Approved NSW Recovery Plan

Recovery Plan for the Coxen's Fig-Parrot

Cyclopsitta diophthalma coxeni (Gould)

NSW NATIONAL PARKS AND WILDLIFE SERVICE

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NSW National Parks and Wildlife Service

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Recovery Plan for the Coxen's Fig-Parrot *Cyclopsitta diophthalma coxeni* (Gould)

Executive Summary

Introduction

Coxen's Fig-Parrot, *Cyclopsitta diophthalma coxeni* (Gould), is one of Australia's rarest and least known birds. Currently known in NSW from only a small number of recent sightings, Coxen's Fig-Parrot has declined due, at least in part, to the clearing of lowland subtropical rainforest in north-east NSW and south-east Queensland. The plight of Coxen's Fig-Parrot highlights the importance of conserving areas of undisturbed habitat which are large enough to allow the subspecies refuge from threatening processes and which provide connectivity between occupied areas.

This Recovery Plan describes our current understanding of the Coxen's Fig-Parrot, documents the research and publicity actions undertaken to date, and identifies the actions required to ensure the ongoing viability of Coxen's Fig-Parrot in the wild.

Legislative Context

The *Threatened Species Conservation Act* 1995 (TSC Act) is NSW's most comprehensive attempt at establishing a legislative framework to protect and encourage the recovery of threatened species, populations and communities. Under the TSC Act, the Director-General of National Parks and Wildlife has certain responsibilities including the preparation of recovery plans for threatened species, populations and ecological communities. This Recovery Plan has been prepared in accordance with the provisions of the TSC Act.

Preparation of Plan

This Recovery Plan has been prepared with the assistance of a recovery team, a non-statutory group of interested parties with relevant expertise, established to discuss and resolve issues relating to the plan. Components within the plan do not necessarily represent the views nor the official positions of all the individuals or agencies represented on the recovery team. This Recovery Plan is based on the most recent information available.

The plan will be reviewed and updated five years from the date of publication.

Current Species Status

Coxen's Fig-Parrot has been recorded on fewer than 200 occasions since being described by Gould in 1866. In NSW, there have been less than 20 reliable sightings since 1970, with most recent records coming from Cambridge Plateau, Tooloom Range and Mebbin State Forest in the north-east of the state. There have been a similar number of sightings in south-east Queensland since 1995, including seven in the Bundaberg area that have resulted from increased community awareness. Predictions about population size are not possible. Although probably never common, the population has declined due to widespread loss of habitat around the turn of the twentieth century.

Coxen's Fig-Parrot is listed as endangered on:

- Schedule 1 of the New South Wales Threatened Species Conservation Act 1995,
- Schedule 2 of the Queensland Nature Conservation (Wildlife) Regulation 1994, subordinate legislation to the Nature Conservation Act 1992,
- The transitional schedules of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

It meets the criteria (sections C and D) for critically endangered status under the International Union for the Conservation of Nature (IUCN 1994) categories of threat (Garnett and Crowley 2000) and appears on Appendix 1 of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES).

Remaining habitat is fragmented and other unknown threats may apply. Coxen's Fig-Parrot is cryptic and extremely difficult to see in its habitat and may therefore be more common than the number of sightings suggest.

Recovery Objectives

The overall objective of this Recovery Plan is to prevent extinction of Coxen's Fig-Parrot and to ensure the viability of wild populations in the long term.

Specific objectives of this Recovery Plan are to:

- protect and maintain wild populations of Coxen's Fig-Parrot and their habitat from human-induced threatening processes in the long term;
- protect and maintain the full genetic diversity of Coxen's Fig-Parrot;
- understand the ecology of Coxen's Fig-Parrot;
- secure and breed a captive population of Coxen's Fig-Parrot; and
- increase the extent, quality and connectivity of the habitat of Coxen's Fig-Parrot.

Recovery Criteria

- Wild populations have not suffered reduction due to anything other than stochastic events.
- Ecological research and monitoring strategies are established.
- Wild populations are located.
- A population of captive-bred birds is established and increasing.
- Knowledge of the bird's conservation status, current distribution, life history and taxonomic status is significantly increased.
- Historical, existing and potential threats are identified.
- Existing habitat is conserved and key areas of degraded and former habitat are rehabilitated.
- Active community participation in Coxen's Fig-Parrot recovery is established.

Recovery Actions

- Implement a community strategy to significantly raise community awareness of Coxen's Fig-Parrot and its plight so that the community supports, becomes actively involved in and promotes the recovery of Coxen's Fig-Parrot and develops independent skills to locate and reliably identify Coxen's Fig-Parrot and report sightings.
- Locate wild populations and implement an ecological research and monitoring strategy.
- Research, document and implement a captive-breeding program.
- Undertake an assessment of Coxen's Fig-Parrot habitat.
- Undertake a program to protect known habitat, rehabilitate current habitat and revegetate former habitat of Coxen's Fig-Parrot.

Biodiversity Benefits

The decline of the Coxen's Fig-Parrot highlights the importance of habitat conservation, the need to maintain habitat connectivity and the conservation of biodiversity. The conservation and study of Coxen's Fig-Parrot will also benefit a unique and rare rainforest type which forms at least part of its habitat. This rainforest type, in turn, supports other threatened species.

Through awareness of the plight of the Coxen's Fig-Parrot and the opportunity to participate in its recovery, the profile of all threatened species is raised in the general community. This in turn leads to greater opportunities for the conservation of threatened species and increased protection of biodiversity.

Brian Gilligan

Director-General

Bob Debus

Minister for the Environment

Acknowledgments

This recovery plan is the culmination of the dedication and work of many people over an extended period of time. The NSW National Parks and Wildlife Service (NSW NPWS) would like to thank the following people:

Current and past members of the Coxen's Fig-Parrot Recovery Team:

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Table of Contents

1 Current conservation status

Coxen's Fig-Parrot, *Cyclopsitta diophthalma coxeni* (Gould), of the family Psittacidae is currently known only from a relatively small number of records, less than 20 sightings since 1970 in north-east NSW and a similar number of sightings since 1995 in south-east Queensland. Thus, a confident estimation of the number and size of the existing populations is not possible.

Historical records indicate that the subspecies once inhabited lowland rainforest from the Mary River in Queensland to the lower Richmond River and possibly the Macleay River in New South Wales. Predictions by computer models and recent unconfirmed sightings suggest its range may extend further north and south than previously thought. Although probably never common, the population appears to have declined to critical levels due to widespread loss of habitat around the turn of the twentieth century. Surveys conducted in 1985, 1987-1989, and 1996-7 located only a few individuals and little other evidence of the bird's presence. Holmes' surveys from 1993-1995 (Holmes 1995) found no birds at all and recent incidental records have been sporadic and scattered. Remaining habitat is fragmented.

Coxen's Fig-Parrot is listed as endangered under the New South Wales *Threatened Species Conservation Act 1995*, the Queensland *Nature Conservation (Wildlife) Regulation 1994,* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* because it is likely to become extinct unless threatening processes are removed. The subspecies also meets the criteria (sections C and D) for critically endangered status under the International Union for the Conservation of Nature (IUCN 1994) categories of threat (Garnett and Crowley 2000), that is, it may have a population size of less than 50 individuals.

2 Description

2.1 Description

Coxen's Fig-Parrot is an attractive, small, predominantly green parrot whose seemingly over-large head and bill, together with an extremely short tail, give it a somewhat dumpy, squat and top-heavy appearance. It attains a length of 16cm (Pizzey and Knight 1997). Both sexes are rich green above and yellowish-green below with a yellow-sided upperbreast. The wings are green with the outer sections of the primary feathers dark blue and the inner sections dark grey. The tertial feathers are red. The bill is two-toned: pale grey with a dark grey or black tip, and the eye is brown. The male has a distinctive blue forehead surrounded by a few red feathers and an orange-red cheek patch bordered below by a mauve-blue band. The female is similar but with a smaller blue forehead patch with less or no red, and a duller, smaller orange-red cheek patch (Forshaw 1981; Pizzey and Knight 1997). Immatures and juveniles have not been described.

Coxen's Fig-Parrot can be confused with several species of lorikeet, particularly the Little Lorikeet (*Glossopsitta pusilla*) and the Musk Lorikeet (*G. concinna*). However, the body build, size, bill colour, distinctive head, breast and wing markings, and absence of brown nape and mantle are useful distinguishing features. Furthermore, fig-parrots and lorikeets look and behave differently in flight. The fig-parrot's dumpy build, broad, pointed wings and almost tail-less silhouette contrast with the overall slimness, small-headed appearance and longer, finer wings of both the Little and Musk Lorikeet (Norris 1964; Corfe 1977). The flight of the Coxen's Fig-Parrot is rapid and direct (Norris 1964; Corfe 1977; Peddie in Lendon 1979). Like the related Red-browed Fig-Parrot (*C.d.macleayana*), it presumably does not adopt the lorikeet style of "darting and dodging through gaps in the branches and foliage of the tree-tops" (Bourke and Austin 1947; Forshaw 1981).

The flight call of the Coxen's Fig-Parrot is a short, clipped, two note call, variously described as a high-pitched 'zeet-zeet' (Slater *et al*. 1986; Pizzey and Knight 1997), 'tcheek, tcheek' (Norris 1964), 'yyit-yyit' (Corfe 1977), a medium-pitched 'zzzt-zzzt' (Martindale 1986), or a rather soft lorikeet-like screech (CSIRO 1996). This call is reputedly indistinguishable from that of other Australian subspecies of fig-parrot (Parker in Holmes 1990), but is harsher and more staccato than the screech of a Little Lorikeet (Martindale 1986). Coxen's Fig-Parrot does not always call while in flight (Brenan 1924; Peddie in Lendon 1979).

2.2 Taxonomy

Coxen's Fig-Parrot is the largest subspecies of Australia's smallest parrot, the Double-eyed Fig-Parrot. The name 'Double-eyed Fig-Parrot' refers to the colourful cheek-patches. Coxen's Fig-Parrot was the first of the three geographically discrete Australian subspecies to be described. It was described by Gould (1867) from skins collected in 1866 by a sawyer at Mount Samson near Brisbane. The other two subspecies are the Red-browed Fig-Parrot (*C. d. macleayana* Ramsay 1874), from around Cairns and the Atherton Tableland south to Paluma in north-east Queensland, and Marshall's Fig-Parrot (*C. d. marshalli* Iredale 1947) from eastern Cape York Peninsula (Forshaw 1981). In addition, five subspecies of Double-eyed Fig-Parrot, including the nominate form, are distributed through New Guinea and the Aru Islands of Indonesia (Forshaw 1989).

All eight subspecies of Double-eyed Fig-Parrot possess bright head markings that exhibit some sexual dimorphism. However, in Coxen's Fig-Parrot this dimorphism is not pronounced (Forshaw 1967). Suggestions that Coxen's Fig-Parrot is a separate species, based upon its large size and almost entirely blue forehead in both sexes (e.g. Rothschild & Hartert 1901, Mathews 1946) were rejected by Forshaw (1967). However, Keast (1961) recognised that it is approaching the degree of morphological differentiation that is typical of a species. Recent unpublished reports of the larger size of Coxen's Fig-Parrot eggs and the unique shell morphology, as compared to eggs of Red-browed Fig-Parrot and Marshall's Fig-Parrot (J. Young pers. comm.), suggest a reconsideration of the taxonomy of *C.d. coxeni* is required. Comparisons of specimens of the three Australian races described in Birds Australia's *Handbook of Australian New Zealand and Antarctic Birds* series, suggest wing formulae and ratios of primary feather lengths may also constitute sufficiently robust characters by which to separate Coxen's Fig-Parrot at the specific level (D. Stewart pers. comm.). It is expected that detailed genetic analysis will resolve the specific status of Coxen's Fig-Parrot.

3 Distribution

3.1 Current and historical distribution

Coxen's Fig-Parrot is currently only known in the wild from less than 20 reliable sightings in NSW since 1970 (see Figure 1) and from several clusters of contemporary sightings in south-east Queensland. For reviews see Martindale 1986; Holmes 1990, 1995; Horton 1996; and Gynther 1996a,b; 1997a, 1998).

The historical distribution of Coxen's Fig-Parrot is blurred. The accepted core range is from Gympie in south-east Queensland to the Richmond River in north-east New South Wales and as far west as the Bunya Mountains and the Koreelah Range (Holmes 1990; Garnett and Crowley 2000). This range may have extended to Maryborough in the north and the Macleay River in the south (Forshaw 1981, 1989; Blakers *et al.* 1984), although these limits are based on records (De Warren 1928; Kinghorn 1936) which are not universally accepted.

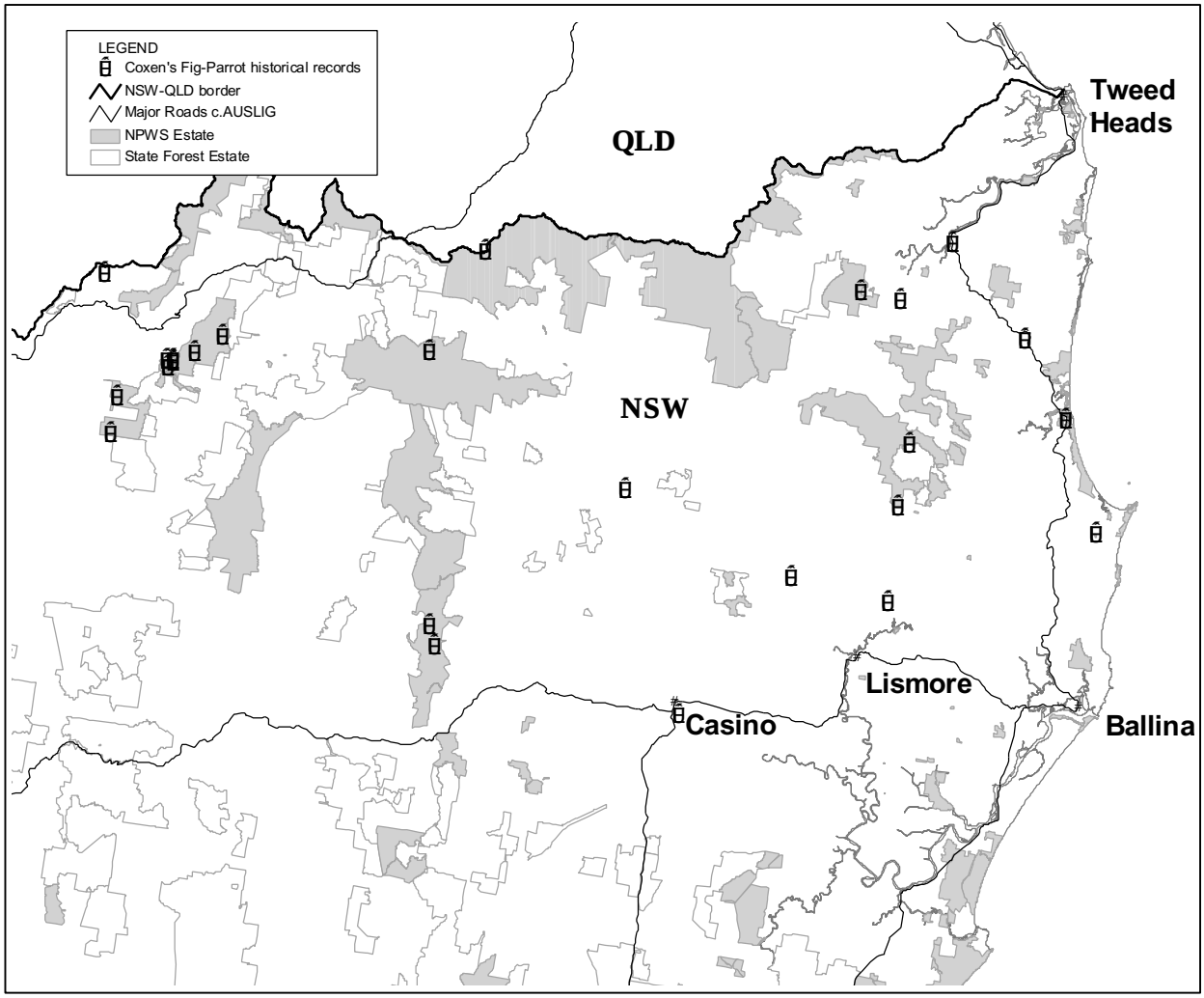
Coxen's Fig-Parrot has been reported (Holmes 1990, 1994a, 1995; Horton 1996; Gynther 1998; I. Gynther pers. comm.) from the following localities:

1. Greater Bundaberg area (1960-2001).
2. Mary River/Blackall Range/Qld (about 1890 to about 2001).
3. Bunya Mountains, Qld (1966).
4. Brisbane, Qld (1866 to before 1900).
5. Main Range, Qld (about 1960 to 1987; 1993-1994, 1997).
6. Lamington Plateau, mainly the Sarabah Range, Qld (1976 to 1998).
7. Levers Plateau (1993-1994).
8. Koreelah Range, NSW (1962 to 1992).
9. Upper Richmond River, NSW (about 1900 to 1987; 1993-1994).

10. Lower Richmond River/Tweed River, NSW (about 1870 to 1991).
11. Mebbin State Forest (1995).
12. Whian Whian State Forest (1995).
13. Big Scrub remnants (1979-1996).
14 Hastings River catchment (1996-1998).

In addition, Holmes (1995) listed a dozen records of Coxen's Fig-Parrot between Bundaberg and Lismore that he considered less credible.

Figure 1. Selected records of Coxen's Fig-Parrot in New South Wales.



A BIOCLIM analysis of documented locations of Coxen's Fig-Parrot yielded a potential distribution from the Boyne River near Gladstone (24°00'S) south to the Williams River (32°20'S) near Barrington Tops (Holmes 1990). This lends support to recent (or recently acquired) credible but largely unsubstantiated records from as far north as the Rockhampton district, Granite Creek State Forest and Deepwater National Park in Queensland and as far south as the Hastings River catchment in New South Wales (Holmes 1995; Gynther et. al. 1998; I. Gynther pers. comm). It also suggests that previously discounted records from the Mann and Macleay Rivers of New South Wales (Holmes 1990) warrant further investigation.

Coxen's Fig-Parrot was previously thought to have suffered a relatively recent range reduction (Martindale 1986), however recent records indicate it may still be thinly but widely distributed throughout its previous range. Recent Queensland records include: Moore Park (February 1997 - March 1998), Kin Kin (September-November, 2000), Gin Gin (January, 2001), Deepwater National Park (May 1997), Childers (September 1997), Main Range National Park (September 1997), East Bundaberg (November/December 1997), the Maleny area (December 1997, January 1998 and October 1999), Lamington National Park (January 1998) and Burnett Heads (February 1998).

In NSW, recent records exist from Mebbin State Forest and Whian Whian State Forest (both January-February 1995 - CSIRO 1996), Eltham (April 1995), Richmond Range National Park (November 1995) and the Hastings River area (1996-1998 - Horton 1996; D. Charley pers. comm.; J. Young pers. comm.)

Nest site surveys (Gynther 1996a; Gynther and O'Reilly 1998; Gynther *et al*. 1998) have detected evidence of current or past Coxen's Fig-Parrot breeding activity in the form of completed or partially excavated nest holes at eight localities. In Queensland, nesting signs were discovered in Kenilworth State Forest, Lamington National Park and Main Range National Park (all August 1996) and in Conondale National Park (October 1998). In New South Wales, breeding evidence was found in Mebbin State Forest, Tooloom National Park and the Tyalgum area in August 1996 and in Toonumbar National Park in September 1997. Signs of recent (post-1995) nesting activity were present at four sites. In Lamington National Park, nest excavations were probably made less than a week prior to their discovery in 1996, although the site was not subsequently used. In the 1997/1998 breeding season, a pair of birds was sighted at a Queensland site previously identified as a probable breeding locality and evidence of past breeding activity was also discovered at a new locality in NSW (Gynther 1997a). As yet, no active nest has been found.

The expected range of the species in NSW where it is most likely to be found includes the following Local Government areas: Ballina Shire Council, Byron Shire Council, Kyogle Shire Council, Lismore City Council, Richmond Valley Shire Council, Tenterfield Shire Council, Tweed Shire Council**.**

3.2 Tenure

Most NSW Coxen's Fig-Parrot records and large habitat areas are on public lands (national parks and state forests). However, in Queensland, many sightings north of the Mary River are on freehold land.

Coxen's Fig-Parrot has been recorded from the following reserves:

Queensland

National Parks:
Bunya Mountains National Park
Burrum Coast National Park
Conondale National Park
Deepwater National Park
Great Sandy National Park
Lamington National Park
Main Range National Park
Mapleton Falls National Park
Mount Pinbarren National Park

New South Wales

National Parks:
Border Ranges National Park
Nightcap National Park
Richmond Range National Park
Tooloom National Park
Toonumbar National Park

***NSW Conservation Reserves**:*
Boatharbour Nature Reserve
Booyong Recreation and Flora and Fauna Reserve

However, as the bird is an itinerant species, records from within a conservation reserve do not necessarily represent a conserved population.

3.3 Critical habitat

No habitat of Coxen's Fig-Parrot has been declared as Critical Habitat in NSW under the TSC Act.

4 Ecology

4.1 Life history

The life history and ecology of the Coxen's Fig-Parrot are largely unknown. Information is pieced together from incidental sightings and/or, where appropriate and possible, extrapolated from knowledge of the other subspecies. Holmes (1990, 1994a, 1995) summarises knowledge currently available.

Coxen's Fig-Parrot is a cryptic species. Most observations are of single birds or pairs feeding in fruiting trees or flying above the forest canopy. However it is easy to overlook small, green birds living high among the foliage of canopy trees (Forshaw 1981). Even when the birds are known to be present in a tree, they can be impossible to detect (Norris 1964). To compound this problem Coxen's Fig-Parrots feed quietly, moving swiftly and silently along the branches (Brenan 1924; Chisholm 1924; Irby 1930). Often they are only detected by the continual stream of fruit debris, the unwanted pulp of figs, falling to the ground (Chisholm 1924). The soft chattering of feeding Red-browed Fig-Parrots (Bourke and Austin 1947) has not been described for Coxen's Fig-Parrots.

Individual fruiting trees may form important habitat components especially during the breeding season. On the Sarabah Range, a Rusty Fig (*Ficus rubiginosa/platypoda*) was visited for at least a week in September 1982, and a Deciduous Fig (*F. superba*) for three successive days in January of both 1982 and 1983. A Moreton Bay Fig (*F. macrophylla*), in the Conondale Ranges was visited in October and November of successive years (Holmes 1990). Recent anecdotal evidence from the Bundaberg area in Queensland may indicate regular usage of individual trees until the fruit reserves are exhausted (Gynther 1998).

Coxen's Fig-Parrots are probably seasonal, altitudinal migrants (Homes 1990). However, these movements may be an artefact of habitat decline and may vary with local availability of food. Where food resources are capable of supporting a part or whole population throughout the year, altitudinal migrations may be reduced or absent (I. Gynther pers. comm.).

In some highland areas, from August to February birds may move to progressively higher altitudes following the wave of ripening fruit through the rainforests (Holmes 1995). All sightings in the Sarabah Range were during this period (Holmes 1990). As summer wanes, the wave of ripening fig and other fruit retreats to the lowlands from March to about October and the fig-parrots may follow. Lowland figs, which produce some fruit all year, have a winter fruiting peak (Storey 1994; L. Jessup pers. comm.; S. Horton pers. obs.).

At this time, fig-parrots may travel in search of food in small flocks (Holmes 1990). The largest "winter" flock sighted in the past 25 years contained seven birds (Holmes 1990). During summer, the birds may occur more regularly in pairs.

The home range size of fig-parrots during either breeding or non-breeding seasons is unknown. Red-browed and Marshall's Fig-Parrots habitually form communal overnight roosts of up to 200 birds in particular trees (Bourke and Austin 1947; Forshaw 1969, 1981; Holmes 1995). Communal roosting is not known for Coxen's Fig-Parrot but Holmes (1995) speculates that it may once have occurred. Furthermore, he suggests that if the population is now so low that communal roosting is precluded, the loss of social interaction and consequent ability to locate food sources may be a contributing factor to the species' apparent ongoing decline.

4.2 Nest and eggs

Coxen's Fig-Parrots, like their related subspecies, are thought to nest in high trees usually within or near the edge of rainforest, although there are a few unconfirmed records from eucalypts some distance away. Like those of their northern counterparts, the nest chamber is excavated on the underside of a dead or decaying limb or trunk in a living or dead tree (Holmes 1995; Pizzey and Knight 1997; J. Young pers. comm.). Nest construction is thought to begin in August (Gynther 1996a; J. Young pers. comm.) and breeding occurs from October to December or January (Holmes 1990, 1995). The normal clutch size is probably two (Holmes 1995; Pizzey and Knight 1997). Incubation and fledging details are unknown for Coxen's Fig-Parrot but, in captivity, Red-browed Fig-Parrots incubate clutches for approximately 20-24 days and their young fledge after about 36-42 days (Romer and Spittall 1994).

4.3 Predators

Although no published information is available, predators of Coxen's Fig-Parrot are expected to include the Brown Goshawk (*Accipiter fasciatus),* Grey Goshawk (*A. novaehollandiae*)*,* Collared Sparrowhawk (*A. cirrocephalus*), Sooty Owl (*Tyto tenebricosa*) and Southern Boobook (*Ninox novaeseelandiae*) (J. Young pers. comm.). Arboreal snakes and Goannas may prey upon nestlings and/or eggs of the Coxen's Fig-Parrot (P. Kubiak pers. comm.).

5 Disturbance

No information is available on the response by Coxen's Fig-Parrot to specific disturbance regimes.

6 Habitat

6.1 Vegetation

Coxen's Fig-Parrots probably prefer lowland subtropical rainforests such as the Big Scrub remnants around Lismore, the foothills west of Brisbane and lowland rainforests north to the Mary River (Holmes 1994b). Within these forests, alluvial areas where figs and other fleshy-fruited trees are prevalent are most likely favoured (Martindale 1986; Holmes 1990). Gallery rainforest was probably also important (Holmes 1990). As much of the lowland subtropical rainforest type has been cleared since European settlement, the remnants are fragmented, more hilly and consequently drier (Martindale 1986). They support fewer fleshy-fruited trees (Floyd 1977) and, as a result, may support lower densities of fig-parrots than the original lowland forests (J. Martindale pers. comm.).

Recent records of Coxen's Fig-Parrots are from subtropical rainforest, sub-littoral mixed scrub, developing littoral rainforest, riparian rainforest corridors in eucalypt woodland and cleared land, and urbanised and agricultural areas with fig trees. These sightings span a range of altitudes from sea level to about 900m asl. Areas with a high fig diversity, where fruiting is staggered along moisture and altitudinal gradients may be favoured (R. Kooyman pers. comm.). Most records are from small remnant stands, forest edges (Holmes 1994a) or thin strips of gallery forest (Norris 1964). The apparent distribution of these recent records and conclusions on habitat preference must be viewed with caution since the cryptic nature of the species makes it easy to overlook and therefore potentially subject to observer bias.

Probable nests are reported within subtropical rainforest and also from sclerophyll/subtropical rainforest ecotones. These ecotones may form an important part of the bird's habitat (J. Young pers. comm.; D. Charley pers. comm.). Coxen's Fig-Parrot has also been reported visiting fruiting trees in gardens and cultivated farmlands (Forshaw 1969; Morris and McGill 1980; Fisher in Holmes 1990; Gynther 1998).

6.2 Food

Fig-parrots are omnivorous. They feed mainly on seeds of near ripe or ripe fruits of native figs, and/or insect larvae that may include the fig wasp (Forshaw 1981; Romer and Spittall 1994; Pizzey and Knight 1997).

Favoured species are the Moreton Bay Fig (*Ficus macrophylla*) and Green-leaved Strangler Fig (*F. watkinsiana*), but other species also eaten include Rusty Fig (*F. rubiginosa/platypoda*), White Fig (*F. virens*), Small-leaved Fig (*F. obliqua),* Cluster Fig (*F. racemosa),* Sandpaper Figs (*F. coronata, F. opposita* and *F. fraseri*) and Deciduous Fig (*F. superba*) (Holmes 1990; Gynther 1998; I. Gynther pers. comm.).

Native fruits also probably eaten are Sour Cherry (*Syzygium corynanthum*), Blue Fig (*Elaeocarpus grandis*) and Bolly Gum (*Litsea reticulata*) (Benfer in Chisholm 1924; Irby 1930; Holmes 1990). Other likely food sources include Lilly-pillies (*Syzygium* spp., *Acmena* spp.) and Red Ash (*Alphitonia excelsa*) (Holmes 1990). Silky Oak (*Grevillea robusta*) nectar may also be eaten (Irby 1930). Lichens may be eaten to supply a probable source of zinc (Romer and Spittall 1994).

Coxen's Fig-Parrot may also feed on exotic plants. These include Edible Fig (*F. carica*), Cotoneaster (*Cotoneaster lacteus*) and Queen Palm (*Arecastrum romanzoffianum*) in gardens (Holmes 1990; I. Gynther pers. comm), and Loquat (*Eriobotrya japonica*) on farmland (Forshaw 1969). The birds may have resorted to these introduced species because their native food was in short supply (Holmes 1990).

7 Relevant legislation

7.1 State, Commonwealth and international listing

Due to its extremely low abundance, Coxen's Fig-Parrot is considered endangered in both NSW and Queensland and is listed on:

- Schedule 1 of the NSW Threatened Species Conservation Act 1995 (TSC Act)
- Schedule 2 of the Queensland Nature Conservation (Wildlife) Regulation 1994, subordinate legislation to the Nature Conservation Act 1992.

Coxen's Fig-Parrot is nationally listed as endangered on the transitional schedules of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The schedules in the EPBC Act are based on the lists compiled by the Australian and New Zealand Environment Conservation Council (1995). As it is nationally listed as endangered, Coxen's Fig-Parrot is eligible for funding under the federal Natural Heritage Trust and is protected under Commonwealth legislation.

Coxen's Fig-Parrot is also listed on Appendix 2 of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES). This Convention establishes an international regulatory framework to restrict the illegal trade of endangered species.

It meets the criteria (sections C and D) for critically endangered status under the IUCN (1994) categories of threat (Garnett and Crowley 2000).

7.2 Recovery plan preparation and implementation

Recovery plan preparation

The TSC Act requires that the Director-General of National Parks and Wildlife prepare recovery plans for all species, populations and ecological communities listed as endangered or vulnerable on the TSC Act schedules. The TSC Act includes specific requirements for both the matters to be addressed by recovery plans and the process for preparing recovery plans. This plan satisfies these provisions. The plan also satisfies the requirements for the NSW component of a federal plan being prepared under the EPBC Act (Environment Australia in prep).

Recovery plan implementation

The TSC Act requires that a state/local government agency must not undertake actions inconsistent with a recovery plan.

The most relevant government agencies in NSW are as follows:

Department of Land and Water Conservation
Department of Urban Affairs and Planning
National Parks and Wildlife Service
State Forests of NSW

The most relevant local government agencies are:

Ballina Shire Council
Byron Shire Council
Kyogle Shire Council
Lismore City Council
Richmond Valley Shire Council
Tenterfield Shire Council
Tweed Shire Council

These authorities must, as the relevant land managers, manage Coxen's Fig-Parrots on any lands under their jurisdiction, in accordance with this plan. This is part of the core responsibilities of these authorities and is not expected to require any additional funding.

7.3 Critical habitat

The TSC Act makes provision for the identification and declaration of critical habitat for species, populations and ecological communities listed as endangered. After declaration, damage to critical habitat (unless the action is specifically exempted or approved by TSC Act) is an offence. A species impact statement is mandatory for all developments and activities proposed within critical habitat.

To date, no critical habitat has been declared for Coxen's Fig-Parrot under the TSC Act. Given the poor state of knowledge of the distribution of the fig-parrot, declaration of critical habitat is neither possible nor desirable at this time. In future, the declaration of critical habitat will only be considered where a demonstrable conservation outcome cannot be achieved through community cooperation and negotiation. In such cases, the Minister may consider any recommendations that may lessen or avoid adverse social consequences.

7.4 Environmental assessment

The TSC Act amendments to the environmental assessment provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act) require that consent and determining authorities in NSW consider threatened species and their habitats when exercising a decision-making function under Parts 4 & 5 of the EP&A Act. When considering any activity that may affect the Coxen's Fig-Parrot, these authorities should consider the conservation strategy outlined in this plan.

Where an activity or development that may impact upon Coxen's Fig-Parrot or its habitat is not subject to approval under the EP&A Act, an approval may nevertheless be required under the *Native Vegetation Conservation Act 1997* or the TSC Act. These approvals must also take the strategy in this plan into consideration.

Exceptions are where the proposed activity or development is classed as exempt or is undertaken in accordance with previously approved Regional Vegetation Management Plans or Property Management Plans.

The NSW NPWS is represented on the Regional Vegetation Management Committees that are responsible for the preparation of these plans and will seek appropriate identification and protection of relevant Coxen's Fig-Parrot habitat under them.

8 Management issues

8.1 Threats and reasons for decline

The decline of Coxen's Fig-Parrot was probably due to the clearing of lowland subtropical rainforest for agriculture and housing from the 1860s to around the start of the twentieth century and then to the logging of rainforest timbers until 1984 (Illidge 1924; Cayley 1938; Martindale 1986). However, Irby (1930), who encountered the species several times in the Richmond and Tweed River valleys, disagreed. She wrote that while "they were never numerous", she considered they were not any rarer then than 20 years earlier "when our vanishing scrubs still covered many a thousand acres now given over to crops and grass". Nonetheless, Coxen's Fig-Parrot, like many other species, probably suffered a corresponding reduction in population numbers and range. Although a significant proportion of the hilly, higher altitude lowland subtropical rainforest is protected within formal conservation reserves, the near coastal, gently sloping, lowland subtropical rainforest such as the Big Scrub, has suffered substantial fragmentation and is poorly reserved (Martindale 1986).

This subspecies may have been in a natural decline towards extinction, like the Paradise Parrot (*Psephotus pulcherrimus*), well before the advent of Europeans. The suspected ongoing decline of the species, ascertained from the paucity of sighting records despite targeted surveys by Martindale (1986, 1996), Holmes (1990, 1995), Gynther (1996a,b; 1997a,b), Gynther and O'Reilly (1997) and more general community surveys in NSW and Queensland (Martindale in prep., Gynther in prep.) may be caused by :

- inadequate extent and quality of habitat;
- loss of connectivity between summer and winter areas;
- fragmented habitat requiring birds to cross open areas;
- disturbance to some suspected ecotonal breeding areas;
- disjunct feeding grounds leading to difficulties in finding food;
- low numbers, preventing a social breeding trigger being activated;
- seasonal food shortages resulting in abnormal competition for remaining resources;
- low numbers limiting an energy efficient communal food search effort;
- increased competition;
- potential change to social structures following population decline;
- disease; and
- stochastic events, such as drought, which may have severe impacts upon low populations.

Currently, the bird may be threatened by weed degradation of feeding and nesting habitat, particularly in the lowland riparian subtropical rainforest remnants where figs and other fleshy-fruited rainforest trees are most concentrated (Joseph 1988; Garnett and Crowley 2000; P. Young pers. comm.; L. Jessup pers. comm.; R.J. Hunter pers. comm.; A. Floyd pers. comm.; S. Horton pers. obs.). Significant invasion by Catsclaw (*Macfadyena unguis-cati*) of gallery rainforest near Bundaberg has been noted by I. Gynther (pers. obs.) in the vicinity of recent fig-parrot sightings. Some of the weeds threatening lowland subtropical rainforests include:

- Camphor Laurel (Cinnamomum camphora)
- Madeira Vine (Anredera cordifolia)
- Balloon Vine (Cardiospermum grandiflorum)
- Cat's Claw Vine (Macfadyena unguis-cati)
- Large-leaved Privet (Ligustrum lucidum)
- Small-leaved Privet (L. sinense)
- Wandering Dew (Tradescantia alba)
- Coral Berry (Rivina humilis)
- Asparagus Fern (Protasparagus spp.)

- Micky Mouse Plant (Ochna serrulata)
- Dutchman's Pipe (Aristolochia elegans)

Other species that are rapidly colonising although may not yet be recognised as a threat by the general community include:

- Cocos Palm (Syagrus romanzoffiana)
- Broad-leaved Pepper Tree (Schinus terebinthifolia)
- Umbrella Tree (Schefflera actinophylla)
- Coffee (Coffee arabica)
- Cherry Guava (Psidium cattleianum)

In NSW, the threat caused by fragmented habitat may be slowly mitigating as a result of government and privately sponsored community rainforest reforestation programs. Many earlier planted rainforest areas and gardens are now maturing and producing fruit (R.J. Hunter pers. comm., S. Horton pers. obs.), however, the majority of potential habitat for the fig-parrot still remains degraded. J.B. Williams (pers. comm.) believes that lowland subtropical rainforests in NSW are both increasing in area and species diversity, while in southern coastal Queensland, loss of lowland subtropical rainforest has probably stabilised, and rehabilitation programs are beginning (P. Young pers. comm.).

Logging and associated disturbance of subtropical rainforest/eucalypt ecotones that may be part of the breeding habitat, may also be a threat for some birds. Forshaw (1981) emphasises the special need to protect the rainforest edge where burning, clearing or logging operations not specifically targeted at the rainforest can be particularly damaging.

Mature figs that remain as isolated paddock or shade trees on agricultural or other land on the north coast of NSW and in south-east Queensland probably form an important winter food source (J. Young pers. comm.). A potential threat is lack of recruitment to these isolated groups of figs.

The rarity of Coxen's Fig-Parrot in the wild and its apparent absence in captivity probably make it highly desirable to illegal egg collectors and aviculturalists. Thus, illegal robbing of nests for eggs, young and adults is a substantial additional threat (Holmes 1990).

Whilst many reasons for the apparent decline in Coxen's Fig-Parrot numbers may never be known or accurately quantified, studies of related subspecies may provide some clues. The cryptic nature of the bird also means that any conclusions on previous habitat or altitudinal requirements of the species must be viewed with caution because of the potential for observer bias. It is quite possible that the quantity of habitat remaining may be more critical to the species than merely its altitudinal distribution (D. Charley pers. comm.).

8.2 Social and economic consequences

The NPWS is responsible for implementing the actions in the Recovery Plan. Estimated costs for the Recovery Plan are $571500 (including captive breeding program) or $251000 (without captive breeding program) over a five year period. Associated costs of this Recovery Plan are included in the appendices.

Intrinsic ecological value

The plight of the Coxen's Fig-Parrot highlights the importance of conserving areas of undisturbed habitat which are large and diverse enough to provide opportunities for refuge for species from threatening processes and to allow evolutionary process to occur in a geological time scale.

Scientific and taxonomic value

Coxen's Fig-Parrot is scientifically valuable as a part of the ecology of rainforest as well as a taxonomic unit in its own right. Like other rainforest bird species, Coxen's Fig-Parrot probably contributes to the dispersal and germination of seeds from fleshy-fruited plants, especially fig trees. However, detailed understanding of its role in rainforest ecology is poorly understood. Further knowledge could give insight into a complex ecosystem.

Biodiversity value

The total Coxen's Fig-Parrot population seems low, and has probably declined to seriously low levels. Therefore each individual plays a key role genetically in the future evolution of the species. The habitat associated with Coxen's Fig-Parrot is a unique and very important part of the biodiversity of NSW and Australia. Coxen's Fig-Parrot shares this habitat with a significant number of other threatened species.

Social benefits

Recovery costs will be met by the NPWS during the recovery program. Members of the public may also contribute to meeting this cost by purchasing Coxen's Fig-Parrot habitat trees and other Coxen's Fig-Parrot related products. A successful recovery program will increase the potential for this and future generations of people to observe and enjoy Coxen's Fig-Parrot.

Commercial value

Coxen's Fig-Parrot has a considerable commercial value through the sale of photographs, posters, film footage and the possible promotion of legal avicultural activities. There is potential to raise awareness of these commercial avenues and take advantage of them in approved recovery strategies. Revenue raised from the implementation of these strategies would be used to fund the recovery of Coxen's Fig-Parrot. There is also undoubtedly a considerable black market for this taxon, particularly overseas.

8.3 Biodiversity benefits

The plight of the Coxen's Fig-Parrot reinforces the need for habitat conservation and the maintenance of habitat connectivity. Given that the factor or factors that are limiting the natural recovery of Coxen's Fig-Parrot are unknown, it is important to conserve areas of diverse vegetation.

The conservation and study of Coxen's Fig-Parrot will also benefit a unique and rare rainforest type which forms at least part of its habitat. This rainforest type, in turn, supports many other threatened species.

9 Previous actions undertaken

9.1 Recovery history

Assessment and research

- 1985/86. RAOU, ANCA and Currumbin Wildlife Sanctuary review of records and field survey of NSW/Qld border area (Martindale 1986).
- 1987-present. Implementation of trial captive breeding program by Currumbin Wildlife Sanctuary using Red-browed Fig-Parrots as analogues. Research ongoing. Over seven years to 1999, 37 progeny raised (S. Goldie pers. comm.).
- 1987-1989. Survey in Qld and NSW and preparation of a summary of known biology and ecology (Holmes 1990) (Sponsored by NSW NPWS & Currumbin Wildlife Sanctuary).
- 1992. Subspecies Recovery Outline produced as part of *The Action Plan for Australian Birds* (Garnett 1992).
- 1993. The then Qld Dept of Environment and Heritage's preparation of the first Recovery Plan under ANCA's Endangered Species Program (Davidson 1993).
- 1993. Formation of the Coxen's Fig-Parrot Recovery Team and implementation of Recovery Plan. The team includes staff from NSW NPWS, SF NSW, O'Reilly's Rainforest Guesthouse (Qld), the then Dept of Environment and Heritage (Qld), Currumbin Wildlife Sanctuary (Qld), Queensland Museum and Environment Australia.
- 1993-1995. Additional cross-border field survey of potential fig-parrot habitat under a research grant agreement administered by the then Qld Dept of Environment and Heritage. No records of Coxen's Fig-Parrot were obtained during the survey period, however, information on a number of plausible past and

concurrent reports was gathered (Holmes 1994a, 1995). The primary approach adopted during these and earlier surveys was to scan fruiting fig trees in the hope of locating fig-parrots feeding among the branches or flying to and from the tree.

- 1994. Completion of a ten month study of the seasonal patterns of fruiting by figs in lowland and upland rainforest in an area of south-east Qld by a Griffith University postgraduate student (Storey 1994).
- 1996. Habitat mapping of canopy height fig trees around the seven most recent, plausible records in NSW (Horton 1996).
- 1996. Examination of Grey Goshawk prey remains in areas of potential Coxen's Fig-Parrot habitat. No Coxen's Fig-Parrot remains were identified (D. Charley pers. comm.).
- 1996. Design of a 'Coxen's Fig-Parrot Sighting Report Form' (Appendix 3).
- 1996. Identification of potential lowland habitats of Coxen's Fig-Parrot by a Southern Cross University student. This project aimed to map the distribution of large fig trees in the Lismore area by interpretation of aerial photos and ground-truthing (Jago 1997).
- August 1996. Two week confidential nest site search and training exercise undertaken (Gynther 1996a). Evidence of current and past nesting activity was located at seven sites (four in Qld, three in NSW), although no birds were observed.
- Sept.-Nov. 1996. Follow up nest searches conducted (Gynther 1996b). Additional evidence of past nesting activity in the form of old nest holes was discovered at one Qld locality (Lamington National Park).
- 1996/1997. Caged Red-browed Fig-Parrots used as potential decoys at a fixed site at O'Reilly's Rainforest Guesthouse during summer. The birds were housed on the rainforest floor beneath fruiting fig trees but no Coxen's Fig-Parrots were located (P. O'Reilly pers. comm.).
- 1996, 1997. Caged Red-browed Fig-Parrots hoisted into canopy of fruiting figs as potential Coxen's Fig-Parrot decoys at one site in NSW (Cambridge Plateau). Monitoring of the caged birds yielded no sightings (Martindale 1996).
- 1997. Draft guidelines formulated for establishment and operation of a Coxen's Fig-Parrot Records Appraisal Committee to appraise incidental sightings.
- June-Aug. 1997. Surveys for past nest sites conducted in Qld during the non-breeding season. High quality habitat identified in the greater Bundaberg area (Gynther *et al*. 1998).
- Aug.-Sept. 1997. Two week confidential nest site search and nest search training exercise. Two birds flew overhead at a site in Main Range National Park and a new nesting locality was discovered in NSW (Toonumbar National Park). Birds were not located at an active nest (Gynther *et al*. 1998).
- Sept.-Dec. 1997. Follow up survey work in Qld and NSW. No birds or additional evidence of nesting activity were discovered (Gynther *et al*. 1998).
- November 1997. Community survey of fruiting fig trees in Cambridge Plateau and Mebbin State Forest conducted. Birds were not sighted (Gynther *et al*. 1998).
- 1997-1998. Detailed mapping by Terrafocus under contract to Byron Shire Council of fig- trees on farmlands in the Byron Shire, NSW to determine strategic habitat corridor locations for a tree planting project.
- Jan.-Feb. 1998. Caged decoy birds reinstalled at a fixed site on the Sarabah Range, Qld by Currumbin Wildlife Sanctuary and O'Reilly's Rainforest Guesthouse. No Coxen's Fig-Parrots were observed (P. O'Reilly pers. comm.).
- March 1998. Community survey of fruiting fig trees conducted in the Bundaberg area, Qld. Coxen's Fig-Parrot was not actually located during the survey but 14 previously undocumented and credible anecdotal sightings were obtained as a result of the associated media attention. An aerial survey of adjacent habitat was also conducted (Gynther *et al*. 1998).
- Sept.-Dec. 1998. Surveys conducted across 14 localities in south-east Qld. Birds were not sighted however a past nest hole (approx. 2 years old) was discovered in Conondale National Park, a previously undocumented breeding locality (Gynther and O'Reilly 1998).

- Oct. 1999-June 2000. Detailed mapping of fig trees on farmlands in Lismore and Kyogle LGAs undertaken. Proposed to be extended in 2000-2001 to include Ballina, Richmond Valley and Tenterfield LGAs.
- 2000. Revised subspecies Recovery Outline produced as part of *The Action Plan for Australian Birds 2000* (Garnett and Crowley 2000).
- June 2001. Southern Cross University provided with funds by NSW NPWS to commence a genetic investigation of the subspecies of Double-eyed Fig-Parrot.
- September 2001. Draft national recovery plan completed by Qld. Parks and Wildlife (Dr Ian Gynther) and the Recovery Team and submitted for adoption by Environment Australia.

Habitat rehabilitation

- Sept. 1999 and ongoing. Implementation of community fig-tree planting program by NSW NPWS, Big Scrub Rainforest Landcare Group and Byron Shire Council in the Byron, Ballina, Casino, Richmond River, Lismore and Kyogle LGAs. Funding supplied jointly by NSW NPWS and Threatened Species Network Community Grants (supported by the Endangered Species Program of the Natural Heritage Trust) with trees being grown by SF NSW and Environmental Training and Employment (Northern Rivers) Inc.
- 1999. The Bundaberg Branch of the Bird Observers Club of Australia successfully obtained a grant of $5,000 from the Threatened Species Network Community Grants Scheme for a fig- tree planting project on Burnett Shire Council land at Moore Park, Qld.
- 2001. Natural Heritage Trust funding secured for "Trees on Farms" project (Mr Terry Moodie) to undertake further fig-tree planting in north-east NSW.
- 2001. Community group 'Save Today Our Parkland' awarded a $20,000 grant from the Threatened Species Network Community Grants Scheme for a habitat rehabilitation and revegetation program focusing on remnant gallery rainforest at sites along Kin Kin and Upper Pinbarren Creeks in the Noosa hinterland of south-east Qld.

Public education and information

- Articles published in ornithological and natural history magazines (Holmes 1987a,b, 1994b; Anon. 1990; Romer and Gynther 1997; Gynther 1999; Romer 1999).
- Exposure to the international avicultural community through liaison with and funding by The World Parrot Trust.
- Joint production and distribution in 1993 of 10,000 colour brochures by Currumbin Wildlife Sanctuary and the then Qld Dept of Environment and Heritage to highlight the parrot's decline and outline the recovery process.
- Media coverage via Qld and NSW statewide radio, television and newspaper articles and community-based newsletters.
- Presentations to ornithological, natural history, avicultural and Landcare groups.
- The Coxen's Fig-Parrot recovery program was the beneficiary of the Queensland Ornithological Society Inc.'s 1996 Twitchathon appeal.
- Wildlife documentaries on national and local television sponsored by Currumbin Wildlife Sanctuary.
- June 1998. Inclusion of Coxen's Fig-Parrot in an endangered species display at the Queensland Museum.
- 1998. Production of Coxen's Fig-Parrot T-shirt and sloppy joes for awareness and fund-raising.
- 1998. Design, production and distribution of an updated colour brochure by the recovery team and Currumbin Wildlife Sanctuary.
- 1998. Joint production of a 'fridge flyer' in the Bundaberg area by the Parrot Society of Australia, Currumbin Wildlife Sanctuary and the Bundaberg Branch of the Bird Observers Club of Australia (Gynther *et al*. 1998).
- Aug. 1998. Delivery of a paper describing the recovery program at the South-East Queensland Rainforest Recovery Conference, Tannum Sands, Qld (O'Reilly 1999).

- Feb. 1999. Presentation on the recovery program at a joint Coxen's Fig-Parrot/Richmond Birdwing Butterfly seminar to local government Environment Officers from across south-east Qld and north-east NSW. The event was hosted by Gold Coast City Council.
- 1999. Production of 5000 colour posters by the then Lismore District of NSW NPWS for general distribution in both states. The poster was reprinted in 2001.

10 Species' ability to recover

Coxen's Fig-Parrot may have been in decline prior to European settlement, however, this process has probably accelerated since then as a result of human-induced causes. Available information is inadequate to predict the species' ability to recover. However, indications from certain other parrot species are that recovery will take some time, even after threatening processes are removed or mitigated (J. Martindale pers. comm.).

In the absence of significant population recoveries in the wild within reasonable timeframes, captive breeding has been shown to be an effective way to conserve and increase populations of other critically endangered bird species, both in Australia and overseas. Currently in Australia, captive breeding forms part of the recovery strategy for the Helmeted Honeyeater *Lichenostomus melanops cassidix* (see Smales *et al.* 1995), Regent Honeyeater *Xanthomyza phrygia* (see Menkhorst *et al*. 1998) and Orange-bellied Parrot *Neophema chrysogaster* (see Rounsevell 1996). The potential need for captive breeding of Coxen's Fig-Parrot has been identified in both the Subspecies Recovery Outline (Garnett 1992) and the previous recovery plan (Davidson 1993).

Other recovery actions to conserve and enhance habitat and re-establish corridors will by necessity take time. Consequently, any release of captive-bred *C. d. coxeni* can only be considered in the long term. The main short term aim of establishing a founder group in captivity would be to reduce the risk of extinction of the subspecies in the wild before all processes threatening the bird can be identified and removed.

Captive breeding and release of Coxen's Fig-Parrot is obviously impossible until wild birds are located to provide the parental stock. More opportunistic sources of stock may be injured birds found by the public or abandoned chicks found at fallen or flooded nests. Nevertheless, captive husbandry techniques and protocols have been developed since 1987 in Queensland at Currumbin Sanctuary on related Red-browed Fig-Parrots, in case the need to secure Coxen's Fig-Parrot in captivity arises (Romer and Spittall, 1994). Further development of, and agreement on, these protocols are required before considering their implementation. Joseph (1988) has suggested that captive breeding may warrant being given a higher priority than conserving existing habitat or populations of Coxen's Fig-Parrot. Resolving these priorities and deciding on an appropriate time for active intervention are important responsibilities of the Recovery Team and will be undertaken in full consultation with the NSW Scientific Committee, the NSW Animal Ethics Committee, and acknowledged experts in the avicultural and general community.

11 Recovery objectives and performance criteria

11.1 Objectives of the Recovery Plan

The overall objective of this Recovery Plan is to prevent extinction of Coxen's Fig-Parrot from human-induced causes, and to ensure the viability of wild populations in the long term.

Specific objectives of this Recovery Plan are to:

- protect and maintain wild populations and their habitat from human-induced threatening processes in the long term;
- protect and maintain the full genetic diversity of Coxen's Fig-Parrot;
- understand the ecology of Coxen's Fig-Parrot;
- secure and breed a captive population of Coxen's Fig-Parrot; and
- increase the extent, quality and connectivity of the habitat of Coxen's Fig-Parrot.

11.2 Recovery performance criteria

- Wild populations have not suffered reduction due to anything other than stochastic events.
- Ecological research and monitoring strategies are established.
- Wild populations are located.
- A population of captive-bred birds is established and increasing.
- Knowledge of the bird's conservation status, current distribution, life history and taxonomic status is significantly increased.
- Historical, existing and potential threats are identified.
- Existing habitat is conserved and key areas of degraded and former habitat are rehabilitated.
- Active community participation in Coxen's Fig-Parrot recovery is achieved.

12 Recovery actions

12.1 Community awareness strategy

The support and active participation of the community are crucial to the success of the Coxen's Fig-Parrot recovery program, with community members being responsible for undertaking many important tasks in the present recovery plan. However, successful implementation of the entire plan necessitates effectively communicating the required actions not just to the general public but, more broadly, to include government agencies, forestry and farming industries, researchers, funding bodies, special interest groups, and other target groups. A good public education and information program provides a means of involving all participants in the recovery process and is, therefore, a vital component in the overall plan.

The objective of the strategy is to raise community awareness of Coxen's Fig-Parrot and its plight to the extent that the community "adopts" Coxen's Fig-Parrot, develops independent skills to reliably locate, identify and report sightings of the bird and, importantly, becomes pro-active in the conservation and rehabilitation of its habitat.

The effectiveness of informal community surveys by an informed public has been demonstrated by the number of highly plausible fig-parrot sightings reported in the greater Bundaberg area following a publicity campaign associated with a community survey. Informal community surveys exponentially expand survey effort in both spatial and temporal dimensions and have been shown to be very cost-effective.

i) Co-ordination of the Recovery Process

The NSW NPWS is responsible for overall coordination of the recovery process and will play a critical role in implementing those actions most directly associated with the core strategies of this plan, namely the shaping of community-based programs to help conserve the Coxen's Fig-Parrot and the coordination of public education. The NSW NPWS will liaise with appropriate government agencies, non-government organisations, the forest industry, farming organisations, academic institutions, natural history clubs and societies, Landcare and catchment management groups, and the general public. NSW NPWS staff will report directly to the recovery team and share the responsibility of arranging recovery team meetings, preparing agendas and compiling minutes.

Outcome

Recovery actions are well coordinated and targeted thereby maximising their effectiveness.

ii) Develop and maintain a community network

Development of a community network for the conservation of Coxen's Fig-Parrot and its habitat will be achieved most effectively through existing projects and established conservation groups. A community network may assist with targeted field surveys, reporting incidental sightings and participating in projects to re-establish fig-parrot habitat.

Possible network links include; Bird Australia's Threatened Bird Network Coordinator, the Threatened Species Network, the Endangered Rainforest Plants Recovery Team, Greening Australia, State Forests of NSW Joint Venture Program, bushwalking and bird-watching clubs and Landcare Coordinators. Information about the community network will be databased. This network will be developed in accordance with the Community Network Strategy devised by the Threatened Species Network.

Outcome

Increased community awareness, ownership and participation in the recovery of Coxen's Fig-Parrot.

iii) Establish a Community participation and publicity campaign

A targeted publicity campaign similar to the Richmond River Birdwing Butterfly campaign is an efficient method of engaging community participation. A selection of preliminary campaign thrusts include:

- establishing community response teams composed of experienced ornithologists who can immediately respond to opportunistic sightings;
- utilisation of existing networks to enlist volunteers for surveys and rehabilitation works;
- producing of a small brochure/leaflet to enable easy identification of Coxen's Fig-Parrots;
- an identification incentive in the form of a sponsored reward for the first confirmed identification of Coxen's Fig-Parrot;
- inclusion of a Publicity Strategy for Coxen's Fig-Parrot as an assignment at local universities;
- creation of slogans such as "You may never see one but...plant a fig, and you just might" to catch public attention;
- preparation of publicity material such as T-shirts, posters, travelling display boards (for shopping centres etc.), food-plant kits, brochures, fliers for inclusion with Local Government rates notices and fridge magnets for resale;
- work with local government to promote and develop "plant figs in public places" schemes;
- offering incentives to schools to conduct projects and artwork in relation to Coxen's Fig-Parrot;
- conducting media interviews about Coxen's Fig-Parrot and requesting volunteers for surveys and rehabilitation works;
- placement of regular articles in popular magazines and daily media;
- production of a regular newsletter for circulation to the community network and more widely;
- production of a video on research/survey to date for screening at seminars and public talks.

Outcome

Raised community awareness and increased opportunity for location of wild populations of Coxen's Fig-Parrot and a coincidental reduction in opportunity to illegally deal in Coxen's Fig-Parrot.

12.2 Ecological research and monitoring strategy

The current distribution and ecology of Coxen's Fig-Parrot are poorly known, and based largely on supposition. Low impact surveys for and, where appropriate, research and monitoring of wild populations is required.

i) Establish survey protocol

All surveys, research or monitoring undertaken by government authorities, recovery team members, consultants, other stake holders and volunteers will, as far as practical, minimise disturbance or disruption to the behaviour of any individuals of any wild populations. These surveys will be in accordance with the Coxen's Fig-Parrot Survey Protocol. This protocol will be established by NSW NPWS and will address issues such as confidentiality and credentials of survey participants. The NSW NPWS will also maintain a register of all people participating in the survey.

Outcome

A protocol will be developed that minimises interference or disturbance to wild populations of Coxen's Fig-Parrot resulting from surveys, research and monitoring.

ii) Locate wild populations

Conduct nest site surveys

Nest site surveys will be undertaken intermittently during the non-breeding season (January-July) to identify areas with evidence of recent nesting activity to be targeted during the subsequent breeding season (August-December). These surveys will focus primarily on preferred habitats within localities of recent, credible incidental sightings or at localities judged to be potentially important based on knowledge of the birds past distribution. They will examine areas throughout the subspecies' documented and suspected distribution. Investigation of the locations of incidental sightings will provide additional information by which to assess records (see 12.2.2.5) and may yield evidence of nesting in unexpected areas.

Trained and highly experienced staff will conduct surveys during the non-breeding season. Surveys during the breeding season will be more intensive and, for a three-week period in August/September, will involve searches of the most probable nesting localities.

Coxen's Fig-Parrot is thought to nest in the same manner as the Red-browed Fig-Parrot. Surveys in northern Qld will be undertaken to hone the skills necessary for locating the nest holes of Coxen's Fig-Parrot. This training exercise will enhance skills in nest recognition, particularly the height, aspect, positioning and appearance of nest holes, the tree species favoured for nesting and the preferred breeding habitats. In addition, familiarity will be increased with the appearance, flight style, behaviour and calls of the similar Red-browed Fig-Parrot.

The training exercise should be conducted in October or November by members of the Recovery Team initially so that the experience gained can be passed on to others and applied as soon as possible to ongoing searches for past and current nests of Coxen's Fig-Parrots. These surveys have advantages, listed in the following outcomes, over the standard survey technique of scanning potential feeding trees or traversing areas of likely habitat in an attempt to observe the birds themselves (eg. see Martindale 1986; Holmes 1990, 1994a, 1995).

Dependent upon the success of the Coxen's Fig-Parrot nest searches, the Red-browed Fig-Parrot nest survey may need to be repeated in other years to provide a refresher course or training for other members of the Recovery Team. Close cooperation will be required between NSW and Qld authorities to coordinate these studies.

Outcome

Nest site surveys and training will:

- increase the survey skills of participants;
- indicate the existence of fig-parrots in an area regardless of whether birds are actually present at the time of the search;
- indicate localities which are currently occupied or have recently been occupied, and suggest localities which have not;
- indicate likely areas of a pair's home range, thus providing valuable ecological data; and
- result in the discovery of an active nest, an essential step in the recovery of the subspecies.

Conduct food tree surveys

Fruiting figs will be monitored at known or suspected Coxen's Fig-Parrot localities. Individual fig trees which either have a history of Coxen's Fig-Parrot visitation (traditional food trees) or which have abundant fruit at the time of the survey will be monitored. A program of regular volunteer surveys will be mounted. This will involve teams of people, trained and supervised, deployed at least during early morning and late afternoon at dawn and dusk at multiple food trees or other observation posts throughout one locality. Ideally, two teams,

each of two observers, will be alternately allocated per tree. At some sites, the location and identity of all canopy level figs has been determined previously (Horton 1996).

These surveys will be a minimum of five days in duration and it is expected that at least four such searches will be conducted every year during the life of this plan. Localities targeted will be from both south-east Qld and north-east NSW and will include areas in which recent sightings have been made.

Research and monitoring programs will be implemented in accordance with this plan at all localities where Coxen's Fig-Parrots are recorded.

Outcome

Community involvement in future Coxen's Fig-Parrot surveys aims to confirm the presence of birds, to gather details on morphology and calls and to provide vital ecological data. The results may also highlight further areas to be examined for evidence of nesting activity. Where appropriate, survey outcomes will be published to provide feedback to the community and to encourage further participation in these programs.

Analyse potential predators' prey remains

Discarded prey items may be caught by a shade-cloth screen (approximately 6 m square) suspended above the forest floor beneath a raptor nest. Forested areas close to past sightings, probable nest sites or core habitat will be targeted.

Regular monitoring of the screens will be undertaken as part of third-year student projects incorporating an investigation of the ecology and dietary preferences of raptors. Targeted raptor species include the Brown Goshawk (*Accipiter fasciatus),* Grey Goshawk (*A. novaehollandiae*) and Collared Sparrowhawk (*A. cirrocephalus*).

Outcome

Analysis of prey remains may yield information about the diversity, abundance and seasonality of many prey species taken within an area. This may indicate the existence of fig-parrots regardless of whether birds are actually present at the time of a search.

Use decoy birds

Northern fig-parrot subspecies will approach closely to the source of mimic calls (Hunter in Bourke and Austin 1947; Forshaw 1981), and Coxen's Fig-Parrot may do the same. Caged decoy Red-browed Fig-Parrots will be deployed in the forest canopy in north Queensland to confirm this. Coxen's Fig-parrots are considered more likely to respond to and interact with caged decoy birds than to electronically recorded calls (J. Martindale pers. comm.). If successful, the technique will be adopted at high priority sites for Coxen's Fig-Parrot during the spring and summer breeding season.

The cages will be monitored by remote recording equipment and visited periodically by survey participants. A suitably qualified person must be on site at all times to ensure the well being of the decoy birds.

Outcome

Possible location of wild populations of Coxen's Fig-Parrot at priority sites.

Operate a formal records appraisal system

The paucity of reported sightings of Coxen's Fig-Parrots, the potential importance of each sighting for advancing the recovery of the subspecies and the opportunity for observer misidentification necessitate that a formalised records appraisal process be adopted.

A Records Appraisal Committee has been established which consists of six members of the Recovery Team or people closely associated with it. It has representation from QPWS, NSW NPWS, the Australian Museum and the Southern Cross University. Reports of past and current sightings (the latter using the existing 'Sighting Report Form') will be circulated.

Outcome

The appraisal process will assist field survey work and distributional modelling studies. Operational guidelines for the Records Appraisal Committee will ensure consistency.

Collect ecological data

The habitat at all Coxen's Fig-Parrot sightings or nest locations has not been characterised. Ecological data such as altitude, aspect, disturbance history, forest type and structure, structural dominants, soil type, and presence and abundance of food trees are required. Information collected will conform to that collected under NSW NPWS Targeted Threatened Species surveys. Identification of habitat types and food species used through the cooler months is of special importance for management because of the assumed dependence of Coxen's Fig-Parrot on the now severely depleted lowland forests during the suspected critical winter period (Holmes 1994a, 1995).

Outcome

Characterisation of known Coxen's Fig-Parrot sites will enhance our knowledge of the bird's habitat requirements and enable predictive modelling.

Develop and maintain a records database

A database of all past records of Coxen's Fig-Parrot will be created incorporating the most recent records as well as historical sightings and specimen-based records. Regular maintenance and review of the database by the Records Appraisal Committee will ensure it is kept current.

Outcome

The database should facilitate the analysis of ecological data, for example highlighting food resources commonly used by the birds, and may assist in identifying areas for rehabilitation. The database may also reveal over time other high priority areas for survey by identifying geographical, seasonal, altitudinal and/or habitat-associated patterns of occurrence.

Undertake predictive modelling of distribution

Predictive modelling of the distribution of Coxen's Fig-Parrot may contribute to recovery by refining current understanding of the subspecies' range and indicating possible field survey targets. A BIOCLIM analysis conducted by the Centre for Research and Environmental Studies at the Australian National University (Holmes 1990) suggested that both the absolute and potential distribution of Coxen's Fig-Parrot were broader than hitherto documented.

These predictions were subsequently justified by reported sightings north and south of the previously recognised distributional limits of the subspecies (Holmes 1994a, 1995; Gynther 1998; J.Young pers. comm.). Further modelling work will be conducted which incorporates all credible recent records and relevant ecological data.

Outcome

Identification of areas on which to focus search effort and to include in revegetation and rehabilitation projects.

Implement an ecological monitoring strategy at occupied sites

The ecology of Coxen's Fig-Parrot is poorly understood. An ecological monitoring strategy will be developed for immediate implementation in the event that a location is discovered where birds can be found repeatedly, e.g. a feeding site or an active nest site. Techniques to be implemented would include direct observation, non-intrusive photography and call recording. Population counts and registers of activity would be kept, and information on diet, breeding biology and behaviour gathered. The data may indicate food resources as well as habitat that are critical to the bird's survival.

Outcome

Implementing this strategy will ensure a rapid increase in our knowledge of the bird's ecology that will benefit many other facets of the recovery program.

Clarify taxonomic status

Investigation of the taxonomic status and relationships of Coxen's Fig-Parrot may be undertaken from museum specimens and wild caught individuals of the two northern subspecies. The genetic analysis will be conducted under a proposal developed by NSW NPWS, QPWS and Southern Cross University (SCU).

Outcome

Confirmation of the specific status of Coxen's Fig-Parrot would encourage funding agencies and potential sponsors to favour applications for financial support for research and management actions, and would significantly raise public awareness and search effort.

Investigate wild Red-browed Fig-Parrots

A field study will be undertaken of the Red-browed Fig-Parrot to examine life history details of direct relevance to Coxen's Fig-Parrot. The study is to include dietary preferences, activity patterns, flock size, movement patterns and communal roosting behaviour and expand the similar study begun by Holmes (Holmes 1995). An additional aspect is the identification of species or genera of northern Qld food plants to determine which plant species in the south are likely to be important food resources for the Coxen's Fig-Parrot.

Outcome

Studying the Red-browed Fig-Parrot may assist understanding of the likely ecology and behaviour of the Coxen's Fig-Parrot.

Remote surveys

Surveys using elevated, remotely activated equipment such as sound recorder, video recorder or camera may be a cost and time-effective method of monitoring a probable or confirmed nest site and/or confirmed feeding station. The advantages over ground survey are that previously unseen canopy sectors may be monitored, and that the method is low impact. Other cost-effective and more direct techniques may include the use of dirigibles (type of balloon craft).

Outcome

Presence of Coxen's Fig-Parrot may be confirmed and valuable information on appearance, behavioural traits and reproductive biology gathered.

12.3 Captive Breeding and Release

Captive breeding can allow natural breeding systems to operate in the absence of an identified threat such that stock are released to the wild, thereby reducing the chance of extinction of a species. Martindale (1986), Garnett (1992), Davidson (1993) and Holmes (1995) have all advocated that a principal recovery plan objective is to re-establish Coxen's Fig-Parrot in parts of its former range from which it has disappeared.

Current best practice for the captive breeding and release of parrots (Snyder et al. 2000) can be divided into four main steps as follows:

- The researching and development of approved protocols in advance.
- Adequate practise and field trialing of techniques on surrogate species.
- Implementation of the program on the target species following receipt of relevant approvals.
- Release and assimilation of individuals back into the wild and adoption of termination criteria.

While the latter steps are dependent on locating an active Coxen's Fig-Parrot nest and may not occur during the life of this plan, it is important that acquisition, husbandry and release techniques are fully researched, field trialed using surrogate species, approved and funded beforehand. These aspects are discussed further below and are costed in Section 13 Implementation.

Full implementation of a captive breeding program to the point that birds are released into the wild requires detailed justification, careful consideration of the program's cost effectiveness and a clear idea of performance

criteria which, if not met, will bring about termination of the program. A summary of these issues is provided below but a more complete assessment of current best practice needs to be conducted following a comprehensive literature review.

i) Develop a Captive Breeding Protocol

An international literature search for information on comparable situations of severe and/or unexplained avian decline will be instigated using traditional and contemporary methods such as the Internet. Particular emphasis will be given to taxa for which captive management plays a key role in recovery efforts. A Captive Breeding Protocol will be developed that includes:

- A Proposal consisting of a literature review of contemporary parrot captive breeding practices and a justification for the captive breeding of Coxen's Fig-Parrot.
- An Action Plan that details the initial response, acquisition and transport techniques to be used when obtaining founder stock and which contains all necessary approvals.
- A Husbandry Manual that describes emergency hand-rearing and fostering techniques and long term captive management practices, as well as identifying areas for further research.
- A Release Plan that addresses the strategy and methods for reassimilation of birds into the wild.

The Protocol will be submitted to relevant authorities for approval prior to commencing any actions involving Coxen's Fig-Parrot.

Outcome

All available information and techniques are considered and the most effective adopted. Captive breeding techniques are detailed in an established protocol. Relevant approvals for the Protocol are in place beforehand in the event that any Coxen's Fig-Parrot eggs or chicks become available opportunistically or a decision be made to acquire birds from the wild.

ii) Conduct analogue trials

Refine capture and transport techniques

Specialist techniques are required to acquire eggs and/or chicks for captive breeding. The proposed techniques outlined in the Action Plan component of the Captive Breeding Protocol (see 12.3.1) will be field trialed on surrogate species, such as Red-browed Fig-Parrots and lorikeets, and refined as necessary. Improvements to procedures will be documented through modification of the Protocol. Training in tree climbing and egg/chick handling at the nest will be required, as will clear and simple procedures for transport that minimise risk to the eggs or young and reduce travel time. Relevant equipment must be purchased. Appropriate contact lists must be prepared and relevant approvals held.

Outcome

A response team is trained and proficient in all acquisition and transport procedures as detailed in the Action Plan. A kit containing all relevant equipment, contact lists and approvals is available on permanent standby.

Refine husbandry techniques

Husbandry techniques for the related Red-browed Fig-Parrot have undergone extensive development at Currumbin Sanctuary since 1987 (Romer and Spittall 1994). Further research is necessary, particularly with respect to seasonal diet, identification and elimination of disease, emergency hand-rearing, cross-fostering and the use of genetic technology to increase reproductive output and diversity of gene pools (Cusack 1997). All procedural refinements which result will be incorporated into the Husbandry Manual, prepared as a component of the Captive Breeding Protocol (see 12.3.1), so that this document represents the current state of knowledge about maintenance of the surrogate population.

Outcome

Prior to a situation arising where Coxen's Fig-Parrot can be or must be acquired from the wild, there will be established, within the bird's known range, a facility which has the requisite expertise in the captive

management of fig-parrots. The Husbandry Manual is continually revised to provide up to date and clear guidance for the captive-breeding program.

Maintain analogue population

The surrogate population of Red-browed Fig-Parrots will require ongoing maintenance and husbandry until the results of further research, as identified by Cusack (1997) are available for incorporation into the Husbandry Manual. Surrogate adults may also be needed to act as foster parents should eggs or chicks of Coxen's Fig-Parrot become available at short notice and a decision to commence captive breeding is made.

Outcome

Through adherence to procedures in the Husbandry Manual for both day-to-day and long term captive management, the surrogate population of Red-browed Fig-Parrots is maintained at levels to permit continued research and adequate numbers of foster parents.

Release captive-bred analogues

The release of captive-bred Coxen's Fig-Parrots into the wild is the long-term aim of the captive -breeding program. The existence of excess Red-browed Fig-Parrots resulting from the development of husbandry techniques provides an invaluable opportunity to trial release techniques in the field. These include the use of radio transmitters to investigate the success with which birds of captive origin assimilate into wild populations and habitat.

Outcome

Release techniques will have been developed in a timely manner so that the success of any releases of Coxen's Fig-Parrot in the long term will be greatly increased.

iii) Upgrade facilities for Coxen's Fig-Parrot

Construct aviaries

Should the decision be taken to proceed with captive breeding of Coxen's Fig-Parrots, it may be necessary, as the program continues, to construct additional aviaries to provide adequate disease isolation, space for breeding and sufficient area to allow re-establishment of natural behavioural traits. It may also be advisable to duplicate facilities at other holding institutions as a precautionary measure against disease, theft of birds, fire and other undesirable stochastic events.

Outcome

Adequate infrastructure is provided in a timely manner as the program proceeds to allow smooth expansion of the program and maintenance of the health and normal behaviour of captive bred birds.

Establish security

Red-browed Fig-Parrots are kept in limited numbers by aviculturists under licence in both NSW and Qld. These birds are difficult to rear and are highly attractive to collectors. They consequently fetch high prices, upwards of $5000, when traded as adults (Jeff Hardy, Coordinator, NSW NPWS Wildlife Licencing Unit, pers. comm.). Trade in fledglings and eggs is illegal.

There are no Coxen's Fig-Parrots held legally under licence in either Australia or overseas thus collection from the wild is the only way that the species could enter the avicultural system. Based on the known price of related subspecies above, and given that any individuals would have to be obtained illegally, the potential value of a Coxen's Fig-Parrot adult could be as high as $30,000 in Australia and more overseas. The value of eggs is less due to the potential for failure in hatching but nevertheless is still likely to be substantial since eggs are far easier to smuggle out of the country.

The potential reward for the illegal collection of birds or eggs from a nest in the wild or from aviary theft means that adequate security for these locations is essential. The holding institution shall undertake a review of security and implement measures necessary to secure the captive birds. These measures will be included in the Captive Breeding Protocol (see 12.3.1).

Outcome

Appropriate security measures are in place to secure the surrogate birds and any Coxen's Fig-Parrots that may be acquired or bred.

iv) Initiate program for Coxen's Fig-Parrot

Implementation of this action is dependent upon completion of the Captive Breeding Protocol, securing adequate funding, obtaining approvals and licences to proceed from state authorities and ethics committees and locating an active nest from which founder stock can be sourced. Once these prerequisites are met, the Recovery Team will consider initiating a program involving the following:

- Acquisition of founder stock and transport to the holding facility.
- Security of nest.
- Monitoring of nest.
- Maintenance of the captive population.

These elements of the program will be discussed in detail in the Action Plan and Husbandry Manual that form part of the Captive Breeding Protocol to be prepared under Action 12.3.1.

Acquire founder stock

Founder stock will be acquired and transported to the holding facility using techniques and procedures previously practised on surrogate species and the equipment kit previously prepared and held by the holding institution. Trained members of a response team, as nominated in the Action Plan, will be bound by a confidentiality agreement. All relevant approvals are to be in place, including permission from any relevant private landowners, before founder stock is acquired.

Outcome

Founder stock is successfully acquired and safely transported to the holding facility with a minimum of administrative or logistical delay.

Ensure security of nest

The potential for any nest found in the wild to be disturbed, either unintentionally by members of the public or deliberately as a result of a breach in confidentiality, will need to be carefully assessed. In addition to losses through poaching, undue disturbance can result in nest desertion by the parent birds and so negate valuable opportunities for either re-clutching later that season or reuse of the nest tree in future breeding seasons. Where security is considered necessary, options may be to use trained volunteers, professional security officers, NSW NPWS or QPWS staff or a rostered combination of the above. Breaches of security will be reported to relevant law enforcement agencies.

Outcome

All active Coxen's Fig-Parrot nest locations are protected from disturbance for the duration of the current and subsequent breeding seasons.

Monitor nest post-acquisition of eggs or chicks

The Recovery Team will recommend to the relevant agency the appointment of a qualified person from a previously prepared shortlist to research and monitor the nest and parent birds after acquisition of the eggs or chicks for captive breeding. Among others, the following questions will be investigated during the monitoring program:

- What are the behavioural and reproductive responses of the parent birds to the nest robbing?
- Are these responses as anticipated from studies on Red-browed Fig-Parrots, both in the wild and in aviaries?
- Is the nest abandoned in favour of another pre-existing one or is a new nest excavated?
- Are new nests or other adult pairs in the vicinity?

- What is the delay until any re-clutching occurs and what behaviour is involved?

Consideration should also be given to attaching radio transmitters to the parents so that, in addition to gaining information on home range sizes and the possible location of other birds, the adult pair can be relocated in the event of nest desertion. These benefits need to be weighed carefully against the potential hindrance to re-clutching at the same nest.

Depending on the nest location, monitoring may be expected to require the researcher to spend considerable periods of time elevated in the canopy. It may need to be repeated in subsequent breeding seasons if the nest remains active. Where circumstances allow, monitoring efforts may also be combined with any security program (see 12.3.4.2).

Outcome

The impact of egg/chick retrieval on the parent birds is assessed and information gained on breeding biology and the potential for the nest to be used in future acquisition programs.

Ensure successful husbandry of captive population

Once founding stock has been acquired and transported to the holding facility, it will be maintained and bred in captivity in accordance with the Husbandry Manual. This will require annually secured funds for the duration of the program in accordance with estimates provided by the holding facility and subject to commercial agreement with the NSW government. These funds will also be supplemented by community and commercial sponsorship. The duration of the program will depend upon breeding success rates and assessment of the number of birds needed to found one or more sustainable wild populations. Details of funding estimates and performance criteria will be provided in the Captive Breeding Protocol (see 12.3.1).

Outcome

The captive population is successfully maintained and augmented by the holding institution over an agreed timeframe. Operation of the captive-breeding program is based upon predetermined performance criteria.

v) Construct facilities for release of captive-bred Coxen's Fig-Parrots

The release of captive-bred Coxen's Fig-Parrots back into the wild will not occur during the period covered by this Recovery Plan. Nevertheless, consideration of the issues involved will be necessary since they are pertinent to obtaining initial approvals to proceed with the captive -breeding program. These issues will be addressed in the Captive Breeding Protocol (see 12.3.1) following a review of best practice in relation to successful parrot release programs elsewhere around the world.

The funding required and its timing will be dependent on the success of the captive breeding program in raising birds for release and the success of other elements of the Recovery Plan in identifying and ameliorating threatening processes in the wild. At the very least, funding will need to be secured for the construction of an *in situ* holding facility at an appropriate location to allow the birds to become acclimatised to the release site and establish adaptive behavioural traits.

The 'soft release' facility would also provide an opportunity to monitor released birds during their assimilation into the wild. More detailed and accurate funding estimates will be provided in the Captive Breeding Protocol.

Outcome

A program and facilities for release of Coxen's Fig-Parrot are in place by the time captive-bred birds are ready for release and threatening processes in the wild are ameliorated.

12.4 Habitat assessment

A thorough assessment of the quantity, distribution and spatial arrangement of remnant rainforest and other suitable habitat as well as the distribution, abundance and fruiting schedules of known fig-parrot food species is crucial for the development of a revegetation and rehabilitation strategy. A detailed map of fig-tree distribution will also establish priority areas for revegetation.

i) Map the distribution of rainforest and other suitable habitat in the Coxen's Fig-Parrot's range

Detailed, accurate and up-to-date mapping of the distribution of rainforest and other suitable habitat in north-east NSW would assist the recovery process for the Coxen's Fig-Parrot, particularly in targeting areas for revegetation or rehabilitation and in identifying potential corridors. Its greatest application would be in the lowlands where the majority of remnant fig-parrot habitat is unprotected. The definition of rainforest conforms to Hunter (1998).

The entire suspected distribution of the Coxen's Fig-Parrot should be mapped with particular emphasis placed on areas within a 30 km radius of recent documented sightings of the bird, remnant figs and rainforests, and those areas which link confirmed Coxen's Fig-Parrot localities. This mapping will be based initially upon aerial photographic analysis used by NSW NPWS as part of the Comprehensive Regional Assessment. It will be refined by ground truthing in priority locations, eg., around known locations of Coxen's Fig-Parrot, and in areas proposed for habitat rehabilitation and/or the development of wildlife corridors. Remote sensing, such as satellite and/or aerial digital multispectral video imaging, will be trialed and developed to assist in the mapping of actual and potential habitat, particularly fig trees. Other developments in mapping technology should be included, as they become available.

Outcome

Mapping will allow the development of a revegetation and rehabilitation strategy and will assist with the assessment of sightings across the landscape. A detailed map of fig-tree distribution and density will be produced to establish high priority areas for revegetation.

ii) Investigate the distribution and phenology of probable Coxen's Fig-Parrot food plants

Inadequate or discontinuous food resources may threaten Coxen's Fig-Parrot and these threats may be seasonal. The ecology of Coxen's Fig-Parrot food resources is poorly understood. In particular, the factors triggering the fruiting patterns of fig species have been little researched. Further the role of fig-pollinating wasps in determining the nutritional quality of fig fruit is unknown but may be of critical importance. Previous studies (Storey 1994; Horton 1996) have been of limited time and scope.

A three year university project will be initiated to investigate the distribution and phenology of known and probable food plants of the Coxen's Fig-Parrot. Knowledge of Red-browed Fig-Parrot food plants will be incorporated.

Outcome

This information will contribute greatly to our understanding of the ecology of Coxen's Fig-Parrot and assist in determining suspected threats.

12.5 Habitat protection and enhancement

i) Develop management prescriptions and protocols for logging identified Coxen's Fig-Parrot habitat

Much of the bird's remaining habitat occurs in State Forests and, at least in the locations described by Norris (1964), Holmes (1994a, 1995) and J. Young (pers. comm.), logging adjacent to rainforest may have impacted on the bird's habitat. Probable fig-parrot nests have been observed as early as July in mature Flooded Gum (*Eucalyptus grandis)* near the rainforest edge and in areas with a rainforest understorey (J. Young pers. comm.).

Threatened Species Licence conditions in the NSW Integrated Forestry Operations Approval (IFOA) require State Forests of NSW (SF NSW) and NSW NPWS to jointly develop and agree on site-specific conditions for all records in state forest that may be affected by logging operations. Such operations must not commence until these conditions are in place.

Conditions relating to proposed logging near rainforest in State Forests north of the Bruxner Highway in NSW are currently being developed but extension of management guidelines to include all probable habitat in state forests within the bird's range is required. Rainforest edge buffers currently approved under the IFOA may

require amendment in the vicinity of known fig-parrot habitat. These buffers should be protected from controlled burns during the August-December breeding season.

At lower elevations, such as in the SFNSW Murwillumbah Management Area, CSIRO (1996) concluded that management that allows rainforest to regenerate to subtropical rainforest would maintain or enhance Coxen's Fig-Parrot numbers. Such practices should be included in general forest management guidelines but the potential impact on other threatened species which may use the forest ecotone, eg., Albert's Lyrebird (*Menura alberti*), White-eared Monarch (*Monarcha leucotis*) and Eastern Bristlebird (*Dasyornis brachypterus*), must be carefully considered. Initial prescriptions will be updated, as more ecological data on Coxen's Fig-Parrot become available.

Outcome

The protection of existing habitat within State Forests.

ii) Regulation of land use by state and local authorities

Various regulatory avenues are available to protect and enhance known and probable Coxen's Fig-Parrot habitat and these can be used in cooperation with community initiatives. The NSW NPWS will encourage the relevant government agencies to adopt these avenues where appropriate as part of their core responsibilities to conservation. Some financial and on-ground support from government authorities may be available to private landholders to assist in the conservation of the species on their lands. A number of avenues through which this support may be obtained are included below.

- Inclusion by local government and/or the Department of Urban Affairs and Planning of known or probable Coxen's Fig-Parrot habitat in relevant planning schemes, eg. State Environmental Protection Policies (SEPPs), development control plans and local or regional environment plans. These schemes involve community consultation by way of seminars, public exhibition of documents, and the production of guidelines outlining how the habitat may be managed effectively for conservation.
- Preparation of property management plans by private landowners or, as a last resort, the issuing of Stop Work Orders by NSW NPWS under the TSC Act.
- Creation and implementation of Tree Preservation Orders under the *Local Government Act 1993* to protect identified and possibly isolated food trees that may be essential foraging habitat for Coxen's Fig-Parrot (Holmes 1990).
- The use of appropriate development consent conditions to encourage food tree planting under the EPA Act.
- Restrictions on the clearing of native vegetation and the identification and protection of relevant habitat in Regional Vegetation Management Plans under the *Native Vegetation Conservation Act 199* (NVC Act)..
- Creation of Property Agreements under the NVC Act.
- Creation of Voluntary Conservation Agreements or Protection Orders under the NPW Act.
- Creation of Interim or Permanent Conservation Orders under the *Heritage Act 1977.*

Outcome

Protection of known or probable Coxen's Fig-Parrot habitat outside conservation reserves.

iii) Habitat rehabilitation and expansion

Restoration of degraded habitats to healthy viable ecosystems is the primary objective of rainforest rehabilitation. Restoration includes staged weeding and replanting programs to achieve a self-perpetuating ecosystem that is maintenance free.

Liaison with the Endangered Rainforest Plants Recovery Team and community groups, such as Landcare, Bushcare and Greening Australia, is recommended to discuss selection of methods and species, and to interact with other rainforest restoration projects.

Spatial continuity and diversity of probable food resources need to be enhanced by expanding the area of suitable habitat and by providing interconnecting habitat corridors, especially along watercourses. Lowland

rainforest areas and potential forest links are a priority, especially in localities where Coxen's Fig-Parrot is currently known or suspected to occur.

Outcome

Healthy, viable habitat for Coxen's Fig-Parrot and other threatened species and removal of major threatening processes.

iv) Initiate propagation of food trees

Initiate large-scale propagation of known and presumed Coxen's Fig-Parrot food trees. Seed collectives and commercial seed collectors should be contacted to commence collection of the appropriate species. The propagation program should take advantage of established infrastructure such as State Forests of NSW, Greening Australia, Landcare, Currumbin Sanctuary, shire council nurseries and other contract rainforest tube-stock growers.

Distribute Coxen's Fig-Parrot food plant kits containing seedlings of known and probable Coxen's Fig-Parrot food trees including certain fleshy-fruited rainforest trees, the larger fig species (*Ficus macrophylla, F. watkinsiana* and *F. obliqua*) and the smaller, fast growing and fast fruiting sandpaper figs (*F. fraseri* and *F. coronata*). Other species besides figs should also be considered to get a mix of species across the landscape. The kits should aim to include local species from appropriate genetic stock and aim to provide a seasonal spread of fruit.

The mixed species kits or individual specimens of food trees will be:

- available for resale from key tourism outlets including NSW NPWS offices, Travel Information Centres, State Forests of NSW sales outlets, ecology and eco-tourism centres and other targeted outlets.
- included in Local Government "free trees and shrubs" for ratepayers;
- planted as street trees and/or open space and local reserves;
- incorporated in Road and Traffic Authority roadside rehabilitation schemes;
- incorporated into State Forest of NSW Joint Venture Schemes;
- included as Greening Australia's stock for Trees on Farms and other private agricultural plantings;
- available to schools for gardens and school projects; and
- recommended and supplied as preferred plants for Landcare, Water Catchment and Rehabilitation groups.

Outcome

Raised community awareness, expanded Coxen's Fig-Parrot habitat and creation of additional food resources in urban and rural settings.

v) Contact NSW Nurseryman's Association

Negotiate with NSW Nurseryman's Association for production of "I'm a Coxen's Fig-Parrot Food Tree" labels for inclusion on commercial nursery stock and all trees produced under Section 12.5.4.

Outcome

Raised community awareness and increased availability of food resources through stronger encouragement and promotion for the planting of food trees.

13 Implementation

Table 1 summarises, prioritises and estimates costs for the recovery actions identified in this plan over the next five years. It is the responsibility of the NSW NPWS to implement and fund all actions beyond identified "core" actions relating to other government authorities and excepting those subject to commercial arrangements with relevant holding institutions or external sponsors. Core actions do not require any additional costs.

Most costs are unsecured, however, some actions in the first year are already funded and in progress. These actions are identified by a hash (#) and are not included in the cost totals. Other costs reflect in kind responsibilities by public authorities and institutions. Although recorded in the table and indicated by an asterisk (*), in kind contributions are not included in the cost totals.

The cost estimates assume that an active Coxen's Fig-Parrot nest will be found in the first year and that approval will be given to proceed with the captive breeding strategy identified in Section 12.3. However, captive breeding costs may vary depending on the time, location, number of nests discovered and number of founding birds acquired each year. If a nest is not found during the life of this plan or if approval to proceed with captive breeding is not forthcoming, then actions 12.3.3 - 12.3.5 become irrelevant and the cost and conservation value of the plan are reduced substantially.

Table 1. Implementation schedule

Section/Heading	Priority	Year 1	Year 2	Year 3	Year 4	Year 5
12.1 Community awareness						
i) Co-ordination of recovery process	1	10000*	10000*	10000*	10000*	10000*
ii) Community network	2	1500	1500	1500	1500	1500
iii) Publicity campaign	1	3000	2000	2000	1000	1000
12.2 Ecological research and monitoring strategy						
i) Establish survey protocol	2	500	-	-	-	-
ii) Locate wild populations						
Nest surveys	1	3000	3000	2000	2000	1000
Food tree survey	1	3000	3000	2000	1000	1000

Table 1: Implementation schedule (contd)

	Section/Heading	Priority	Year 1	Year 2	Year 3	Year 4	Year 5
	Prey remains analysis	3	500*	500*	-	-	-
	Decoy bird use	3	500*	500*	-	-	-
	Records appraisal system	2	500*	-	-	-	-
	Collect ecological data	1	3000	3000			
	Develop records database	2	2000*		-	-	-
	Predictive modelling	2	4000*	-	-	-	-
	Ecological monitoring	1	20000	15000	10000	5000	5000
	Clarify taxonomic status	2	17000#	-	-	-	-
	Investigate Red-browed Fig-Parrot	2	4000	2000	-	-	-
	Remote surveys	2	2000	2000	-	-	-
12.3 Captive breeding and release							
i)	**Develop captive breeding protocol**	1	3000*	2000*			
ii)	**Conduct analogue trials**						
	Refine capture/transport techniques	1	10000				
	Refine husbandry techniques	1	20000#	10000	5000		
	Maintain analogue population	1	6000	6000	6000	6000	6000
	Release analogues	3					5000
iii)	**Upgrade facilities for Coxen's Fig-Parrot**						
	Construct aviaries	2	50000	20000			
	Establish security	1	37000	10000	10000	10000	10000
iv)	**Initiate program for Coxen's Fig-Parrot**						
	Acquire founding stock	1	3000	3000	3000	3000	3000
	Ensure security of nest	1	8000	8000	8000	8000	8000
	Monitor nest post-acquisition of eggs or chicks	1	8000	8000	8000	8000	8000
	Maintain captive population	1	17500	14000	14000	14000	14000
v)	**Release facilities for Coxen's Fig-Parrot**	3					5000
12.4 Habitat assessment							
i)	**Map habitat distribution**	2	10000#	5000	-	-	-
ii)	**Investigate food plants**	2	3000	3000	1000	-	-
12.5 Habitat protection and enhancement							
i)	**Prescriptions and logging**	1	Core	-	-	-	-

protocols						

Table 1: Implementation schedule (contd)

Section/Heading	Priority	Year 1	Year 2	Year 3	Year 4	Year 5
ii) Regulation of land use	1	Core	Core	Core	Core	Core
iii) Habitat rehabilitation/expansion	1	20000#	10000	10000	10000	10000
iv) Propagate food trees	1	7000#	5000	2000	1000	1000
v) Contact Nurseryman's Association	2	500	500	-	-	-
Total per year cost not including captive breeding of Coxen's Fig-Parrot		**79500**	**71000**	**41500**	**27500**	**31500**
Total Cost	**$251000**					
Total cost per year including captive breeding of Coxen's Fig-Parrot		**203000**	**134000**	**84500**	**70500**	**79500**
Total Cost	**$571500**					

Annotation to Table 1:

12.1 Community awareness

i) Co-ordination of recovery process

Part-time in conjunction with NSW NPWS responsibilities to other threatened species.

12.2 Ecological research and monitoring strategy

ii) Locate wild populations

Clarify taxonomic status: NSW NPWS $3,000 and balance is in kind by Southern Cross University.

12.3 Captive breeding and release

These costs are subject to negotiation with the holding institution and other commercial sponsors. It is hoped that NSW NPWS and the federal government will be able to contribute about half of the costs.

ii) Conduct analogue trials

Refine capture/transport techniques: Includes NSW NPWS in kind contribution and equipment costs, eg., climbing gear, incubators etc.

Refine husbandry techniques: Based on estimates by Cusack (1997) and includes in kind costs incurred by Currumbin Sanctuary estimated to be at least $5,500 per annum by Goldie (2001). First year is in progress using in kind contributions only.

Release analogues: Travel to Nth. Qld. and monitor release/assimilation with radio tracking.

iii) Upgrade facilities for Coxen's Fig-Parrot

Construct aviaries: Assumes existing aviaries at holding institutions are insufficient and allowing for duplication of facilities to minimise risk from disease, fire, theft etc.

Establish security: First year cost includes capital cost of electric fencing and video cameras.

iv) Initiate program for Coxen's Fig-Parrot

Acquire founding stock: Mostly NSW NPWS in kind but includes possible need for helicopter. Assumes additional stock will be required each year and that nest remains active.

Ensure security of nest: Assumes nest remains active over five years.

Monitor nest post-acquisition of eggs or chicks: Assumes nest remains active over five years.

Maintain captive population: Based on estimates from Goldie (2001) but subject to commercial negotiation.

12.4 Habitat assessment

i) Map habitat distribution

NSW NPWS 2000/2001 Threatened Species allocation.

ii) Investigate food plants

NSW NPWS contribution to Ph.D. study.

12.5 Habitat protection and enhancement

This action will not be implemented during the life of this plan but is included since its consideration is integral to any initial approvals. An estimate of costs is difficult and will depend on the length and success of the captive-breeding program. The value given is the minimum thought necessary for the initial construction of a holding facility, however, longer term costs that involve monitoring of released birds are likely to be substantially higher. These will be discussed in more detail in the proposed Captive Breeding Protocol (see 12.3.(i)).

i) Prescriptions and logging protocols

The logging approvals provided by the state government under the Integrated Forestry Operations approval require SFNSW to negotiate with NSW NPWS over the development of site specific prescriptions in areas where the species is recorded. As a core responsibility, there is no additional cost.

ii) Regulation of land use

The government authority responsible will depend on the location of records. As a core responsibility there is no additional cost.

iii) Habitat rehabilitation/expansion

Environment Australia NHT grant to Big Scrub Rainforest Landcare Group and Byron Shire Council. Strategy will depend on location of records and existing habitat corridors.

iv) Propagate food trees

NSW NPWS 2000/2001 Threatened Species allocation.

14 Preparation details

This recovery plan has been prepared by Dr. Ian Gynther, John Martindale and Stephanie Horton in close consultation with other members of the Coxen's Fig-Parrot Recovery Team. The actions, outcomes, priorities and costs are those agreed by the Team but do not necessarily represent the views of individual members or consultants.

14.1 Date of last amendment

No amendments have been made to date.

14.2 Review date

This recovery plan will be reviewed within five years of the date of publication.

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Appendix 1: Copy of Coxen's Fig-Parrot brochure, 1998 version.

WHERE TO LOOK

Coxen's Fig-Parrot is mostly seen in or near remnant stands of subtropical rainforest, in strips of rainforest along rivers and creeks, and in any other forest type where there is an abundance of fruiting figs. It may also be encountered in isolated fig trees in urban and agricultural areas.

Typical food trees are the Moreton Bay Fig *Ficus macrophylla*, various Sandpaper Figs such as *F. coronata* and *F. opposita* and Green-leaved Strangling Fig *F. watkinsiana*. Other species of fig trees are also known to be important food resources.

The bird is extremely difficult to see and is most likely to be detected by the noise of falling particles of discarded fruit as it feeds or by its high-pitched *zeet-zeet* call usually given in flight.

WHAT TO DO IF YOU SEE ONE

If you see one
DO NOT
attempt to capture or disturb it.

It is important that information about sightings gets to a member of the Coxen's Fig-Parrot Recovery Team as soon as possible! Please report any past or present sightings to:

NSW
NSW National Parks and Wildlife Service on (02) 6628 1177 or (02) 6651 5946 or your nearest NPWS office.

QUEENSLAND
Queensland Department of Environment and Heritage on (07) 3227 7055 or your nearest ODEH or Queensland National Parks and Wildlife Service office.

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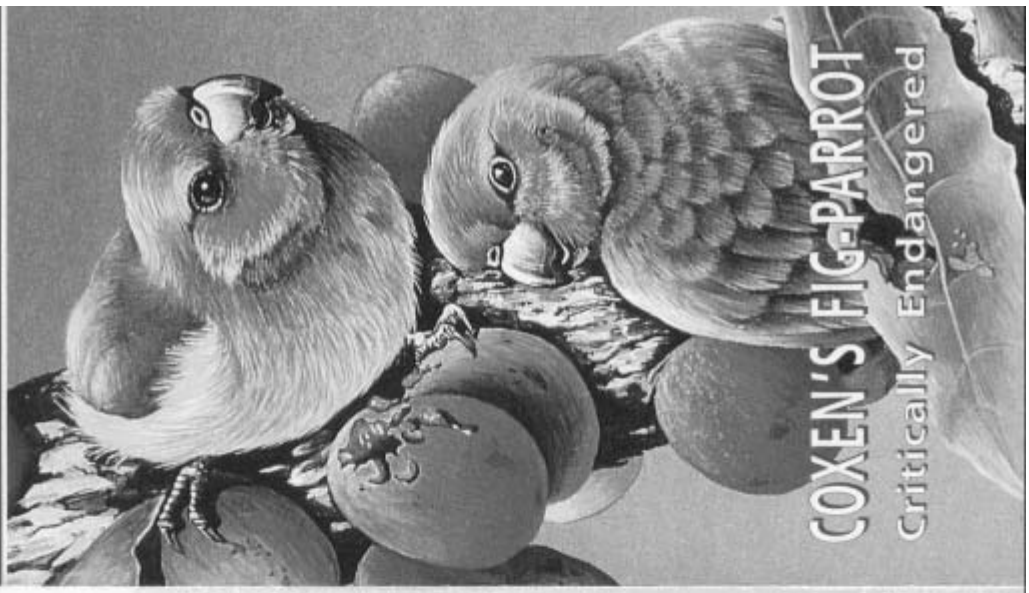
TEXT: *Liz Romer*
ILLUSTRATIONS: *Rose Bedford, Jenny Holmes and Sherry Varney*
PHOTOGRAPHS: *Currumbin Sanctuary and Ian Gynther*
SPONSORED BY: *The Coxen's Fig-Parrot Recovery Team*



ON THE BRINK

Coxen's Fig-Parrot is one of Australia's most endangered birds. Historical records show it was once numerous in subtropical rainforests between the Mary River in south-east Queensland and the Richmond River in north-east New South Wales.

Reports today suggest its range could extend as far as Gladstone in the north and Port Macquarie in the south. Nevertheless, due to extensive habitat clearing, its numbers have dramatically declined.

A BIT ABOUT THE BIRD

Very little is known about the biology of Coxen's Fig-Parrot. Our knowledge of its life history is based largely on information pieced together from incidental sightings and, where appropriate, extrapolated from knowledge of the other two Australian fig-parrots.

No known photos of this subspecies exist; only artistic impressions based on museum specimens are available. It would be of immense benefit to the recovery program to be able to obtain video or photographic evidence of the bird.

CONSERVATION MEASURES

A national recovery team was formed in 1993 to instigate actions to save Coxen's Fig-Parrot.

Regular searches for the bird are carried out by members of the recovery team and volunteers.

Mapping of suitable habitat is also being carried out to assist in the search for this elusive parrot.

At Currumbin Sanctuary in Queensland techniques of captive breeding are being developed with the closely related Macleay's Fig-Parrot (also known as the Red-browed Fig-Parrot) from North Queensland.

DON'T BE FOOLED

Coxen's Fig-Parrot resembles three species of lorikeet. All four of these parrots are generally green, small and fast flying.

Lorikeets often form large noisy flocks. They feed at the blossoms of various trees including eucalypts, melaleucas, banksias and grevilleas. Coxen's Fig-Parrot usually occurs singly or in pairs, though possibly forms small flocks in autumn and winter. It has a dumpy build with an extremely short tail and an over large head and bill, giving a somewhat heavy appearance. It closely resembles a Peachface Lovebird in size and build. It feeds mainly on the seeds contained in figs.

COXEN'S FIG-PARROT - 15cm
Forehead blue (often partly bordered red). **Cheek** orange-red bordered with blue. **Side of breast** yellow. **Primary wing feathers** blue & dark grey. **Bill** grey, tipped darker. **Underwing** mostly yellow-green with cream bands. Wings broad pointed.
Female similar, slightly duller.
Note: former name Blue-browed Lorikeet refers to diagnostic blue forehead (red or green in the three lorikeets).

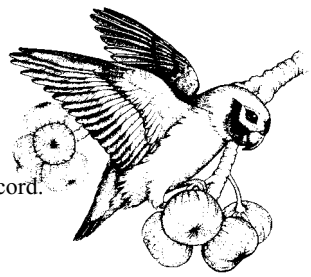
MUSK LORIKEET - 22cm
Forehead and ear red. **Crown** dull blue. **Hindneck** brownish. **Side of breast** yellow. **Bill** black, tipped red. **Underwing** mainly green. Slim, small-headed with long, fine wings and tail.

LITTLE LORIKEET - 15cm
Face red. **Hindneck** brownish. **Bill** black. Slim build, small-headed with long, fine wings and tail.

SCALY BREASTED LORIKEET - 23cm
Underwing mainly red. **Breast feathers** yellow and green giving scaled appearance. **Bill** red.

Appendix 2: Sighting Report Form

Coxen's Fig-Parrot
Records Appraisal Committee



Please use this to document details of any Coxen's Fig-Parrot *Cyclopsitta diophthalma coxeni* record.

Mail to: John Martindale, Threatened Species Unit, NSW National Parks and Wildlife Service, Locked Bag 914, Coffs Harbour NSW 2450.

Name:

Address:

Contact phone: (H) (W) (Fax)

Other observers present (include addresses and phone nos):

Date of observation:

Location (be as precise as possible, e.g. include park or state forest name, distance and bearing from named point features, road/track name, latitude/longitude etc.):

Habitat description (e.g. broad vegetation type, dominant tree species, topography, altitude etc.):

Sighting conditions (time of day, weather, visibility, duration of observation):

Optical or other aids used (e.g. binoculars, telescope, tape recorder):

Number of birds observed:

Distance from bird/height of bird above ground:

Prior experience with this species:

How confident are you of your identification (e.g. 90%, 100%?):

Description of bird (describe what you saw/heard, e.g. size, shape, comparative size of body parts, plumage, colour of eyes and bill, age, sex, calls etc. Attach copies of any sketches or field notes made. Use extra pages if required):

Behaviour of bird (What was the bird doing when observed? What alerted you to its presence?):

How was it distinguished from similar species?:

Reference books used:

Other comments:

[Office Use Only] Received: Case No.: Recommendation:

NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

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