



# Natural Heritage Trust

*Helping Communities Helping Australia*

## **RECOVERY PLAN FOR THE**

## **NORFOLK ISLAND GREEN PARROT**

*Cyanoramphus novaezelandiae cookii*

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Birds Australia  
May 2002

ENVIRONMENT AUSTRALIA

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### ***Executive Summary***

The Norfolk Island Green Parrot should now be considered a full species *Cyanoramphus cookii* and as such is one of the rarest and most endangered bird species in Australia. It is only found on Norfolk Island (3825 ha) where it is largely restricted to natural or semi-natural forests most of which are found within the Norfolk Island National Park (465ha). It probably originally occurred on the adjoining and smaller Phillip Island 190 ha). The total population size is currently estimated to be 160 with 14 known breeding pairs. Total population size is primarily limited by the availability of predator-free breeding habitat and nesting sites and ultimately by habitat loss and the small area of remaining suitable habitat. This plan outlines actions which if implemented should shift the conservation status from critically endangered to conservation dependent within ten years. It proposes to achieve this by establishing and maintaining sufficient predator-free nest sites for 25 breeding pairs on Norfolk Island, establishing a second breeding population on Phillip Island, investigating establishing a true second population either captive on the Australian mainland or introduced to Lord Howe Island, and by replanting 4 ha of potential breeding habitat each year.

### ***Background Information***

The Norfolk Island Green Parrot *Cyanoramphus novaezelandiae cookii* is restricted to Norfolk Island (29°02'S, 167°57'E) and is listed as nationally "endangered" (EPBC 1999). It is "critically endangered" using the criteria of International Union for the Conservation of Nature (IUCN 1994). It is currently listed as a subspecies of *Cyanoramphus novaezelandiae cookii* but is now considered a full species following Boon (*et al.* 2001). This taxonomy is followed by Garnett & Crowley (2000).

Both sexes of Green Parrot present similar plumage and males are distinguished from females by their larger size, larger red crown, and heavier bill (Forshaw 1981). Juveniles have a distinctive flesh-coloured bill for the first 4-6 weeks after fledging (Forshaw 1981).

Male Green Parrots call to advertise their territories and to attract females (Greenwood *et al.* 1989). Breeding in the wild takes place in all months of the year, peaking from December to March, and declining in September to November, when Crimson Rosellas (*Platycercus elegans*;) breed (Greenwood *et al.* 1989, Hicks and Preece 1991). Incubation commences after the second or third egg is laid and lasts 21 days (Hicks and Preece 1991). As the chicks reach approximately two weeks of age the female may leave to be fed by the male and commence a new nest (Greenwood 1993). Green Parrots may have multiple double-clutches and successfully fledge young up to four times in a year, with males and females sharing care of the young. (R. Ward pers.comm.). Green Parrots generally prefer to use a fresh nest site each time, but may revert to the original site if a third site is not available. Fledglings leave the nest six to seven weeks after hatching and are dependent on their parents for food for a further 3-7 weeks (Davidson 1997, Forshaw 1981, Hicks & Greenwood 1989, Hicks and Preece 1991). Clutch size is relatively large (1-8, mean 6; Hicks & Greenwood 1989). The age of first breeding is unknown but may be soon after independence (Greene 1990). Thus Green Parrots have a high breeding potential. The following research and monitoring work has been undertaken and continues on the wild population of the Green Parrot:

- Population census (No census has been undertaken since 1997 due to the poor quality of the colour band surfacing and a lack of resources:
- Searches for active nests, recording their location, nest maintenance and monitoring breeding progress, informal descriptions of nest hollows including the success of interventions, described later;
- Searching and mapping of potential nest sites;
- Recording and mapping the location of all parrot sightings outside NINP;
- Observations of the diet of the parrot;
- Colour-banding of fledglings and monitoring of their survival and development;
- A radio-tracking study of the post-fledging movements of wild juvenile Green Parrots;
- Incidental observations on mortality and post-mortems.
- Related research that has been undertaken in Norfolk Island National Park (NINP) includes a detailed rat population monitoring program, supplementing the extensive rat baiting program implemented since December 1992.

A rat-baiting program has been implemented in NINP. This was reviewed by Innes (1995) and additionally in 2002 by Wilson (awaiting report)

There is evidence that the rat baiting program is reducing rat numbers to low levels, with Black Rats declining first, then Polynesian Rats increasing in abundance and then declining (Innes 1995).

Cats have been trapped in wire cage traps in NINP on a regular basis since 1992. Trapping is also conducted in response to sightings or other evidence of cat activity within the NINP. Approximately 50 cats are trapped in the park each year.

Feral Crimson Rosellas regularly attempt to nest in sites modified for Green Parrots. Regular monitoring of nest sites to discover and destroy Rosella nesting activity is undertaken. The removal and destruction of adult Rosellas in Green Parrot breeding areas is undertaken and is also effective in reducing their numbers. Current measures to control for European Starlings are restricted to removal of all nesting attempts. Feral Honey Bees are destroyed when they are near nest sites.

### Biodiversity Benefits

The actions specified in this recovery plan will benefit a range of Norfolk Island threatened fauna. The existing control of rats and cats greatly benefits other island fauna.

This includes the threatened fauna and flora listed in Table 1.

Table 1: Flora *proposed* for listing and listed fauna that will benefit from the actions proposed in this plan.

TAXA	STATUS
<b>PLANTS</b>	Critically Endangered
<i>Phreatia limenophylax</i> (Endl.) Benth.	
<i>Myoporum obscurum</i> Endl.	
<i>Clematis dubia</i> (Endl.) P.S.Green	
<i>Meliccytus latifolius</i> (Endl.) P.S.Green	
<i>Achyranthes margaretarum</i> de Lange	
<i>Boehmeria australis</i> Endl. var. <i>australis</i>	
<i>Euphorbia norfolkiana</i> Boiss.	
<i>Calystegia affinis</i> Endl.	
<i>Hibiscus insularis</i> Endl.	
<i>Elymus multiflorus</i> (Banks & Sol. ex Hook.f.) A.Love & Conner var. <i>kingianus</i> (Endl.) Conner	
<i>Abutilon julianae</i> Endl.	
<i>Achyranthes arborescens</i> R.Br.	Critically Endangered
<i>Elatostema montanum</i> Endl.	Critically Endangered
<i>Wikstroemia australis</i> Endl.	Critically Endangered
<i>Meryta latifolia</i> (Endl.) Seem.	Critically Endangered
<i>Pisonia brunoniana</i> Endl.	Endangered
<i>Tylophora biglandulosa</i> (Endl.) F.Muell.	
<i>Zehneria baueriana</i> Endl.	
<i>Muehlenbeckia australis</i> (G.Forst.) Meisn.	
<i>Pennantia endlicheri</i> Reissek	
<i>Pouteria costata</i> (Endl.) Baehni	
<i>Coprosma pilosa</i> Endl.	

<p><i>Streblus pendulinus</i> (Endl.) F.Muell.  <i>Blechnum norfolkianum</i> (Heward) Maiden  <i>Cephalomanes bauerianum</i> (Endl.) P.S.Green  <i>Coprosma baueri</i> Endl.#  <i>Marattia salicina</i> Sm.  <i>Crepidomanes endlicherianum</i> (C.Presl) P.S.Green  <i>Lastreopsis calantha</i> (Endl.) Tindale.  <i>Phreatia paleata</i> Rchb.f.  <i>Pteris kingiana</i> Endl.  <i>Pteris zahlbruckneriana</i> Endl.  <i>Senecio evansianus</i> Belcher  <i>Dendrobium brachypus</i> (Endl.) Rchb.f.  <i>Senecio hooglandii</i> Belcher *</p>	
<p><i>Melicope littoralis</i> (Endl.) T.G.Hartley  <i>Zanthoxylum pinnatum</i> (J.R.Forst. &amp; G.Forst.)  W.R.B.Oliv.  <i>Melicytus ramiflorus</i> J.R.Forst. &amp; G.Forst. ssp.  <i>oblongifolius</i> (A.Cunn.) P.S.Green  <i>Meryta angustifolia</i> (Endl.) Seem.  <i>Euphorbia obliqua</i> Endl.  <i>Tmesipteris norfolkensis</i> P.S.Green  <i>Senecio australis</i> Willd.  <i>Ileostylis micranthus</i> (Hook.f.) Tiegh.  <i>Hypolepis dicksonioides</i> (Endl.) Hook.  <i>Peperomia urvilleana</i> A.Rich.  <i>Taeniophyllum muelleri</i> Lindl.ex Benth.  <i>Nephrolepis</i> aff. <i>cordifolia</i>  <i>Ungeria floribunda</i> Schott &amp; Endl.  <i>Rapanea ralstoniae</i> P.S.Green.  <i>Exocarpos phyllanthoides</i> Endl. var. <i>phyllanthoides</i>  <i>Cordyline obtecta</i> (Graham) Baker  <i>Dysoxylum bijugum</i> (Labill.) Sem  <i>Pittosporum bracteolatum</i> Endl.  <i>Dianella intermedia</i> Endl.  <i>Elymus rectisetus</i> (Nees) A.Love &amp; Conner  <i>Freycinetia baueriana</i> Endl. ssp. <i>baueriana</i>  <i>Phormium tenax</i> J.R.Forst.&amp; G.Forst.*  <i>Capparis nobilis</i> (Endl.) F.Muell. ex Benth.*  <i>Carex neesiana</i> Endl.*</p>	<p>Vulnerable</p> <p>Vulnerable</p>
<b>BIRDS</b>	
<b>Norfolk Island Boobook</b> <i>Ninox novaeseelandiae undulata</i>	Endangered
<b>Scarlet Robin</b> ( <i>Petroica multicolor multicolor</i> ).	Vulnerable
<b>Golden Whistler</b> ( <i>Pachycephala pectoralis xanthopracta</i> ). Vulnerable	Vulnerable
<b>REPTILES</b>	
<i>Christinus guentheri</i> <i>Psuedomoia lichinigera</i>	Vulnerable

### Relationship to other plans

The Norfolk Island National Park Plan of Management 2000 is the strategic nature conservation document for the island.

### ***Habitat Critical to Survival***

Until the late 1700s Norfolk Island was covered in dense forests and the Green Parrot was probably widely distributed across the island. Between the late 1700s and 1800s, felling of forest tree species led to considerable deforestation. Clearing for agriculture and plantation production further reduced native vegetation cover. By the late 1800s the Green Parrot was confined to the area now included in NINP. Since then, the structure and composition of the remaining native vegetation has changed dramatically primarily through weed invasion and grazing (Anon 1984).

The most extensive area of native habitat remaining on Norfolk Island is within NINP, which encompasses 465 ha (12%) of the island. Gilmour and Helman (1989) quantified the native vegetation assemblages of the Park as 30% 'native forest' (palm, hardwood, and Norfolk Island Pine forest), 37% 'weed-infested native forest' and 33% 'exotic forest' (see also Schodde *et al.* 1983).

Green Parrots forage in all habitats within the park except for a small area of eucalypt plantation (J. Hicks, pers.comm.) and in some areas outside of the park. The principle diet of adult Green Parrots appears to be a variety of native seeds, fruits, flowers, and leaves. This includes Norfolk Island Pine (*Araucaria heterophylla*), Ironwood (*Nestegis apetala*), Norfolk Island Palm (*Rhopalostylis baueri* var. *baueri*), Bloodwood (*Baloghia inophylla*), Cordyline (*Cordyline obtecta*) and Whiteoak (*Lagunaria patersonia* spp. *patersonia*) (Forshaw 1981, Hicks and Preece 1991). Seeds, fruit and bark of some exotic species are also consumed, namely Red Guava, African Olive and Lantana (*Lantana camara*) (Hicks and Preece 1991).

African Olive and Red Guava seeds may now form a significant part of the diet of newly-fledged juveniles (Davidson 1997, Motte and Hall 1988), with Bloodwood seeds, Norfolk Island Pine seed and green and fallen Red Guava fruit also important (Davidson 1997).

No quantitative studies have been conducted on the foraging preferences and nutritional value of native and exotic foods in the diet of wild Green Parrots. Captive Green Parrots readily accept native Norfolk Island herbs (Chaff-flower *Achyranthes aspera* seed, Pig Face *Carpobrotus glaucescens* leaves and fruit, Mile-a-minute *Wollastonia biflora* flowers and fruit). Hicks and Preece (1991) note that although the NI Green Parrot feeds in forest trees, other closely related *Cyanoramphus* spp. occur and forage in grassland environments eg. the Kermadec Parakeet (*C.n.cyanurus*) on Macauley Island and the Red-fronted Parakeet (*C.n.novaezelandiae*) on Tiritiri Island (NZ).

Parrots typically forage from early to mid-morning, flying between favoured feeding areas in pairs or small parties (Davidson 1997, Forshaw 1981). From mid-morning to late afternoon parrots move to sunny (but unexposed) positions near the tops of trees, where they preen quietly and are inconspicuous (Forshaw 1981). Adults forage mostly in the tops of trees and occasionally on the ground (Forshaw 1981, Hicks and Preece 1991), while juveniles, for 3-5 weeks after fledging, feed extensively on the ground eating the fallen seeds of African Olive and Red Guava (Davidson 1997). Davidson (1997) recorded a total of 244 perch locations from 3 radio-tracked juveniles, of which 58 (24%) were on the ground, 101 (41%) were in African Olive

and Red Guava and 85 (35%) were in 12 native tree species. It is unclear whether frequent foraging in exotic vegetation reflects a preference for olive and guava by juveniles or the widespread abundance of these species in NINP (Davidson 1997).

Wild birds often feed in the Norfolk Island Botanic Garden and visit the aviaries where captive parrots are held. The subspecies is not shy (Forshaw 1981) and has been recorded foraging in gardens (Davidson 1997). From 1991-1998, 31 possible sightings of Green Parrots outside NINP were made. The majority of sightings were in December and January, the peak breeding season for wild Green Parrots.

The Green Parrot's breeding range is now believed to be restricted to the National Park. Natural nest sites are known only in hollows of native tree species, typically within 2 m of the ground (Hicks and Preece 1991). Of 43 wild nests monitored between 1983 and 1988, all were in native species. Twenty-eight of 43 nests were in Ironwood, 11 were in Cordyline, 2 were in Norfolk Island Pine and 2 were in Whiteoak. There appears to be a significant relationship between vegetation type and location of nesting site. Native forest is the most used nesting habitat, followed by 'weed-infested native forest' then 'dense Red Guava' forest. 'Dense African Olive forest' supported the lowest number of nests. Adults usually return to the same nest site each season (Hicks and Preece 1991). No nests have been located in 'plantation forests' probably because the trees are immature. Potential extensions of habitat exist outside the National Park if nesting hollows were provided and maintained, and predator control measures were introduced.

Critical habitat is defined as all habitats used by this taxa. These include all known sites for nesting, and food resources, water shelter etc, as defined by the EPBC (1999). This includes native and exotic forest and areas inside and outside of the NINP. Habitat with the potential to support Green Parrots also fit the criteria for critical habitat, and the revegetated areas of Phillip Island may well be critical habitat, as well as potential habitat on Norfolk Island currently not used by Green Parrots. The critical habitat of the Green Parrot is mapped in Figure 1 and is defined in this plan as all potential Green Parrot habitat within its 'current normal range'.

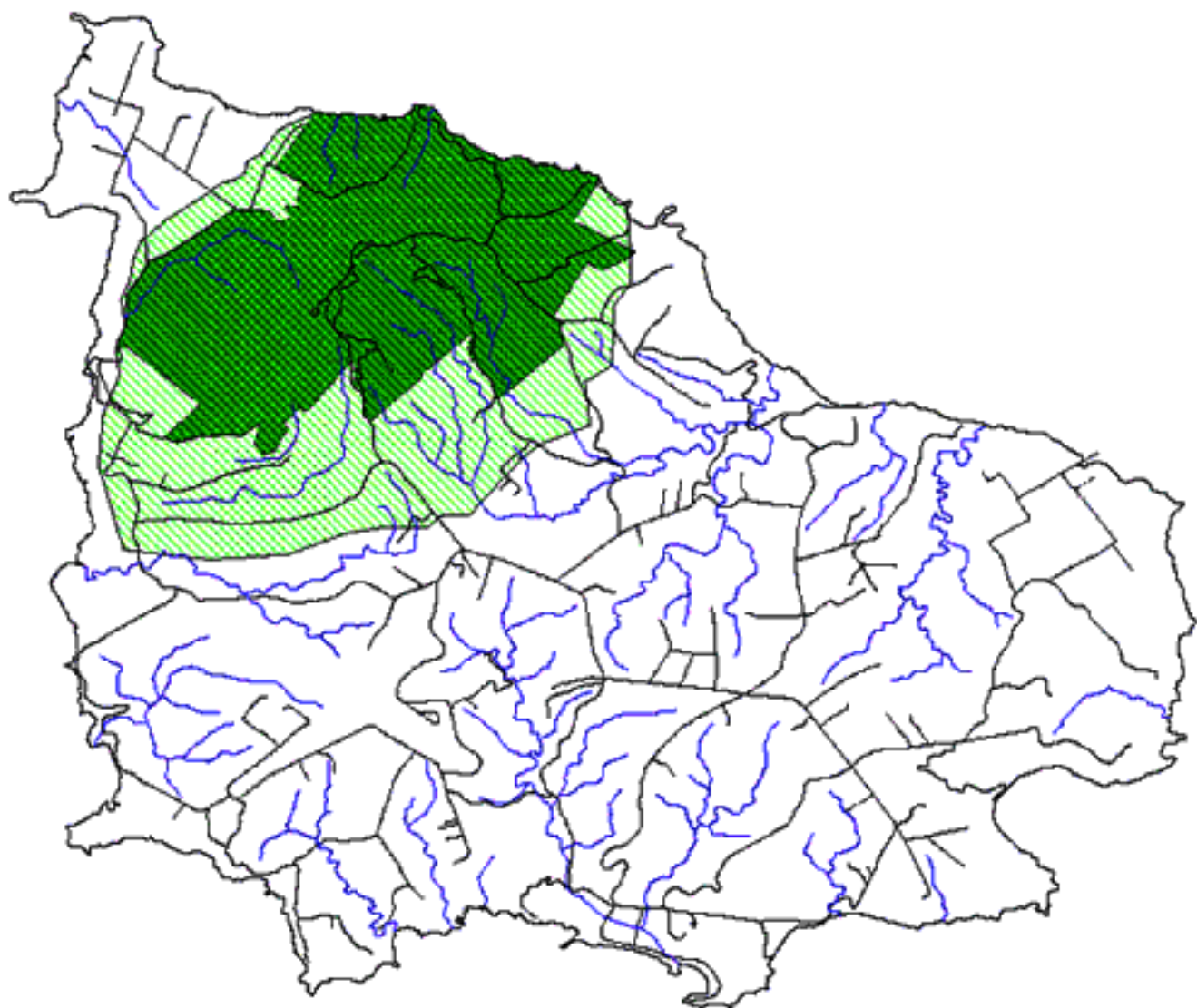
### ***Threats to the taxon***

The primary factors responsible for the decline of the Green Parrot have been habitat loss, particularly trees with suitable hollows, and predation by introduced predators. Currently egg/chick predation by introduced predators particularly rats and cats, a shortage of predator-free nest sites, and nest hollow competition are the main factors limiting population recovery. Disease may be a significant cause of mortality in certain circumstances. Other factors which may have contributed to the decline in the past include shooting and trapping for crop protection (until the 1950s) (Hicks and Preece 1991).

#### **Predation**





Predation by the Ships Rat, *Rattus rattus*, and cats continues to be the greatest threat to the parrot and the greatest threat to the island's native vertebrate fauna.

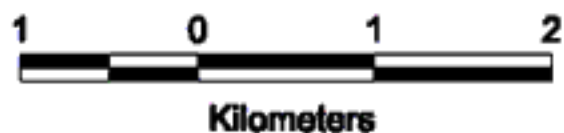
The Black Rat colonised the island in the 1940s (Hicks and Preece 1991). Domestic cats were introduced to the island in the late 1700s and were established as feral by the 1830s. Rats eat eggs and nestlings, and predate on brooding females. Cats predate on fledglings and breeding adults. Nest sites are within a few metres of the ground and accessible to both predators. Predation by Black Rats was identified as the cause behind six of fifteen failed wild Green Parrot nests from 1983-1991 (Hicks and Preece



 Nepean Island

**Figure 1: Norfolk, Phillip and Nepean Islands showing the current normal range of the Norfolk Island Green Parrot.**

-  Creeks
-  Roads
-  Green parrot range
-  National Park



Phillip Island 



1991) and the cause of at least two of eighteen failed clutches in 1996 (cause of failure for 15 clutches was unknown) (unpubl. data). Female Green Parrots appear to be particularly vulnerable to predation by cats and rats as only the females brood the eggs and females are very reluctant to leave their nests (P. Stevenson pers.comm.) Juveniles face the highest risk of predation immediately after fledging and 3-5 weeks later, when they begin to forage independently (Davidson 1997). Juveniles have poor foraging skills and spend a large proportion of their time on the ground, consuming fallen exotic fruits (abundant in most of NINP). In contrast, native Bloodwood seeds are collected and consumed perched in trees (Davidson 1997). An analysis of Green Parrot numbers and breeding output by Innes (1995), indicated that the parrot population and the number of breeding attempts had increased since rat baiting commenced. Rats and cats have been a common factor implicated in the extinction of three *Cyanoramphus* subspecies on other islands.

Potential natural predators of the Green Parrot are the hybrid Norfolk Island Boobook Owl (*Ninox novaeseelandiae undulata*), the Marsh Harrier (*Circus approximans*) and Kestrel (*Falco cenchroides*). Hybrid descendants of the owl are the subject of a concurrent management program and the diet of these owls has been monitored since 1986. No Green Parrots or Crimson Rosellas have ever been recorded (P. Olsen pers.comm.) and thus owls are not considered a significant predator of Green Parrots. The Polynesian Rat (*Rattus exulans*) may take parrots but as there has been a long period of co-existence, it is considered unlikely to be a significant threat (Anon 1984). Since 1988, 88 natural hollows have been modified to prevent access by rats. Fifty-five of these hollows have been used by Green Parrots, many repeatedly. Rat proofing prevents rat access above or below the nest from elsewhere in the hollow tree. Galvanised iron sheeting (camouflaged) is placed around the limb or trunk outside the hollow for at least 30 cm in all directions from the hollow entrance. Nearly all nest sites have been modified, so there are no data to quantify the effectiveness of this method by comparing with breeding output from unmodified hollows. Given the 'critically endangered' status of the species, experimentation to resolve this issue is considered too high a risk. Only one natural site is considered sufficiently rat resistant to not require rat proofing. As well as predator proofing, nest hollows are regularly "serviced" through the addition of rotted *Nestegis* sp. (family Oleaceae) pulp after each nesting. This soft material forms a "bed" within the nest hollow.

### Nest Hollow Shortage

The number of natural nest sites is now very small and natural replacement of nest sites will take many years. Only 12% of the island has natural vegetation where natural hollows can develop and hollows are rare in most of this remaining native vegetation.

A number of artificial nest boxes have been trialed including nest boxes made from PVC pipe and from plywood and none was successful. This is despite exhaustive trialing of numerous designs in a variety of materials, and advice and the expertise of expert aviculturists brought to Norfolk Island. Thus further attempts to develop artificial nest boxes for field placement are not warranted at this stage (J. Hicks pers.comm., P. Stevenson, pers.comm.).

The only successful man-made nests have been natural hollows salvaged from island trees and erected in a known breeding area. Parrots have successfully fledged young from these nests (R. Ward pers.comm.).

### Nest Hollow Competition

Green Parrots compete for nest hollows with introduced Crimson Rosellas, European Starlings and Honey Bees. Crimson Rosellas are known to aggressively expel Green Parrots from their territory (Hicks and Preece 1991). While it was understood that Crimson Rosellas on Norfolk Island nest from September-November, during which months Green Parrots rarely nest, some variation in this pattern has been observed in recent times. The incidence of Crimson Rosellas using Green Parrot hollows has also decreased significantly from 1993 to 1997, probably due to regular culling of Crimson Rosellas in NINP since 1990.

Green Parrots will use a nest site that has been used by Crimson Rosellas. Prior Red Parrot nesting activity at specific hollows did not significantly affect Green Parrot breeding success at those hollows (as measured by the number of Green Parrot chicks produced in each breeding attempt (R. Ward pers.comm.).

European Starlings use tree hollows from August to November (Hermes *et al.* 1986) thus there is no direct competition with Green Parrots for nest sites. However, the starling's nesting material can render a nest site unattractive to Green Parrots. If the hollow is not cleared of this material, a nesting opportunity may be lost. There have been numerous examples of nesting material attributed to European Starlings being found in hollows previously used by Green Parrots. (D. Greenwood and R. Ward, pers. obs.)

In the 1992-93 breeding season, bees occupied seven wild nest sites and bee control was considered a priority (Greenwood 1993). In 1995, feral bees caused one fatality and two injuries to captive Green Parrots (Yorkston 1995). Bees occupied one nest site from 1992 to 1996 (unpubl. data) and another site for one month in 1994. There are no records of feral bees at wild nest sites or within the aviaries since 1995. Feral bees are systematically removed from near nest sites within NINP.

### Disease

A serious threat to all island birds is the introduction of new disease. Island birds have often evolved in the absence of diseases common in continental bird faunas and the introduction of such diseases to island birds can be disastrous. For example the introduction of avian malaria to Hawaii which caused the extinction of almost the entire endemic bird fauna from below 600 m altitude, and was probably the main cause of the total extinction of several bird species (Hay 1986). The range of many surviving species was severely reduced and fragmented which in turn markedly increased their chances of extinction. Avian malaria arrived with the accidental introduction of a new species of mosquito (Hay 1986).

Once established, a new disease may persist on an island in feral populations of continental bird species which have resistance to the disease. The Black Francolin *Francolinus francolinus*, introduced to Guam, may have provided a reservoir of disease-carrying hosts accentuating the impact of disease on the island's endemics (Hay 1986). McNamara (1989), summarising the conclusions from a workshop on the management of Australian and New Zealand islands, recommended that the eradication of introduced species from islands be given a high priority.

Psittacine Circoviral Disease (PCD) was confirmed in wild and captive populations of Green Parrots in 1995 (Stevenson *et al.* 1995). The disease is prevalent in Crimson Rosellas on Norfolk Island (Hermes *et al.* 1986, Hicks and Preece 1991). An outbreak of PCD caused high mortality among Crimson Rosellas in 1976 and one

apparently diseased Green Parrot was seen in 1977 (Forshaw 1981). In 1995 there was an outbreak of PCD in Green Parrots and Crimson Rosellas and two captive female Green Parrots died (Yorkston 1995). The disease is now thought to be widespread in the wild Green Parrot population. With the entire sub-species, captive and wild, located only on Norfolk Island, it is extremely vulnerable to a disease epidemic. Recent studies by Taronga Zoo suggests that all NI Green Parrots are carriers of the virus but appear to remain unaffected until subjected to stress. Green Parrots may be particularly vulnerable to disease due to the population bottlenecks the taxon has suffered in the past which may have reduced the genetic variability in the population. PCD is a nationally listed as a Key Threatening Process (EPBC 1999), and in June 2002 work commenced on a Threat Abatement Plan. The Threat Abatement Plan is likely to make recommendations which will affect the Norfolk Island Green Parrot and these will have to be considered by the Recovery Team. Captive breeding for release may exacerbate the spread of PCD (PCD Nomination; EPBC website). A vaccine is now available which induces immunity in vaccinated birds and might assist management of the disease at least in captive Norfolk Island Green Parrots.

#### *Habitat Loss and Degradation*

Native forest contained within the NINP is protected under the EPBC Act 1999 and a range of tree species are protected under Norfolk Island Government legislation. Weed-infestation and loss by natural attrition of mature habitat trees are the primary factors degrading NINP and consequently, Green Parrot nesting habitat. On Norfolk Island generally, loss of native forest through clearance on private land and by natural causes and the subsequent expansion of woody weeds is still a significant problem. Feral predators and nest competitors also degrade habitat particularly outside the national park where there is no program to control rats, cats, or crimson rosellas.

#### *Collisions with windows*

Between 5-10 Green Parrots have been reported dead in the past 12 months, most of which are a result of window collisions (R. Ward pers.comm.) The number may have increased in the past 5 years coinciding with an increased number of sightings of Green Parrots outside the park. Most of the birds are juveniles, however, some adults have been killed. With such a small population this mortality is significant and attempts are and should continue to be made to reduce it.

#### ***Location Information and Data for the Taxon***

The Green Parrot is restricted to Norfolk Island. It does not currently occur on Nepean and Phillip Islands (1 and 6 km south of Norfolk Island respectively), however, both islands were originally forested and it probably did occur at least on Phillip Island (J. Hicks pers.comm.). At the time of settlement Green Parrots were abundant, with convicts deployed to protect planted corn crops from parrots with sticks (P. Stevenson pers.comm.). The population of Green Parrots may have declined by as much as 90% from the 1700's to the present. Based on an estimated territory size of 20 ha and an island area of 3825 ha, the pre-European breeding population of Green Parrots on the island is estimated to have been about 190 adult pairs. By 1908 the parrot was restricted to the gullies around Mt Pitt, now within NINP. In 1937 a collecting expedition from the Smithsonian Institute collected so many birds that Green Parrots

were thought to have disappeared and were not sighted for the ensuing two years (P. Stevenson pers.comm.).

In the 1960s-70s the population was estimated at 10-20 pairs (McKean 1976, Smithers and Disney 1969). In 1977-78, island-wide surveys only located parrots in NINP and adjacent forested areas, and the population was estimated at 3-5 pairs (17-31 birds, Forshaw 1981, Schodde *et al.* 1983). The population is thought to have decreased further in the 1980s (Hermes *et al.* 1986). From 1988 to 1995 the population did not increase significantly, fluctuating between 3 and 10 pairs, due to an acute scarcity of adult females, with an estimated 6 adult females in 1991-92 (P. Stevenson pers.comm.). This was probably largely due to predation of females at the nest (P. Stevenson pers.comm.). In 1995 the total wild population was estimated at 44 individuals including juveniles which increased to c. 69 and seventeen breeding pairs in 1997 (R. Ward unpubl. data). No total population census has been conducted since 1997, mainly due to the unavailability of a durable colour band surfacing. Green Parrots are now being recorded regularly outside the park and the total population is currently thought to number approximately 160 individuals with 14 known breeding pairs (March 2001). Adult pairs are now more commonly seen suggesting that adult female survival has improved as a result of predator control (R. Ward pers.comm.). Most of the habitat of the Green Parrot is in national park but some is on private land. The EPBC (1999) requirements for listing areas of critical habitat require that private landowners of land nominated for listing as critical habitat be consulted prior to listing.

### ***Recovery Objectives and Timelines***

#### Overall Objective

- To shift the status of the Norfolk Island Green Parrot from Endangered to Conservation Dependent within 10 years

#### Specific Objectives

To reduce the risk of extinction and improve the conservation status of the species by:

- Increasing the extent of occurrence of the species and its total population size
- Implementing threat abatement strategies
- To increasing involvement in and awareness of the Green Parrot by the community
- Operating /implement the Recovery Plan through a Recovery Team.

#### Performance Criteria

Relevant Objective: Increase the extent of occurrence of the species and its total population size

Performance Criteria:

- A minimum of 25 breeding pairs within 5 years
- A second wild population established
- Establishment of an *ex situ* captive population investigated

- An additional 20 ha of breeding habitat established in the 5 year life-time of this plan

Relevant Objective: Implement threat abatement strategies

Performance Criteria:

- Sufficient predator-proof nest sites to support the increased number of breeding birds
- Rat and cat predation not posing a threat to Green Parrot population recovery
- Feral nest competitors removed from Green Parrot nests and controlled in Green Parrot nesting areas.

Relevant Objective: To increase involvement in and awareness of the Green Parrot by the community

Performance Criteria:

- Increased community involvement in reporting of sightings and population monitoring
- Community survey undertaken to evaluate community involvement and awareness.

Relevant Objective: To operate/ Implement the Recovery Plan through a Recovery Team

Performance criteria:

- Demonstrated successful operation / implementation of the Recovery Team over five years.
- Annual monitoring of progress against recovery plan objectives and performance criteria.

## ***Actions***

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- ❖ Relevant Objective: Increase the extent of occurrence of the species and its total population size

Performance Criteria:

- A minimum of 25 breeding pairs within 5 years
- A second wild population established
- Establishment of a mainland captive population investigated

**Actions:**

- Conduct annual population count

Total population size and the number of adult males and females is the most important measure of the success of this recovery plan. The recovery team will conduct an annual count within NINP to determine total minimum population

size, number of adult males and females, number of juveniles and the area of occupancy. These counts are currently confined to the NINP because of difficulties in accessing private land outside the park and the large areas to be covered in such a survey. However a significant number of parrots are now using this private land and attempts must be made to count these birds in the total population survey. Investigate conducting a simultaneous volunteer-driven survey of the parrot population outside of the park.

- Monitor breeding population

Locate all nests and protect them from predators. Consolidate all existing nesting data onto a single database.

- Establish and maintain sufficient predator-proof nest sites to support at least 25 breeding pairs.

This will permit the population to expand into currently unoccupied areas of NINP where lack of suitable hollows currently appears to limit nesting there and possibly areas outside of NINP. Lack of predator control outside the park currently means that there are limited opportunities to establish nesting habitat outside the park. Additional nest sites required to implement this plan should be made according to this design developed over a number of years and proven to be quite successful.

- Establish a wild population on Phillip Island

Currently about half of Phillip Island or c. 95 ha of Phillip Island has a young flora of weedy and native forest which has many Green Parrot feed species. Nest sites should be established on Phillip Island and a trial release of Green Parrots made. The recovery team will need to decide the source of these birds. It may be most practicable to use recently fledged wild birds from NI. Monitor this population total population size, age structure of population and causes of nesting failure for first two years. This area of vegetation may only support 4-5 breeding pairs (based on 20 ha/pair). If the Phillip Island population is completely isolated from Norfolk Island, such a small population may have to be supplemented with immigrants from Norfolk Island to prevent inbreeding, probably every generation.

- Investigate possibility of introduction of Green Parrots to Lord Howe Island

The closely-related Lord Howe Island Red-crowned Parakeet *C. n. subflavescens* became extinct in the nineteenth century possibly as a result of hunting and trapping (Hutton 1991). Currently an island restoration plan is being considered for Lord Howe Island. This would be a relatively long-term program which might include the opportunity to introduce Norfolk Island Green Parrots onto the island. The Green Parrot Recovery Team should liaise with the Lord Howe Island board to explore the options for including Norfolk Island Green Parrots in that program.

- Investigate establishment of a captive population on the Australian mainland

This may be warranted because the proximity of Phillip Island to Norfolk Island necessitates that birds on these two islands would be considered a single population and thus an additional population is required to safeguard the taxon against a catastrophic population decline or extinction of the wild population.

A suitable mainland institution would establish and maintain a quarantined captive population.

- Action: Restore 4 ha of nesting habitat each year

Within the NINP habitat will be restored by removal of unsuitable weedy species and replanting of suitable native species, and by providing supplementary nest sites where necessary. Outside the park areas suitable for rehabilitation will be identified and landowners approached for their cooperation and assistance.

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Relevant Objective: Implement threat abatement strategies

Performance Criteria:

- Sufficient predator-proof nest sites to support the increased number of breeding birds.
- Rat and cat predation not posing a threat to Green Parrot population recovery.
- Feral nest competitors removed from Green Parrot nests and controlled in Green Parrot nesting areas.

**Actions**

- Predator proof all potential nest sites.

Nest sites require ongoing maintenance to maintain their predator proof status. Part of actions above.

- Maintain predator and introduced competitor control program

The rat and cat control program will need to continue to be implemented. An island-wide cooperative rodent control program should be implemented when practicable to assist establishment of Green Parrot breeding habitat outside NINP. Continue the existing cat control program. Control populations of Crimson Rosellas, European Starlings and Feral Honeybees in Green Parrot breeding areas. Remove all nest competitors attempting to nest in Green Parrot nest sites.

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Relevant Objective: To increase involvement in and awareness of the Green Parrot by the community

Performance Criteria:

- Increased community involvement in reporting of sightings and population monitoring
- Community survey undertaken to evaluate community involvement and awareness.

**Actions**

- Re-design the Green Parrot brochure.

Include information on bird strike deaths and window design and other measures to reduce the likelihood of bird strike. Hawk silhouette stickers might be provided free of charge to people who have had Green Parrots hit their windows or where likelihood of strikes is high.

- Provide regular updates in the NINP weekly newspaper column.

- Maintain the Green Parrot display aviary.
- Involve community in annual population monitoring

The Green Parrot pamphlet needs updating to conform to the Environment Australia style guide and it needs to be reprinted from time to time.

Community reporting of Green Parrots should be encouraged in extension and media reports. This might take the form of providing training in the detection of birds by call using the aviary population, identification of males and females, and reading of band numbers. As mentioned above, this may be the only practicable way of monitoring the population of Green Parrots outside of NINP.

- Conduct survey of community awareness of and involvement in the Green Parrot recovery program.

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Relevant Objective: To operate/ Implement the Recovery Plan through a Recovery Team

Performance criteria:

- Demonstrated successful operation / implementation of the Recovery Team over five years.
- Annual monitoring of progress against recovery plan objectives and performance criteria.

**Actions:**

- Supervise the project
- Report on progress against objectives and performance criteria

The Recovery Team currently comprises three Norfolk Island Environment Australia staff, a Taronga Park zoo representative, a representative from the Norfolk Island National Park Advisory Council, and two members of the Norfolk Island community. There is no indigenous population and thus no indigenous representative. The recovery team will endeavour to ensure funding is available for the actions in this recovery plan. This may include seeking both private and public funding. The team will work toward satisfying the obligations associated with funding including publicity and reporting requirements. The Recovery Team will be involved in evaluating the performance of the plan.

***Recovery Plan Project Design***

Objective	Performance Criteria	Actions
Increase the extent of occurrence of the species and its total population size	<ul style="list-style-type: none"> <li>• A minimum of 25 breeding pairs within 5 years</li> <li>• A second wild population established</li> <li>• Establishment of an <i>ex situ</i> captive population investigated</li> <li>• An additional 20 ha of breeding habitat established in the 5 year life-time of this plan</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct annual population count</li> <li>• Monitor breeding population</li> <li>• Establish and maintain sufficient nest sites to support at least 25 breeding pairs.</li> <li>• Establish a wild population on Phillip Island</li> <li>• Investigate introduction of Green Parrots to Lord Howe Island</li> <li>• Investigate establishment of a captive population on the Australian mainland</li> <li>• Restore 4 ha of nesting habitat each year</li> </ul>
Implement threat abatement strategies	<ul style="list-style-type: none"> <li>• Sufficient predator-proof nest sites to support the increased number of breeding birds.</li> <li>• Rat and cat predation not posing a significant threat to Green Parrot population viability.</li> <li>• Feral nest competitors removed from Green Parrot nests and controlled in Green Parrot nesting areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Predator proof all potential nest sites</li> <li>• Maintain predator and introduced competitor control program</li> </ul>

<p>To increase involvement in and awareness of the Green Parrot by the community</p>	<ul style="list-style-type: none"> <li>• Increased community involvement in reporting of sightings and population monitoring</li> <li>• Community survey undertaken to evaluate community involvement and awareness.</li> </ul>	<ul style="list-style-type: none"> <li>• Re-design the Green Parrot brochure.</li> <li>• Provide regular updates in the NINP weekly newspaper column</li> <li>• Maintain the Green Parrot display aviary.</li> <li>• Involve community in annual population monitoring</li> <li>• Conduct survey of community awareness of and involvement in the Green Parrot recovery program.</li> </ul>
<p>To operate/ Implement the Recovery Plan through a Recovery Team</p>	<p>Demonstrated successful operation / implementation of the Recovery Team over five years. Annual monitoring of progress against recovery plan objectives and performance criteria.</p>	<ul style="list-style-type: none"> <li>• Supervise the project</li> <li>• Report on progress against objectives and performance criteria</li> </ul>

### ***Guide for Decision-makers***

The following actions may hamper the species viability and recovery. This taxon is dependent on active conservation management.

1. Failure to resource any of the ongoing management activities for Green Parrots
2. Removal of nesting sites or potential nesting sites
3. Removal of feeding habitat
4. Introduction of new avian pathogens
5. Introduction of new invasive weeds
6. Introduction of new predators or nest competitors

### ***Tools to Assist Implementation***

#### Costs

<b>Action</b>	<b>Likely expenses</b>	<b>Cost estimate</b>	<b>Responsibility</b>	<b>Timeframe</b>
Conduct annual population count	NINP staff time and operating	\$4,500 pa	NINP	Ongoing
Monitor breeding population	Regular monitoring during breeding season	\$7,000 pa	NINP	Ongoing
Establish and maintain sufficient nest sites to support at least 25 breeding pairs.	Maintain existing nest sites. Construct and maintain new sites.	\$20,000 pa	NINP	Ongoing
Establish a wild population on Phillip Island	Construct and maintain nest sites on Phillip Island Introduce birds. Monitor success.	\$16,000 first year \$10,000 second year	NINP	2003
Investigate possibility of introduction of Green Parrots to Lord Howe Island	Negotiation with appropriate bodies	None initially	NINP	Dependent on outcome of proposed land rehabilitation program for Lord Howe.
Investigate establishment of a captive population on the Australian mainland	Construction of aviaries on mainland. Removal and transport of birds to mainland. Maintenance of birds in captive facility.	None initially	Recovery Team	Ongoing
Restore 4 ha of nesting habitat	Identification of	\$250,000	NINP	Ongoing

each year	sites, rearing of seedlings, planting, weed control etc.	pa		
Predator proof all potential nest sites	Maintain predator-proofing of all nests	Costed in nest maintenance action	NINP	Ongoing
Maintain predator and introduced competitor control program	Maintain rat and cat control programs	\$65,000 pa	NINP	Ongoing
Re-design the Green Parrot brochure.	Update to conform with Environment Australia style guide	\$4,700		2002
Provide regular updates in the NINP weekly newspaper column.		\$1,000 pa	NINP	Ongoing
Maintain the Green Parrot display aviary.		\$5000	NINP	Ongoing
Involve community in annual population monitoring	Press articles covered		NINP	Ongoing
Supervise the project	Recovery team meetings	\$2500	NINP	Ongoing
Report on progress against objectives and performance criteria	Regular meetings of recovery team	\$2500	NINP	Ongoing

Summary table of costs

	2002	2003	2004	2005	2006
NINP	\$362,200	\$378,200	\$372,200	\$362,200	\$362,200

Landholder incentives

Opportunities exist for the Natural Heritage Trust to be used to protect remnant vegetation on private land. Management agreements between NINP and landholders, where NINP provides funding for fencing, have been put in place to protect and enhance native vegetation. This program is ongoing.

Community Participation

Regular press articles in Norfolk Island newspapers and other suitable media.  
Encourage public to report sightings. Develop a formal volunteer survey of Green Parrot to monitor populations outside of the NINP. See Action: "Involve community in annual population monitoring"

Run field days providing information for revegetation requirements and remnant protection.

***Checklist of Legislative Requirements***

<b><i>Requirement</i></b>	<b><i>Addressed in plan at</i></b>
(a) Objectives to be achieved	9
(b) Criteria for measuring achievement of the objectives	9
(c) Actions needed to meet the objectives	10-14
(d) Threats to the species	5-8
(e) Habitat critical for survival	8
(f) Estimated duration and cost of the recovery process	17
(g) Interests affected by the plan’s implementation and organisations or persons that will be involved in evaluating the plan’s performance	15-16
(h) Major benefits to other native species or communities	2-3
(i) Provide a short description and a 1:100,000 scale map of <ul style="list-style-type: none"> <li>: the location of the species</li> <li>: areas of critical habitat for survival</li> <li>: areas that should be reserved from development action</li> </ul>	Figure 1
(j) Identify actions required to reduce threatening processes	10-14
(k) Provide guidance on environmental impact assessment matters, including a description of any actions that would be likely to have a significant impact on the listed species	16
(l) Describe proposed incentive for encouraging participation and cooperation by private landholders	17
(m) Identify mechanisms for encouraging community participation in the recovery process.	15,17

***Interests that will be affected by the plan’s implementation or adoption***

Commonwealth – Parks Australia;  
 Norfolk Island Government;  
 Private landholders to a limited extent.

***Consultation with, and advice considered from relevant State and Territory Governments and the general public***

This plan is the culmination of several redrafts of a plan first written by Brett Lane & Associates and subsequent extensive development by the staff of Norfolk Island National Park. This version was completed by Birds Australia in consultation with Parks Australia, Australian Government Conservator, and staff of Norfolk Island National Park, NI Conservator of Public Reserves, Environment Australia, NSW National Parks and Wildlife Service and Taronga Zoo.

The recovery plan has been before the Norfolk Island National Park Advisory Committee (NINPAC) on a number of occasions from early drafting. The NINPAC is representative of the Norfolk Island community and Norfolk Island government is represented by the Norfolk Island Conservator of Public Reserves. The recovery actions are in the main focussed on the National Park, so no landholders are affected.

This project produces no significant adverse social or economic impacts that the recovery team is aware of.

### ***Monitoring, reporting and review***

Progress will be monitored and evaluated yearly by members of the recovery team through an annual review. The monitoring process will include:

- Compiling information from flock composition counts, annual count data, maintaining a number of protected nests not less than the minimum required for recovery, and assessing progress against the criteria and objectives of the recovery plan (data comparisons performed by participating biologists).

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