Australian Government

Draft National Recovery Plan for Forty-spotted Pardalote (*Pardalotus quadragintus*)

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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Cover page: Forty-spotted Pardalote *Pardalotus quadragintus* on Bruny Island © Barry Baker

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Acronyms

AOO	Area of occupancy
BLA	BirdLife Australia
BOM	Bureau of Meteorology
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Commonwealth)
Cwth	Commonwealth
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DNRET	Department of Natural Resources and Environment Tasmania
EOO	Extent of occurrence
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FPRT	Forty-spotted Pardalote Recovery Team
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
NGO	Non-government organisation
RFA	Regional Forest Agreement
SPRAT	Species Profile and Threats
Tas	Tasmania
TSP Act	*Threatened Species Protection Act 1995* (Tasmania)
TSSC	Threatened Species Scientific Committee

1. Summary

Common name: Forty-spotted Pardalote

Scientific name: *Pardalotus quadragintus*

Family: Pardalotidae

Current status of taxon:

1. *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth): Endangered
2. *Threatened Species Protection Act 1995* (Tas): Endangered
3. IUCN Red List of Threatened Species: Endangered

1.1 Species description, distribution and habitat

The Forty-spotted Pardalote is a small, cavity nesting passerine measuring 9 to 10 cm in length and weighing approximately 12 g. Individuals are generally olive green in colour and pale yellow around the eye, cheek and on the rump. The wings are black with characteristic white spots. The species does not exhibit any apparent size or colour dimorphism between the sexes (Woinarski & Rounsevell 1983).

Forty-spotted Pardalotes are endemic to Tasmania, occurring in three areas: on Bruny Island (including Partridge and Snake Islands) and nearby parts of mainland Tasmania including Tinderbox and Coningham Peninsulas and at Ida Bay; on Maria Island; and in the Strzelecki Range of Flinders Island (Bryant 2018). Historically the species is thought to have been widely distributed in lowland forests of White Gum (*Eucalyptus viminalis*) in eastern Tasmania and also on King Island (Rounsevell & Woinarski 1983; Brown 1986). Viable subpopulations appear to have now disappeared from Taroona, Darling Range Flinders Island, Lime Bay State Reserve, Peter Murrell Reserve (Howden), and Coningham Peninsula (Bryant 2010; Bryant & Webb 2014; S Bryant, GB Baker pers. obs. cited in Bryant et al. 2021).

The species is only found in forests where White Gum are present. Small pockets of White Gum and even individual trees are also important habitat for the species. White Gum provides most of the birds' food in the form of manna (a sugary secretion produced by the tree in response to incisions made on branchlets by the birds, as well as insect attack); along with invertebrates and lerp (Woinarski & Bulman 1985; Case & Edworthy 2016). Pairs actively defend permanent territories that are typically around 0.7 ha in size within White Gum forest and woodland (Woinarski & Bulman 1985), and use hollows in White Gums and other trees for nesting (Woinarski & Rounsevell 1983; Brown 1986).

1.3 Recovery Plan Vision, Objective, and Strategies:

1.3.1 Long-term vision

The Forty-spotted Pardalote population has increased in numbers to such an extent, or occurs in a sufficient number of secure locations, that the species no longer qualifies for listing as threatened under any of the *Environment Protection and Biodiversity Conservation Act 1999* listing criteria.

1.3.2 Recovery plan objectives

By 2033, demonstrably reduce the severity of identified threats across the species' range.

By 2033, increase the number of viable populations of the Forty-spotted Pardalote across its current and historical range.

By 2033, maintain and improve the extent, condition and connectivity of habitat of the Forty-spotted Pardalote.

By 2033, measure and sustain a positive population trend compared to baseline counts in the number of mature individuals of Forty-spotted Pardalote.

These objectives will be achieved by implementing the actions set out in this recovery plan that minimise threats while protecting and enhancing the species' habitat throughout its range, adequately monitoring the species, generating new knowledge to guide recovery, and increasing public involvement achieving these objectives.

1.3.3 Strategies to achieve objectives

1. Implement management strategies to reduce known threats to Forty-spotted Pardalotes and their habitat.
2. Increase the number and viability of Forty-spotted Pardalote subpopulations through assessed translocation and supplementation techniques.
3. Enhance protection and increase the quality, extent and connectivity of known and potential habitat for the Forty-spotted Pardalote.
4. Improve knowledge of the biology and ecology of the Forty-spotted Pardalote and maintain a long-term monitoring strategy to identify population trends.
5. Increase stakeholder participation in Forty-spotted Pardalote conservation and management.
6. Coordinate, review and report on recovery progress.

1.4 Criteria for success

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

- Threats within the range of the Forty-spotted Pardalote are managed and reduced to avoid or mitigate negative impacts on the species and its habitat.
- The number of subpopulations, area of occupancy or species range has increased, and stochastic risk of extinction reduced.
- Research and planning to inform the feasibility of reintroduction as a management strategy has been conducted.
- The quality, extent and connectivity of Forty-spotted Pardalote habitat has improved throughout the species' current and potential range and a network of sites is protected and managed for the species.
- Understanding of the species' ecology has increased, in particular knowledge of its conservation status, threats, current distribution, population trends, movement ecology, life history and critical habitat.

- The Forty-spotted Pardalote population has been adequately monitored using standardised methods and an increase in the population from baseline counts is observed as a result of recovery actions.
- There is increased participation by key stakeholders and the public in recovery efforts and monitoring.

1.5 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 Forty-spotted Pardalote Recovery Team has the responsibility of providing advice, coordinating and supporting the implementation of the recovery actions outlined in this recovery plan. The membership of the Recovery Team includes individuals with relevant government agencies, non-government organisations and expertise from independent researchers and community groups.

2. Introduction

This document constitutes the 'National Recovery Plan for Forty-spotted Pardalote (*Pardalotus quadragintus*).' The plan considers the conservation requirements of the species across its range and identifies the actions needed to ensure the species' long-term viability in nature, and the parties that will undertake those actions.

The first recovery plan for the species was prepared under the Commonwealth's Endangered Species Program in 1991 (Bryant 1991). This recovery plan supersedes the previous recovery plan (Threatened Species Section 2006) that was adopted under the EPBC Act in November 2006. A summary of the key achievements gained for the species over this thirty-year period is provided in Appendix A.

The second Forty-spotted Pardalote Recovery Plan (Threatened Species Section 2006) was reviewed in February 2021 by the Forty-spotted Pardalote Recovery Team. The review noted that since the adoption of the recovery plan in 2006, a notable amount of progress had been made in facilitating the conservation of the species. Most effort was directed towards: securing perpetual covenants within the species known and potential range; deploying nest boxes to support breeding; planting White Gum to expand potential habitat; increasing public awareness of the species; and research conducted to test techniques to manage the ectoparasitic fly (*Passeromyia longicornis*) nest parasite (Edworthy et al. 2019; Alves et al. 2020).

Many of the actions identified in the recovery plan were still deemed relevant in recovering the species, though previously viable breeding subpopulations have now gone from locations at Taroona, Lime Bay State Reserve, Peter Murrell Reserves, and Coningham Peninsula. The review noted that there was a lack of coordinated response to threatening activities even though primary and secondary threats were quite well understood. It also noted that there was a lack of funding to support recovery actions at the landscape scale. The review identified the following current threats: climate change; impact of ectoparasitic fly on nesting success; development expansion; private land clearing; housing sub-divisions; and competitor species (e.g., Striated Pardalote (*Pardalotus striatus*; Edworthy 2016a) and other aggressive birds). Additionally, developing and implementing fire management plans, nest box and assessing the feasibility of translocation strategies to parts of the species' historic range were deemed high priority future actions.

The review determined that the actions required to conserve and promote recovery of the species include short- and long-term activities that need to be coordinated at a landscape/regional level with a range of stakeholder groups. These actions need to be informed by long-term monitoring to determine their success and status of the species. The review concluded a new recovery plan should be developed for Forty-spotted Pardalote.

Accompanying Species Profile and Threats Database (SPRAT) pages provide background information on the biology, population status and threats to the species. SPRAT pages are available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=418.

2.1 Conservation status

The Forty-spotted Pardalote is a listed threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The species was eligible for listing under the

EPBC Act as on 16 July 2000 and previously it was listed as Endangered under Schedule 1 of the preceding Act, the *Endangered Species Protection Act 1992* (Cwlth).

The species is also listed as Endangered under Tasmanian legislation, the *Threatened Species Protection Act 1995* (TSP Act) (Table 1).

Table 1: International, National and State conservation status of the Forty-spotted Pardalote

Legislation	**Conservation Status**
Environment Protection and Biodiversity Conservation Act 1999 (Cwth)	Endangered
Threatened Species Protection Act 1995 (Tas)	Endangered
Non-statutory listing status	
IUCN Red List (International)	Endangered

2.2 Taxonomy

Conventionally accepted as *Pardalotus quadragintus* (Gould 1838). No subspecies are described.

2.3 Species description

The Forty-spotted Pardalote is a small passerine measuring 9–10 cm in length and weighing approximately 10 g (Higgins & Peter 2002). Individuals are generally olive green in colour and pale yellow around the eye, cheek and on the rump. The wings are black with characteristic white spots. The species does not exhibit any apparent size or colour dimorphism between the sexes (Woinarski & Bulman 1985).

The Forty-spotted Pardalote can be distinguished from adults of the co-occurring Striated Pardalote (*P. striatus*) and Spotted Pardalote (*P. punctatus*) by having no prominent head markings, a duller body colour and rounder body shape and (Higgins & Peter 2002). However, misidentifications can occur due to confusion with juveniles, especially of Spotted Pardalotes.

2.4 Species distribution in Australia

Forty-spotted Pardalote are endemic to Tasmania. Historically, the species was more widely distributed across eastern Tasmania in lowland forests of White Gum and also on King Island (Campbell 1903; Rounsevell & Woinarski 1983; Brown 1986; Bryant 2018); however it is now largely confined to a few islands off the coast of Tasmania, and headlands and peninsulas in south and south-eastern Tasmania. The species now occurs in three widely separated subpopulations located at:

1. Bruny Island (including Partridge and Snake Islands) and nearby parts of mainland Tasmania including Tinderbox and Conningham Peninsulas and at Ida Bay;
2. Maria Island; and
3. Flinders Island in the Strzelecki Range (Figure 1) (Bryant 2018).

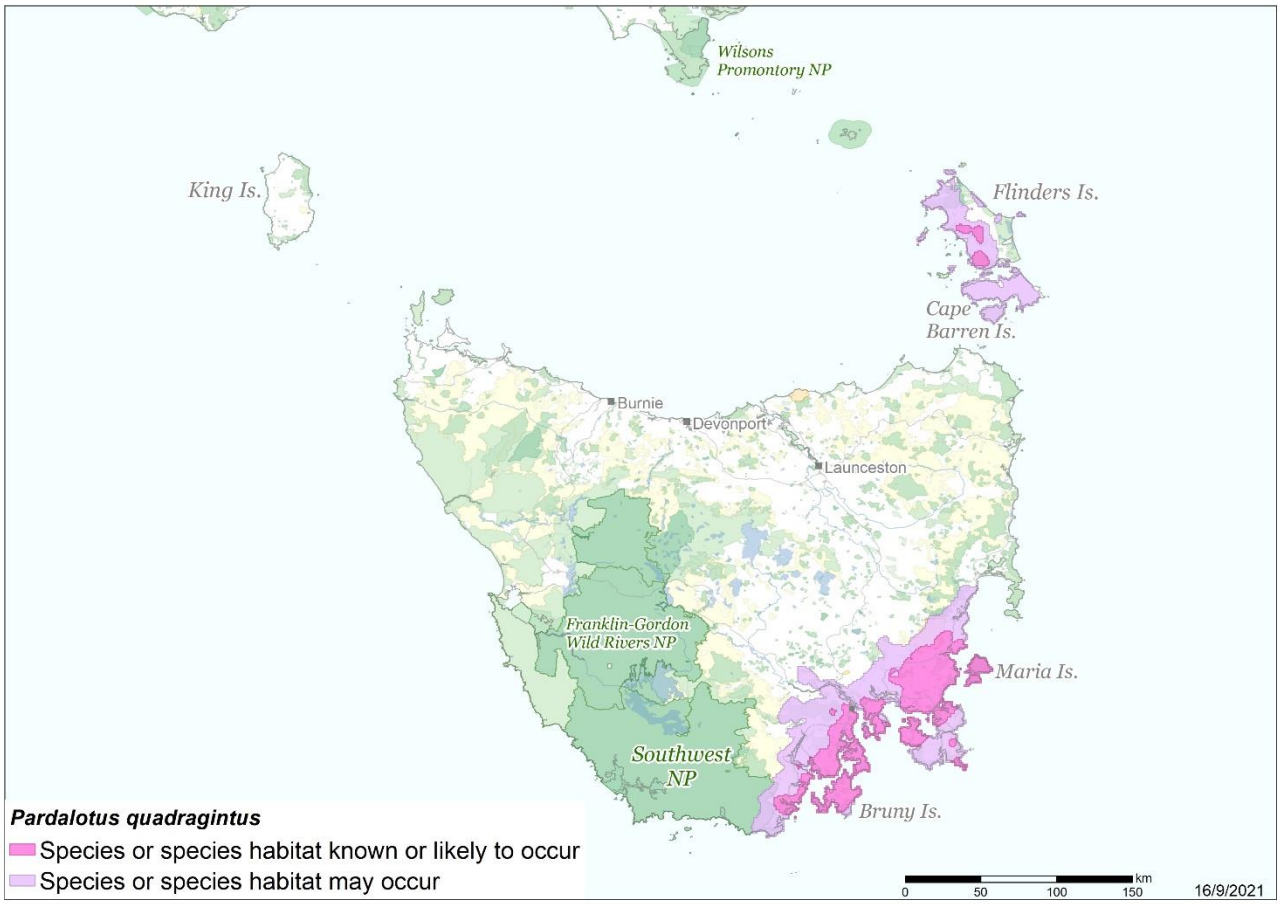
Viable breeding subpopulations appear to have gone from locations at Taroona, Lime Bay State Reserve, Peter Murrell Reserve, and Coningham Peninsula (Bryant 2010; Bryant & Webb 2014; S Bryant, GB Baker unpublished cited in Bryant et al. 2021). The extent of occurrence (EOO) and area of occupancy (AOO) for the species is estimated at 17,000 km^2 (14,000–20,000 km^2) and

208 km^2 (200–220 km2), respectively (Bryant et al. 2021). The EOO is estimated to be stable (medium reliability), however the AOO has a contracting trend (medium reliability; Bryant et al. 2021).

Table 2: Forty-spotted Pardalote known locations

Location	Tenure	Status	Confidence	Viable/Non-viable
Bruny Island (including Partridge and Snake Islands)	National Park, Nature Reserve, Private, Game Reserve, State Forest, Kingborough Council	Present	High	Viable
Maria Island	National Park	Present	High	Viable
Flinders Island, Darling Range, Boughams Sugarloaf, Mount Strzelecki Range	National Park, Nature Reserve, Private,	Present	Low	Non-viable
Mt Faulkner, Granton	Private, Conservation Area	Not present	Low	Non-viable
Taroona	Private	Not present	Low	Non-viable
Howden	State Reserve & Conservation Area, Kingborough Council, Private	Present	Low	Viable
Tinderbox	Private, Nature Reserve, State Parks and Wildlife Tinderbox Hills Reserve	Present	Low	Viable
Coningham/Oyster Bay	Nature Recreation Area, Aboriginal Land Council Tasmania, Private	Present	Low	Non-viable
Lime Bay & Coal Mines	State Reserve & Historic Site	Not present	Low	Non-viable
Southport/Ida Bay	Private, State Reserve	Present	Low	Viable

Figure 1: Current modelled distribution of Forty-spotted Pardalote.



Source: Base map Geoscience Australia; species distribution data Species of National Environmental Significance database.
Caveat: The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything contained herein.
Species distribution mapping: The species distribution mapping categories are indicative only and aim to capture (a) the habitat or geographic feature that represents to recent observed locations of the species (known to occur) or habitat occurring in close proximity to these locations (likely to occur); and (b) the broad environmental envelope or geographic region that encompasses all areas that could provide habitat for the species (may occur). These presence categories are created using an extensive database of species observations records, national and regional-scale environmental data, environmental modelling techniques and documented scientific research.

2.5 Key Biodiversity Areas

The Key Biodiversity Area (KBA) programme aims to identify, map, monitor and conserve the critical sites for global biodiversity across the planet. This process is guided by a Global Standard for the Identification of Key Biodiversity Areas, the KBA Standard (IUCN 2016). It establishes a consultative, science-based process for the identification of globally important sites for biodiversity worldwide. Sites qualify as KBAs of global importance if they meet one or more of 11 criteria in five categories: threatened biodiversity; geographically restricted biodiversity; ecological integrity; biological processes; and, irreplaceability. For more information on KBAs visit: http://www.keybiodiversityareas.org/home

The global KBA partnership currently recognises four Key Biodiversity Areas as important for Forty-spotted Pardalote conservation and to support the long-term persistence of the species.

The four KBAs with Forty-spotted Pardalote as one of their Trigger species were also recognised prior to the introduction of the KBA standard as Important Bird Areas for the species in 2008 based on the analysis undertaken by BirdLife Australia. They include:

Bruny Island: The whole of Bruny Island and some close inshore islets is considered a KBA because although fragmented it supported one of the largest populations of Forty-spotted Pardalotes scattered across the whole island. Bruny is geographically two islands joined by a narrow sandy isthmus. Most of the island is eucalypt forest and livestock-grazed fields, but there are also several small towns, notably Alonnah, Adventure Bay and Lunawanna. Some forests are zoned as Permanent Timber Production or Future Potential Production Forests, but there are several formally protected areas, notably the South Bruny National Park, The Neck Game Reserve, and Dennes Hill Nature Reserve (declared specifically for the species), two Forest Reserves and ten permanently protected conservation covenants on private land.

Maria Island: This KBA is comprised of Maria Island, which lies off the eastern coast of Tasmania, and the nearby small islets of Ile de Nord (9.7 ha) and Lachlan (2.5 ha), each of which is important for seabirds. Maria is virtually two islands, joined by a low, narrow isthmus. The most extensive vegetation unit is open-forest of *E. obliqua*, *E. globulus* and *E. viminalis* with a shrubby understorey. The KBA supported Forty-spotted Pardalote across the north and south of the island during previous surveys. The birds do not occur on Ile de Nord and Lachlan.

Central Flinders Island: The KBA includes a series of conservation reserves and adjacent land with similar habitat on central Flinders Island in Bass Strait. The KBA is defined by the distribution of documented breeding Forty-spotted Pardalotes and nearby similar grassy White Gum woodland, though the species is now likely functionally extinct on Flinders Island. The Forty-spotted Pardalote are located (1) between Walkers Lookout and Lucks Hill in the Darling Range, (2) south-west of East Sugarloaf and (3) east of Brougham Sugarloaf within Brougham Sugarloaf Conservation Area.

South-east Tasmania: The KBA includes grassy White Gum woodland used by the endangered Forty-spotted Pardalote. The Forty-spotted Pardalote has been recorded within the KBA since 1986: Lime Bay, Taroona, Ida Bay, Howden and Tinderbox Peninsula (though recent records are lacking).

2.6 Population trends

The Forty-spotted Pardalote is a highly specialised species that has undergone significant population declines, and is now nationally Endangered. Historical records confirm the Forty-spotted Pardalote once occurred on King Island, Flinders Island, and well down the east coast from Bridport to Southport (Higgins & Peter 2002). Despite this seemingly wide distribution, the species was always referred to as being uncommon or rare (Littler 1910; Milledge 1980; Woinarski & Bulman 1985).

The first estimate of the total population size of the Forty-spotted Pardalote was of fewer than 850 birds in eight discrete geographic locations (Rounsevell & Woinarski 1983). However, during the mid-1980s, a more detailed assessment across the species entire range generated a total population estimate of 3,520 ± 704 birds at six discrete locations (Brown 1986, 1989). During the 1990s a similar population size of 3,840 ± 768 birds was estimated at four of the previous six locations (Bryant 1997; Bryant & Jackson 1999). A re-assessment in 2009 to 2010 generated a total population size estimate of 1,500 ± 300 birds (Bryant 2010), equating to an

overall 60% decline in bird numbers across the species' entire range (Threatened Species Section 2012).

The *Action Plan for Australian Birds 2020* estimated the contemporary population to be 1,800 (range 1,400–11,200) mature Forty-spotted Pardalotes in the wild, but the reliability of this estimate is low (Bryant et al. 2021). The Maria Island subpopulation is thought to be the largest with an estimated 950 (range 700–5,500) mature individuals with a stable trend (Bryant et al. 2021).

Population surveys of Forty-spotted Pardalote are undertaken infrequently (Bryant et al. 2021). Forty-spotted Pardalotes occur at a mean density of 2.7 (CI: 2–3.7) birds per ha, though their density changes in relation to habitat quality (Alves et al. 2021). Recent population estimates are lacking from Maria Island, South Bruny Island and mainland Tasmania (Bryant et al. 2021). However, it is likely that the small population continues to decline as a result of ongoing habitat loss and fragmentation, introduced predators, competitors, and the ectoparasitic fly (*P. longicornis*) causing severe nestling mortality (Bryant et al. 2021).

2.7 Cultural and community significance

The Forty-spotted Pardalote remains a flagship of the species approach to woodland bird conservation in Tasmania. Its recovery program has rallied community support, not only for protection of this species, but for the conservation of dry sclerophyll forests in Tasmania generally.

The species only occurs in Tasmania on the lands of the Palawa/Pakana First Nations People (Bryant et al. 2021). Although the Indigenous cultural and community significance of the species is not widely known, its strongholds on Maria Island, Bruny Island and Coningham (Putalina) signify a strong cultural connection to Tasmania's Palawa people. Further research into the subject area may benefit the conservation of the species by providing insights about traditional culture and land management, including appropriate fire management of White Gum forests and woodlands.

This statement of significance is not intended to be comprehensive, applicable to, or speak for, all Indigenous Australians and it is acknowledged that Indigenous groups and individuals are the custodians of this knowledge.

2.8 Relevant biology and ecology

Forty-spotted Pardalotes are habitat specialists, only found in forests where their preferred food tree, White Gum, occur. A tree canopy layer at a projected cover of 10% or more (Brereton et. al. 1997) with low annual rainfall, high annual mean temperature, low altitude and on shallow, fertile soils are also required (Brereton et. al. 1997). This geographical and environmental domain occurs in a narrow band between Bicheno and Southport, and all populations except those of Flinders Island, occur within this region (Brereton et. al. 1997).

2.8.1 Feeding ecology

The Forty-spotted Pardalote is a foliage-gleaner feeding on manna, invertebrates and lerps. Manna is a sugary exudate produced by White Gums in response to damage by the birds or insect attack; lerp is the protective coat formed by foliage sap sucking psyllids (Woinarski & Bulman 1985; Case & Edworthy 2016). Manna is the key food component of the Forty-spotted Pardalote and during the breeding season is critical for provisioning of chicks. The Forty-

spotted Pardalote is the only reported species able to stimulate manna production by puncturing stem tissue using a hook on the beak (Case & Edworthy 2016). The species' invertebrate prey consists mainly of insects such as beetles, flies, bugs, wasps and caterpillars, although it is also known to feed on millipedes and spiders (Woinarski & Bulman 1985; Brown 1986; Bulman et al. 1986; Higgins & Peter 2002).

2.8.3 Breeding ecology

Breeding takes place between August and January (Higgins & Peter 2002; Alves 2021). Nests are built in hollows of live or dead trees, stumps of logged or fallen trees and limbs, and very occasionally in holes in the ground (Brown 1986; Bulman et al. 1986). Forty-spotted Pardalotes prefer to nest in hollows with small entrances; however, it is likely that birds nest in a variety of hollows in low quality habitats (Woinarski & Bulman 1985). They build fully domed nests inside tree cavities using tree bark, grass and soft material (i.e. feathers and fur) which they use to line their nests (Wall, 1966; Alves et al. 2020.) Both sexes build the nest and feed the young. The species is also known to use artificial next boxes successfully (Edworthy 2016c).

Forty-spotted Pardalotes lay 3–5 eggs (typically 4–5), and produce one to two broods per year (Edworthy 2016; Alves et al. 2020). The incubation and nestling periods last up to 55 days in total (Edworthy et al. 2019). Nests are often re-used in successive seasons, and it is likely that pairs remain together for several years (Woinarski & Bulman 1985). Generation length is estimated at 2.1 years (range 1.6–2.6 years) (Bird et al. 2020).

Breeding attempts can fail when nests are flooded or depredated (Milledge 1978; Woinarski & Bulman 1985), or when nests are neglected by their owners because of frequent territorial disputes with other birds including Striated Pardalotes and Tree Martins (*Petrochelidon nigricans*) (Blakers et al. 1984). Reduction in the availability of manna during unsuitable conditions can also cause breeding attempts to fail. Manna (the main food item in nestling's diet) can be knocked off foliage during strong winds and dissolved during extended periods of heavy rain (Woinarski, & Bulman, 1985), causing nestling mortality (F. Alves, unpublished data). This is because the manna of White Gum is a key component (comprising 84.2%) of the diet of young birds (Case & Edworthy 2016). In some breeding areas, a lack of suitable nesting sites may force birds to nest in suboptimal sites that are more prone to disturbance and, consequently, are less likely to fledge young successfully (Milledge 1978; Bulman et al. 1986).

Parasitism of nestlings by the larvae of an ectoparasitic fly (*Passeromyia longicornis*) is the main cause of nestling mortality in areas of high parasite prevalence (Edworthy et al. 2019).

2.8.4 Movement patterns

Pairs of Forty-spotted Pardalotes are territorial, and relatively sedentary at permanently occupied sites (Bryant et al. 2021). Territory sizes have only been quantified on Bruny Island where, in one high-density population, territories of pairs ranged from 0.3 to 1.6 ha in size (Woinarski & Bulman 1985).

Genetic similarities and differences occur across the species' range, e.g., the North Bruny population is similar to Tinderbox implying dispersal across the channel, but North and South Bruny subpopulations are distinct.

2.8.5 Fire regime

Forty-spotted Pardalote rely on White Gum for food and habitat. Therefore it is important to prevent fire reaching the canopy of mature White Gum trees or other eucalypt species. To avoid hot burns which can damage Forty-spotted Pardalote habitat, cool patchwork burning on an 8-14 year interval is recommended to prevent build-up and reduce fuel loads. Where time since last fire exceeds 20 years and fuel loads are already very high, extreme care needs to be taken in reducing fuel loads through burning.

2.9 Habitat critical to the survival

Habitat critical to the survival of a species or ecological community encompasses areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community);
- to maintain genetic diversity and long-term evolutionary potential; or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act. Further information can be found in the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance.

Habitat critical to the survival of the Forty-spotted Pardalote include:

Foraging habitat:

- All White Gum forest within the known range of the Forty-spotted Pardalote. This includes any forest and woodland supporting White Gum (*E. viminalis*) as dominant or subdominant canopy, including single trees.

Breeding habitat:

- Living (mature) and dead trees of any species with hollows with small entrances and crevices suitable for nesting which are within known range of the species.

Habitat for the long-term maintenance of the species or for the reintroduction of populations

- White Gum forest that could support the reintroduction of a viable Forty-spotted Pardalote population. This may include, but no limited to, habitat that recently supported expatriated subpopulations.
- All Key Biodiversity Areas with Forty-spotted Pardalote as a Trigger species.
- Suitable habitat in future climate niches as information becomes available.

It is also important to consider and maintain connectivity, buffer zones, and refugia habitat for the species. Sympathetic management of areas adjoining Forty-spotted Pardalote habitats is important e.g., woodland and forest. Habitat connectivity is important for maintaining or enhancing species genetic diversity and long-term evolutionary potential. Potential or planned

release sites are also considered habitat critical to the survival of Forty-spotted Pardalote and should be afforded the same level of protection and conservation management as known sites.

Habitat critical to the survival of Forty-spotted Pardalote occurs across a range of land tenures, including freehold land and reserves, publicly owned forests and state reserves, and national parks. It is essential that the locations where the species regularly occurs is given the highest protection and conservation measures target these productive habitats.

Increasing the extent and quality of habitat critical to the survival through protection and management of currently occupied habitat, and habitat suitable for potential or planned future releases, would assist to increase the area of occupancy and population size of the Forty-spotted Pardalote.

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

2.9.1 Key considerations in environmental impact assessments

When considering habitat loss, alteration or likely degradation to habitat in any part of the Forty-spotted Pardalote's range, including in areas where the species 'may occur', surveys for occupancy and identifying preferred habitat remain an essential tool in refining understanding of the area's relative importance for the species. On-site assessments are essential and both recent survey data and historical records need to be considered when assessing the relative importance of a local area or region for Forty-spotted Pardalote.

Habitat critical to the survival of the species should not be destroyed or modified. Actions that have indirect impacts on habitat critical to the survival should be minimised and adequately mitigated. Actions that compromise adult and juvenile survival should also be avoided, for example, the transmission and introduction of diseases, or actions that might increase predation threat from either native or introduced predators. Actions should not be assessed in isolation and consideration must be given to existing and future activities that may impact the species to ensure conservation outcomes on a landscape scale are achieved.

Actions that remove, fragment and/or degrade habitat critical to the survival would interfere with the recovery of the Forty-spotted Pardalote and potentially reduce the area of occupancy of the species. It is important for the recovery of the species to retain wet and dry sclerophyll forests or woodlands that contain White Gum as described above (see section *2.8 Relevant biology and ecology*). If removal of habitat critical to the survival cannot be avoided then an offset must be consistent with the department's Offsets Policy.

3. Threats

3.1 Historical causes of decline

Loss, degradation and fragmentation of suitable habitat (dry sclerophyll forests and woodlands supporting White Gum) through clearing for agriculture (e.g., sheep grazing), forestry and residential development has been identified as the primary reason for the species' historical decline (Bryant 1991; Bradshaw 2012).

3.2 Current threatening processes

The major current threats to the species are habitat degradation and wildfire (Bryant et al. 2021). Over 80% of habitat is at high risk of wildfire, with only 17% having burnt since 1969. Forty-spotted Pardalote habitat is particularly vulnerable to fire on hot, windy days during drought (Webb et al. 2019). Drought frequency and severity are expected to increase (Evans et al. 2017), which will increase fire risk, as well as direct drought threats to the trees. The extent and quality of habitat also continues to be reduced by land clearance for urban development and agriculture (Webb et al. 2019).

Larvae from an ectoparasitic fly (*P. longicornis*) are the principal cause of nestling mortality in areas where the fly is of high prevalence (Edworthy et al. 2019; Alves et al. 2020). This threat is also likely to increase with climate change as larval development is temperature dependent (Edworthy 2016b).

Several other species of birds may be impacting on the survival and reproductive output of Forty-spotted Pardalotes. Striated Pardalotes compete with Forty-spotted Pardalote for food and nesting sites and may have a competitive advantage in altered habitat (Edworthy 2016a) and Tree Martins have also been observed trying to occupy nest boxes used by Forty-spotted Pardalotes (A Hingston pers. comm. 2022). Noisy Miners (*Manorina melanocephala*) and introduced Laughing Kookaburra (*Dacelo novaeguineae*) are potential competitors or predators, respectively, across the range (Bryant 2010; Webb et al. 2019). Grey Butcherbirds (*Cracticus torquatus*), which are often associated with Noisy Miners (Westgate et al. 2021), are also potential predators. Though not documented, introduced Sugar Gliders may also predate on nestlings on the Tasmanian mainland.

Human activity, noise and other habitat disturbances may also contribute to declines in urban and public use areas (Bryant 2010).

3.2.1 Fire regimes that cause biodiversity decline

The principal threat to Forty-spotted Pardalotes is wildfire (Bryant et al. 2021). Wildfires have the potential to kill trees or scorch canopies critical for producing food. Structural changes to forest habitat as a result of fire that reduce tree canopy cover may lead to reductions in abundance or the local extinction of the Forty-spotted Pardalote (Bryant et al. 2021).

Over 80% of the species' currently occupied habitat or AOO (now largely confined to Maria and Bruny Islands), is at high risk of wildfire with only 17% having burnt since 1969, most of that being in one fire on Flinders Island (Bryant et al. 2021). The fire history of the adjacent mainland is indicative of the vulnerability of the habitat to fire on hot, windy days during drought (Webb et al. 2019). Single fires on Maria and Flinders Islands, or on the larger, more convoluted Bruny Island and Tinderbox Peninsula, could affect all individuals present within a period short enough to prevent recolonisation or allow recovery (Bryant et al. 2021).

3.2.2 Parasitism

The ectoparasitic fly parasitises nestlings of Forty-spotted Pardalote, causing severe mortality (Edworthy et al. 2019; Alves et al. 2020). The fly lays its eggs in the nests of Forty-spotted Pardalotes and once the nestlings hatch, the larvae burrow under their skin and feed on their blood. This leads to very high mortality rates of fly-struck pardalote nestlings and is now the primary cause of nesting failure.

In areas of high ectoparasitic fly prevalence, up to 81% of all nestlings are killed (Edworthy et al. 2019; Alves et al. 2020). The overall potential threat this poses is high, given that fly development is temperature-dependent (Edworthy 2016b).

Research by Alves et al. (2020) found that Forty-spotted Pardalotes could effectively "self-fumigate" their own nests when provided with sterilised chicken feathers treated with bird-safe insecticide. In self-fumigated nests, 95% of hatchlings survived to fledging compared to just 8% of hatchlings in untreated control nests (Alves et al. 2020). At present, this novel technique is a highly effective and inexpensive method of reducing parasitism of chicks, though insecticide resistant flies may pose a future threat.

The threat of parasitism interacts with increasing temperatures caused by anthropogenic climate change.

3.2.3 Habitat loss, modification and disturbance

Development in Forty-spotted Pardalote habitat impacts the species, either through direct impacts from activities such as housing/road developments and the associated infrastructure (e.g., increased window strike); or increased human disturbance (e.g. noise from traffic, increase human visitation from tourism), aggressive birds and predation by domestic and feral animals (Webb et al. 2019). Habitat modification on edges of residential blocks for bush fire protection and addition of non-native plant species can also degrade habitat condition.

The impact of large lot development/subdivision also likely threatens the species. Subdivisions can impact on significant areas of potential Forty-spotted Pardalote habitat and once subdivided, the land is not managed to maintain native birds under threat.

Illegal firewood collecting ('wood-hooking'), clearance of individual paddock trees and small remnants through "tidying up" also likely threaten the species by reducing habitat quantity and quality.

3.2.4 Land clearing

In Australia, the main threats to bird survival in agricultural areas is habitat loss caused by clearing of native vegetation, and subsequent degradation of the remnant vegetation (Stevens 2001). Loss of suitable habitat (dry sclerophyll forests and woodlands supporting White Gum) through land clearing for agriculture has been extensive in eastern Tasmania (Bryant et al. 2021). For example, Grassy White Gum forest in the southeast bioregion has been reduced by over 50% since European settlement and major clearing of dry sclerophyll forests has taken place along the coastal plains (Threatened Species Section 2006). Remaining vegetation remnants are generally isolated and small, and often below the critical size needed to sustain healthy populations of Forty-spotted Pardalote. However, Webb et al. (2019) noted that less than 2% of Forty-spotted Pardalote habitat has been cleared since 1996.

The historical reduction in suitable habitat is compounded by loss in quality of habitat through drought, tree decline and probably a range of other factors including displacement by other competitive species of birds (Bryant 2010). Any loss of suitable habitat can lead to a loss of breeding populations and also increased fragmentation, resulting in reduced dispersal opportunities.

3.2.5 Increased frequency or length of droughts

Since 1950, the number of record hot days (above 35°C) across Australia has more than doubled and the mean temperature has increased by about 1.4°C since 1910 (BOM & CSIRO 2020; IPCC 2021). Heatwaves are also lasting longer, reaching more extreme maximum temperatures, and occurring more frequently over many regions of Australia, including Tasmania (Perkins-Kirkpatrick et al. 2016; Evans et al. 2017; Herold et al. 2018; BOM & CSIRO 2020).

It is likely that Australia will spend more time under drought conditions, with more frequent, longer duration and more intense drought predicted to occur across southern Australia (Evans et al. 2017; Kirono et al. 2020). Heatwaves exacerbate drought, which in turn can increase bushfire risk and adversely impact resource availability (Climate Council of Australia 2018, 2019; BOM & CSIRO 2020). Birds are also vulnerable to extreme heatwaves that overwhelm their physiological limits (McKechnie et al. 2012).

Extended dry periods have been implicated in the loss of Forty-spotted Pardalote habitat, leading to increased fragmentation and reduced patch size (Garnett et al. 2011). For example, on Bruny Island, extended periods of low rainfall have killed many White Gum seedlings planted to assist the species, although several stands are now providing food (S Bryant unpublished cited in Bryant et al. 2021).

Droughts also negatively impact food resources (e.g., insects and manna production) and eucalypts regularly show signs of dieback including parched receding canopies. This may result in decreases in Forty-spotted Pardalote abundance (Understory Network 2011).

3.2.6 Small population size

Small, isolated populations may lose their long term genetic viability (Barrett et al. 1994). 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.

Recent genetic analysis of Forty-spotted Pardalotes completed by Alves et al. (2021) revealed previously undetected population genetic structure corresponding to geographical barriers and fragmentation. North Bruny Island has the highest allelic richness, followed by Tinderbox Peninsula, South Bruny Island and Maria Island (Alves et al. 2021). However, in terms of contribution to total allelic richness across the species, North Bruny Island and Maria Island populations contributed the most genetic diversity (Alves et al. 2021). Thus conserving these two populations is of high conservation value. Alves et al. (2021) concluded that genetic management of Forty-spotted Pardalotes at this present time is not needed, though some small local populations are vulnerable to genetic stochasticity. Instead, habitat restoration should be prioritised to increase population size, especially on Bruny Island and the adjacent Tasmanian mainland. This research can be used to inform any future translocation trials (e.g., defining management units and sourcing founder stock) (Alves et al. 2021).

The genetic variability of the Flinders Island subpopulation is still unknown. Inbreeding, in addition to fire, may have contributed the rarity of birds on Flinders Island (Bryant & Webb 2014).

The threat of small population size may also interact with competitor species and habitat quality. For example, there appears to be a critical mass of Forty-spotted Pardalotes under which other competitors, such as Striated Pardalotes, are not able to establish (T Cochran pers comm. 2022). This pattern likely reflects habitat conditions as, where habitat is good, specialist species can outcompete other species (F Alves pers. comm. 2022).

3.2.7 Declining White Gum health

Forty-spotted Pardalote is totally reliant on White Gum which is in decline across Tasmania. The cause of decline is not well understood. White Gums are known to be highly susceptible to stress due to climatic factors and climate change projections indicate an increasing frequency and intensity of heat waves. 'Ginger tree syndrome' is the term given to a condition affecting eucalypts, often following extreme heat events. Elevated ambient air temperatures can cause water stress and hence shrinkage of the bark and trunk leading to the production of kino (Mitchell 2015). The syndrome is typified by the seeping of kino through the bark, turning the trees 'ginger' and providing a visual means of identifying affected trees. Tree mortality typically follows within 12 months.

Furthermore, Potts et al (2016) found that White Gum is moderately susceptible to Myrtle Rust in comparison to other Tasmanian Eucalypts – of 122 seedlings tested under laboratory conditions 34% susceptible, 10.7% resistant and 46.7% highly resistant (Potts et al 2016).

3.2.8 Competition for nest hollows

Forty-spotted Pardalote, Striated Pardalote and Tree Martins compete for similar nest cavities (e.g., those with small entrances and deep chambers). Striated Pardalotes have been observed actively evicting Forty-spotted Pardalotes from nesting sites often after birds have established nests (Edworthy 2016a). Hollow competition reduces breeding opportunities for Forty-spotted Pardalote, resulting in energy loss, delayed breeding, nest takeover, and loss of eggs (Edworthy 2016a).

Additionally, Striated Pardalotes are relatively insensitive to habitat disturbance and may have a competitive advantage in altered habitats (Bryant 2010).

3.2.9 Competition by aggressive native birds

The Noisy Miner is a native species that often aggressively excludes other small woodland birds from remnants (Willson & Bignall 2009). Noisy Miners have benefited from landscape-scale clearing and fragmentation. They typically dominate open Eucalypt woodland remnants on farms, in tree corridors and clumps of paddock trees, especially those lacking a shrubby understorey (Crates et al. 2018). Although Noisy Miners do not currently co-occur with Forty-spotted Pardalotes (Webb et al. 2019), local scale control programs at a critical breeding sites may benefit the species if they become a known threat.

3.2.10 Predation by introduced species

Sugar Gliders are introduced to mainland Tasmania (Gunn 1851; Rounsevell et al. 1991; Lindenmayer 2002; Hui 2006). Nest predation by Sugar Gliders may pose a threat to Forty-spotted Pardalote breeding on mainland Tasmania (e.g. at Tinderbox), as inferred by research on Swift Parrots (Stojanovic et al. 2014; Heinsohn et al. 2015). Sugar Gliders not only prey on nesting young and eggs of Swift Parrots, but also often kill the sitting female (Stojanovic et al. 2014; Heinsohn et al. 2015). Predation by Sugar Gliders will not occur in small hollows

preferred by Forty-spotted Pardalotes; however it is considered a threat where birds may be forced to use larger hollows.

Additionally, there has been a significant change in bird populations across Australia (BirdLife, 2015), and there are knowledge gaps in terms of the impacts of these changes on predation and competition of native and introduced bird species and their impacts on the Forty-spotted Pardalote. For instance, Laughing Kookaburra were introduced to northern Tasmania from the mainland in the early 20th century (Mallick & Driessen 2009). Drier conditions, longer drought periods and reduced rainfall are thought to have influenced their movements, with birds now widespread across the north and eastern half of the state. The Laughing Kookaburra is a potential nest predator across the entire range of the Forty-spotted Pardalote (Bryant et al. 2021), and have been observed predating on small birds at Bruny Island.

3.2.11 General recreation

Recreational access and use of land and water can result in disturbance to native birds, leading to breeding failure, avoidance and abandonment of habitat, and significant energetic and physiological impacts related to disturbed feeding and roosting (Taylor & Knight 2003; Banks & Bryant 2007). Human activity, noise and other habitat disturbances may be contributing to Forty-spotted Pardalote declines in urban and public use areas (Bryant 2010).

3.3 Threat prioritisation

Each of the threats outlined above has been assessed to determine the risk posed to the Forty-spotted Pardalote population using a risk matrix. This in turn determines the priority for actions outlined below. The threats were considered in the context of the current management regimes. The impact of that threat has been assessed assuming that existing management measures continue to be applied appropriately. If management regimes change then the level of risk associated with threats may also change.

The risk matrix considers the likelihood of an incident occurring and the consequences of that incident. Threats may act differently in different parts of the species range and at different times of year, but the precautionary principle dictates that the threat category is determined by the subpopulation at highest risk. Population-wide threats are generally considered to present a higher risk.

The risk matrix uses a qualitative assessment drawing on peer reviewed literature and expert opinion. In some cases the consequences of activities are unknown. In these cases, the precautionary principle has been applied. Levels of risk and the associated priority for action are defined as follows:

Very High – immediate mitigation action required.

High – mitigation action and an adaptive management plan required; the precautionary principle should be applied.

Moderate – obtain additional information and develop mitigation action if required.

Low – monitor the threat occurrence and reassess threat level if likelihood or consequences change.

Each threat has been described in *Section 3.2* in terms of the extent that it is operating on the species. The risk matrix (**Error! Reference source not found.**) provides a visual depiction of

the level of risk being imposed by a threat and supports the prioritisation of subsequent management and conservation actions. In preparing a risk matrix, several factors have been taken into consideration, they are: the life stage they affect; the duration of the impact; the spatial extent, and the efficacy of current management regimes, assuming that management will continue to be applied appropriately. The risk matrix and ranking of threats has been developed in consultation with experts and using available literature.

Table 3. Forty-spotted Pardalote Residual Risk Matrix*

Likelihood	**Consequences**				
	Not significant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain		• Predation	• Nest hollow competition	• Habitat loss, modification and disturbance • Parasitism • Land clearing	
Likely				• Fire regimes that cause biodiversity decline • Declining White Gum health	
Possible		• Competition • General recreation	• Increased frequency or length of drought	• Small population size	
Unlikely					
Unknown					

*Threats are assessed over a 10 year timeframe

Risk Matrix legend/Risk rating:

Low Risk	Moderate Risk	High Risk	Very High Risk

Categories for likelihood are defined as follows:

Almost certain – expected to occur every year
Likely – expected to occur at least once every five years
Possible – might occur at some time
Unlikely – such events are known to have occurred on a worldwide basis but only a few times
Rare or Unknown – may occur only in exceptional circumstances; OR it is currently unknown how often the incident will occur

Categories for consequences are defined as follows:

Not significant – no long-term effect on individuals or populations
Minor – individuals are adversely affected but no effect at population level
Moderate – population recovery stalls or reduces
Major – population decreases

Catastrophic – population extinction (within 10 years)

4. Populations under particular pressure

A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area (see Significant Impact Guidelines 1.1 - Matters of National Environmental Significance). In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- A geographically distinct regional population, or collection of local populations; or
- A population, or collection of local populations, that occurs within a particular bioregion.

The actions described in this recovery plan are designed to provide ongoing protection for the Forty-spotted Pardalotes throughout their range. As 100% of known mature individuals exist in three subpopulations at 5 locations (range 3–10) (Bryant et al. 2021), particular attention may be given to the following areas:

- Subpopulations on Maria Island and in the Strzelecki Range of Flinders Island are important due to their size and their occurrence on state-owned land.
- Sub-population on Flinders Island due to its isolation and lack of information on its viability.
- All individuals on Bruny Island (including Partridge Island).
- Populations on mainland Tasmania including Peter Murrell Reserve, Howden, Tinderbox and Coningham Peninsulas and at Ida Bay are significant because they appear to be the last remnant populations within an area where the species was once widespread.

Subpopulations in areas where there is a history of significant vegetation fragmentation such as: Taroona and Lime Bay may not persist because of habitat patch size and limited opportunities for re-colonisation.

5. Vision, Objectives and Strategies

5.1 Long-term Vision

The Forty-spotted Pardalote population has increased in size to such an extent or number of secure locations that the species no longer qualifies for listing as threatened under any of the *Environment Protection and Biodiversity Conservation Act 1999* listing criteria.

5.2 Recovery Plan Objective

By 2033, demonstrably reduce the severity of identified threats across the species' range.

By 2033, increase the number of viable populations of the Forty-spotted Pardalote across its current and historical range.

By 2033, maintain and improve the extent, condition and connectivity of habitat of the Forty-spotted Pardalote.

By 2033, measure and sustain a positive population trend compared to baseline counts in the number of mature individuals of Forty-spotted Pardalote.

These objectives will be achieved by implementing the actions set out in this recovery plan that minimise threats while protecting and enhancing the species' habitat throughout its range, adequately monitoring the species, generating new knowledge to guide recovery, and increasing public involvement achieving these objectives.

5.3 Strategies to achieve objectives

1. Implement management strategies to reduce known threats to Forty-spotted Pardalotes and their habitat.
2. Increase the number and viability of Forty-spotted Pardalote subpopulations through assessed translocation and supplementation techniques.
3. Enhance protection and increase the quality, extent and connectivity of known and potential habitat for the Forty-spotted Pardalote.
4. Improve knowledge of the biology and ecology of the Forty-spotted Pardalote and maintain a long-term monitoring strategy to identify population trends.
5. Increase stakeholder participation in Forty-spotted Pardalote conservation and management.
6. Coordinate, review and report on recovery progress.

6. Actions to achieve the specific objectives

Actions identified for the recovery of Forty-spotted Pardalote are described below and have been considered within a 10-year timeframe. 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 Forty-spotted Pardalote and also provide valuable information to help identify long-term population trends.
Priority 2:	Action would provide a more informed basis for the long-term management and recovery of Forty-spotted Pardalote.
Priority 3:	Action is desirable, but not critical to the recovery of Forty-spotted Pardalote or assessment of trends in that recovery.

Strategy 1 – Implement management strategies to reduce known threats to Forty-spotted Pardalotes and their habitat

Action	Description	Priority	Performance Criteria	**Responsible Agencies** and potential partners	**Indicative Cost**
1.1	Develop a management strategy for habitat critical to the survival of Forty-spotted Pardalote	1	• Up to date management strategy for White Gum habitat and protection of Forty-spotted Pardalote populations created and maintained. • White Gum management strategy adopted by government agencies, industry and community groups. • Threat abatement is prioritised at known subpopulations to promote, improve and secure existing subpopulations where threats are understood.	**Tasmanian Government** **Local government** **NRM regional bodies** NGOs Academic institutions	*Costs will be estimated during public consultation
1.2	Develop and implement wildfire risk and hazard reduction burn mitigation strategies relevant to each Forty-spotted Pardalote subpopulation	1	• Develop guidelines for Forty-spotted Pardalote friendly fire protocols. • Improve prescriptions for protection of White Gum during planned burns and embed into TasFire and PWS fire management procedures. • Key stakeholders (TFS, PWS and volunteer firefighters from local brigades) inform mapping of critical habitat. • Appropriate planned burning and other hazard reduction measures for habitat protection and restoration undertaken: - Prevent fire reaching the canopy of mature White Gum and other eucalypt species. - Prevent build-up of fuel loads and reduce fuel loads by undertaking appropriate planned burning and other hazard reduction measures. • Site-specific fire management plans developed, reviewed, and implemented, including	**Tasmanian Government** **Local government** **Traditional Owners** **Private landowners** **Emergency services** **Parks** **Fire authorities** Academic institutions NGOs NRM regional bodies	

			identification of known and potential habitat and details of proposed mitigation strategies. - Forty-spotted Pardalote habitat is identified as an asset to be prioritised for protection during wildfire suppression activities. • Fire management impacts considered at the population scale • A wildfire emergency response plan has been developed (including rapid suppression and, where relevant, extraction planning and capacity building).		
1.3	Implement research to develop an ongoing management strategy for ectoparasitic fly	1	• Management strategy for ectoparasitic fly finalised and implemented. • Monitoring of ectoparasitic fly infestation and mortality conducted. • Tested methods to control fly larvae parasites are utilised where needed. • If deemed successful, funding and resources have been acquired for long-term monitoring of ectoparasitic fly. • Management actions to control fly larvae parasites have been incorporated into relevant relocation or release site management plans.	**Tasmanian Government** NRM regional bodies NGOs Academic institutions	
1.4	Ensure no impacts on Forty-spotted Pardalote and its habitat in all populations from clearing of habitat	1	• Within and adjacent to known populations, there have been no removal of White Gum trees as part of subdivision activities, including single White Gum trees. • Construction activities such as road construction, that threaten White Gum trees have been prevented/mitigated. • Construction activities which may increase general levels of noise, human activity, vehicular traffic, etc.	**Australian Government** **Tasmanian Government** **Local governments** Recovery Team	

			have been prevented/mitigated within or adjacent to known populations • Window-strike risk addressed in new buildings		
1.5	Identify and mitigate climate change threats on Forty-spotted Pardalote habitat	2	• Modelling techniques have been used to investigate the potential impact of climate change on Forty-spotted Pardalote and their habitat critical to the survival • Model outputs have been incorporated into local management plans to improve Forty-spotted Pardalote resilience to climate change • A management strategy has been developed for White Gum forests and woodlands in response to climate change (*see action 1.1*) • Revegetation projects use appropriate seed sources and are situated in areas such that new plantings have the best chance of survival under an altered climate	**Australian Government** **Tasmanian Government** **Academic institutions** NRM regional bodies NGOs	
1.6	Examine the use of known Forty-spotted Pardalote nest cavities by introduced and native species to ascertain the level of competition and predation	1	• Through the use of cameras or other non-invasive surveying techniques, the main species (both introduced and native) competing for Forty-spotted Pardalote hollows have been identified throughout its range. • Areas with high levels of competition throughout the species' range have been identified, particularly where introduced species are the main threat. • An improved understanding of hollow use and competition (and potential predation) can be demonstrated. • Any new knowledge has been incorporated into management interventions. • If deemed appropriate, funding and resources have	**Academic institutions** **Tasmanian Government** Private landowners NGOs NRM regional bodies	

			been acquired for long-term monitoring of nest cavities by introduced and native species.		
1.7	Conduct further research to evaluate nest site requirements, the effectiveness of nest boxes and artificial hollows, and strategic hollow enhancement	1	• Improved knowledge on the nest site requirements of Forty-spotted Pardalote has been generated • Development of a long-lasting nest box design, that does not require frequent replacement or maintenance, including supporting structures and fixings • The optimal spacing of nest boxes has been determined, such that intraspecific competition is minimised while densities of Forty-spotted Pardalote are sufficient to deter Striated Pardalote • Development of an artificial nest site program tailored specifically to the needs of the species has been trialled • If deemed successful, funding and resources have been acquired for long-term monitoring and maintenance of nest box programs • Acceleration of hollow development through natural processes has been investigated • Any new knowledge has been incorporated into management interventions • Coordinated nest box trials (varying designs and placements) have been conducted • A nest box strategy for Forty-spotted Pardalote has been developed and implemented	**Academic institutions** **Tasmanian Government** Private landowners NGOs NRM regional bodies	
1.8	Assess and manage introduced and native predators (*see Action 1.6*)	2	• Knowledge of 1) predator impact and 2) introduced predator control action effectiveness has increased, and effectiveness of feral predator management has improved	**Australian Government** **Tasmanian Government** **Traditional Owners** **Private landowners** NGOs	

			• Impact of introduced predators has been assessed and areas of high impact identified • A standardised monitoring program for introduced predators has been designed and implemented across all known Forty-spotted Pardalote subpopulations • Actions to control introduced predators undertaken if required. • Reporting on introduced predator monitoring is coordinated and results are accessible by responsible agencies and recovery partners. • If deemed appropriate, targeted predator monitoring is applied before, during, and after any reintroductions.	NRM regional bodies	
1.9	Manage recreation activities that negatively impact the species	2	• Activities which could kill or damage White Gum trees or seedlings (e.g. off-road vehicles, trail-bike riding, horse-riding off formed tracks, lighting of fires) are discouraged in Forty-spotted Pardalote known and potential habitat within public and private land tenures where relevant.	**Tasmanian Government** **Local governments**	

Strategy 2 – Increase the number and viability of Forty-spotted Pardalote subpopulations through assessed translocation and supplementation techniques

Action	Description	Priority	Performance Criteria	**Responsible Agencies** and potential partners	**Indicative Cost**
2.1	Population Viability Analysis (PVA) results used to determine the viable population size to build towards	1	• PVA results inform management. • Undertake iterative PVA to inform adaptive management.	**Academic institutions** Recovery Team NGOs	*Costs will be estimated during public consultation
2.2	Assess whether reintroduction (wild to wild translocation) is a viable management strategy for the species	1	• A translocation strategy has been developed in which an appropriate risk management framework was applied to consider and implement, if appropriate, wild-to-wild translocation of birds.	**Academic institutions** **Tasmanian Government** NGOs NRM regional bodies	
2.3	Develop wild to wild translocation trial proposal (see *Action 2.2*)	2	• Forty-spotted Pardalote wild to wild translocation trial proposal has been developed, including potential release site options and management • Risk assessment of potential release sites on public and private land, including identification of preferred areas for translocation from and to, have been completed if translocation proposal approved. • Genetic assessments have supported translocation trials. • Age of independence of juvenile Forty-spotted Pardalotes determined to guide selection of appropriate individuals for translocation. • Source site/s monitoring has been undertaken, including determination of food availability and abundance of potential predators and competitors • Receiving site/s preparation has been carried out e.g., predator	**Australian Government** **Tasmanian Government** **Academic institutions** **Private landowners** NGOs NRM regional bodies	

			and competitor management • Translocation trial in suitable habitat within the species historic range has been undertaken and reported on • The translocation meets agreed success criteria		
2.4	Investigate establishing a captive population to act as an insurance and breed for release population	3	• A feasibility study has been undertaken to determine whether an insurance and breed for release population of Forty-spotted Pardalote would be an effective tool to mitigate against possible extinction • Best-practice captive-breeding and animal husbandry information and knowledge are collated	**Tasmanian Government** **Zoo and Aquarium Association** Academic institutions NGOs	
2.5	Undertake genetic analysis of Flinders Island subpopulation	1	• Genetic analyses have supported any translocation trials.	**Academic institutions** Recovery Team NGOs	

Strategy 3 – Enhance protection and increase the quality, extent and connectivity of known and potential habitat for the Forty-spotted Pardalote

Action	Description	Priority	Performance Criteria	**Responsible Agencies** and potential partners	Indicative Cost
3.1	Identify areas of high conservation significance (habitat critical to the survival) of Forty-spotted Pardalote	1	• Existing and new information has been reviewed and used to identify priority areas of conservation significance, including potential habitat. • New knowledge has been used to refine the definition of 'habitat critical to the survival.' • Key Biodiversity Areas have been reviewed and updated as new information becomes available.	**Recovery Team** **Tasmanian Government** **Research agencies** NGOs Academic institutions	*Costs will be estimated during public consultation
3.2	Restore known and potential White Gum habitat in strategic locations close to, and within key sites and movement corridors (see Action 3.1)	1	• White Gums have been regenerated within and between known key populations using appropriate seed. • Targeted fencing at identified sites has been carried out to reduce browsing by stock and native animals. • Targeted replanting in wetter areas to mitigate climate change impacts have been completed. • Connectivity among, and quality of, habitat patches has improved • Where appropriate, high priority private lands have been secured through conservation covenants that meet the required guidelines.	**Australian Government** **Tasmanian Government** **Local Governments** **NRM regional bodies** **Private landholders** Academic institutions NGOs	
3.3	Maintain or improve habitat quality of existing subpopulations		• New knowledge has been used to target habitat restoration activities within known subpopulation including nest boxes and feather dispenser installations and replanting		

3.3	Develop agreements with priority local government agencies that aim to rehabilitate, enhance and protect Forty-spotted Pardalote habitat	2	• At least 20 priority areas of degraded habitat are identified and rehabilitated. • Management agreements have been developed with local government and state government agencies which maintain and enhance Forty-spotted Pardalote habitat. • Management agreements have prevented further habitat loss or encroachment within or near urban areas.	**Tasmanian Government** **NRM regional bodies** Local Governments Private landholders	
3.4	Continue to improve reservation status and/or develop management agreements with private landowners	2	• Key breeding and foraging sites on private land identified and habitat quality assessed. • Landowners have been encouraged to enter covenanting or other private land conservation programs, where relevant.	**Tasmanian Government** **Private landowners** NRM regional bodies NGOs	

Strategy 4 – Improve knowledge of the biology and ecology of the Forty-spotted Pardalote and maintain a long-term monitoring strategy to identify population trends

Action	Description	Priority	Performance Criteria	**Responsible Agencies** and potential partners	Indicative Cost
4.1	Develop and implement a long-term monitoring strategy to inform management interventions	1	• Long-term monitoring strategy has been developed • Current baseline information on population/sub-population distribution and size has been collected and reported on. - Status of Flinders Island population better known. • Knowledge of Forty-spotted Pardalote conservation status, distribution, population trends, movement ecology and life history have improved. • Population trends and responses to management actions have been monitored and reported on	**Australian Government** **Tasmanian Government** **Traditional Owners** **Private landowners** **Academic institutions** NGOs NRM regional bodies	*Costs will be estimated during public consultation
4.2	Surveys of Forty-spotted Pardalote populations are undertaken regularly using methodology that facilitates monitoring of population trends	1	• Surveys and monitoring are consistent in methodology used, survey effort, time of year surveyed, etc. and this information is managed by the recovery team and made available upon request. • Monitoring done at a range of spatial scales, with some small areas surveyed intensively and frequently. • Standardised surveys have been undertaken regularly (e.g., annually) throughout the species' entire range (sites where the species may occur have been included). • Population trends for locations surveyed reported regularly.	**Australian Government** **Tasmanian Government** **Private landowners** **Academic institutions** **NGOs** NRM regional bodies Citizen Scientists	
4.3	Design and implement research projects to address knowledge gaps	1	Gaps in knowledge required to inform species management have been identified and addressed. Understanding of the following parameters has improved:	**Australian Government** **Tasmanian Government** **Private landowners**	

			• Wild population breeding success factors and trends. • Habitat carrying capacity for different subpopulations at fine scales (including interactions with Striated Pardalote). • White Gum decline, and the interaction between habitat health and Forty-spotted Pardalote population health. • The sources of nest predation and disturbance, and the effects of this disturbance on breeding outcomes. • Population level impacts of introduced predators such as Laughing Kookaburra. The impacts of climate change on all Forty-spotted Pardalote populations have been identified and addressed, including: • Populations most at risk of climate change impacts have been identified. • Impacts of increased frequency and severity of drought and heat waves, and changes in rainfall patterns on habitat has been modelled and associated refuge sites identified and protected. • Threat mitigation planning incorporates synergistic impacts of climate change.	**Academic institutions** **NGOs** NRM regional bodies Citizen Scientists	
4.4	Habitat critical to the survival of the Forty-spotted Pardalote has been defined and mapped	1	• Current and predictive modelling used to map White Gum distribution. • White Gum DBH criteria for retention has been defined. • White Gum habitat distance (km) from the coast has been defined.	**Australian Government** **Tasmanian Government** **Academic institutions** **Private landowners** NGOs Citizen Scientists	
4.5	Map known/likely habitat of the species (including private land) and conduct formal searches for new	1	• All potential habitat containing White Gum within the species' range has been mapped and planning mechanisms to protect and restore potential habitat have been implemented.	**Australian Government** **Tasmanian Government** **Academic institutions** **Private landowners**	

	subpopulations or populations in mapped habitat (*See Action 5.4*)		• Accurate vegetation mapping has been developed and made accessible to land managers and decision makers. • Spatial data have been made available that maps Forty-spotted Pardalote habitat and fire histories. • Spatial data and maps (including Habitat Critical to the Survival) have been stored and shared amongst relevant management agencies.	NGOs Citizen Scientists	

Strategy 5 – Increase stakeholder participation in Forty-spotted Pardalote conservation and management

Action	Description	Priority	Performance Criteria	**Responsible Agencies** and potential partners	Indicative Cost
5.1	Establish and maintain community awareness and education programs that benefit the species conservation	1	• Popular articles backed by scientific literature about Forty-spotted Pardalote conservation, including important habitats, threats and recovery actions have been published online and in community newsletters, local bulletins and newspapers. • Informative displays have been developed to educate the broader community about Forty-spotted Pardalote conservation at appropriate key breeding and non-breeding sites. • Educational resources have been developed that target key user groups and communities where Forty-spotted Pardalote are located including impacts of: - large lot purchases and subdivisions. - Inappropriate or unintentional exotic native plantings.	**Recovery Team** **Tasmanian Government** **Australian Government** **Local Governments** Private landowners NRM regional bodies Traditional Owners NGOs	*Costs will be estimated during public consultation
5.2	Expand training of volunteers to identify the species with confidence, especially landholders who can then take on monitoring populations on a regular basis	1	• Existing community/volunteer survey programs maintained. • New community/volunteer/land manager survey programs are established where opportunities exist. • Outcome of surveys and monitoring (including nil observations) submitted to the Natural Values Atlas and other appropriate repositories.	**Recovery Team** **Tasmanian Government** Volunteer organisations NRM regional bodies NGOs Private landowners Citizen Scientists	
5.3	Respect and engage Indigenous Traditional Owners in recovery actions	1	• Traditional Owner involvement in the recovery effort has increased. • The conservation and management of Forty-spotted Pardalote considers	**Tasmanian Government** **Traditional Owners** **Recovery Team**	

			Traditional Owners knowledge and cultural values. • The cultural significance of the Forty-spotted Pardalote is identified across the species' distribution and relevant knowledge incorporated into recovery planning and events. • If supported by First Nations communities, the Forty-spotted Pardalote name formally changed to recognise Indigenous heritage.	NRM regional bodies NGOs Academic institutions	
5.4	Establish extension activities with private landholders to protect Forty-spotted Pardalote habitat	2	• A private landowner network with an interest in Forty-spotted Pardalote is established. • The private landowner network facilitates access to survey sites. • The private landowner network facilitates improved Forty-spotted Pardalote habitat management through extension activities.	**Private landowners** **Tasmanian Government** **NRM regional bodies** **Recovery Team** Local Governments NGOs	
5.5	Liaise with all relevant local councils and fire services to improve awareness of Forty-spotted Pardalote subpopulation locations and the importance of White Gum	1	• White Gums are protected where possible in areas of known and potential habitat within their municipality. • Tasmanian Fire Service are aware of optimal fire regimes for Forty-spotted Pardalotes.	**Tasmanian Government** **Local Governments** **Tasmanian Fire Service**	

Strategy 6 – Coordinate, review and report on recovery progress

Action	Description	Priority	Performance Criteria	**Responsible Agencies** and potential partners	Indicative Cost
6.1	Maintain a Recovery Team that effectively organises, implements, reviews and reports on recovery outcomes	1	• The Recovery Team continues to coordinate, review and report on the recovery outcomes for the life of this plan. • The Recovery Team liaises with other threatened species Recovery Teams with overlapping geographic distributions (e.g. Swift Parrot) to avoid duplication, maximise efficiency of program delivery, and minimise any potential conflict between recovery strategies. • The Recovery Team represents diverse stakeholders.	**All**	*Costs will be estimated during public consultation
6.2	Approve Recovery Team governance arrangements	1	• Terms of Reference for the Recovery Team have been approved in accordance with national best practice guidelines. • The Recovery Team has been registered nationally.	**Recovery Team** **Australian Government** **Tasmanian Government**	Core government business
6.3	Submit annual reports on progress against recovery actions	1	• Recovery Team annual reports have been submitted each year in accordance with the national reporting framework.	**Recovery Team** **Australian Government**	Core government business
6.4	Review the recovery plan five years after making	1	• In consultation with relevant stakeholders, a five yearly review of the recovery plan has been undertaken and endorsed by the Recovery Team. • The conservation status of Forty-spotted Pardalote has been reviewed every 5 years in conjunction with the recovery plan review.	**Recovery Team** Australian Government Tasmanian Government	
6.5	Facilitate knowledge exchange and awareness among relevant threatened	1	• Recovery Team members to communicate back to their represented stakeholder group any relevant, non-confidential information and report any questions or	**Recovery Team**	

	species land managers, researchers and decision makers		concerns back to the Recovery Team. • Meetings or workshops between land managers and researchers have occurred when and if required to facilitate collaborative recovery planning and implementation. • Traditional Owners have been consulted and Indigenous knowledge incorporated into relevant management actions.		
6.6	Secure funding and public support to maintain recovery actions in the long-term	1	• Sufficient funding has been secured long-term (10 years) to complete all recovery actions.	**Recovery Team** Australian Government Tasmanian Government	

7. Duration and cost of the recovery process

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 Tasmanian 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. All actions are considered important steps towards ensuring the long-term survival of the species.

Table 5: Summary of recovery actions and estimated costs for the first five years of implementation (these estimated costs do not take into account inflation over time).

Action	Cost					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Strategy 1						
Strategy 2						
Strategy 3						
Strategy 4						
Strategy 5						
TOTAL						

8. Effects on other native species and biodiversity benefits

Measures to mitigate threats to the Forty-spotted Pardalote and protect their habitat will benefit other threatened plant and animal species and ecological communities within the species' range. Foremost is the Swift Parrot whose breeding range co-occurs on Maria and Bruny islands and other locations such as Tinderbox Peninsula and Howden. Key Biodiversity Areas triggered by Forty-spotted Pardalote for instance list a total of 18 other (threatened and non-threatened) species as Triggers (BirdLife International 2021). These include: Swift Parrot (*Lathamus discolor*), Green Rosella (*Platycercus caledonicus*), Tasmanian Native-hen (*Tribonyx mortierii*), Strong-billed Honeyeater (*Melithreptus validirostris*), Black-headed Honeyeater (*Melithreptus affinis*), Yellow-throated Honeyeater (*Nesoptilotis flavicollis*), Yellow Wattlebird (*Anthochaera paradoxa*), Tasmanian Scrub-wren (*Sericornis humilis*), Tasmanian Thornbill (*Acanthiza ewingii*), Black Currawong (*Strepera fuliginosa*), Pink Robin (*Petroica rodinogaster*), Flame Robin (*Petroica phoenicea*), Dusky Robin (*Melanodryas vittatae*), Scrubtit *(Acanthornis magna*), Pied Oystercatcher (*Haematopus longirostris*), Short-tailed Shearwater (*Ardenna tenuirostris*), and Striated Field-wren (*Calamanthus fuliginosus*).

There are also a number of Ecological Communities listed at the state level that will benefit from increased efforts to protect and conserve Forty-spotted Pardalote habitat. Many mammals, invertebrates and plants will also receive benefits as a result of measures put in place to protect and improve Forty-spotted Pardalote habitat.

9. Social and economic considerations

The main social and economic impacts of this recovery plan will be on those who require approval to remove or modify Forty-spotted Pardalote 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 assessment processes, requirement to provide offset funding, to secure or rehabilitate habitat, or for other threat mitigation work.

Landholders may be eligible for various government grants and funding programs that support threatened species, including the Forty-spotted Pardalote. Landholders may also be provided with opportunities to participate in a range of conservation programs that benefit a wide range of threatened species. These may include covenanting programs to protect habitat critical to the survival of the species, incentive or stewardship programs to restore or maintain high quality foraging or breeding habitat for the species, and other offset-related opportunities to be involved in conservation management on their land.

BirdLife Tasmania and a network of community volunteers actively but irregularly survey for this species, including monitoring threats in its habitat inside and outside Key Biodiversity Areas and explore conservation actions. Involvement in Forty-spotted Pardalote conservation can provide social benefits with community members and engaged groups having a sense of achievement, inclusion, community spirit and pride whilst gaining enjoyment and appreciation of their surrounding natural environment. The community education components of the

program also promote community ownership, provide community support and encourage active involvement in protecting local natural resources.

The Recovery Plan includes opportunities for Indigenous Peoples to lead, manage and be involved in recovery programs on Country. These include: developing and implementing adaptive management plans for Forty-spotted Pardalote; leading and participating in Forty-spotted Pardalote surveys and long-term population monitoring programs; developing, managing and implementing threat abatement programs for pest animals, stock, fire and/or weeds; leading and participating in research programs to improve the long-term prospects for the Forty-spotted Pardalote.

In addition, there is the potential for financial gains through ecotourism ventures and holiday accommodation operators in areas where Forty-spotted Pardalote are reliably seen. Such areas are more likely to be in regional areas of Tasmania through the breeding season. Additional social benefits include encouraging passive recreation, appreciation of natural aesthetic values and increased awareness and appreciation of Indigenous cultural values.

10. Affected interests

Organisations and individuals likely to be affected by the actions proposed in this plan include: government agencies (Commonwealth, state, local), particularly those involved with environment and conservation programs; regulators; private landholders; Indigenous land and sea management groups (including ranger programmes); researchers; Bushcare, Landcare and Wildcare groups; bird watching groups; conservation groups; wildlife interest groups; 4WD and fishing groups; environmental consulting companies; tourism operators; mining companies; industry and commercial bodies; and, proponents of agricultural development in the vicinity of important habitat.

However, this list should not be considered exhaustive, as there may be other interest groups that may like to be included in the future or need to be considered when specialised tasks are required.

The following table lists some of the interest groups, how they could contribute to the success of the plan and the potential benefits/impacts that may emerge from the Plan's implementation:

Interest Group	Contribution	Impacts/Benefits
Australian Government	Responsible for development, coordination and evaluation of the plan. Responsible for implementation of the plan in Commonwealth areas. Subject to available resources, providing financial support for implementation of the plan	Informed decision making regarding the EPBC Act referral and assessment process. Greater ability to deliver on domestic and international obligations regarding biodiversity conservation. Increased knowledge of the Forty-spotted Pardalote and its habitats – increased exchange of information between decision makers and the community.

Interest Group	Contribution	Impacts/Benefits
Tasmanian government agencies	Responsible for development, coordination and evaluation of the plan. Potential implementation of the plan within jurisdictional boundaries. Subject to available resources, providing financial and/or in kind support for implementation of the plan	Informed decision making regarding the *Threatened Species Protection Act 1995* assessment and implementation process. Greater ability to deliver on state obligations regarding biodiversity conservation. Increased knowledge of the Forty-spotted Pardalote and its habitats – increased exchange of information between decision makers and the community.
Local Government	Contributing to the development of the plan and taking the plan into consideration when reviewing planning schemes. Potential implementation of on ground activities within jurisdictions.	Increased knowledge of the Forty-spotted Pardalote and its habitats – increased exchange of information. Enhanced ability to deliver obligations regarding biodiversity conservation. Supports local tourism industry.
Natural Resource Management (NRM) regional bodies	Integrating the plan into NRM regional plans. Opportunity to deliver on-ground activities.	Increased awareness of regional importance of important habitat sites. Informing managers of biodiversity values. Opportunity to seek funding for conservation projects under biodiversity conservation programs.
Land councils and Traditional Owners (including those that have co-management or sole management responsibilities for important habitats).	Contributing to the development of the plan and development and implementation of site management plans – research and monitoring activities – contributing traditional knowledge.	Increased knowledge of the Forty-spotted Pardalote and its habitats – increased exchange of information. Opportunity to seek funding for conservation projects and achieve ownership of projects. Develop research partnerships with scientists and the community. Develop traditional burning practices that consider the ecological requirements of Forty-spotted Pardalote.
Conservation Groups	Contributing to the implementation and evaluation of the plan, particularly in conducting research and monitoring programs – implementing on ground activities.	Opportunity to seek funding for conservation and awareness projects under biodiversity conservation programs. Greater coordination of targeted conservation projects. Delivering on charitable/not-for-profit goals benefiting the public.
Community and Special Interest groups	Contributing to the plan and volunteering for conservation activities – implementing on ground activities. Adding to the knowledge of the Forty-spotted Pardalote via contribution to datasets.	More Forty-spotted Pardalote to enjoy. Opportunity to participate in conservation projects.
Researchers	Contributing to the implementation of the plan and priority research activities.	Increased exchange of information – opportunity to seek funding for research. Opportunity to establish collaborations within Australia and internationally.

Interest Group	Contribution	Impacts/Benefits
Recreational users of sites – camping, 4WD, field and game groups.	Contributing to the development of the plan during the public consultation period.	Some leisure activities that affect important habitat sites may need to be managed. These groups will be one of the main recipients for education and awareness activities that focus on how they may continue their activities and contribute to the conservation of threatened birds at the same time.
Landholders	Contributing to the development and implementation of the plan.	These groups will be the target of education and awareness activities. Opportunity to access voluntary incentives to comply with recommendations, where relevant and available. Enhance certainty regarding EPBC referrals.
Commercial users of sites or surrounding area – agriculture, mining, farmers (surrounding land use), forestry, tourism operators, property developers	Contributing to the plan during the public consultation period and implementing measures that minimise the impact of their operations on threatened birds.	These groups will also be some of the main recipients for education and awareness activities, although theirs will focus on minimising the impacts of their operations on the threatened woodland birds and the habitats on which they depend. Enhance certainty regarding EPBC referrals.

11. Consultation

The *Recovery Plan for the Forty-spotted Pardalote (Pardalotus quadragintus)* has been developed through extensive consultation with the national recovery team and a broad range of stakeholders. The consultation process brought together key species experts and conservation managers, from a range of different organisations, to categorise ongoing threats to the Forty-spotted Pardalote and identify knowledge gaps and potential management options.

Consultation included representatives from government agencies, non-government organisations, researchers and local community groups. During the drafting process the Department of Agriculture, Water and the Environment (Cwlth) continued to work closely with key stakeholders.

Notice of the draft plan was made available for public comment for three months between <date> and <date>. Any comments received that were relevant to the survival of the species were considered by the Threatened Species Scientific Committee as part of its assessment process.

12. Organisations and 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 publicly 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; or
- whether a recovery plan is no longer necessary for the species' as either 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 the Department of Agriculture, Water and the Environment (Cwth) in association with the recovery team, Tasmanian Government 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 *Recovery Plan for the Forty-spotted Pardalote (Pardalotus quadragintus)* include organisations likely to be affected by the actions proposed in this plan and are expected to include:

Australian Government

Department of Climate Change, Energy, the Environment and Water (DCCEEW)

Tasmanian Government

Department of Natural Resources and Environment Tasmania (DNRET)

Tasmanian Government Forest Practices Authority (FPA)

Department of Communities Tasmania

Local Government Authorities: Kingborough, Huon, Hobart, Flinders Island, Glamorgan Spring Bay Council (which includes Maria Island)

Non-government organisations

National Recovery Team

BirdLife Australia

Bruny Island Environmental Network

NRM (South, North)

Tasmanian Land Conservancy

Traditional Owner Groups

Universities

Other community groups

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APPENDIX A - Key Achievements

Achievements of the 1991-1997 Recovery Plan (from Threatened Species Section 2006)

- Populations of the species and the area of known habitat were maintained.
- Additional populations were identified on Flinders Island and at Kingston and Howden on the Tasmanian mainland.
- 92 ha on Dennes Hill, Bruny Island was acquired by the Crown and proclaimed as a Nature Reserve. Dennes Hill is the most significant breeding subpopulation on private land.
- A subpopulation on private land at Walkers Hill on Flinders Island was acquired by the Crown through a land swap and proclaimed as a Nature Reserve.
- 280 ha of Crown Land on Flinders Island known to support the species was incorporated into the new Brougham Sugarloaf Conservation Area during the Regional Forest Agreement.
- At the beginning of the Recovery Plan 55% of the known habitat of the species was protected through reservation. During the life of the Recovery Plan a further 11% of the populations by area were protected.
- Prescriptions for conservation of the species and its habitat were developed and incorporated into Forest Practices and Local Government planning processes.
- Several thousand white gum seedlings were grown and distributed to landowners. Plantings were undertaken in historically cleared areas of Dennes Hill Nature Reserve and experimental plots were established on cleared land and pasture on Bruny Island.
- A major publicity campaign resulted in a dramatic increase in public awareness in eastern Tasmania of the species and its plight and a subsequent Honours research project in 1999.

Achievements of the 2006-2010 Recovery Plan (from Threatened Species Section 2012)

- Increased protection of populations on private land through perpetual covenants and management agreements, increasing the species reservation status to 77%.
- Bruny Island Threatened Species Recovery Plan produced (Cochran 2003).
- Post wildfire survey undertaken on Flinders Island (TSS 2005).
- Nest box trial commenced on Bruny Island.
- Trial plantings undertaken on Dennes Hill, Woodlands Estate and other private properties on Bruny Island, and incentive money provided for small scale works (NRM South, Threatened Species Network).
- Increased landholder awareness in threatened species protection through the NRM South Mountain to Marine program.
- A resurvey of the species throughout its entire range (Bryant 2010).

- Masters Thesis completed at Peter Murrell Reserve, Howden (Iijima 2010).

Achievements since 2010 (supplied by Recovery Team)

- Resurvey and installation of next boxes on Flinders Island.
- Purchase and protection of land used by Tinderbox Hill subpopulation by Tasmanian Land Conservancy.
- Identification of small subpopulation at Ida Bay, Southport.
- Covenanting of populations by Kingborough Council Offset program and DNRET's Private Land Conservation Program improving protection.
- Expansion and proliferation of nest box program on Bruny Island.
- Research from two PhDs (ANU) and two Hons Thesis (UTAS) completed and new research underway.
- Initiation of long-term monitoring and re-survey program across the species range.
- Continued awareness generated by BIEN, BI Bird Festivals and other public activities.
- First ecological burn undertaken on Maria Island in 2021.