of habitat and will likely impact the ability of the birds to disperse widely.

A result of ongoing habitat loss is that much of the regent honeyeater's habitat is now fragmented, or altered to the point where it is no longer suitable for the species' use. It is known from bird banding studies that regent honeyeaters are able to move considerable distances within south-east Australia, with the long-distance record being a movement of approximately 580 km (Recovery Team, unpublished data). However, the means by which they move between remnant patches is not well understood, and it is possible there are not enough interconnected patches of habitat to allow unhindered movement. Even if there are enough stands of remnant vegetation, and they are in a suitable matrix across the landscape to support the underlying ecological requirements of the species, the quality of these remnants may not be sufficient to support regent honeyeaters or sustain them during large-scale movements. Many remnants are degraded and likely missing important ecological features, such as large trees and/or high quality nectar flows. Fragmentation may also expose breeding populations of regent honeyeaters to greater predation pressure and increased harassment from other aggressive honeyeaters.

4.2.3 Habitat degradation

Remaining regent honeyeater habitat faces ongoing degradation and loss of quality, particularly on agricultural land in central and north-east Victoria and on the western slopes and northern tablelands of New South Wales. Loss of mature trees occurs through senescence, eucalypt dieback, harvesting for fence posts or firewood, or drought-induced stress. Grazing of livestock and rabbits (*Oryctolagus cuniculus*), and the associated soil compaction, simplifies the structural diversity of remnant vegetation by removing or severely restricting shrub and sapling regrowth, leading to the reduction of suitable habitat quality.

Garnett and Crowley (2000) identified the regent honeyeater as one of 21 nationally threatened birds at risk from firewood collection. Driscoll et al. (2000) identified that Blakely's red gum, yellow box, white box and mugga Ironbark are heavily harvested for firewood, and that current firewood collection occurs at rates well above a sustainable level. Illegal felling of key species for firewood and fence posts has been noted in travelling stock reserves in recent years.

Changes to nectar availability in the regent honeyeater's key eucalypt species affect the distribution and abundance of regent honeyeaters. Nectar availability is reduced through clearing, drought, fire or presence/absence of competing species. Where fire intervals are too frequent, flowering events and maturation of nectar rich plant species may be reduced, resulting in a reduction of foraging resources for nectivorous birds (Woinarski & Recher 1997). It is important to identify and retain trees that produce relatively high levels of nectar. In some areas where there has been a history of removal of large trees, regent honeyeaters often

select the largest available trees of the 'key' species. These trees are not necessarily mature or particularly large but are locally significant, producing heavier nectar flows than surrounding trees (Webster & Menkhorst 1992; Oliver 2000).

Climate change also threatens the regent honeyeater's habitat through both increased risk of drought and fire and altered flowering patterns, potentially leading to further habitat loss and degradation. Threats from climate change can only be addressed through efforts to make regent honeyeater populations and their habitat more resilient.

4.2.4 Competition

The regent honeyeater's reliance on nectar from a few key species predisposes it to competition from other nectivorous birds and the honeybee (*Apis mellifera*) (Menkhorst 1997). Regent honeyeaters compete for food resources with larger and/or more aggressive honeyeaters such as the noisy miner, noisy friarbird and the red wattlebird. While the impacts from greater levels of competition with these other aggressive honeyeaters is unclear, anecdotal evidence suggests it is likely to negatively affect breeding success and survival.

The population of red wattlebirds appears to be increasing across its eastern Australian range (Birds Australia 2008), which may effectively reduce habitat availability for regent honeyeaters. The noisy miner is common in fragmented and degraded habitat due to its preference for open areas adjoining eucalypt woodland, and may occupy areas up to 300 m from a forest edge. In areas occupied by noisy miners, the abundance and species richness of other bird species are about half that recorded at nearby areas unoccupied by noisy miners (Piper & Catterall 2003; Clarke & Oldland 2007; Maron et al., 2013; Thomson et al., 2015). Noisy miners are now listed as a Key Threatening Process under the EPBC Act, as well as in Victoria and New South Wales under the respective state legislation, and their impact on regent honeyeaters was one of the factors in those determinations.

Honeybees may also compete with regent honeyeaters for nectar (Menkhorst 1993), although the significance of this for the regent honeyeater is unknown and requires further investigation. Competition from feral honeybees (*Apis mellifera*) is listed as a 'Threatening Process' for nectivorous species in NSW and Victoria.

5 Populations under particular pressure

The actions described in this recovery plan are designed to provide ongoing protection for the regent honeyeater throughout its range.

It is thought that the regent honeyeater comprises a single population, with some exchange of individuals between regularly used areas (Garnett et al., 2011). Recent genetic analysis further supports this (Kvistad et al., 2015). The regent honeyeater was formerly more common and widespread, but its distribution and population size have declined markedly due to the loss and degradation of its preferred woodland habitat (Franklin et al., 1989; Regent Honeyeater Recovery Team, unpublished data). Ongoing declines in population size and habitat availability present significant challenges for the recovery of the regent honeyeater and exert strong pressures on survival of the species in the wild. Given these challenges, all areas where regent honeyeaters are known or are likely to occur require protective measures.

6 Objectives and strategies

The objectives of this recovery plan are to:

- Reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years; and to
- Enhance the condition of habitat across the regent honeyeater range to maximise survival and reproductive success, and provide refugia during periods of extreme environmental fluctuation.

The strategies to achieve the plans' objectives are:

- Improve the extent and quality of regent honeyeater habitat.
- Bolster the wild population with captive-bred birds until the wild population becomes self-sustaining.
- Increase understanding of the size, structure, trajectory and viability of the wild population.
- Maintain and increase community awareness, understanding and involvement in the recovery program.

7 Actions to achieve specific objectives

Actions identified for the recovery of the regent honeyeater are described below.
It should be noted that some of the objectives are long-term and may not be achieved prior to the scheduled five-year review of the recovery plan. Priorities assigned to actions should be interpreted as follows:

Priority 1:	Taking prompt action is necessary in order to mitigate the key threats to the regent honeyeater and also provide valuable information to help quantify long-term population trends.
Priority 2:	Action would provide a more informed basis for the long-term management and recovery of the regent honeyeater.
Priority 3:	Action is desirable for, but not critical to, the recovery of the regent honeyeater or assessment of trends in recovery.

Strategy 1: Improve the extent and quality of regent honeyeater habitat

Research actions

	Action	Priority	Performance Criteria	Responsible Agencies and potential partners	Indicative Cost (priority 1)
1a	Construct a spatial prioritisation model to determine suitable sites for habitat protection or restoration.	1	• Sites identified for protection and targeted restoration works in suitable landscapes.	**Universities** Research agencies	$50,000
1b	Limit the impact of competition with commercial honeybee operations at key sites.	2	• The impacts of competition with commercial honeybees on regent honeyeaters has been evaluated and understood.	**BirdLife Australia Recovery Team** **State agencies** **Universities**	

On-ground actions

	Action	Priority	Performance Criteria	Responsible Agencies and potential partners	Indicative Cost (priority 1)
1c	Protect intact (high quality) areas of regent honeyeater breeding and foraging habitat (as described in '3.4.6 Habitat critical to survival').	1	• The extent of quality habitat protected has increased (e.g., through land covenants and state/national parks). • Developments avoided in any known regent honeyeater breeding areas (breeding areas shown in Figure 1) • Clearing of mature foraging trees in areas of habitat critical to the survival of the species (as described in 3.4.6) has been limited. • Any developments in areas of mapped breeding habitat (figure 1), or areas critical to survival (section 3.4.6) have incorporated suitable threat mitigation	**BirdLife Australia Recovery Team** **State agencies** **Australian Gov.**	$575,000

			measures. • If avoidance or mitigation were not possible, any developments that proceeded provided offsets that protected and/or rehabilitated habitat of equivalent or better quality.		
1d	Rehabilitate degraded areas that were previously commonly used by the regent honeyeater.	1	• Appropriate restoration plantings have been undertaken in degraded habitat that was formerly used by the regent honeyeater. • The characteristics of rehabilitated sites that are known to be used by regent honeyeaters (e.g., Lurg and Capertee) are investigated and the knowledge is applied to new and ongoing restoration planting activities.	**BirdLife Australia** **Recovery Team** **State agencies** **Australian Gov.**	$200,000
1e	Habitat patches or corridors are enhanced in order to facilitate landscape scale movements.	1	• Key habitat patches and corridors are identified and expanded and/or rehabilitated.	**BirdLife Australia** **Australian Gov.** **Recovery Team** **State agencies** Research agencies	$500,000
1f	Protect, maintain and improve Travelling Stock Routes (TSRs) in areas where regent honeyeaters are known or likely to occur.	1	• TSRs in areas that are used by regent honeyeaters identified. • Conservation efforts – including establishing appropriate grazing regimes that promote natural regeneration, replanting, weed control and control of noisy miners – undertaken in identified TSRs. • The value of TSRs for the regent honeyeater is captured in any future review of their ownership and management arrangements.	**State agencies** **Local Land Services**	Core government business
1g	Noisy miner control actions undertaken.	1	• Indentify key areas important to regent honeyeaters for noisy	**BirdLife Australia** **Recovery Team** **State agencies**	$190,000

			miner control and implement control programs. • Assess the impacts and benefits of any noisy miner control program.	**Research agencies**
1h	Limit the impact of competition with commercial honeybee operations at key sites.	2	• Competition with commercial honeybees is limited to a level that does not threaten the survival of regent honeyeater populations.	**BirdLife Australia** **Recovery Team** **State agencies** **Universities**
1i	Ecological thinning of dense regrowth forests.	2	• Thin select areas of habitat to encourage development of understorey and crown density.	**BirdLife Australia** **Recovery Team** **State agencies** Australian Gov.

Strategy 2: Bolster the wild population with captive-bred birds until the wild population becomes self-sustaining.

Research actions

	Action	Priority	Performance Criteria	Responsible **Agencies** and potential partners	Indicative **Cost (priority 1)**
2a	Develop a Population Response Model for the regent honeyeater.	1	• A population response model is designed to achieve the following objectives: - a realistic recovery timeframe and trajectory, informed by knowledge of species biology and threats, is identified, - the outcomes of observed population fluctuations can be predicted, and - the effectiveness of recovery actions can be assessed.	**Research agencies**	$70,000

	Action	Priority	Performance Criteria	Responsible Agencies and potential partners	Indicative Cost (priority 1)
2b	Maintain a captive population of regent honeyeaters in order to: • provide a level of insurance against further declines in the wild population. • supplement the wild population in line with the captive management release strategy.	1	• Captive management plan implemented. Key plan objectives to include: - A captive population with at least 90% wild heterozygosity retained. *Note: This may require collection from the wild to augment the captive population*. - On the advice from the Species Co-coordinator of the captive program, the Recovery Team will endorse application to collect from the wild. - Captive release strategy that incorporates: - level of genetic diversity of individuals and groups. - selection of individuals predicted to have best opportunity to survive and reproduce in wild. - a target of at least five releases between 2015 and 2025 of an optimum number of birds determined by the Recovery Team, that is reviewed annually. - Releases to occur at sites where population supplementation might be most necessary or effective. - Released birds should be	**BirdLife Australia Recovery Team State agencies Taronga Zoo**	$500,000

			monitored, especially with regard to any subsequent movements away from the release area and survival over future years. - Disease risk management protocols for the movement and release of birds, which are annually reviewed.		

Strategy 3: Increase understanding of the size, structure and population trends of the wild population of regent honeyeaters

Research actions

	Action	Priority	Performance Criteria	Responsible **Agencies** and potential partners	Indicative **Cost (priority 1)**
3a	Design a range-wide systematic monitoring program.	1	• Range-wide annual monitoring survey sites selected using contemporary habitat suitability modelling. • Habitat suitability models provided to Recovery Team and made available through publication.	**Universities** **BirdLife Australia** **State agencies** Local Land Services	$100,000
3b	Trend analysis performed on long-term monitoring data.	1	• Trend profiles generated and population indices calculated for the regent honeyeater. • Findings reported to Recovery Team and made available through publication.	**Universities**	$50,000
3c	Determine contemporary causes of breeding success/failure at key sites.	1	• Formal analysis performed on nest monitoring data. • Findings reported to Recovery Team and made available through publication.	**Universities** **BirdLife Australia**	$250,000

3d	Update genetic information on the regent honeyeater population.	1	• Historic genetic data made available and used in analysis to inform future population viability analyses.	**Universities** **BirdLife Australia** State agencies	$75,000
3e	Investigate alternative methods (e.g., genetic) to assess wild population size.	2	• Opportunities to use genetic techniques to analyse regent honeyeater population size and trends have been investigated.	**BirdLife Australia** **Recovery Team** **Research agencies** State agencies Australian Gov.	

On-ground actions

	Action	**Priority**	**Performance Criteria**	**Responsible Agencies** and potential partners	**Indicative Cost (priority 1)**
3f	Implement range-wide monitoring program.	1	• Surveys undertaken at monitoring sites annually for the life of the recovery plan. • Distribution maps updated to any include new information.	**BirdLife Australia** **State agencies** **Universities** Local Land Services	$240,000
3g	Continuation of long term regent honeyeater monitoring program at key sites, including the Capertee Valley; Bundarra-Barraba; Hunter Valley & Chiltern.	1	• Continuation of bi-annual national volunteer surveys. • Regular effective monitoring of abundance, using a standardised method, is conducted at key sites. • Population trends are assessed for each site and reported annually to the Recovery Team and made publicly available through relevant websites.	**BirdLife Australia** **Recovery Team** State agencies	$150,000
3h	Undertake intensive nest monitoring to evaluate breeding success at key sites.	1	• Study of breeding individuals will be undertaken at sites where regent honeyeaters predominate. • All new individuals captured as part of research are colour-banded.	**Universities** **BirdLife Australia** State agencies	$50,000
3i	Undertake regular monitoring at other known or suspected	2	• Other known and likely areas, including	**BirdLife Australia** **Recovery Team** State agencies	

	regent honeyeater sites.		patches, are surveyed. • Reported sightings in new locations verified. • Any additional areas found to regularly have regent honeyeaters re-surveyed at least annually to better understand ongoing use. • Distribution maps updated to include any new information.	
3j	Investigate movement patterns of wild regent honeyeaters.	2	• Radio or satellite tracking of surrogate species (e.g. noisy friarbird) trialled to better understand movement patterns of regent honeyeaters.	**Universities** **BirdLife Australia** **Recovery Team** **Research agencies** State agencies
3k	Explore relationship between nectar availability / variability and regent honeyeater movement and breeding effort.	3	• Nectar samples collected throughout the range over multiple years, aligning with monitoring surveys and concentrating in key breeding areas.	**Universities**

Strategy 4: Maintain and increase community awareness, understanding and involvement in the recovery program

Research actions

	Action	Priority	Performance Criteria	Responsible Agencies and potential partners	Indicative Cost (priority 1)
4a	Develop and implement a broad strategy to raise awareness and educate the general public about regent honeyeater conservation.	2	• Articles about regent honeyeater conservation are published in newsletters, local bulletins, and on the web. • Informative displays are developed to educate the community. • Newsletter detailing recovery plan implementation produced and disseminated on at least an annual basis.	**BirdLife Australian** **Recovery Team** **State agencies**	

- On-ground actions

	Action	Priority	Performance Criteria	Responsible Agencies and potential partners	Indicative Cost (priority 1)
4b	Maintain and support regent honeyeater operations groups.	1	• Regent honeyeater operations groups maintained in key areas. • Operations groups undertake regular regent honeyeater monitoring.	**BirdLife Australia Recovery Team** State agencies	$125,000
4c	Continue to inform, support and encourage landholders and other community members to be involved in the conservation of the regent honeyeater.	2	• All landholders with regent honeyeater habitat are aware of the species and its management requirements and have been encouraged to manage their native woodland for biodiversity outcomes.	**BirdLife Australian Recovery Team State agencies ZAA**	
4d	Conduct community training and monitoring workshops.	3	• Community training workshops undertaken detailing ways to restore regent honeyeater habitat and identify regent honeyeaters in the field.	**BirdLife Australian Recovery Team**	
4e	Maintain captive exhibit to educate public.	2	• A captive exhibit of regent honeyeaters maintained with conservation themes. • Exhibit assessed for effectiveness in increasing understanding of regent honeyeaters conservation requirements.	**ZAA** BirdLife Australia Recovery Team State agencies	

8 Duration and cost

It is anticipated that the recovery process will not be achieved prior to the scheduled five year review of the recovery plan. The National Recovery Plan for the Regent Honeyeater *(Anthochaera phrygia)* will therefore remain in place until such time as the population of regent honeyeater has improved to the point at which the population no longer meets threatened species status under the EPBC Act.

The cost of implementation of this plan should be incorporated into the core business expenditure of the affected organisations and through additional funds obtained for the explicit purpose of implementing this recovery plan. It is expected that state and Commonwealth agencies will use this plan to prioritise actions to protect the species and enhance its recovery, and that projects will be undertaken according to agency priorities and available resources. Whilst only Priority 1 actions are costed in this recovery plan, this shouldn't deflect from any proposal to undertake Priority 2 or 3 actions. All actions are considered important steps towards ensuring the long-term survival of the species.

Table 3: *Summary of high priority recovery actions and estimated costs in ($000's) (costs are for first five years of implementation and don't take into account inflation over time)*

Action	Cost					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Construct a spatial prioritisation model to determine suitable sites for habitat protection and restoration	50	-	-	-	-	50
Protect high quality/priority regent honeyeater habitat	115	115	115	115	115	575
Rehabilitate degraded areas that were previously used.	40	40	40	40	40	200
Habitat patches or corridors are enhanced.	100	100	100	100	100	500
Noisy miner control actions undertaken.	50	50	10	40	40	190
Develop a Population Response Model for regent honeyeaters.	50	5	5	5	5	70
Maintain captive population.	40	190	40	190	40	500
Design a range-wide monitoring program.	100	-	-	-	-	100
Trend analysis performed on long-term monitoring data.	50	-	-	-	-	50
Determine contemporary causes of breeding success/failure at key sites.	50	50	50	50	50	250
Update genetic information on regent honeyeater population	75	-	-	-	-	75
Implement a range-wide monitoring program.	-	60	60	60	60	240
Implement a long term regent honeyeater monitoring program at key sites	30	30	30	30	30	150
Undertake intensive nest monitoring to evaluate breeding success at key sites.	50	-	-	-	-	50
Maintain and support regent honeyeater operations groups.	25	25	25	25	25	125
Total	825	665	475	655	505	**3,125**

9 Effects on other native species and biodiversity benefits

Through the efforts of the Recovery Team and the extensive efforts of individuals and community organisations, the regent honeyeater has become a "flagship" species for conservation issues in the box-ironbark forests and woodlands, spotted gum-ironbark forests and coastal swamp mahogany forests of south-east Australia.

Rehabilitation work undertaken as part of the 1999-2003 Recovery Plan of forest and woodland remnants has been shown to benefit other threatened and declining woodland species. Sightings of 15 threatened or declining bird species and two threatened mammals have been recorded at Lurg Hills, Victoria, a site replanted to provide habitat for regent honeyeaters (Thomas, 2009).

Threatened Ecological Communities listed under the EPBC Act that are of importance to regent honeyeaters include: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands; and the Grey Box Grassy Woodlands and Derived Native Grasslands of south-eastern Australia.

10 Social and economic considerations

The major economic impact of this recovery plan will be on those who require approval to remove or modify regent honeyeater habitat and are prevented from doing so, or are required to modify their proposal by a consent authority. This may include increased costs due to the requirement to provide offset funding for research, to secure or rehabilitate habitat, or for other threat mitigation work. Any further loss of forest and woodland habitat from areas known or likely to contain regent honeyeaters is regarded as significant.

Regent honeyeater habitat has been heavily modified through clearing, development, fragmentation and degradation. The more fertile areas have been targeted for agricultural pursuits. Restrictions on further clearing of regent honeyeater habitat will impact on some landowners/managers and developers. These restrictions are not predicted to impact significantly on agricultural and forestry industries since the remnants of these forest communities are generally located on less fertile soils and are, therefore, relatively unattractive for grazing or cropping. There is likely to be greater consideration of impacts from urban development in coastal areas containing swamp mahogany and spotted gum-ironbark associations, and from the mining industry. At this stage, the impact of any restrictions on proposed developments is unknown.

Public and private forestry harvesting operations are potential threats to the regent honeyeater. The retention of nesting areas and a suitable number of large mature trees for nectar production and to provide foraging habitat is required. Application of suitable prescriptions protecting regent honeyeater habitat in areas managed for forestry throughout the range of the regent honeyeater may reduce the volume of timber available for harvesting. The extent of this reduction is unknown at this stage.

The protection, enhancement and expansion of remnant vegetation of suitable type by fencing and restricting stock access is preferable to the undertaking of new planting programs. It is a more efficient and cost effective approach to habitat restoration. However, planting of the regent honeyeater's preferred foraging species to enhance the structural and species diversity of woodlands on private land is also beneficial and may improve the agricultural viability of some properties by encouraging insectivorous birds which may reduce insect attack of crops and pastures. Such plantings should include a diverse representation of the endemic habitat including understorey species. Planting patches of habitat or enhancing existing remnants rather than creating narrow corridors may be preferable because regent honeyeaters and many other native birds do not necessarily need corridors for movement provided the habitat patches are close enough together, and these plantings often provide perfect habitat for the noisy miner. Planting of eucalypts also lowers the water table and assists in reducing salinity, which may enhance property values in the longer term.

The main social benefit of this plan is that it addresses community concerns that further losses or local extinctions be prevented. Landcare groups and Land For Wildlife/NSW Nature Conservation Trust properties have shown interest in enhancing habitat for the regent honeyeater and take pride in helping conserve a threatened species on their land. In addition, activities such as bird-watching and tree-planting, and especially captive releases and monitoring, potentially contribute to the economy of small communities, such as Barraba, Chiltern and Capertee Valley.

11 Affected interests

Organisations likely to be affected by the actions proposed in this plan include Australian and State Government agencies, particularly those with environmental, agricultural and land planning concerns; the agricultural sector; researchers; and conservation groups. This list, however, should not be considered exhaustive, as there may be other interest groups that would like to be included in the future or need to be considered when specialised tasks are required in the recovery process.

12 Consultation

The National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) has been developed through extensive consultation with a broad range of stakeholders. The consultation process included a workshop in Melbourne that brought together key species experts and conservation managers, from a range of different organizations, to categorize ongoing threats to the regent honeyeater, and identify knowledge gaps and potential management options. Workshop invitees included representatives from the Commonwealth Government and from the New South Wales, Victorian and Queensland Governments; BirdLife Australia; Taronga Zoo; researchers from university sector; and local community groups involved in regent honeyeater conservation.

13 Organisations/persons involved in evaluating the performance of the plan

This plan should be reviewed no later than five years from when it was endorsed and made publically available. The review will determine the performance of the plan and assess:

- whether the plan continues unchanged, is varied to remove completed actions, or varied to include new conservation priorities
- whether a recovery plan is no longer necessary for the species because either a Conservation Advice will suffice, or the species is removed from the threatened species list.

As part of this review, the listing status of the species will be assessed against the EPBC Act species listing criteria.

The review will be coordinated by DotE in association with relevant Australian and State Government agencies and key stakeholder groups such as non-governmental organisations, local community groups and scientific research organisations.

Key stakeholders who may be involved in the review of the performance of the National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) include organisations likely to be affected by the actions proposed in this plan.

Australian Government
Department of the Environment

State/territory governments
Victoria – Department of Environment, Land, Water and Planning and Parks Victoria
New South Wales – Office of Environment and Heritage; Forestry Corporation of NSW
Queensland – Department of Environment and Heritage Protection
South Australia – Department for Environment, Water and Natural Resources
Australian Capital Territory – ACT Parks Conservation and Lands
Natural resource management bodies
Local government

Non-government organisations
BirdLife Australia
Taronga Zoo
ZAA
Conservation groups
Universities and other research organisations

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