

SUPERB PARROT

POLYTELIS SWAINSONII
ACTION PLAN



Male Superb Parrot at tree hollow (L Rayner)

PREAMBLE

The Superb Parrot (*Polytelis swainsonii*) was declared a vulnerable species in the ACT on 19 May 1997 (Instrument No. DI1997-89 Nature Conservation Act 1980, Appendix A), and relisted in 2015 (Instrument No. NI2015-438 *Nature Conservation Act 2014*). Under section 101 of the Nature Conservation Act 2014, the Conservator of Flora and Fauna is responsible for preparing a draft action plan for listed species. The first action plan for this species was prepared in 1999 (*Action Plan No. 17*; ACT Government 1999). This revised edition supersedes the earlier edition.

Measures proposed in this action plan complement those proposed in the action plan for Yellow Box-Blakely's Red Gum Grassy Woodland, the ACT Native Woodland Conservation Strategy, and for listed threatened woodland bird species such as the Hooded Robin (*Melanodryas cucullata*), Brown Treecreeper (*Climacteris picumnus*), Painted Honeyeater (*Grantiella picta*), Regent Honeyeater (*Anthochaera phrygia*), Swift Parrot (*Lathamus discolor*), and Scarlet Robin (*Petroica boodang*); available at available at the [ACT Government's Environment website](#).

CONSERVATION STATUS

The Superb Parrot is recognised as a threatened species in the following sources:

- **National:** Vulnerable – *Environment Protection and Biodiversity Conservation Act 1999*
- **Australian Capital Territory:** Vulnerable – Section 91, *Nature Conservation Act 2014* (June 2016) and Special Protection Status species – Section 109, *Nature Conservation Act 2014*
- **New South Wales:** Vulnerable – Schedule 1, *Biodiversity Conservation Act 2016* (December 2017)
- **Victoria:** Vulnerable – Section 91, *Nature Conservation Act 2014* (June 2016)

SPECIES DESCRIPTION AND ECOLOGY

DESCRIPTION

The Superb Parrot is a medium-sized, slender green parrot, weighing 133 to 157 g. Adult birds have a distinctively long, graduated tail, and pointed, backswept wings in flight. Adult males have brilliant bright green plumage with a bright yellow forehead and cheeks, and a red band across the lower throat. Adult females are green, with a pale green-blue face, red thighs, and rose-pink patches on the inner walls of the tail feathers. Both sexes have an orange iris and a coral-red bill. Immature birds resemble the adult female with a slightly darker iris.

DISTRIBUTION

Superb Parrots are endemic to inland south-eastern Australia. It occurs throughout the inland slopes and plains of New South Wales (NSW), including the Australian Capital Territory (ACT), and extends into northern Victoria (Barrett et al. 2003). The species is considered a vagrant in Queensland (Baker-Gabb 2011).

The Superb Parrot breeding range is located west of the Great Dividing Range, mostly within the South Western Slopes (NSW) and Riverina (NSW and VIC) bioregions (Baker-Gabb 2011). On the South Western Slopes, its core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west (OEH 2018). However, there are known

outlying breeding areas further east in locations such as Gundaroo and Dalton. In the non-breeding autumn and winter months, birds are observed further north and west in the central and north western slopes and plains as far north as the upper Namoi and Gwydir Rivers, with a general absence of birds in their core breeding range. However, in the last five years, individual birds and small flocks have been recorded in most known core breeding locations during the non-breeding season.

Breeding in NSW also occurs along the Murray, Edward and Murrumbidgee River corridors (OEH 2018) and this has been traditionally referred to as the “Riverina” population. This population is not known to move seasonally like the South Western Slopes population, although birds tend to spend the non-breeding season on the floodplain woodlands away from their River Red Gum forest breeding habitat. In Victoria, the species is largely confined to the Barmah Forest in the Riverina, with occasional sightings east along the Murray River.

Superb Parrots are mainly present in the ACT region during their breeding season (September to January) and sparsely distributed throughout open Eucalypt woodland between Canberra, Yass, Sutton and Gundaroo (Davey 1997). Most Superb Parrot sightings from the ACT region have been in the northern districts of Belconnen and Gungahlin. Group sizes of 20 to 30 Superb Parrots can be observed in a single year at known breeding landscapes (C. Davey/L. Rayner pers. comm.). **Figure 1** shows the distribution of Superb Parrot sightings in the ACT region from November 2004 to August 2015, based on observations reported to [Canberra Nature Map](#). Since 2015, there have been an increasing number of Superb Parrot sightings over autumn and winter in the Territory (COG unpublished data), particularly in the southern suburbs of Kambah and Wanniasa (M. Mulvaney pers. comm.). In 2018, a flock of at least 20 birds was observed near the Erindale College sportsfields (D. Oliver pers. obs), and multiple groups of 4-10 birds were present in the central Molonglo Valley until late May (L. Rayner pers. obs.).

High variability in observed Superb Parrot abundance, due primarily to movement, impedes reliable estimates of population size and growth (Manning et al. 2007). Best available recent estimates of Superb Parrot population change, based on survey data, suggest ongoing decline of the wild population across a substantial portion of their range (Ellis and Taylor 2014; Birdlife Australia 2015; A. Manning unpublished data; TSSC 2016; see Appendix B), but with an increasing number of Superb Parrot sightings

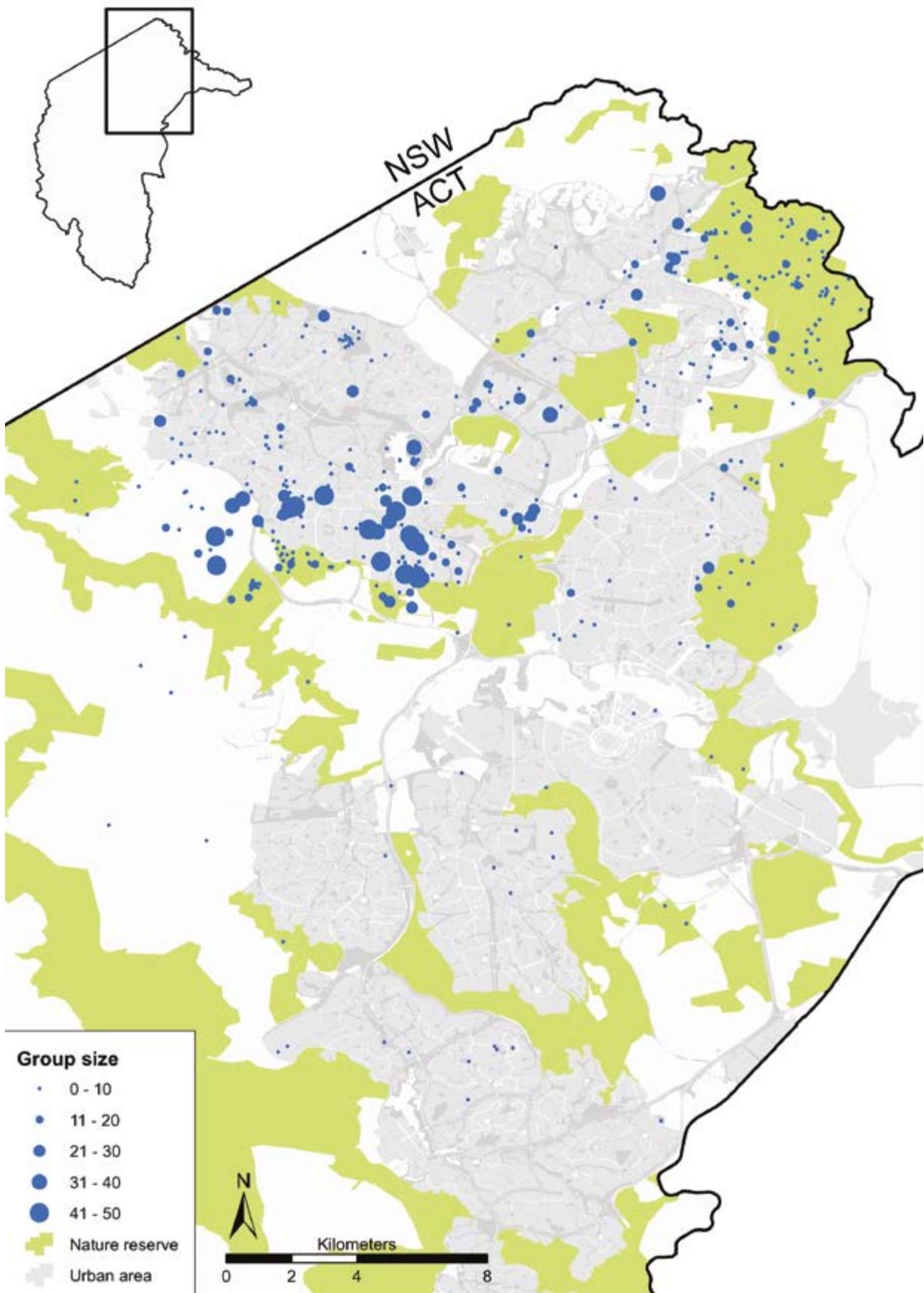
in the ACT region (COG unpublished data). These regional trend patterns are consistent with bioclimatic modelling that projects a contraction and south-eastward shift of the species’ range in response to climate change (Manning et al. in review; see below). However, it was estimated that there were less than 5,000 wild Superb Parrot breeding pairs left in the 1990s (Higgins 1999), a population size of 6,500 mature individuals in 2000 (Garnett and Crowley 2000) and “well over 10,000” in 2010 (Garnett et al. 2011). Most recently, BirdLife International (2016) estimated a population size of up to 20,000 mature individuals. Agreement on population estimates is lacking among experts (TSSC 2016).

HABITAT AND ECOLOGY

Superb Parrots are an open woodland species relying on riverine forests in the Riverina, and Box-Gum woodlands in the tablelands and slopes (Webster 1988). Tree species associated with the Superb Parrot across its range include: River Red Gum (*Eucalyptus camaldulensis*), Blakely’s Red Gum (*Eucalyptus blakelyi*), Scribbly Gum (*Eucalyptus rossii*), Yellow Box (*Eucalyptus melliodora*), Apple Box (*Eucalyptus bridgesiana*), Grey Box (*Eucalyptus microcarpa*), White Box (*Eucalyptus albens*), Red Box (*Eucalyptus polyanthemos*), Mugga Ironbark (*Eucalyptus sideroxylon*), Inland Red Box (*Eucalyptus intertexta*), Black Box (*Eucalyptus largiflorens*), and Callitris species (Baker-Gabb 2011; Rayner et al. 2015a).

Superb Parrots are highly mobile, but its movement ecology is poorly understood. The Superb Parrot National Recovery Plan (Baker-Gabb 2011) states that “*the Superb Parrot has been considered nomadic (Sharrock 1981), resident (Schrader 1980), dispersive (Webster 1988; Webster & Ahern 1992), migratory (Schrader 1980), or partly migratory (Higgins 1999)*”. The direction, drivers and regularity of range-scale movements are unclear, though more recent research has revealed a strong link between seasonal movements and plant productivity (Manning et al. 2007) and, potentially, changes in food supply (Baker-Gabb 2011) and drought impacts (Higgins 1999).

Figure 1: Distribution of Superb Parrots in the ACT based on sightings over an 11-year period from November 2004 to August 2015. Group sizes show the number of Superb Parrot individuals seen for each sighting. Source: Canberra Nature Map. Most records displayed were contributed by the Canberra Ornithologists Group.



Superb Parrots will forage in Box-Gum woodland habitats or in artificial habitats in urban areas or on private land (e.g. crops; Webster 1988; Manning et al. 2004). When breeding, Superb Parrots typically forage within 9 km of nesting habitat (see below; Webster 1988; Manning et al. 2004; Rayner et al. 2015a). The condition and connectivity of Box-Gum woodland communities that provide foraging resources proximal to Superb Parrot breeding colonies may influence the species' breeding success (Leslie 2005). In the ACT, Superb Parrot individuals will forage in urban-adjacent woodland patches (including critically endangered Yellow Box- Blakely's Red Gum Grassy Woodland) and urban forest and greenspace, particularly in flowering Eucalypts and other trees directly adjacent to playing fields (M. Mulvaney unpublished data).

Superb Parrots feed on the ground and in trees, on a variety of plant species. Their diet includes seeds of Wallaby-grass (*Rytidosperma spp.*), Barley-grass (*Critesion spp.*), Wheat (*Triticum aestivum*) and Oats (*Avena sativa*), numerous Wattles (e.g. Silver Wattle (*Acacia dealbata*), Deane's Wattle (*Acacia deanei*), and Gold Dust Wattle (*Acacia acinacea*)), and Elms (*Ulmus spp.*). Superb Parrots feed on flowers, nectar and fruits of Eucalypts (e.g. Mugga Ironbark), Mistletoe (*Amyema miquelii*, *Amyema quandang*), Dwarf Cherry (*Exocarpos strictus*), and Plums (*Prunus spp.*). Lerps taken from Eucalypt foliage are another important component of the Superb Parrot diet (Baker-Gabb 2011). In the ACT, Superb Parrot foraging locations are positively associated with vegetation cover in the 3 to 20 m height range, and the presence of Eucalypts (Blakely's Red Gum, Argyle Apple (*Eucalyptus cinerea*) and River Peppermint (*Eucalyptus elata*)), Wattles (Cootamundra Wattle (*Acacia baileyana*)), and Elms (English Elm (*Ulmus procera*) and Chinese Elm (*Ulmus parvifolia*)) (ACT Government unpublished data). Observations of Superb Parrot foraging are frequently reported in Yellow Box and Mugga Ironbark.

Superb Parrots breed singly or in loose colonies, from September to December, typically near a watercourse (Webster 1988; Manning et al. 2004). In the ACT, core breeding locations are situated in open woodland in Mulligans Flat and Goorooyarroo Nature Reserves (Davey 2010, 2012, 2013b; Rayner et al. 2015a, 2016) and in the central and lower Molonglo Valley (Davey 2013a). An obligate hollow nester, Superb Parrots rely on large, old and senescing Eucalyptus trees for breeding (Manning et al. 2004). On the inland slopes, Superb Parrots show a strong reliance on Blakely's Red Gum for nesting (Manning et al. 2006) and this tree species, along with Scribbly Gum, contribute the majority of known Superb Parrot nest trees

in the ACT (Rayner et al. 2015a, 2016). Nest trees in the ACT are typically live individuals with an average trunk diameter of 110 cm (at breast height; Rayner et al. 2016), but Superb Parrots will also nest in large standing dead trees (Manning et al. 2004; Umwelt 2015).

Superb Parrots favour nest hollows located in a trunk or primary limb, 5 to 35 m above ground (Webster & Ahern 1992; Manning et al. 2004; Umwelt 2015; Rayner et al. 2015a, 2016). Internal dimensions of Superb Parrot nest hollows vary across tree species. For example, in the ACT, nest hollows in Blakely's Red Gum are typically deeper than in Scribbly Gum. Superb Parrot nest hollows are often re-used in successive breeding seasons, and not always by the same pair (L. Rayner pers. obs.). In the ACT, re-use rates are higher for nest trees (80%) than for nest hollows (40%). That is, Superb Parrots will preferentially use a different hollow in the same nest tree, when the original hollow is otherwise unavailable (Rayner et al. 2016).

Superb Parrots lay 4–6 eggs that are incubated by the female for approximately 22 days before hatching (Higgins 1999; L. Rayner unpublished data). Nestlings are fed by both parents for approximately 40 days before fledging (Forshaw & Cooper 1981; L. Rayner unpublished data). It is estimated that Superb Parrots can live for 25 years or more (Baker-Gabb 2011). A generation time of 7.5 years is derived from an age at first breeding of 1 year and a maximum longevity in the wild of 14 years (TSSC 2016).

PREVIOUS AND CURRENT MANAGEMENT

The previous action plan for the Superb Parrot states that: “*the focus of attention for habitat protection is in the northern part of the ACT near Hall, and at Mulligans Flat*”. (ACT Government 1999). Indeed, areas of public land that provide significant breeding habitat for the species (i.e. multiple adult pairs breeding over multiple years) in the northern ACT have been removed from urban zoning and formally protected as part of Goorooyarroo Nature Reserve. In this landscape, ACT Government enforced a 100-m buffer between the urban boundary and any known nest tree, and restricted development works and vehicle access in the vicinity of nest sites during the breeding season.

The second, and equally important, breeding area for Superb Parrots in the ACT is in the Yellow Box-Blakely's Red Gum Grassy Woodland located in the central and lower Molonglo Valley (Davey 2013a). On 19 August 2008, the then Minister for Planning, Andrew Barr, removed the central Molonglo Valley area from ever being considered as a future urban area (ACT Legislative Assembly – Hansard). A Memorandum of Understanding between the ACT Government and landholders guides management of the central Molonglo Valley to protect and maintain the biodiversity values of the area, including Superb Parrot nest trees, in perpetuity while enabling other compatible land uses to occur.

Superb Parrots occur in woodland and forest habitats with sparse tree cover and a grassy understorey. Historically, grassy woodland communities have been extensively cleared and severely modified throughout south-eastern Australia (Hobbs and Yates 2000). Habitat loss has been high in Yellow Box-Blakely's Red Gum Grassy Woodland, which is listed as an endangered ecological community (nationally under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*, and in the ACT under the *Nature Conservation Act 2014*) and supports Superb Parrot breeding habitat. Due to this association, previous and current practices to improve and maintain the extent and quality of grassy ecosystems in the ACT assist management objectives for conserving the Superb Parrot population. Such practices include:

- Retaining and protecting mature, hollow-bearing trees;
- Prohibiting illegal firewood and wildlife collection;
- Thinning or replanting endemic Eucalypts to promote appropriate woodland stand densities;
- Planting of endemic Eucalypts to promote landscape connectivity; and
- Managing grazing impacts through fencing and stock rotation.

The protection and management of Superb Parrot breeding habitat is also strengthened by the listing of 'The Loss of mature trees and a lack of recruitment' as a Key Threatening Process under the Nature Conservation Act 2014 (accepted 27 September 2018). This listing is supported by Conservation Advice (ACT Government 2018) that explicitly recognises time lags in tree hollow development and the role of dieback in accelerating mortality of trees suitable for hollow-nesting fauna.

THREATS

Due to the migratory habit of Superb Parrots, threats beyond the Territory are likely to be impacting on birds that breed, and were bred, in the ACT. The ACT Government is therefore committed to supporting research and recovery actions implemented elsewhere in the species' range, where practicable.

Within the ACT, three key threats to maintaining a viable, stable and breeding population of Superb Parrots have been identified. These threats are: (1) habitat loss; (2) climate change and (3) nest competition.

HABITAT LOSS

Superb Parrots have lost significant areas of breeding and foraging habitat due to widespread destruction and degradation of Box-dominated woodlands throughout its range in south-eastern Australia (Hobbs and Yates 2000). Consequently, Superb Parrots have undergone a substantial historical range contraction, particularly evident in Victoria (Baker-Gabb 2011). The species currently occupies only a fraction of its former range (BirdLife International 2016), primarily in the NSW South Western Slopes bioregion (Manning et al. 2007), where over 92% of temperate woodland has been cleared (TSSC 2006).

Remaining suitable Superb Parrot habitat in NSW is largely confined to roadside vegetation and small, fragmented patches of woodland on travelling stock routes and private land (Baker-Gabb 2011), which continue to be degraded by illegal clearing and habitat simplification (e.g. firewood collection, Driscoll et al. 2000). In contrast, the ACT contains some of the largest and most intact patches of lowland temperate woodland; a high proportion of which is formally protected (ACT Government 2004). However, simulation models undertaken by Manning et al. (2013) indicate that large hollow-bearing trees will continue to be lost from temperate woodland landscapes in lieu of strategic action to reduce tree mortality and increase tree recruitment. For example, in the South Western Slopes, the number of potential Superb Parrot nest trees is predicted to decline by 38% from current densities by 2050 (Manning et al. 2013).

Tree mortality within the Superb Parrot range can be exacerbated by human-induced habitat degradation caused by illegal firewood harvesting, artificially high water levels due to irrigation, inappropriate fire regimes, and overgrazing by stock, rabbits and native herbivores (Baker-Gabb 2011; Webster & Ahern 1992). Further, Eucalypt dieback, which is characteristic among Superb Parrot nest trees (Manning et al. 2004) and significantly worse in Blakely's Red Gum (Lynch et al. 2017), may accelerate nest tree mortality in the ACT region.

The loss of hollow-bearing trees poses a particular challenge to Superb Parrot conservation in the ACT because: (1) it is estimated that suitable Superb Parrot nest hollows take more than 120 years to form (Manning et al. 2004); (2) Superb Parrots show a strong preference for breeding in nest trees previously occupied by Superb Parrots (Rayner et al. 2015a, 2016), such that the loss of known nest trees may have a disproportionate negative impact on the local population; (3) Superb Parrots experience intense competition for nesting hollows, particularly from resident parrot species (Rayner et al. 2016) but also exotic species (see below); and (4) to date, attempts to supplement nest site availability with artificial structures (e.g. nest boxes) has shown little benefit to Superb Parrots (e.g. Lindenmayer et al. 2017).

CLIMATE CHANGE

A recent study by Manning et al. (in review) suggests that Superb Parrots are highly sensitive to climate change. Their analysis, using BIOCLIM models (e.g. Xu and Hutchinson 2013), projected the total bioclimatic range of the Superb Parrot will decrease by approximately 47% by 2050, and by 75% by 2070 as a result of climate change. Similar predictions have been made for Superb Parrots by the Central West Local Land Services, which are supported by detailed climate change model projections for the Central West region (Rawson 2016); a critical region for species migration, particularly from north to south and from low to high elevation.

Along with these further range contractions, it is predicted that the core range of the Superb Parrot will shift south-eastward concentrating the population over the ACT and areas to the immediate north. Such predictions are supported by regional population trends estimated for the species (Appendix B), which show significant declines in the north-west of the range (Ellis and Taylor 2014), stable or weak declining trends toward the current core range (Birdlife International 2015; A.

Manning unpublished data) and an increased number of sightings in the ACT region (COG unpublished data).

The high mobility of Superb Parrots is likely to assist the species in finding viable habitat in future climates. However, supporting necessary movement through dispersal pathways and habitat continuity, and protecting and creating habitat that supports all stages of the species' life cycle, will be critical.

Importantly, the condition of woodland habitats is likely to influence future colonisation dynamics for the Superb Parrot. For example, a recent study by Tulloch et al. (2016) found that Superb Parrots have a higher probability of colonising new habitats where grazing intensity is reduced.

Climate modelling indicates that conditions suitable for Blakely's Red Gum will persist across its entire range in the ACT for the mid to long term (Mackenzie et al. 2018). Indirect influences of climate change, such as more intense insect-related defoliation, may increase levels of dieback in

Blakely's Red Gum (Lynch et al. 2017). A decline in this critical nesting resource could threaten Superb Parrot population recovery by reducing landscape-scale hollow availability and increasing competitive pressure for suitable breeding sites in novel nest tree species.

NEST COMPETITION

Inter-specific competition is a documented threat to the Superb Parrot population (Baker-Gabb 2011). Superb Parrots are an obligate hollow-nesting species and, as such, concern about the impacts of nest site competition is highest where there is a lack, or perceived shortage, of potential nest sites (Webster 1988). While ongoing loss of hollow-bearing trees is widely accepted to be an unsustainable threat to the Superb Parrot population, there is debate over whether (and, if so, where) suitable nest hollow availability is a factor limiting population growth (Davey and Purchase 2004; Manning et al. 2013; BirdLife International 2016).

Superb Parrots in the ACT show a preference for tree hollows with an average entrance diameter of 12-13 cm (Umwelt 2015; Rayner et al. 2016), and an average chamber depth exceeding 70 cm (Rayner et al. 2016). The prevalence, abundance and distribution of such hollows, among tree species and across known breeding landscapes, has not been measured or estimated. Such information is critical to understanding and forecasting

resource limitation for Superb Parrots. Further, the dynamics of hollow access and exclusion in diverse woodland faunal communities are difficult to measure and have not been studied in detail. Where aggressive, competitive interactions do not result in the obtainment or usurpation of a Superb Parrot nesting site, indirect effects of competitor visitation and harassment on individual fitness and provision rates remain plausible (L. Rayner pers. comm.).

Given such knowledge gaps, understanding the effects of nest competition on Superb Parrots is currently limited to data on the presence and abundance of known and potential competitors. Potential nest site competitors include the Crimson Rosella (*Platycercus elegans*), Common Starling (*Sturnus vulgaris*), Sulphur-crested Cockatoo (*Cacatua galerita*), Eastern Rosella (*Platycercus eximius*), Common Myna (*Acridotheres tristis*), Galah (*Eolophus roseicapilla*), Little Corella (*Cacatua sanguinea*) and Long-billed Corella (*Cacatua tenuirostris*) (Webster 1988; Baker-Gabb 2011; Rayner et al. 2015a). In the ACT, concern has been raised about the impact of the exotic Common Myna (Pell and Tidemann 1997; Davey 2013b), but clear evidence of disruption to Superb Parrot nesting success from this species is lacking. Rayner et al. (2015, 2016) identify the native Crimson Rosella and the exotic Common Starling as the dominant competitors for Superb Parrot nesting sites in the ACT. There are also anecdotal reports of feral honey bees (*Apis mellifera*) occupying potential Superb Parrot nest sites, although their significance and level of impact is not known (Baker-Gabb 2011).

In the ACT, nest site competition in Superb Parrot breeding landscapes is high (Davey et al. 2013b; Rayner et al. 2015a, 2016) and likely to increase given projected increases in the regional population due to climate change (Manning et al. in review). The potential impacts of current and future urban developments in Canberra on urban and woodland bird communities, and specifically the abundance of hollow-dependent birds, is likely to influence competition for nesting sites in the ACT (Rayner et al. 2015b).

ADDITIONAL THREATS

Other threats to Superb Parrots that are poorly understood or prevalent outside of the species' range, and therefore not a focus of this action plan, include:

Urban impacts – Superb Parrots commonly breed in peri-urban woodland, and research into the disruption to Superb Parrot breeding activity from existing suburbs and new developments is in its infancy. Preliminary results from the ACT indicate that Superb Parrots require a distance of at least 200 m to buffer the impacts of urban development on nest selection (ACT Government unpublished data). Negative urban impacts can include: construction disturbance, altered competitor and predator exposure, noise and light pollution, increased human activity, and/or loss of habitat connectivity. Urban impacts may be direct or indirect and may increase with proximity to the urban boundary (e.g. Rayner et al. 2015b). The prevalence of drone use in urban areas is increasing; the impact of this on Superb Parrot flight space is unknown.

Vehicle strike: Superb Parrots are highly susceptible to death by vehicle strike, particularly in rural areas where large flocks can be killed while feeding at the roadside on spilt grain (Rees 2016).

Predation: Predation of Superb Parrot nests is low in the ACT (Rayner et al. 2015a, 2016). However, predation of adult Superb Parrots by feral cats, dogs and foxes, particularly while individuals forage on the ground, has not been studied.

Poisoning: Poisons used for pest control, and pesticides used for crop management, have been identified as potential threats to Superb Parrot breeding success (Baker-Gabb 2011).

Illegal trade: It is believed that many thousands of wild Superb Parrots have illegally entered the aviculture trade (Baker-Gabb 2011), but the level of ongoing threat from such activities is unclear.

Psittacine beak and feather disease (Pbfd): Superb Parrots are susceptible to Pbfd, but incidence and transfer of this fatal disease among Superb Parrot individuals is poorly understood.

MAJOR CONSERVATION OBJECTIVES

The overall objective of this plan is to maintain a wild, self-sustaining population of Superb Parrots across its natural geographic range in the ACT. This includes the conservation of natural evolutionary processes. Specific objectives of the action plan are to:

- Conserve the ACT population of Superb Parrots by protecting landscapes that support confirmed breeding colonies.
- Enhance long-term viability of Superb Parrot populations through management of open woodland to increase breeding and foraging habitat area.
- Enhance long-term viability of Superb Parrot populations through management of urban landscapes to aid connectivity and promote foraging habitat.
- Improve understanding of Superb Parrot ecology, including habitat selection, resource requirements and emerging threats.
- Promote greater awareness of, and strengthen stakeholder and community engagement in, the conservation of Superb Parrots.

CONSERVATION ISSUES AND INTENDED MANAGEMENT ACTIONS

PROTECTION

Superb Parrots are a highly mobile species that moves through much of northern ACT during the breeding season. During this time it nests in open woodland habitats and forages in small woodland patches and urban greenspace. This pattern of habitat use also has become increasingly common in southern Canberra. As such, Superb Parrots occur on land under a range of tenures.

A major focus of Superb Parrot protection measures in this action plan are on critical breeding habitat as indicated by the presence of: (i) a known nest tree, or (ii) a confirmed breeding colony. Here, we define a breeding colony as the aggregation of at least four adult Superb Parrot pairs that attempt to nest, in the same year, within an 80-ha area, where the maximum distance between these nesting attempts is 1 km. This definition is supported by Superb Parrot breeding research undertaken in the ACT (Rayner et al. 2015a, 2016) and may not be a suitable definition for areas beyond the ACT or under future climates. Where a new superb parrot breeding colony is located in the ACT, further survey work will be required to determine the extent of nesting effort in the supporting landscape (as per Superb Parrot survey guidelines, see Table 1 - Action 1d). Once all nesting events are located, the area requiring formal protection will be the minimum convex polygon area (IUCN 2015) containing those nesting events, with an additional 200 m conservation buffer applied to the polygon perimeter. This is an evidence-based buffer distance, with results of ACT Superb Parrot research indicating that the distribution of breeding Superb Parrots in woodland is impacted within 200 m of disturbance. As such, this action plan seeks to protect critical breeding habitat from direct and indirect threats.

Bioclimatic projections indicate that additional areas of the ACT may become suitable for breeding Superb Parrots in the future, particularly in the south of the Territory. Similarly, with an increasing number of birds over-wintering in the ACT in recent years, the protection of emerging wintering grounds may be required. For the purpose of this action plan, wintering grounds are defined as locations in the ACT where repeat sightings of Superb Parrots, within or between years, occur from 1 June to 31 August.

ACT Government will explore options for the protection of new and future Superb Parrot habitat on Territory land, as such information becomes available (see below). ACT Government also will seek to apply formal protections to known Superb Parrot movement pathways on Territory land, which can include the nomination of trees identified as important movement 'stepping stones' to the ACT Tree Register, established under the Tree Protection Act 2005 (<https://www.legislation.act.gov.au/a/2005-51/default.asp>). The ACT Government also will cooperate with surrounding shires in NSW to protect and enhance regional habitat and movement corridors for the species.

ENVIRONMENTAL OFFSET REQUIREMENTS

Environmental offset requirements for species and ecological communities in the ACT are outlined in the ACT Environmental Offsets Policy 2015. The ACT Government has committed to assess and offset impacts to Superb Parrots from the Throsby and Molonglo Valley residential developments. These commitments form part of the Gungahlin Strategic Assessment and Molonglo Strategic Assessment offset packages approved by the Commonwealth Government under the EPBC Act 1999.

Avoidance, mitigation and offset measures detailed in the Gungahlin Strategic Assessment Biodiversity Plan 2013 and Molonglo Valley Plan for the Protection of Matters of National Environmental Significance 2011 meet requirements for the protection of matters of national environmental significance under the EPBC Act. As a condition of these plans, the ACT Government is required to manage Superb Parrots to ensure long-term persistence of breeding individuals in northern ACT. These plans, and supporting documents, are publicly available on the ACT Environmental Offsets Register.

The Molonglo Valley plan does not specify conservation actions and outcomes for Superb Parrots but acknowledges benefit to Superb Parrots through the protection and conservation of Box-Gum woodland within the Molonglo Valley strategic assessment area. However, a targeted survey was undertaken as part of the Molonglo Adaptive Management Strategy 2013 to establish the baseline distribution, abundance and breeding status of Superb Parrots within the Molonglo Valley strategic assessment area.

Conservation outcomes planned for Superb Parrots in the Gungahlin Strategic Assessment Biodiversity Plan 2013, to be achieved through direct and indirect offsets, include:

- Long-term persistence of a breeding Superb Parrot population in northern ACT;
- Improved management of potential Superb Parrot habitat to support population recovery;
- Improved understanding of Superb Parrot habitat requirements for foraging and dispersing within peri-urban and urban environments;
- Improved understanding of Superb Parrot breeding ecology in the northern ACT in terms of site fidelity and nest success; and
- Improved Superb Parrot habitat connectivity through strategic planting in the northern ACT.

The *Superb Parrot Habitat Improvement Plan 2015 and Extension to the Mulligans Flat and Gorooyaroo Nature Reserves Offset Management Plan 2015* were developed to guide the implementation of ecological management activities and support progress toward the above conservation outcomes within the offset areas.

Environmental offset research commitments have advanced ecological knowledge of Superb Parrots in northern ACT and, in turn, support the development of conservation priorities defined in this action plan. Annual reports (Rayner et al. 2015a, 2016) that summarise the findings of Superb Parrot offset research are publicly available on available at the [ACT Government's Environment website](#). There remain significant knowledge gaps about the ecology of Superb Parrots and further ecological research and monitoring of Superb Parrots is required to fulfil the ACT Government's strategic assessment commitments (see below).

MONITORING AND RESEARCH

Superb Parrot distribution and abundance varies in response to seasonal conditions at the landscape scale (Manning et al. 2007). Therefore, long-term monitoring is essential to determine the population status of Superb Parrots in the ACT region and evaluate the success (or otherwise) of conservation measures implemented. The collection of baseline population data at key breeding locations is needed to: (i) determine Superb Parrot population size and growth; (ii) track population variability to derive robust population trend estimates that inform the species' conservation status; and (iii) measure the potential direct and indirect impacts of human-related disturbance and climate change.

Superb Parrot survey data has been collected in the ACT by Davey (2010, 2012, 2013a, 2013b), by the [Canberra Ornithologists Group](#) through the ACT Woodland Bird Monitoring Program and Garden Bird Survey, by the public through the online reporting tool [Canberra Nature Map](#), and by the ACT Government (Umwelt 2015, SMEC 2017, Rayner et al. 2015a, 2016). Preliminary survey work by Davey (2010) aimed to identify ecological constraints to proposed urban development and resulted in improved understanding of the distribution and habitat preferences of Superb Parrots in the ACT, including the identification of active breeding colonies and core breeding areas (Davey 2010, 2013a).

A monitoring and research project was initiated by the ACT Government in 2015 within the Mulligans Flat and Goorooyarro Nature Reserves and within a rural lease in the lower Molonglo, as part of environmental offset area management under commonwealth approval conditions. The project is a collaboration between the Australian National University and the ACT Government, and involves surveys for breeding individuals, nest hollow surveillance and GPS tracking. The project aims to measure reproductive output and identify variables influencing nest success and movement of Superb Parrots in the ACT. In 2017, this project was expanded to include the central and lower Molonglo Valley breeding colony identified by Davey (2013a). This work involved developing and implementing a comprehensive monitoring strategy for Superb Parrots in the ACT, resulting in mapping of known Superb Parrot nest trees, and an improved understanding of breeding success, nest site selection and local foraging movements (Rayner et al. 2015a, 2016). In 2017, the ACT Government used tracking data from individual Superb Parrots tagged within Goorooyarro Nature Reserve (Rayner et al. 2015a) to investigate foraging site selection within the ACT.

Superb Parrot monitoring and research in the ACT will continue to focus primarily on reproductive participation and output in woodland habitats on reserve and rural land. Further monitoring and research is required to better understand Superb Parrot movement ecology and future habitat selection in response to climate change and habitat-related disturbance. Specific research priorities for the ACT are outlined in Table 1 (below). Key research objectives include:

- **Monitor reproductive participation and output:** in critical breeding habitat.
- **Characterise breeding and foraging resources:** that support reproductive success of the ACT population.
- **Assess competition and predation at known nesting sites:** to be achieved through remote camera data collection and nest survival analysis.
- **Investigate efficacy of artificial breeding habitat:** exploring whether designed artificial hollow structures (nest box, log hollow, artificial limb or created hollow chamber) can increase Superb Parrot recruitment.
- **Monitor emerging occupancy:** confirm new Superb Parrot habitat through field surveys in the breeding season, with focus on southern grassy woodland areas (e.g. Tuggeranong district).
- **Update guidelines for surveying Superb Parrots:** at different stages of the species' life cycle, to deliver robust estimates of abundance, distribution and annual productivity.
- **Identify future potential habitat:** using a combination of monitoring surveys, ecological research, and predictive modelling to guide long-term protection of critical Superb Parrot habitat, with a focus on (1) open woodland located in the Molonglo Valley and Stromlo Districts, and (2) the distribution and abundance of mature native trees. Once identified, future habitats may require proactive management to maintain and improve habitat values for the Superb Parrot.
- **Investigate movement ecology:** advance cross-jurisdictional partnerships to develop tracking techniques, identify wintering habitats and advance knowledge of range-wide movements.

MANAGEMENT

Due to the high mobility of Superb Parrots and the uncertainty associated with future habitat use, management actions will be focused on maintaining and enhancing habitat quality at known breeding and foraging locations (based on best available evidence) and preventing or minimising any adverse impacts on Superb Parrots from activities occurring in adjacent landscapes.

Known breeding areas in the ACT are described in Davey (2010, 2012, 2013a, 2013b), Umwelt (2015), Rayner et al. (2015, 2016) and SMEC (2017), providing valuable ecological data for managing broad structural attributes of breeding habitat. Hotspots of foraging activity by breeding Superb Parrots have been identified by Rayner et al. (2015) and the ACT Government (unpublished data). This research showed that 68%, 28% and 4% of foraging stops occurred on urban, reserve and rural land respectively. Superb Parrot foraging on reserved land was contained almost exclusively to the Mulligan's Flat-Goorooyarroo Extended Woodland Sanctuary, while foraging stops in urban environments were more widely distributed. The ACT Government will explore opportunities to develop conservation arrangements with managers of ACT urban forest and greenspace to protect foraging locations critical to Superb Parrots. Foraging locations within the ACT urban environment that require sensitive ecological management include, but are not limited to:

- Mullion Park and surrounds, Harrison
- Gungahlin Cemetery, Mitchell
- Bellenden Street, Crace
- Kaleen Playing Fields and North Oval, Kaleen
- Fern Hill Park. Australian Institute of Sport and surrounds, Bruce
- Billabong Park and Just Robert Hope Park, Watson
- John Knight memorial Park, Belconnen
- Spofforth Street Golf Course, Holt
- Parkland around Ginninderra Creek near MacGregor Oval, MacGregor
- Parkland between Ginninderra Drive and Goodwin Hill, MacGregor
- Charnwood Playing Fields and Boslem/Harte Park, Charnwood

Maintaining the ecological integrity of ACT habitat that supports Superb Parrot breeding colonies is a priority and contributes to population recovery efforts undertaken throughout the species' range. Key management actions for ensuring the persistence of Superb Parrots in the ACT include:

- **Map and retain known nest trees:** living and dead - that have been used by Superb Parrots in the last five years. Potential nest trees in future habitats should be protected against removal when relevant bioclimatic projections become available.
- **Mitigate projected woodland tree loss:** to be achieved through a combination of revegetation works and management of grazing pressure to support natural regeneration (where appropriate).
- **Promote favourable vegetation structure:** at breeding and foraging locations; includes the maintenance of suitable tree stand densities, ground layer diversity and strategic augmentation plantings (e.g. acacias near breeding sites).
- **Promote urban foraging resources:** includes liaison with Transport Canberra and City Services Directorate to update Municipal infrastructure Design Standards for urban landscape projects, with particular attention to suburbs within 9 km of known breeding colonies.
- **Identify and retain vegetation that facilitates movement:** particularly local movements between breeding and foraging locations. Seasonal migration pathways should be protected if/when tracking technology allows for such insight.

In addition to these on-ground actions, the ecological management of woodland remnants and protection of scattered paddock trees on private land will be supported.

IMPLEMENTATION

Implementation of conservation actions outlined in the ACT Native Woodland Conservation Strategy and action plan for Yellow Box-Blakely's Red Gum Grassy Woodland will be fundamental to making progress towards the objectives of this action plan. Further, implementation of this action plan will require:

- Land planning and land management areas of the ACT Government to consider the conservation of Superb Parrots and grassy woodland ecosystems;
- Allocation of adequate resources to undertake the actions specified in the ACT Native Woodland Conservation Strategy and Superb Parrot Action Plan;
- Liaison with other jurisdictions (particularly NSW), landholders (Commonwealth Government) and stakeholders (e.g. National Superb Parrot Recovery Team) with responsibility for the conservation of Superb Parrots and grassy woodland ecosystems;
- Collaboration with universities, CSIRO and other research institutions to facilitate and undertake necessary Superb Parrot research;
- Collaboration with non-government organisations (e.g. Canberra Ornithologists Group), citizen scientists and the wider community to assist with monitoring and on-ground actions, and to help raise awareness of Superb Parrot conservation and recovery issues.

Implementation of this action plan will result in new knowledge about the habitat and ecology of Superb Parrots. This knowledge should inform the implementation and review of actions in this plan. Under s.108 of the Nature Conservation Act 2014 the Conservator of Flora and Fauna must report to the Minister about each action plan at least once every five years and make the report publicly accessible within 30 days. The Scientific Committee must review an action plan every 10 years, or at any other time at the Conservator's request.

OBJECTIVES, ACTIONS AND INDICATORS

Table 1: Objectives, Actions and Indicators

OBJECTIVE	ACTION	INDICATOR
PROTECT		
1. Conserve the ACT Superb Parrot population by protecting areas that support breeding birds and emerging wintering grounds.	1a. Apply formal measures to protect critical breeding habitat of Superb Parrots on Territory land. Encourage formal protection of critical breeding habitat on Commonwealth land.	All critical breeding habitat of the Superb Parrot is protected by appropriate formal measures.
	1b. Identify and apply formal protection measures to trees on Territory land that support Superb Parrot movement.	All trees identified as ‘stepping stones’ are nominated for protection via the ACT Tree Register.
	1c. Track the conservation status of Superb Parrots by monitoring abundance in areas that support confirmed breeding colonies and, where appropriate, at emerging ACT wintering grounds.	Superb Parrot abundance is stable or increasing (accounting for temporal population variability and/or future range shift).
	1d. Review and update monitoring and survey guidelines for Superb Parrots.	New guidelines for surveying Superb Parrots are produced.
MAINTAIN & IMPROVE		
2. Enhance long-term viability of Superb Parrot populations through management of open woodland to increase breeding and foraging habitat area.	2a. Manage woodland habitat to ensure persistence of Superb Parrot breeding and foraging resources.	All Superb Parrot nest and forage trees in open woodland, with evidence of use in the last 5 years, are mapped and retained.
	2b. Undertake tree planting to mitigate long-term habitat tree loss in the vicinity of known Superb Parrot breeding locations.	Hollow producing Eucalypt species, such as Blakely’s Red Gum, Scribbly Gum, River Red Gum and Red Box, are strategically planted within 100 ha of known Superb Parrot breeding locations.
	2c. Maintain suitable understorey structure and condition, particularly ground layer diversity, at known Superb Parrot foraging sites in open woodland.	Understorey condition is maintained or improved at known Superb Parrot foraging sites in open woodland.

OBJECTIVE	ACTION	INDICATOR
3. Enhance long-term viability of Superb Parrot populations through management of urban landscapes to aid connectivity and promote foraging habitat.	3a. Provide advice to planners on plant species favoured by Superb Parrots for foraging in urban open space.	Superb Parrot feed plant species are planted and promoted at known urban foraging locations.
	3b. Provide advice to planners on the location and species composition of Superb Parrot urban movement corridors.	Suitability of known Superb Parrot urban movement corridors is maintained or improved.
4. Improve understanding of Superb Parrot ecology, including habitat selection, resource requirements and emerging threats.	4a. Support Superb Parrot research initiatives that: (i) identify and map critical habitat areas (i.e. breeding and foraging locations) and (ii) characterise critical habitat resources (e.g. tree hollows)	Data on Superb Parrot nest tree locations, and nest hollow dimensions, are collected and mapped.
	4b. Support Superb Parrot research initiatives that: (i) evaluate competitive pressure of co-occurring hollow-using species; and (ii) measures prevalence and impacts of nest predation.	Detailed long-term monitoring of Superb Parrot nest success is undertaken at one or more known breeding locations.
	4c. Support research that advances knowledge of Superb Parrot foraging ecology, including the identification of variables (e.g. plant species) that determine optimum foraging habitat.	Data on Superb Parrot multi-strata foraging habitat selection and foraging behaviour are collected and analysed.
	4d. Support research that advances knowledge of Superb Parrot migration flightpaths, including the potential use of habitat corridors across jurisdictions.	The efficacy of local- and range- scale satellite telemetry tracking methods is investigated and tested.
	4e. Support research that investigates the potential of hollow creation, manipulation and supplementation for improving nest success and breeding productivity of Superb Parrots.	Hollow manipulation and supplementation trials are explored at one or more known breeding locations.
	4f. Support research that defines future potential Superb Parrot breeding and movement habitat in response to climate change.	Future potential Superb Parrot habitat is identified and considered in conservation decision making.

OBJECTIVE	ACTION	INDICATOR
COLLABORATE		
5. Promote greater awareness of, and strengthen stakeholder and community engagement in, the conservation of Superb Parrots.	5a. Undertake or facilitate stakeholder and community engagement and awareness activities.	Increased awareness and participation by the community to assist Superb Parrot recovery actions in the ACT.
	5b. Actively seek and facilitate citizen scientist involvement in research activities, where possible.	Citizen science activities are actively supported.
	5c. Support cross-jurisdictional Superb Parrot conservation research and monitoring initiatives.	Cross-jurisdictional engagement activities are undertaken.
	5d. Collaborate with Throsby residents to demonstrate and promote beneficial conservation actions that support Superb Parrot populations in adjacent woodland habitat.	A conservation workshop is held with the residents of Throsby.

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APPENDIX A

NATURE CONSERVATION ACT (1980) CRITERIA SATISFIED

- 2.1 The species is known to occur in the ACT region and is already recognised as vulnerable in an authoritative international or national listing.
- 2.2 The species is observed, estimated, inferred or suspected to be at risk of premature extinction in the ACT region in the medium-term future, as demonstrated by:
 - 2.2.1 Current serious decline in population or distribution from evidence based on:
 - 2.2.1.1 Direct observation, including comparison of historical and current records;
 - 2.2.1.3 Serious decline in quality or quantity of habitat; and
 - 2.2.1.5 Serious threats from herbivores, predators, parasites, pathogens or competitors.
 - 2.2.4 Seriously fragmented distribution for a species currently occurring over a moderately small range or having a moderately small area of occupancy within its range.
 - 2.2.6 Small population.

APPENDIX B

POPULATION TREND ESTIMATES

The following trend estimates have been derived for the Superb Parrot:

- The State of *Australia's Birds 2015* report (Birdlife Australia 2015) indicated a weak (non- significant) decline in Superb Parrot reporting rate between 1999 and 2013 for the South-east Mainland Region;
- Ellis and Taylor (2014) indicated a significant decline (50%) in Superb Parrot reporting rate between 2005 and 2013 in central western NSW; and
- An analysis by Manning et al. (unpublished data) indicated a significant decline (53%) in Superb Parrot reporting rate between 2001 and 2014 in the core breeding range.

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