

Swift
Parrot
Recovery
Plan



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A Commonwealth Government Initiative



Tasmania

DEPARTMENT of
PRIMARY INDUSTRIES,
WATER and ENVIRONMENT

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Abbreviations

BA	Birds Australia
DPIWE	Department of Primary Industries, Water and Environment, Tasmania
EA	Environment Australia
ESP	Endangered Species Program
FPB	Forest Practices Board
IUCN	International Union for the Conservation of Nature
NGO	Non-governmental organisation
NPWS	National Parks and Wildlife Service, New South Wales
NRE	Department of Natural Resources and Environment, Victoria
TSN	Threatened Species Network, a national network administered by the World Wide Fund for Nature
UT	University of Tasmania
VOL	Volunteers

Summary

Current Species Status

The swift parrot is listed as Endangered on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1995* and Endangered under Schedule 3 of the Tasmanian *Threatened Species Protection Act 1995*; Schedule 1 of the New South Wales *Threatened Species Conservation Act 1995* and Vulnerable under Schedule 8 of the South Australian *National Parks and Wildlife Act 1972*. In Victoria the species has been listed as a threatened taxon in Schedule 2 of the Victorian *Flora and Fauna Guarantee Act 1988*. The swift parrot population is estimated to number less than 2,500 mature individuals. Within the parrot's breeding range the area of occupancy is less than 500 km² and the population has a severely fragmented distribution. A continuing decline in the number of mature individuals and in habitat extent and quality is projected unless action is taken to address the threats to the species.

Habitat requirements and limiting factors

The swift parrot breeds only in Tasmania and migrates to mainland Australia in autumn. During winter it is semi-nomadic, foraging for lerps and nectar in flowering eucalypts predominantly in Victoria and New South Wales, particularly in box ironbark forests and woodlands. In Tasmania, the breeding range of the swift parrot is largely restricted to the east coast within the range of the Tasmanian blue gum. The breeding season of the swift parrot coincides with the flowering of blue gum and the nectar of this eucalypt is the main source of food for the parrots during breeding.

Woodlands and forests within the parrot's over-wintering range and its restricted breeding distribution have been fragmented and substantially reduced by land clearance for agriculture and urban and coastal development. Forestry operations and firewood collection have also altered the age structure of forests, resulting in the loss of older trees that provide a major food resource as well as hollows for nesting. The swift parrot also suffers from high mortality during the breeding season through collisions with man-made structures such as windows, wire mesh fences and vehicles.

Recovery plan objectives

Overall objectives

- To change the conservation status of the swift parrot from endangered to vulnerable within 10 years.
- To achieve a demonstrable sustained improvement in the quality of swift parrot habitat to increase carrying capacity.

Specific objectives

- To identify priority habitats and sites across the range of the swift parrot.
- To implement management strategies to protect and improve priority habitats and sites resulting in a sustained improvement in carrying capacity.
- To reduce the incidence of collisions with man-made structures.
- To determine population trends within the breeding range.
- To quantify improvements in carrying capacity by monitoring changes in extent and quality of habitat.
- To increase public awareness about the recovery program and to involve the community in the recovery.

Recovery criteria

- Priority habitats and sites have been identified and protected.
- Management strategies to protect breeding and foraging habitat have been implemented.
- The incidence of collisions is reduced.
- The population density or extent and quality of habitat is not reduced and ideally is enhanced.
- Community based networks are maintained and a newsletter is produced.

Actions needed

1. Identify the extent and quality of foraging habitat.
2. Protect and manage the habitat of swift parrots at a landscape scale.
3. Reduce the incidence of collisions.
4. Monitor population trends and habitat use.
5. Keep the public, volunteers and community networks informed.
6. Manage the recovery process through a recovery team.

Estimated costs of recovery (in \$1000's)

Actions	1	2	3	4	5	6	Total
Year 1	36.0	66.0	3.0	96.0	10.2	5.2	216.4
Year 2	36.0	36.5	3.0	96.0	10.2	5.2	186.9
Year 3	40.0	42.5	3.0	96.0	10.2	5.2	196.9
Year 4	28.0	41.5	3.0	132.0	10.5	6.1	221.1
Year 5	28.0	41.5	5.0	102.0	10.5	6.1	183.1
Total	168.0	228.0	17.0	522.0*	51.6	27.8	1014.4

*This figure includes \$398,000 worth of volunteer time and travel

Biodiversity benefits

As a forest and woodland dependent bird, the swift parrot is a high profile species associated with forest and woodland conservation in south eastern Australia. It is the only member of the genus *Lathamus*, and therefore is of high conservation significance. The management and protection of the habitat of swift parrots will have benefits for the ecological integrity of a range of threatened vegetation communities including the grassy Tasmanian blue gum and grassy/shrubby swamp gum forests of eastern Tasmania, the box-ironbark forests of south-eastern Australia, spotted gum forests and coastal swamp mahogany forests in New South Wales. Conservation of swift parrot habitat has benefits for other nationally threatened species including the forty-spotted pardalote *Pardalotus quadragintus*, regent honeyeater *Xanthomyza phrygia*, powerful owl *Ninox strenua*, tuan *Phascogale tapoatafa*, squirrel glider *Petaurus norfolcensis* and a number of other declining forest and woodland bird species in south eastern Australia.

Introduction

Description of species

The swift parrot *Lathamus discolor* (White) is a small fast-flying, nectarivorous parrot which occurs in eucalypt forests in south eastern Australia. Bright grass green in colour, the swift parrot has patches of red on the throat, chin and forehead, which are bordered by yellow. It also has red on the shoulder and under the wings and blue on the crown, cheeks and wings. A distinctive alarm call of kik-kik-kik (usually given while flying), a streamlined body, long tail and flashes of bright red under the wing enable the species to be readily identified.

The genus *Lathamus* is monotypic and belongs to the subfamily Platycercinae, the broad-tailed parrots which includes the genera *Platycercus*, *Barnadius*, *Purpreicephalus*, *Northiella*, *Psephotus* and *Neophema* (Christidis *et al.* 1991, Higgins 1999). Although the swift parrot superficially resembles lorikeets in habit and form (nectar feeder with brush tongue), it is generally accepted that the similarities between the swift parrot and the lorikeets have arisen through convergence (Smith 1975, Forshaw 1981, Christidis and Boles 1994, Gartrell *et al.* 2000).

Distribution

Swift parrots breed in Tasmania and migrate to mainland Australia in autumn (Fig. 1). During winter the parrots are semi-nomadic, foraging in flowering eucalypts mainly in Victoria and New South Wales. Small numbers of swift parrots are occasionally recorded in the Australian Capital Territory, south eastern South Australia and southern Queensland.

In Tasmania, the breeding range of the swift parrot is largely restricted to the south east coast within the range of blue gum where it occupies an area of less than 500 km². There is a smaller breeding population in the north of the state between Launceston and Smithton.

In Victoria, Swift Parrots are found in the dry forests and woodlands of the box-ironbark region on the inland slopes of the Great Dividing Range. There are a few records each year from suburban Melbourne, and in the dry forests and woodlands of the Melbourne and Geelong districts. They are occasionally recorded south of the divide in Gippsland and East Gippsland.

Until recently it was believed that in New South Wales, swift parrots forage mostly in the western slopes region along the inland slopes of the Great Dividing Range but are patchily distributed along the north and south coasts including the Sydney region. However, evidence is gathering that the forests on the coastal plains from southern to northern NSW are also extremely important. There are also records from the Australian Capital Territory in the Canberra area and the Namadgi National Park.

Recent records from southern Queensland have come from the Gold Coast, Noosa, Toowoomba, Warwick and Lockyer Valley areas and records from south-eastern South Australia have come from the Bordertown-Naracoorte area.

Population size

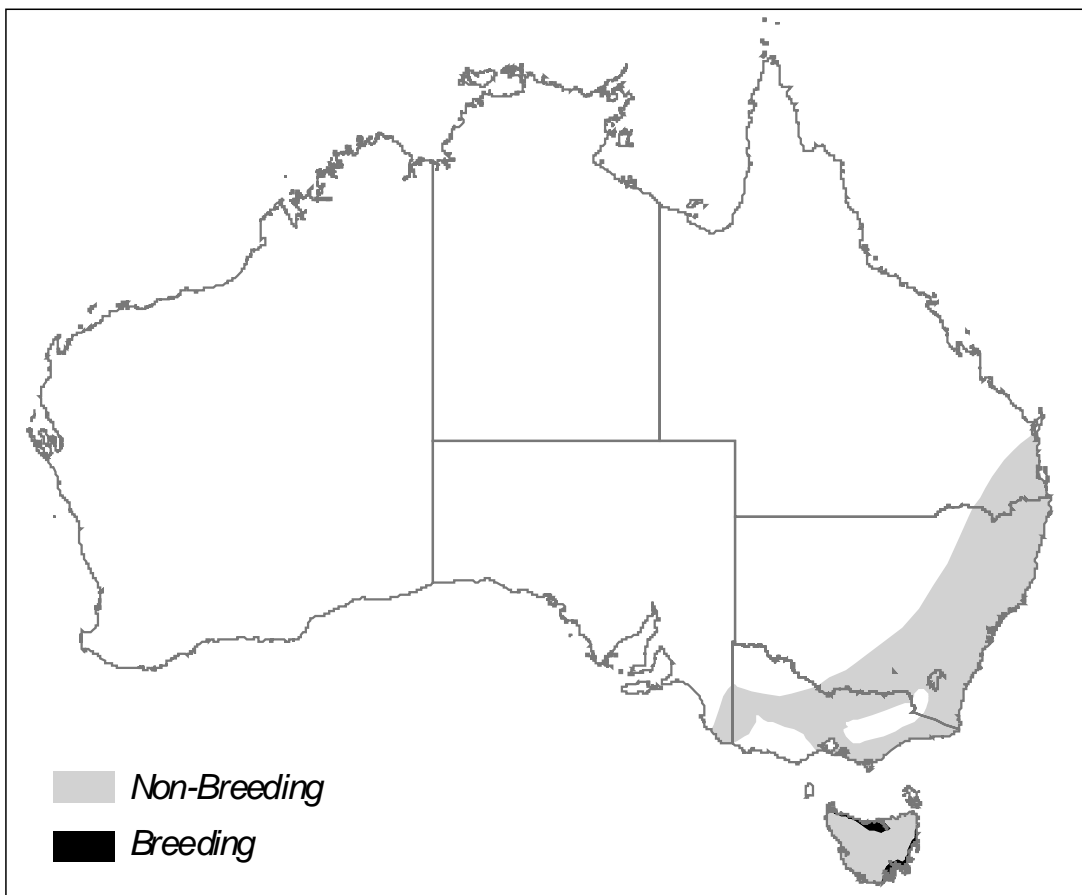
There have been two surveys of the swift parrot breeding population in Tasmania, one conducted during the 1987/88 breeding season, which located an estimated 1,320 pairs (Brown 1989). Another survey was carried out during the 1995/96 breeding season, which

located an estimated 940 pairs. The aim of these surveys was to attempt to locate and count all breeding birds. In the 1999/2000 breeding season a program to estimate the density of swift parrots was initiated using a fixed-stationary observer technique at 65 permanent plots across the range of grassy blue gum forest in eastern Tasmania. These plots form the basis of a repeatable survey program to monitor swift parrot population trends.

There have been eleven winter surveys in the Swift Parrot's non-breeding range, in 1995 (one) and 1996-2000 (two in each year). The winter surveys comprise weekend counts in May and August, involving over 300 volunteers in Victoria, New South Wales and Queensland. The aim of the winter surveys is not to obtain estimates of population size, but to locate and monitor important foraging areas used by swift parrots. The greatest number of swift parrots located in a weekend survey was on August 5th and 6th 2000, when 1247 birds were recorded.

The breeding season survey data suggest that the swift parrot population is at best stable at an estimated 1000 breeding pairs but may be continuing to decline because of continued habitat loss.

Figure 1: Distribution of the swift parrot in Australia



Habitat

During the breeding season, swift parrots occur predominantly in grassy blue gum¹ forest in eastern Tasmania where they feed on the nectar from the flowers of these eucalypts (Brereton 1997). Shrubby swamp gum forest is an important food resource early in the breeding season and in years when flowering of Tasmanian blue gum is poor (Brown 1989, Brereton 1997).

Swift parrots nest in hollows in old growth trees across a range of eucalypt species. They prefer stringybark, white peppermint and blue gums with a diameter at breast height over bark greater than 0.8 m. In south-east Tasmania, all recorded nest sites are located within 8 km of the coast, away from foraging areas and often occur in shrubby dry stringybark forest, white peppermint grassy/shrubby dry forest or grassy blue gum dry forest on upper slopes and ridge tops (Brereton 1997). There are also known nesting areas in northern Tasmania in shrubby dry stringybark forest in the Gog Range and Badgers Hills.

Post-breeding habitat is mainly in the wetter forests in west and north-west Tasmania where summer and autumn flowering eucalypt species are abundant, particularly stringybark, alpine ash, white gum, mountain gum and cabbage gum.

The principal over wintering habitat on the mainland is the box-ironbark forests and woodlands inland of the Great Dividing Range in Victoria and New South Wales (Kennedy & Tzaros in press, Kennedy & Overs 2001). Box-ironbark forest is a vegetation type dominated by yellow gum, red ironbark and grey box in central Victoria, and mugga ironbark and grey box in north-east Victoria and the western slopes of New South Wales. The box-ironbark habitats occur across a range of landforms, but drainage lines account for a disproportionately high number of foraging sites. A variety of grassy woodland vegetation types are also used in these areas including white box grassy woodland, grey box grassy woodland and grey box/yellow gum woodland).

Certain forest types on the coastal plains along the eastern seaboard are also important foraging habitats. In lowland coastal forests of New South Wales, swift parrots forage in flowering swamp mahogany, spotted gum and red bloodwood. In south east Queensland and northern New South Wales, narrow-leaved red ironbark/ forest red gum forests and yellow box forest are utilised.

Swift Parrots choose larger trees for foraging within grassy blue gum forest and box-ironbark habitats (Kennedy & Tzaros in press). There is evidence that the parrots also preferentially select larger trees in the forests of the coastal plains of NSW (Kennedy 2000). Factors which contribute to the importance of large trees are that a greater proportion of large trees flower than small trees and large trees have greater canopy foliage than small trees and thus support a greater number of flowers (Wilson and Bennett 1999; Law *et. al.* 2000).

¹ Appendix 1 contains a list of scientific and common names of *Eucalyptus* and *Corymbia* species mentioned in the text.

Table 1. Priority swift parrot habitats

Habitat type	Habitat	Distribution
Foraging habitat within breeding range	Grassy <i>Eucalyptus globulus</i> forest	Eastern Tasmania
	Shrubby <i>E. ovata</i> forest	Eastern and northern Tasmania
Nesting habitat	Old growth forest: <i>E. obliqua</i> dry forest <i>E. pulchella</i> grassy/shrubby dry sclerophyll forest Grassy <i>E. globulus</i> forest	Eastern Tasmania
	Old growth <i>E. obliqua</i> dry forest	Northern Tasmania
Foraging habitat within overwintering range	<i>E. microcarpa</i> / <i>E. tricarpa</i> / <i>E. leucoxylon</i> box ironbark forest	Central Victoria
	<i>E. microcarpa</i> grassy woodland	Central and western Victoria
	<i>E. leucoxylon</i> / <i>E. microcarpa</i> woodland	Central and western Victoria
	<i>E. microcarpa</i> / <i>E. sideroxylon</i> box ironbark forest	North-east Victoria and the western slopes of New South Wales
	<i>E. albens</i> grassy woodland	Western slopes of New South Wales
	<i>E. robusta</i> forest	Coastal New South Wales
	<i>Corymbia maculata</i> forest.	Coastal New South Wales
	<i>C. gummifera</i> forest.	Coastal New South Wales
	<i>Eucalyptus tereticornis</i> / <i>E. crebra</i> forest	Southern Queensland, Northern New South Wales
	<i>E. melliodora</i> forest	Southern Queensland

Life History

Breeding

Swift parrots begin to return to Tasmania in early August with most of the population arriving by mid-September. The breeding season coincides with the flowering of Tasmanian blue gum, the nectar of which is the main food source for the parrots during this time. In Tasmania, the breeding range of the swift parrot is largely restricted to the south east coast within the range of blue gum. There is also some breeding in the north of the state between Launceston and Smithton, which is outside the natural range of Tasmanian blue gum. Blue gums have been planted widely as a street tree, in wind breaks, in gardens and plantations and are used by swift parrots when in flower. The size of this breeding population varies from year to year depending on the available flowering resource.

Both sexes are involved in the search for suitable nest hollows which begins soon after they arrive in Tasmania. Nesting starts in late September, however birds that are unpaired on arrival in Tasmania may not begin nesting until November after they have found mates (Brown 1989). Gregarious by nature, pairs may nest in close proximity to each other and even in the same tree. Nest sites may be re-used but not necessarily in successive years. The re-use of a nest site depends on the availability of food in that area.

The female occupies the nest chamber just before egg laying. She will not leave the nest until the chicks are hatched and sufficiently developed. The usual clutch size is four eggs but up to five may be laid (Hutchins and Lovell 1985). The eggs are white, glossy and oval, rounded at both ends. During incubation the male visits the nest site every three to five hours to feed the

female. He perches near the nest and calls her out, either feeding her at the nest entrance or both will fly to a nearby perch.

Young swift parrots fledge at about six weeks and the first chicks are usually seen outside the nest in late November and early December. The presence of juvenile birds that appear to have recently left the nest in late January and early February suggests that double brooding may occur in some years. Brown (1989) reported a second nesting attempt at Fern Tree in the 1987/88 breeding season, however it was unsuccessful. At a property near Devonport, two distinct arrivals of juveniles have been reported, firstly in mid-December and a smaller group of young in mid-February. Double brooding has also been reported in captive birds.

Dispersal

Young birds begging for food are seen when they first leave the nest. They remain in the nesting area and gather together in flocks before dispersing. After breeding, most of the east coast population of adults and immature birds moves westwards to the Central Plateau and western Tasmania as blue gum flowering declines and other eucalypts begin to flower elsewhere, in particular stringybark, gum-topped stringybark/alpine ash and white gum/manna gum. The parrots are nomadic during the post breeding period, appearing wherever there is a suitable nectar source in the west and north of the state.

Swift parrots begin to leave Tasmania for the mainland from mid-February and most have left by the end of April. They leave from the north coast between Launceston and Smithton and appear to migrate through western Bass Strait during daylight hours without stopping, arriving on the mainland around Port Phillip Bay including the Mornington and Bellarine Peninsulas. However, records in East Gippsland and the far south coast of NSW at around this time suggest that some birds may fly direct to eastern Victoria and southern NSW.

A small number of Swift Parrot records are received from the Melbourne area in March and April, but most of the birds are not detected until they reach their usual non-breeding range in the box-ironbark region or in coastal New South Wales. Once Swift Parrots reach their core non-breeding range there is no known geographical pattern of movement. Dispersal within the non-breeding range during winter does occur, with the two winter surveys often recording markedly different results for a particular site in a given year. Such within-year dispersal on the mainland is subject to local food resources. As a result, swift parrots may stay at a site for a few days or several months, and changes in food availability may necessitate large or relatively small-scale movements. A small number of records are received from the Melbourne area in late winter-early spring before the birds return to Tasmania.

Some broad temporal changes in the relative importance of various food species are evident in the Victorian box-ironbark region, where the Swift Parrot has been most intensively studied on the mainland. Grey box is a source generally used early in the non-breeding season. Red and mugga ironbark stands are used through much of the winter and yellow gum and white box are of increasing importance towards the end of the winter. There is considerable overlap in the flowering times of these species however, and local conditions play a major role in dictating the timing and extent of flowering in each region.

Food

During the breeding season, swift parrots feed primarily on the nectar from the flowers of Tasmanian blue gum. The intensity of Tasmanian blue gum flowering varies greatly from year to year and the nectar from the flowers of black gum/swamp gum is an important foraging resource in years when there is little blue gum flowering. Black gum flowers in late winter and is the only nectar source available to swift parrots prior to the Tasmanian blue gum flowering in spring.

Post-breeding food resources in Tasmania are mainly nectar from summer and autumn flowering eucalypts, particularly stringybark, gum-topped stringybark, white gum, mountain gum and cabbage gum/snow gum.

Swift Parrots feed extensively on nectar and lerp and other items from eucalypt foliage during the non-breeding season. Mugga ironbark, red ironbark, white box, grey box, and yellow gum are important sources of nectar in the box-ironbark forests and woodlands of Victoria and New South Wales (Table 1). Grey box, river red gum and white box are major sources of lerp in these areas at times. Swamp mahogany, spotted gum and red bloodwood are important nectar sources in coastal parts of the non-breeding range. Forest red gum and yellow box are used by foraging swift parrots in northern NSW and south east Queensland. There are also several records of the species foraging on lerp in the foliage of blackbutt in the Wollongong area of NSW.

Table 2. Location of principal over wintering forage species used by the Swift Parrot

	Forest Redgum	Grey Box	Mugga Ironbark	Red Ironbark	Spotted Gum	Swamp Mah'y	Red Bl'wood	White Box	Yellow Gum
Central Victoria		*		*					*
North east Victoria		*	*					*	
NSW western slopes		*	*					*	
NSW coast	*			*	*	*	*		
Southern Queensland	*								
South Australia									*

Reasons for listing

Small population size

There is anecdotal evidence from reports in the past that the swift parrot was once more abundant and that its range extended from the Mt. Lofty Ranges in South Australia to south east Queensland (Hindwood and Sharland 1964, Brown 1989, Higgins, 1999). Swift parrots are now rarely seen in South Australia and are restricted to the Bordertown area on the Victorian/South Australian Border, although they are still regularly recorded in small numbers from south east Queensland. The total swift parrot population is estimated to be no more than 1000 pairs and is at best stable but may be continuing to decline, given the continued mortality of birds and the ongoing loss of habitat. The decline in swift parrot numbers was first reported as early as 1917 by Mathews who summarised its status “It appears to be exceedingly rare in New South Wales and more common, though by no means now as plentiful as formerly, in Tasmania” (in Brown 1989).

Loss of habitat

The breeding range of the swift parrot based on environmental domain analysis of the Tasmanian blue gum utilised by the swift parrot during the breeding season is estimated to be 264,000 ha (4% of Tasmania's land mass including the offshore islands) of which 148,000 ha (56%) is forested (Brereton 1997). Of the remaining forested area within the breeding range, only 4% contains potentially suitable swift parrot foraging habitat. This is predominantly grassy *Eucalyptus globulus* forest, which covers an area of approximately 8,000 ha. The area of potential habitat occurs as a narrow band down the south east coast of Tasmania predominantly between Swansea and Dover including the Forestier and Tasman Peninsulas and Maria and Bruny Islands. This band extends no more than 5 km inland except for an area between Marion Bay and Sorell where the band expands up to 10 km. The environment of this area is characterised by low rainfall, high annual mean temperature, low seasonality of rainfall and temperature, low elevation and relatively fertile soils. Within this area suitable

grassy *E. globulus* forest has a patchy distribution which is related to available moisture and soil depth. The habitat most often used by swift parrots tends to be on deeper soils with higher available moisture particularly on lower slopes and coastal plain.

Breeding success varies greatly from year to year depending on the intensity and extent of blue gum flowering. In years of poor flowering there appears to be little breeding activity particularly in the larger south eastern Tasmania population. The impact of seasonal variability in breeding success on the swift parrot population is being intensified by the loss of habitat within the breeding range. Areas of grassy blue gum forest, which in the past may have contained a suitable food resource in some years, have now been cleared. Approximately 56% of grassy *E. globulus* forest has been cleared.

The greatest proportion (82%, 7000 ha) of grassy *E. globulus* dry forest within the breeding range occurs on private land. The amount of habitat within the reserves is approximately 18%, (1500 ha), the majority occurring within the Maria Island National Park.

The environmental domain of the shrubby *E. ovata* forest used by the swift parrot during the breeding season also occurs as a narrow band down the south-east coast of Tasmania, predominantly between Triabunna and Ida Bay including the Forestier and Tasman Peninsulas and Bruny Island. The environmental domain of shrubby *E. ovata* forest is wetter and cooler than that of grassy *E. globulus* forest. *E. ovata* prefers moist sites and its occurrence is typically localised in drainage basins, soaks and hollows. Shrubby *E. ovata* forest has been severely depleted by land clearing in Tasmania, approximately 97% of this forest type has been lost.

Habitat loss has also been considerable across the non-breeding range. Box-ironbark forests and woodlands have been extensively cleared for agriculture. It has been estimated that 85% of the vegetation in the box-ironbark region has been cleared in Victoria and New South Wales (Robinson and Traill 1996). The density of large trees has been greatly reduced in the habitat that remains in Victoria (Soderquist and Rowley 1995).

Important vegetation types in Victorian non-breeding habitats are box-ironbark forest (168,200 ha remaining), heathy dry forest (45,100 ha) and a range of low-lying woodlands (12,500 ha). Of this habitat, only a small amount is suitable for swift parrots at any given time. Flowering of box-ironbark eucalypts is greatly variable from year to year, with a stand of eucalypts rarely producing a large amount of nectar in two successive years. The birds must locate the areas of abundant food within this 225,000 ha area of habitat, which is spread in remnants over a total area of 3 million hectares.

In Victoria, only 3% of the box-ironbark ecosystem currently occurs in conservation reserves (Environment Conservation Council 1997). However, a further 184,000 ha of box-ironbark forest has been recommended for inclusion into Victoria's reserve system (Environment Conservation Council 2000). In New South Wales, only 5% of ironbark and woodland communities are reserved (Robinson and Traill 1996).

Current threats

Habitat loss

Woodlands and forests within the parrot's over-wintering range and the blue gum forests within its restricted breeding distribution continue to be fragmented and lost through land clearance for agriculture, plantation development and urban and coastal subdivision. Since 1996 370 ha of grassy *E. globulus* forest within the range of the swift parrot has been cleared (Forest Practices Board 2001). In addition, forestry operations and firewood collection are altering the age structure of forests across its range, resulting in the loss of older trees which provide a substantial food resource as well as hollows for nesting.

Adult mortality

Collisions with chain-link fences, windows and cars are a significant cause of mortality to swift parrots during the breeding season. On average, 19 adult birds that have collided with man made structures are recovered annually and four of these birds are released back into the wild. The remaining birds are either dead or the nature of their injuries do not allow them to be released. In some years the mortality can be quite high for example during the 1997-98 breeding season, 34 adult swift parrots were retrieved, 23 of which were dead. Most collisions occur in urban areas before young are fledged, when the adults are highly mobile in their search for summer flowering eucalypts, both native and introduced. The problem is exacerbated in years of poor Tasmanian blue gum flowering. In such situations swift parrots concentrate in urban areas where they forage on native and introduced flowering eucalypts. In the 1997-98 breeding season, an estimated 488 birds were recorded at 16 locations in the Hobart area between the 24 October 1997 and the 4 November 1997.

Existing Conservation Measures

The swift parrot is listed as Endangered on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1992* and Endangered under Schedule 3 of the Tasmanian *Threatened Species Protection Act 1995*; Schedule 1 of the New South Wales *Threatened Species Conservation Act 1995* and Vulnerable under Schedule 8 of the South Australian *National Parks and Wildlife Act 1972*. In Victoria the species has been listed as a threatened taxon in Schedule 2 of the Victorian *Flora and Fauna Guarantee Act 1988*.

Conservation actions have been accomplished during the implementation of the previous Swift Parrot Recovery Plan 1997 – 2000 including:

- Surveys within the breeding and overwintering range of the swift parrot to identify, characterise and map swift parrot habitat.
- The use of a range of mechanisms to protect known and potential foraging and breeding habitat including threatened species legislation, vegetation clearance controls, formal reservation through the Regional Forest Agreements, management prescriptions included in codes of forest practices and voluntary measures such as conservation agreements, covenants and Land for Wildlife schemes.
- Identifying collision hotspots so that remedial measures can be taken as well as making information available to the public on how to reduce the risks of swift parrot collisions with man-made structures.
- Establishing a program to monitor densities within the breeding range to provide a basis on which to assess the progress of the recovery program.
- An investigation of the biology and ecology of the species to investigate the mechanisms that control the productivity of the population.
- A review of the effectiveness of management prescriptions in conserving habitat within production forest in Tasmania. The results of the review are being used to improve the implementation of management prescriptions.
- Involving the community in the recovery program and providing feedback through a public information and education program.

Strategy for Recovery

The recovery program will carry out the following tasks:

- Identify and map priority foraging habitats in New South Wales, Victoria, Queensland and to identify important breeding sites in Tasmania.
- Implement a strategy to protect priority sites and habitats using a range of administrative avenues and voluntary measures, including, threatened species legislation, vegetation clearance controls, management prescriptions, codes of practice, conservation agreements, covenants and Land for Wildlife schemes.
- Identify degraded habitats that have potential to benefit the recovery of the swift parrot. These sites will be targeted for protection and habitat improvement, including undertaking rehabilitation and revegetation works.
- Monitor collisions and collision hazards, particularly during the breeding season and take remedial action to reduce the impact of this source of mortality on the population.
- Monitor the density of the breeding population and the extent and quality of habitat to assess the progress of the recovery program towards meeting its objectives.
- Increase public awareness about the recovery program through an information and education program.
- Involve the community in the recovery through the support of networks and participation in operations groups and the recovery team.

Recovery objectives and criteria

Overall objectives

- To change the conservation status of the swift parrot from endangered to vulnerable within 10 years.
- To achieve a demonstrable sustained improvement in the quality of swift parrot habitat to increase carrying capacity.

Specific objectives

- To identify priority habitats and sites across the range of the swift parrot.
- To implement management strategies at the landscape scale to protect and improve priority habitats and sites resulting in a sustained improvement in carrying capacity.
- To reduce the incidence of collisions with man-made structures.
- To determine population trends within the breeding range.
- To quantify improvements in carrying capacity by monitoring changes in extent and quality of habitat.
- To increase public awareness about the recovery program and to involve the community in the recovery.

Recovery criteria

- Priority habitats and sites have been identified and protected.
- Management strategies to protect breeding and foraging habitat have been implemented.
- The incidence of collisions is reduced.
- The population density and/or extent and quality of habitat is not reduced and ideally is enhanced.
- Community based networks are maintained and a newsletter is produced.

Table 3. Relationships between specific objectives, recovery criteria and actions.

Objectives		Recovery criteria		Actions
<ul style="list-style-type: none"> • Identify priority habits and sites • Protect and improve priority habitats 	↔	<ul style="list-style-type: none"> • Priority habitats and sites have been identified and protected 	↔	<ol style="list-style-type: none"> 1. Identify the extent and quality of foraging habitat 2. Habitat management
<ul style="list-style-type: none"> • Reduce the incidence of collision 	↔	<ul style="list-style-type: none"> • The incidence of collisions is reduced 	↔	<ol style="list-style-type: none"> 3. Reduce the incidence of collisions
<ul style="list-style-type: none"> • Determine population trends • Quantify improvements in carrying capacity 	↔	<ul style="list-style-type: none"> • The population density and/or extent and quality of habitat is not reduced and ideally is enhanced 	↔	<ol style="list-style-type: none"> 4. Population and habitat monitoring
<ul style="list-style-type: none"> • Increase public awareness and involve the community 	↔	<ul style="list-style-type: none"> • Community based networks are maintained and a newsletter is produced 	↔	<ol style="list-style-type: none"> 5. Community education and information 6. Manage the recovery process through the Swift Parrot Recovery Team

Recovery Actions

Action 1. Identify the extent and quality of foraging habitat.

Action 1a. Identify the extent and quality of foraging habitat within the overwintering range.

Aims

To identify priority habitats and sites so that appropriate management actions can be taken to protect and improve the habitats resulting in a sustained improvement in carrying capacity.

Justification

Although some priority habitats and sites have been identified, the variability in the distribution and extent of food resources between years means that many important habitats and sites are still little known. Some regions that swift parrots are known to use (eg. NSW coast, south east Qld) are little studied. This information is vital to the management of a species using fragmented habitats at a continental scale. Priority sites when identified can be protected using a range of administrative (eg. management prescriptions, threatened species legislation) and voluntary conservation measures (eg. LFW, covenants).

Methods

A project officer will visit regions with swift parrot non-breeding habitat during the winter. The regions in which work will be done will be dictated in part by the number of swift parrot records and the amount of flowering in that area during that winter. The priority areas for study are the south west slopes, the coastal spotted gum forests and swamp mahogany forests of New South Wales, the forest redgum/narrow leaved ironbark forests and yellow box forests in northern New South Wales and south east Queensland, the box ironbark forests in central and north east Victoria and the Gippsland box-ironbark forests. Local State agency staff and volunteer observers will be able to inform the project officer of the likelihood of finding swift parrots. The project officer will identify regions to be studied depending on swift parrot activity and record habitat use at foraging sites. The methods used will be those described in the guidelines to “Assessing Swift Parrot habitat “ to assess tree size distribution, vegetation type, tree species composition and bird community composition at foraging sites. The results of these studies will enable decisions to be made about suitable management regimes for the identified patches of swift parrot habitat. Funds will be required to employ a project officer, vehicle hire and travel expenses.

Responsibilities

Administration: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart). Fieldwork: NRE and NPWS, volunteers

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
25.0	25.0	29.0	17.0	17.0	113.0

Action 1b. Identify the flowering patterns of blue gum.

Aims

To identify those grassy blue gum patches within the breeding range in Tasmania, which provide a consistent food source for breeding swift parrots by obtaining a long-term record of

the flowering patterns of blue gum. This will also provide valuable data for the understanding of the relationship between blue gum flowering and swift parrot breeding success.

Justification

The intensity of Tasmanian blue gum flowering is a major factor affecting the reproductive success of the swift parrot. Long term records of the flowering patterns of blue gums are important in understanding the relationship between flowering and breeding success. Tasmanian blue gum is a biennial flowering tree although site type and environmental conditions also have a significant impact on flowering and in some areas flowering events can be up to seven years apart. A program to assess blue gum flowering in three southern Tasmanian populations was initiated by the Co-operative Research Centre for Temperate Hardwood Forestry (CRCTHF) at the University of Tasmania in 1993. A further six sites covering the range of blue gum in eastern Tasmania were added by the recovery program in 1997. The program has six years of data from the southern sites and three years from the rest of the range of blue gum. A preliminary analysis of this data has shown that major flowering events are uncommon but data over a longer period is required to obtain a better understanding of blue gum flowering.

Methods

The relative abundance and length of blue gum flowering will be measured by counting opercula (bud caps) which are collected in litter traps that are cleared monthly. The program will continue to be carried out jointly by DPIWE and CRCTHF. Funds are required to maintain the litter seed traps, for vehicle hire and the collection and sorting of samples.

Responsibilities

Administration: DPIWE (Hobart), UT. Fieldwork: DPIWE (Hobart and District staff), UT, volunteers

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
11.0	11.0	11.0	11.0	11.0	55.0

Action 2. Manage swift parrot habitat at a landscape scale.

Action 2a. Mapping of foraging and breeding habitat.

Aims

To map foraging and nesting habitat across the range of the swift parrot.

Justification

The mapping of foraging and nesting habitat will be available to land use planners so that important habitat can be protected and managed. Habitat mapping will also enable landholders to be identified and be approached with offers of assistance to protect and manage habitat on their land. The mapping will also enable a strategic approach to be taken in managing habitat patches across the landscape.

Methods

Swift parrot locations and habitat will be plotted onto maps of an appropriate scale. On ground mapping of the site will delineate the suitable habitat surrounding the records. GIS modelling of swift parrot habitat data will also be undertaken to identify potential areas of habitat. Habitat mapping will form the basis of a swift parrot habitat management strategy

across the range of the species.

In Victoria and New South Wales habitat mapping will be included in forest management plans and regional vegetation strategies. In Tasmania the mapping of grassy blue gum forest and shrubby/grassy swamp gum forest is being undertaken by the recovery program in conjunction with the Vegetation Management Strategy and the Private Land Reserve Program of the Regional Forest Agreement. Funds will be required to undertake habitat mapping, GIS modelling, field truthing and map production.

Responsibilities

Administration: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart). Fieldwork: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart), volunteers.

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
33.0	11.5	7.5	7.5	7.5	67.0

Action 2b. Management and protection of habitat.

Aims

To implement appropriate management regimes to protect and improve swift parrot habitat on public and private land.

Justification

Habitat loss and degradation has been identified as a major threatening process. This action aims to target those important habitats and sites identified in Action 1 for protection and enhancement using a range of administrative avenues and voluntary measures to ensure that they are maintained in the long term and to improve the carrying capacity. Mechanisms to achieve this include threatened species legislation, vegetation clearance controls, codes of practice for forestry and agriculture, conservation agreements, covenants, Land for Wildlife schemes and habitat rehabilitation programs.

Methods

A range of methods will be used to carry out this action including:

- Increasing the awareness of landowners and managers, State agencies and Local Governments of their responsibilities under State and National threatened species protection legislation.
- Strategic targeting of priority foraging and nesting sites on private land for protection under land management agreements or covenants.
- Target priority foraging, roosting and nesting habitat on State Forest and other Crown Land for additions to the reserve system through the Regional Forest Agreement process where they include swift parrot habitat.
- Ensure that codes of practice for forestry including plantation establishment include prescriptions for the protection of the habitat of the swift parrot.
- Develop and implement management guidelines in New South Wales for habitat that remains in State Forest under the Integrated Approval process (NSW).
- Develop and implement Special Management Zones (SMZ) in Victoria for habitat that remains in State Forest under a Forest Management Plan.
- Form links with vegetation management programs such as Bushcare to identify swift parrot habitat and areas that would benefit from re-vegetation and rehabilitation. This can be facilitated in NSW via the Regional Vegetation Management Planning process

under the NSW *Native Vegetation Conservation Act 1997* and in Tasmania by the *Vegetation Management Strategy*.

- Undertake habitat rehabilitation through programs such as Landcare and the Tasmanian schools based Swift Parrot habitat Rehabilitation network.
- Protect potential and known foraging habitat and known roosting habitat on private land in NSW through: (i) the Regional Vegetation Management Planning process and the clearing consent process under the NSW *Native Vegetation Conservation Act 1997*, (ii) local and regional environmental planning process under Part III of the *Environmental Planning and Assessment Act 1979* and (iii) encourage protection of habitat in residential zones via Part IV of the *Environmental Planning and Assessment Act 1979*.

Funds are required for a project officer to develop strategies and management prescriptions and negotiate conservation agreements with landowners and land managers.

Responsibilities

Administration: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart).

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
29.0	23.0	23.0	24.0	24.0	123.0

Action 2c. Develop a strategy to provide for a continued supply of suitable nest hollows.

Aim

To develop a strategy to provide for a continued supply of trees with hollows trees in Tasmania for nesting swift parrots.

Justification

Action has been taken to protect existing nest sites and there are prescriptions for the protection of habitat trees in wildlife habitat clumps in production forest however there has been no assessment as to whether there will be a continued supply of suitable nest hollows into the future. A strategy for the recruitment of hollow bearing trees should be developed which caters for all hollow dependent species, as this will be more effective than a species by species approach.

Methods

The recovery team will promote the development of a nest hollow strategy to the responsible agencies and stakeholder groups, including the Department of Primary Industry, Water and Environment, Forest Practices Board, Forestry Tasmania, Forest Industry Association of Tasmania and the Tasmanian Farmers and Graziers Association. The strategy will address a range of threatening processes including the continuing loss of hollow bearing trees in native forests and woodlands due to firewood harvesting which is being considered for listing as a key threatening process on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Responsibilities

Administration: DPIWE (Hobart)

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
4.0	2.0	2.0	0.0	0.0	8.0

Action 2d. Ecological thinning in mainland habitats.

Aims

To accelerate the recovery of swift parrot habitats by thinning of coppice regrowth forest.

Justification

Swift parrot sites in some box ironbark forests in Victoria were heavily cut over for timber until relatively recently. As a result habitats within these areas have a high density of young coppice regrowth from past forestry practices. These habitats are no longer used for timber harvesting and the recovery of these sites to high quality swift parrot habitat will occur in time. However, this process of recovery may be accelerated significantly by the implementation of thinning of stems. Current research indicates that larger trees are preferred by swift parrots for foraging as they flower more frequently than smaller trees and they support a larger number of flowers.

Methods

Swift parrot sites in need of thinning in non-timber harvesting areas will be identified, and trials will be carried out. Ongoing monitoring to assess the effectiveness of the trials will be conducted, from which management guidelines will be developed for non-harvesting areas. Funds are required to undertake thinning trials and monitoring.

Responsibilities

Administration: NRE (Bendigo). Fieldwork: NRE (Bendigo).

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
0.0	0.0	10.0	10.0	10.0	30.0

Action 3. Reduce the incidence of collisions.

Aims

To reduce the incidence of swift parrot collisions with man made structures including chain-link fences, windows and vehicles.

Justification

Actions implemented under the previous plan to increase public awareness of problem structures and promote remedial measures appear to be having some success with less injured birds being recovered in the past two years. However, collisions continue to be a cause of mortality in adult and juvenile birds in Tasmania and a program to identify problem structures and sites is still required.

Methods

Make the recently produced collision brochure widely available to homeowners. The pamphlet provides advice on how to identify problem areas and offers a range of solutions. To maintain awareness of the collision threat to the recovery of the swift parrot through the media and the schools-based Swift Parrot Habitat Rehabilitation Network. Monitoring of structures and sites where remedial measures have been employed will be undertaken to ensure they remain effective. Funds are required to undertake annual monitoring of problem structures and sites, to conduct a public awareness program and to update and reprint the collision brochure.

Responsibilities

Administration: DPIWE (Hobart).

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
3.0	3.0	3.0	3.0	5.0	17.0

Action 4. Population and habitat monitoring.

Action 4a. Population monitoring.

Aims

To undertake annual monitoring of the breeding population using a repeatable method.

Justification

A repeatable monitoring method is necessary to assess population trends, which will provide an ongoing measure to assess the progress of the recovery program.

Methods

Population surveys are carried out in eastern Tasmania in spring, when the population is centred on the east coast. Seventy-three 1 hectare permanent plots have been established in grassy blue gum forest, which is the primary foraging habitat in eastern Tasmania. A stationary observer census is used to assess population density at each site. These sites were

selected and surveyed for the first time in spring 1999. It is anticipated that revisits to each site using a repeatable census method during the breeding months when the population is resident will uncover patterns in overall density that are not obtainable at other times of the year when swift parrots are more highly dispersed.

Responsibilities

Administration: DPIWE (Hobart). Fieldwork: DPIWE (Hobart)

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
18.0	18.0	18.0	20.0	20.0	94.0

Action 4b. Winter Surveys.

Aims

To monitor distribution and habitat use on the mainland. To increase interest and awareness within the community of the recovery program by participation in searches. To monitor use at known sites and find “new” sites and habitats.

Justification

The highly mobile and nomadic nature of the swift parrot population makes it difficult for project officers and agency staff to monitor distribution and habitat use on the mainland. The winter surveys provide an opportunity to obtain a broad overview of mainland distribution and also to monitor the use of sites and habitats. The winter surveys are also invaluable in creating interest in the species and its recovery.

Methods

The winter surveys are carried out as a joint project with the Regent Honeyeater Recovery program. Volunteers are called for in various media, and existing volunteers are updated on activities. The volunteers are sent survey forms and offered advice on potentially suitable sites and habitats. The results are sent to the Swift Parrot Project Officer and the Regent Honeyeater Recovery co-ordinator by return mail or electronically. The results are collated and the data used to support the implementation of Actions 1a, 2a and 2b. Volunteers receive feedback from the surveys through the newsletter. The winter surveys will aim to increase volunteer coverage in eastern Victoria, northern and coastal New South Wales and south east Queensland.

Responsibilities

Administration: NRE (Bendigo), NPWS (Queanbeyan), BA. Fieldwork: volunteers

Costs (\$1000's)

Source	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
Other	16.0	16.0	16.0	18.0	18.0	84.0
VOL	62.0	62.0	62.0	64.0	64.0	314.0
Total	78.0	78.0	78.0	82.0	82.0	398.0

Action 4c. Monitoring the effectiveness of management prescriptions in conserving habitat in production forests.

Aim

To monitor the effectiveness of management prescriptions in conserving breeding and foraging habitat in production forests.

Justification

Monitoring of the effectiveness of management prescriptions is the most appropriate means of determining whether habitat in production forests is being protected and enhanced. The adaptive management cycle depends on the identification of habitat, the implementation of protective measures and the monitoring of those measures over time to assess whether they are effective in protecting and enhancing habitat. Monitoring of forest prescriptions has already been undertaken in Tasmania and has resulted in the identification of problems in the application of prescriptions. Measures have been undertaken to improve the prescriptions and to increase the effectiveness of them in retaining and protecting habitat. These modified prescriptions will have to be reviewed in the future to assess whether they have successfully addressed the problems raised in first review.

Methods

A retrospective study of forest operations that have been conducted under prescription will be undertaken in New South Wales, Victoria and Tasmania. Coupes will be re-visited and assessed for habitat after timber harvesting and a comparison made with habitat before harvesting to determine whether the quantity and quality of habitat is being maintained. The retained habitat will be monitored for use by swift parrots. Information about habitat present in a coupe prior to harvesting will be compiled from previous habitat surveys, forest management plans and retained forest. The results of the review will be incorporated into management prescriptions for the swift parrot in production forests. Funds are required for a project officer, vehicle hire, travel allowance and data acquisition.

Responsibilities

Administration: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart), FPB (Hobart).
Fieldwork: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart), FPB (Hobart).

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
0.0	0.0	0.0	30.0	0.0	30.0

Action 5. Community education and information.

Action 5a. Community and volunteer networks.

Aims

To provide advice and support to the networks of volunteers, extension officers and field staff who carry out surveys to identify foraging and breeding sites and are involved in habitat rehabilitation and revegetation programs.

Justification

Networks of volunteers and groups will be necessary to assist with identification of foraging and breeding sites, collection of information about food sources, population and habitat monitoring and habitat rehabilitation projects. Volunteers will play an important role in the

implementation of actions 1a, 1b, 2b, 3 and 4a.

Methods

The recovery program will provide technical advice and support to the volunteers which assist with the identification of habitat, collect blue gum flowering data, monitor collision hotspots and undertake the winter surveys, For example, the program will identify sites which can be rehabilitated and revegetated by the schools based Swift Parrot Habitat Rehabilitation Network. Birds Australia and the Threatened Species Network provide assistance with recruiting and co-ordinating volunteers. Funds are required to support the community based networks in the three states covering the range of the swift parrot. This action will also carry the training and education of field and extension staff about the requirements and habitats of the swift parrots, including Land for Wildlife officers and Bushcare facilitators. The program, which already has links with the Regent Honeyeater Recovery Team, will also seek links with other relevant programs such as Woodland birds program and the Box-ironbark program. Some examples of the outputs to assist networks and other community members to be involved in the recovery are:

- include summaries of swift parrot habitat and management in threatened species field guides being produced for local government and regional vegetation management committees by NPWS.
- Produce a profile of swift parrot for inclusion into the Threatened Species Management Manuals (eg. Tasmania’s Threatened Species Handbook, NSW Threatened Species Management Manual).
- Place profiles, listing statements, action statements and recovery plans on the websites.
- Produce Environmental Impact Assessment and Management Guidelines for considering habitat of swift parrot for distribution to all local governments, major environmental consultants and other government agencies.

Responsibilities:

Administration: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart), BA, TSN.
Fieldwork: volunteers

Costs (\$1000’s)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
8.5	8.5	8.5	8.7	8.7	42.9

Action 5b. Newsletter.***Aims***

To maintain and increase support for the Swift Parrot Recovery Program by distributing information about the aims of the program and its achievements.

Justification

The swift parrot is a key species in the conservation of woodlands and forests in south east Australia and is an example of an integrated approach to the protection and management of a species that utilises patchy and fragmented habitats at a continental scale. The swift parrot winter surveys are undertaken by a large network of volunteers, some of whom travel long distances to survey important sites. The newsletter is the primary means of informing volunteers why their efforts are important. This is vital to maintain interest in the project from the volunteer network.

Methods

An annual newsletter will be produced after results from the second winter survey have been received. Results of the surveys, stories from volunteers, relevant research results and information on habitats and potential areas to visit will be included. Funds are required to prepare and publish the newsletter.

Responsibilities

Administration: NRE (Bendigo), NPWS (Queanbeyan), DPIWE (Hobart), BA, TSN.

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
1.7	1.7	1.7	1.8	1.8	8.7

Action 6. Manage the recovery process through a recovery team.

Aims

To guide the implementation of the recovery plan and evaluate and review progress regularly by a team with appropriate expertise, management responsibility, community representation and a concern for the conservation of the species.

Justification

The appropriate body to implement and undertake reviews of the recovery plan is a recovery team which has members from representatives of funding bodies, land management agencies, other land managers, the community and others with relevant expertise.

Methods

The recovery team meets twice a year and consists of representatives from the Nature Conservation Branch, Tasmanian Department of Primary Industry, Water and Environment, the Flora and Fauna Branch, Victorian Department of Conservation and Natural Resources (Chair), NSW National Parks and Wildlife Service, Birds Australia and the Threatened Species Network. There are three corresponding members of the recovery team: the South Australian Department of Environment and Natural Resources, the Australian Capital Territory Department of Environment and the Department of Environment and Heritage, Queensland. They are not formal members of the recovery team but are kept informed on the recovery process and are involved in those actions that are relevant to their state, eg. winter surveys.

District land management staff and other stakeholders are invited to participate in recovery team meetings when meetings are held in their region. The recovery team also works with the Regent Honeyeater Recovery Team in undertaking the winter surveys as a joint project. NGO representatives receive some assistance from the recovery program to attend meetings.

Responsibilities

Team administration: NRE (Melbourne), NPWS (Queanbeyan), DPIWE (Hobart), BA, TSN.

Costs (\$1000's)

Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
5.2	5.2	5.2	6.1	6.1	27.8

Implementation Schedule

Task	Description	Priority	Feasibility	Responsible Party	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total (\$000)
1	Identify the extent and quality of foraging habitat									
1a	Identify foraging habitat within the overwintering range.	1	100%	NRE, NPWS, DPIWE	25.0	25.0	29.0	17.0	17.0	113.0
1b	Identify the flowering patterns of blue gum	2	100%	DPIWE, UT	11.0	11.0	11.0	11.0	11.0	55.0
					36.0	36.0	40.0	28.0	28.0	168.0
2	Habitat Management									
2a	Mapping of foraging and breeding habitat	2	100%	NRE, NPWS, DPIWE:	33.0	11.5	7.5	7.5	7.5	67.0
2b	Management and protection of habitat	1	100%	NRE, NPWS, DPIWE:	29.0	23.0	23.0	24.0	24.0	123.0
2c	Develop a nest hollow strategy	1	100%	DPIWE	4.0	2.0	2.0	0.0	0.0	8.0
2d	Ecological thinning in mainland habitats				0.0	0.0	10.0	10.0	10.0	30.0
					66.0	36.5	42.5	41.5	41.5	228.0
3	Reduce the incidence of collisions	1	80%	DPIWE	3.0	3.0	3.0	3.0	5.0	17.0
					3.0	3.0	3.0	3.0	5.0	17.0
4	Population and habitat monitoring									
4a	Population monitoring	1	100%	DPIWE	18.0	18.0	18.0	20.0	20.0	94.0
4b	Winter Surveys	2	100%	NRE, NPWS	78.0	78.0	78.0	82.0	82.0	398.0
4c	Monitoring the effectiveness of management prescriptions	2	100%	NRE, NPWS, DPIWE:	0.0	0.0	0.0	30.0	0.0	30.0
					96.0	96.0	96.0	132.0	102.0	522.0
5	Community education and information									
5	Community and volunteer networks	3	100%	NRE, NPWS, DPIWE, BA, TSN	8.5	8.5	8.5	8.7	8.7	42.9
5b	Newsletter	3	100%	NRE, NPWS, DPIWE, BA, TSN	1.7	1.7	1.7	1.8	1.8	8.7
					10.2	10.2	10.2	10.5	10.5	51.6
6	Manage the recovery process through a recovery team	3	100%	NRE, NPWS, DPIWE, BA, TSN	5.2	5.2	5.2	6.1	6.1	27.8
					5.2	5.2	5.2	6.1	6.1	27.8
TOTALS					216.4	186.9	196.9	221.1	193.1	1014.4

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Appendix 1

List of *Eucalyptus* and *Corymbia* species mentioned in the text and their common names

Species	Common Name
<i>Corymbia maculata</i>	Spotted gum
<i>Corymbia gummifera</i>	Red bloodwood
<i>Eucalyptus albens</i>	White box
<i>Eucalyptus camaludensis</i>	River red gum
<i>Eucalyptus crebra</i>	Narrow-leaved red ironbark
<i>Eucalyptus dalrympleana</i>	Mountain gum
<i>Eucalyptus delegatensis</i>	Gum-topped stringybark, Alpine ash
<i>Eucalyptus globulus</i>	Tasmanian blue gum
<i>Eucalyptus leucoxylon</i>	Yellow gum
<i>Eucalyptus melliodora</i>	Yellow box
<i>Eucalyptus microcarpa</i>	Grey box
<i>Eucalyptus ovata</i>	Black gum, Swamp gum
<i>Eucalyptus pauciflora</i>	Cabbage gum, Snow gum
<i>Eucalyptus pilularis</i>	Blackbutt
<i>Eucalyptus pulchella</i>	White peppermint
<i>Eucalyptus obliqua</i>	Stringybark
<i>Eucalyptus robusta</i>	Swamp mahogany
<i>Eucalyptus sideroxylon</i>	Mugga ironbark
<i>Eucalyptus tereticornis</i>	Forest red gum
<i>Eucalyptus tricarpa</i>	Red ironbark
<i>Eucalyptus viminalis</i>	White gum, Manna gum



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RESOURCES

CONSERVATION

LAND MANAGEMENT

