

CHAPTER 11

RECOVERY PLAN

Adopted by the Australian Nature Conservation Agency,
Endangered Species Program

SUMMARY

Current Species Status:

Endangered in South Australia (Schedule 7, National Parks and Wildlife Act, 1972); listed in CITES Appendix 2; referred to Australian National Conservation Agency as a species of indeterminate status needing immediate attention (RAOU-WWF Resolution 1(i) (Joseph 1992); South Australian subspecies is Endangered under proposed IUCN criteria ($N_e < 50$) (Garnett 1992b). The South Australian subspecies is restricted to patches of remnant habitat on Kangaroo Island, and is estimated at approximately 150 individuals. The breeding rate is very low, and the population may be declining. It is also vulnerable to habitat loss in fires.

Habitat Requirements and Limiting Factors:

The Glossy Black Cockatoo requires sheoak (*Allocasuarina*) forest or woodland for foraging, and large hollow bearing eucalypts for roosting and nesting habitat. It is limited by habitat loss due to land clearance, and may face a shortage of nest hollows exacerbated by competition from introduced species.

Recovery Plan Objectives:

- (1) To ensure that a viable breeding population persists on Kangaroo Island.
- (2) To reduce the vulnerability of the South Australian subspecies by establishing a second breeding population.

Recovery Criteria:

- (1) An increase in the breeding rate on Kangaroo Island above current levels.
- (2) An increase in the population census on Kangaroo Island to at least 400 birds.
- (3) The establishment of at least one self-sustaining breeding population within the former range in mainland South Australia.

Research Actions Needed:

- 1) a) Map and evaluate remnant habitat
b) Study of drooping sheoak autecology
- 2) Survey and monitor the population
- 3) a) Study the population demography
b) Measure genetic diversity
- 4) a) Assess the feasibility of a re-introduction

- b) Investigate the feasibility of captive breeding

Management Actions Needed:

- 1) Maintain the observer network and database
- 2)
 - a) Expand the nest box program
 - b) Monitor and maintain nest hollows and boxes
- 3) Protect existing habitat
- 4) Re-establish habitat through tree planting
- 5) Conduct public outreach and education

Biodiversity Benefits:

The *Allocasuarina verticillata* / *Eucalyptus cladocalyx* associations that provide habitat for the Glossy Black Cockatoo in South Australia is sharply reduced from its original distribution and is probably declining. Protection of remnant areas and re-establishment of this vegetation community will also benefit other significant species that use it as habitat.

INTRODUCTION

Description of Species and Subspecies

The Glossy Black Cockatoo (*Calyptorhynchus lathami*) is the smallest member of the endemic Australian genus that includes most of the Black Cockatoos, and is notable for its bulbous bill and variable plumage markings. It is by far the most highly specialized cockatoo in its habitat and diet. Schodde et al (1993) investigated

morphological variation among populations and concluded that the species could be divided into three subspecies: the core population in south-eastern Australia (*C.l. lathamii*); an outlying population in central eastern Queensland (*C.l. erebus*); and the isolated population on Kangaroo Island, South Australia (*C.l. halmaturinus*). This Recovery Plan will focus on the highly endangered South Australian subspecies, which is distinguishable from the core subspecies by its small body and disproportionately large bill.

Distribution

The present distribution of the Glossy Black Cockatoo extends eastward from the Great Dividing Range, from central Queensland through New South Wales and into the eastern tip of Victoria, with scattered populations in the Pilliga and Riverina regions. In addition an isolated population in South Australia is restricted to Kangaroo Island. The precise distribution of the species at the time of European settlement is uncertain because the earliest records often confused it with its closest relative, the Red-tailed Black Cockatoo (*C. magnificus*). However, there are historical records of Glossy Black Cockatoos from eastern Victoria, Tasmania, and King Island.

The range of *C. l. erebus* may have changed little in historic times, and though its range has contracted *C. l. lathamii* is still widely distributed and locally abundant, but *C.l. halmaturinus* is in a much more precarious position (Schodde et al. 1993). It probably disappeared from south-east South Australia and western Victoria as a result of climatic changes during the most recent glacial epoch 12-25,000 years ago. Since European settlement it has declined further, disappearing from Eyre and Fleurieu Peninsulas and the southern Mount Lofty Ranges. The last records from the mainland are from the 1970's (Joseph 1989). The subspecies is now restricted to Kangaroo Island where the population is centred on the western half of the north coast and is estimated at 150 to 200 birds (see Appendices 1 and 2 for details of current distribution).

Habitat

Glossy Black Cockatoos are rarely seen far from sheoak trees (*Allocasuarina spp.*), the seeds of which provide their principal food source. These trees typically occur either in pure stands or in sheoak-eucalyptus forest. The cockatoos are a temperate species and in the northern parts of their range are largely confined to mountain ranges and plateaus. In addition to sheoaks, they need eucalypts both for shelter between foraging bouts and for night roosting sites. They also require large hollow-bearing eucalypts as nesting habitat.

On Kangaroo Island the foraging habitat consists almost entirely of drooping sheoak (*Allocasuarina verticillata*) woodland, sugar gum (*Eucalyptus cladocalyx*) stands provide most of the roosting sites, with sugar gums and South Australian blue gums (*E. leucoxylon*) providing virtually all the nesting sites. The cockatoos also require fresh drinking water daily, particularly during summer. Habitat is concentrated in the western half of the Island's north coast, and scattered along steep slopes near inland waterways. (See Chapter 2 for more details of habitat characteristics.)

Life History and Ecology

Reproductive biology

Glossy Black Cockatoos are closely paired year round, and pairs are permanent or semi-permanent. They nest in winter, with most records from April through July. Nests are in tree hollows high in eucalypts, usually live sugar gums or South Australian blue gums. Nesting pairs show little territoriality, and two nests have been observed in the same tree. Nest preparation is minimal, although the female may line the hollow floor with chips of wood chewed from inside the hollow. The female lays only one egg, and performs all of the incubation and brooding. The egg hatches after approximately 28

days. The male regurgitates food for the nesting female, who in turn feeds the nestling. The nestling fledges about 90 days after hatching, after which it is fed by both parents. See Chapters 3 and 5 for further details of breeding biology.

Life history

The period of juvenile dependency usually lasts until the onset of the following breeding season, although it may sometimes last longer. During this period the juvenile accompanies its parents at all times, including roosting in physical contact. Parents preen their dependent young and feed it both by regurgitation and by sharing partially eaten seed cones. Juveniles develop foraging skills slowly, and are noticeably slow and clumsy at handling seed cones for some months. Nothing is known about the pattern of juvenile dispersal, pairing, or age of first reproduction in the wild. In captivity females usually begin to acquire adult plumage characteristics by one year (Connors & Connors 1988, Courtney 1986) but may take up to three years (Sindel & Lynn 1989). Males may begin to lose their juvenile tail bars as early as the second molt, but some barring can persist up until the seventh year. A captive female has laid a fertile egg at two years old (Sindel & Lynn 1989), but it is unknown at what age males reach sexual maturity.

No information is available on mortality rates. Predation by Wedge-tailed Eagles (*Aquila audax*) was the primary cause of mortality in Carnaby's Cockatoos (*Calyptorhynchus funereus latirostris*) studied in Western Australia (Saunders 1982), and the behaviour of Glossy Black Cockatoos suggests that these eagles, which are common on Kangaroo Island, prey on them as well. One Glossy Black Cockatoo carcass found on Kangaroo Island showed signs typical of predation by a Peregrine Falcon (*Falco peregrinus*) (unpublished data). The species maximum life span is unknown, but other cockatoos have potential life spans of many decades (Hill 1954).

Population structure

Joseph (1982) and other observers have noted an apparently male-biased sex ratio on Kangaroo Island, but the extent of this phenomenon has been uncertain because the yellow head markings characteristic of adult females are variable in extent and because sub-adults are often not distinguished reliably in the field. My observations have shown that a few (apparently young) paired females have little or no yellow on the head, but that there is also an excess of males. At Latham Conservation Park this bias was present year round and peaked in late winter at 1.7 males per female (unpub. data). The unpaired males did not leave the flock during mornings and evenings, showing they were not mated to nesting females.

The population also includes a very low proportion of young birds. In a survey of the Island in 1980, Joseph (1982) found only five juveniles among 115 birds, and in surveys in 1987 and 1988 he noted three birds with sub-adult plumage out of a combined total of 69 (Joseph 1987, 1988b). A 1993 survey found no dependent juveniles, and 10 birds with sub-adult plumage out of 101 identified by plumage type (Chapter 2). (Sub-adult plumage may be retained for up to three years by females and seven years by males.) A flock including more than 10 mated pairs studied by J. Pepper during three breeding seasons fledged an average of one juvenile per year (Chapter 5).

Diet

Various writers have noted reports of Glossy Black Cockatoos eating items other than sheoak seeds, including seeds of *Angophora*, *Acacia*, *Hakea*, *Eucalyptus*, and *Pinus*, as well as wood boring grubs. Most of these reports are second hand, and all are sketchy or concern single events. All observers agree that the primary food source is *Allocasuarina* seeds (Chapter 4). Although the cockatoos exploit several different species, they generally feed on only one in any given area (e.g., *Allocasuarina torulosa* in Queensland, *A. littoralis* in eastern New South Wales and eastern Victoria, and *A. verticillata* in inland New South Wales and South Australia) (Forshaw 1981).

Allocasuarina verticillata has previously been reported as the sole food source for the Glossy Black Cockatoo on Kangaroo Island (e.g., Cleland and Sims 1968, Joseph 1982, Blakers et al. 1984). More recently they have been seen feeding on *A. muelleriana* on several occasions (Pepper 1993), but this appears to be an unusual occurrence. Although some *A. verticillata* seed cones contain insect larvae, the cockatoos do not prefer trees with higher concentrations of larvae, suggesting that they do not seek them out as a food source (Chapter 4). The cockatoos occasionally chew eucalyptus fruits, but this does not seem to be directed towards feeding as it is associated with maintenance behaviors such as preening and chewing bark and twigs, and unlike foraging is never sustained for more than a few minutes.

Foraging ecology

On Kangaroo Island the cockatoos usually feed in the same small area for a period of days or weeks before shifting to a new foraging location. They show a noticeable preference for specific trees which they return to repeatedly while completely avoiding other nearby trees. During a field study of foraging behaviour (Chapter 4), the cockatoos spent the vast majority of foraging time actually handling cones. The handling time per cone was determined primarily by cone size, while seed intake rate was determined primarily by seed weight per cone. The cockatoos preferred trees bearing cones with higher ratios of seed to cone mass, larger seeds, and greater total seed mass per cone. The cockatoos' preference for cones with the highest proportion of seed rather than the highest seed weight does not appear to maximize their gross food intake rate, but does appear to maximize their net energy gain. This strategy is consistent with being limited by energy rather than protein or another specific nutrient. In most of the foraged trees a small percentage of cones contained seed-eating insect larvae. The birds showed a slight tendency to avoid trees with more infested cones, suggesting that they did not seek out

insect larvae as a food source. Males foraged significantly faster than females, resulting in a 20% higher seed intake rate.

Reasons for Listing

Degree of decline

No estimates of historical population sizes are available, but the South Australian subspecies in particular has clearly suffered a severe decline. Barrett (1949) reported that the Glossy Black Cockatoo "has disappeared from many districts owing to the advance of settlement and the destruction of its food-trees". Within the former range in mainland South Australia, S.A. White (in Mathews 1916, vol. 6 p. 131) stated that they were "quite numerous in the seventies of the last century in the southern portion of the Mt. Lofty Ranges", and reported to be "very plentiful in the ranges south of Adelaide in the early days of the colony". The clearance of most of Kangaroo Island since World War II presumably has sharply reduced the population there as well.

Causes of past decline

The Glossy Black Cockatoo is a habitat specialist, and the main reason for its decline is clearly habitat loss. This has been due largely to land clearance for agriculture, which has left very little sheoak woodland in South Australia. Drooping sheoak trees were also selectively harvested for firewood and ornamental uses (Cleland and Sims 1968). Frequent fires may also have played a role in habitat destruction. Cooke (1987) found that on mainland South Australia grazing by rabbits can prevent regeneration of drooping sheoak. This may have reduced foraging habitat even in uncleared areas, especially following fires. The loss of nesting habitat through ring-barking and selective felling of large eucalypts may also have contributed to the cockatoo's decline.

Current threats

The South Australian Glossy Black Cockatoo is extremely vulnerable because of its small numbers and limited range, which leave it at risk from various catastrophes such as food shortages, disease epidemics, and bush fires. In addition, there is some evidence that the population is currently in decline (Chapter 9). Possible causes of this decline and other specific threats are discussed below.

Low breeding rate

All available evidence points to a very low breeding rate on Kangaroo Island (see "Population Structure" above). We do not have enough information on ecology and demography to estimate what recruitment rate is required for a stable population, but the observed rate of a few percent per year is far lower than has been reported for any other cockatoo, and would require exceptionally low mortality rates to be sustainable (Chapter 10). The two most likely causes are insufficient food resources and a shortage of suitable nest hollows (see below). The importance of these two factors may vary both between regions and between years, but the fact that the cockatoos start nests at a very low rate but usually complete them successfully suggests that hollow availability may be the more critical limitation.

Food limitation

It is not clear how severely its food supply limits the current population. The mere presence of seed cones does not imply adequate food, because the cockatoos are probably constrained by how efficiently they can forage and are therefore quite sensitive to the density and quality of food resources (Clout 1989, Chapters 2, 4). The temporary addition of a second tree species to their diet just before *A. verticillata* cones ripened in 1991 is a possible indication of a seasonal food shortage (Pepper 1993). Consideration of foraging habitat requirements for *C. l. halmaturinus* should include not only the immediate situation but also the need to increase the population size, and the unpredictable but inevitable losses of habitat to bush fires.

Nest hollow shortage

It is not feasible to survey the density of useable tree hollows on Kangaroo Island because potential hollow openings are too high to inspect easily, but several lines of evidence point to a shortage. Most cockatoo pairs do not start a nest even after searching for and investigating hollows, and hollows used in past years are almost always occupied each nesting season. The cockatoos adopted artificial hollows as soon as they were available, and the high occupancy rate of natural and artificial hollows by other species also suggests a limited supply. Possible causes of a hollow shortage include a history of commercial harvesting of sugar gums for timber along much of the north coast, and the common historical practice of ring-barking large eucalypts on pastoral properties. Also, much of the foraging habitat is second growth, following deliberate firing and clearing effort for agriculture. While sheoak matures in a decade or two, eucalypts do not form hollows for well over 100 years (Saunders et al. 1982, Ambrose 1982 in Linenmeyer et al. 1991).

Nest hollow competition

Competition for nest hollows may be a significant factor both in preventing the cockatoos from starting nests and in preventing them from successfully fledging young. At least three of eight known nest failures were caused by disruption by other species, including Little Corellas (*Cacatua sanguinea*) and brush-tail possums (*Trichosurus vulpecula*) (J. Pepper, unpub. data). Furthermore, tree hollows used by Glossy Black Cockatoos in previous years are more often occupied by competitors during the nesting season than by the cockatoos. These additional rivals include feral honeybees (*Apis mellifera*) and Yellow-tailed Black-Cockatoos (*Calyptorhynchus funereus*). Honeybees may be the most important and the most difficult to manage of these competing species because they are quite numerous on Kangaroo Island, fill hollows quickly, occupy them for years at a time, and are difficult to exclude or remove. Because most of these species have either appeared or become more numerous after European settlement as a result of

human activity, nest hollow competition may be a relatively recent pressure on the cockatoo population.

Fire

Perhaps the most critical short term threat to the population is the loss of habitat to bush fires. Drooping sheoak is fire sensitive, and may require approximately 15 years to regenerate sufficiently to support a population of Glossy Black Cockatoos (Pepper 1992). Fire apparently caused the species disappearance from King Island (Green & McGarvie 1971). Because few large areas of foraging habitat remain on Kangaroo Island, a series of major bush fires over a period of 10 or 15 years could have a decisive impact there as well. This threat was demonstrated and intensified by a 1991 fire that burned most of the habitat on the Island's west coast, displacing approximately 20 Glossy Black Cockatoos (Pepper 1992). Even relatively small fires could have severe impacts in critical habitat areas, such as a 3 km stretch of the Middle River that has produced half of the known nests on the Island (Chapter 9). Particularly in combination with high grazing pressure, fire may also cause permanent loss of sheoak forest (Cooke 1987, Pepper et al. 1993).

Habitat loss

Wholesale habitat destruction on Kangaroo Island Land ended when clearance for agriculture was largely stopped by the Native Vegetation Act of 1985. Residents continue to clear drooping sheoaks from housing blocks in several habitat areas however, including the towns of American River, Western Cove, and Penneshaw, and to lesser extent east of the De Mole River. Current town plans do not include conservation of cockatoo habitat as a goal.

Nest robbing

Nest robbing for the pet trade is a threat to many endangered parrots, including Australian cockatoos (Mell & Wetherall 1992). There is no evidence whether or how

severely nest robbing has affected the Glossy Black Cockatoo. It is important to recognize this danger however, because the species is gaining popularity among aviculturists and the South Australian subspecies is receiving increasing public attention.

Inbreeding and loss of genetic diversity

The Glossy Black Cockatoo is clearly in a genetic bottleneck, with an effective population size well below that necessary to maintain genetic diversity. If the population remains small for several generations it will lose genetic diversity and the ability to adapt to changes in the environment, and will risk inbreeding depression and accompanying loss of health and fertility. Although this is an important consideration, the long generation time of the species makes the process slower than it would otherwise be, and the risk of extinction from other causes is probably more pressing (Chapter 10).

Lack of a captive population

Captive breeding programs have aided the recovery of a number of endangered parrots. Unfortunately, although Glossy Black Cockatoos can be bred in captivity with some difficulty, aviary collections contain no known specimens of *C. l. halmaturinus* (Garnett 1992b). This greatly increases the risk of the subspecies becoming extinct.

Existing Conservation Measures

Recent conservation actions include the purchase and dedication of Lathami and Lashmar Conservation Parks in 1987 and 1991 respectively, to preserve critical habitat. The planting of several hectares of drooping sheoak on former pasture within Lathami in 1991, and the installation of 12 nest boxes in and near this park in 1992. In addition, there are several revegetation projects in progress on farm lands under the Landcare program where sheoaks are being replanted. Other ongoing measures include: collecting sighting records from the volunteer network; maintaining a computerized sightings database; and monitoring and maintaining nest boxes as resources permit.

A fundraising drive in winter 1993 coordinated by Terry Dennis of the Department of Environment and Natural Resources resulted in an \$8,500 'Glossy Black Rescue Fund' being established and administered by the National Parks Foundation of South Australia Incorporated. The aim of this effort was to establish a fund to support habitat protection initiatives and restoration projects on the Island.

Other recent efforts to increase public awareness and support have included: presentations to Island schools and other organizations; articles in the Island Landcare newsletter, local and statewide newspapers, and magazines; several television reports and interviews associated with the fundraising drive; the establishment of a permanent display at the 'Wool and Wilderness' visitor centre on Kangaroo Island.

RECOVERY OBJECTIVES AND CRITERIA

Objectives:

- 1) To ensure that a viable breeding population persists on Kangaroo Island.
- 2) To reduce the vulnerability of the South Australian subspecies by establishing a second breeding population.

Criteria:

The criteria for achieving these objectives will be:

- 1) An increase in the breeding rate on Kangaroo Island above current levels.
- 2) An increase in the population census on Kangaroo Island to at least 400 birds.
- 3) The establishment of at least one self-sustaining breeding population within the former range on mainland South Australia.

RECOVERY ACTIONS - RESEARCH PHASE

Action 1: (a) Map and evaluate remnant habitat

(b) Study of drooping sheoak autecology

Aims

To create an accurate map of the distribution of *Allocasuarina verticillata* and other known habitat elements on Kangaroo Island, and study the autecology of *A. verticillata* as it relates to Glossy Black Cockatoo feeding ecology.

Justification

Because the distribution and abundance of the cockatoos is so closely linked to that of drooping sheoak, many management decisions will depend on knowing: how much foraging habitat exists and where; how fragmented it is; what threats are posed from bush fire, overgrazing, or land clearance; the best techniques and key locations for revegetation effort. Mapping large (hollow bearing) eucalypts would also provide crucial information on the distribution of potential nesting habitat relative to foraging habitat. Accurate habitat maps will make habitat and population surveys (e.g., Chapter 2) more complete and reliable, and help determine the best sites for nest boxes (Management Action 2) and habitat protection and creation projects (Management Actions 4 and 5).

Methods

Habitat resource mapping will be carried out using stereoscopic aerial photos and mapping equipment at the Department of Geography, University of Adelaide. The data will be incorporated into a GIS system (ARC/INFO) to integrate information on habitat distribution with information on: topography; soils; natural and artificial water sources; land tenure/use; fire history; preferred foraging areas; movement patterns; and potential nesting sites. The resulting habitat map will be extensively ground truthed to verify accuracy and assist in discriminating the various *Allocasuarina* species.

The GIS will be interrogated to provide an analysis of suitable and potential habitats for the Glossy Black Cockatoo. Analysis of the vegetation structure and fire history will provide the basis for a forward projection of: resource availability; suitable sites for revegetation projects with food and nesting tree species; areas most suitable for nest box introduction and artificial water points. The project will also provide a methodology that can be expanded to identify sites on the Fleurieu and Eyre Peninsulas for potential habitat (re)establishment and species reintroduction.

Early results from foraging ecology work indicate levels of selectivity in the choice of food trees in Glossy Black Cockatoo flocks on Kangaroo Island. Analysis of cones/seed from favored foraging trees showed those trees to have significantly higher: ratios of seed to cone mass; protein levels (9%); lipid (26%); total energy content (13%) (Chapter 4). These results indicate that much more needs to be understood about these variables and how to select for optimum food value characteristics in revegetation projects. Funding for this work will be pursued by senior research staff at the University of Adelaide

Action 2: Survey and monitor the Kangaroo Island population

Aims

To thoroughly survey Kangaroo Island for Glossy Black Cockatoos on a regular basis to obtain accurate and current information on population size, flock structure, recruitment, and distribution.

Justification

This information is essential to assess trends in demography and habitat use, the effectiveness of management steps already taken, and the priorities for further action.

Methods

Searches in previously unsurveyed or rarely visited habitat should be conducted twice yearly initially, to determine seasonal use. Coordinated surveys should be conducted each year for five years to comprehensively assess flock size and composition, individual movements between areas and to determine levels of recruitment (Research Action 2). To increase its accuracy and to include as many dependent juveniles as possible the survey should be carried out during the spring (October) post-breeding aggregation behaviour and should focus on the morning and evening hours when the birds are most active (Chapter 9). Each survey should follow the methodology of previous surveys and include the same localities so the results can be compared meaningfully. New habitat areas indicated by vegetation mapping (Research Action 1) and sighting reports (Management Action 3) should be included. Covering the Island thoroughly will require help from paid and volunteer assistants.

Action 3: (a) Study the population demography

(b) Measure genetic diversity

Aims

To increase our understanding of the ecology and demography of the South Australian Glossy Black-Cockatoo.

Justification

Many aspects of the species' life history and demography are totally unknown, and can be learned only through studies of marked birds. Specific questions include: age at independence, pairing, and first nesting; patterns of plumage development in the wild; dispersal patterns of young birds; juvenile and adult mortality rates; duration of the pair bond and nest site fidelity; extent of bias in reproductive success (i.e., a few individuals having most of the offspring); home range size; genetic diversity; and seasonal movement patterns. All are important as a basis for management priority and many are important in

assessing the population's viability and vulnerability to inbreeding depression. The need for basic data on the species' population dynamics is highlighted in Chapter 10, and has been pointed out previously by Joseph (1988a) and Garnett (1992a, 1992b). An additional benefit of a marking program will be to verify and increase the accuracy of population estimates.

Methods

Females and nestlings will be trapped at nests located while monitoring hollows and boxes (Management Action 2) following the method of Saunders (1982, *in lit.*). To increase the marked population especially of males, it may also be necessary to mist net (or spring trap) at roosting, drinking or foraging sites by adapting methods used for above-ground netting of other large parrots (e.g., Munn 1991, Meyers & Pardieck 1993). To avoid the increased mortality rates associated with wing tagging (Saunders 1988), birds will be individually marked with color coded or alpha numeric leg bands on the left leg, which is the most visible leg on foraging birds. In addition, blood and/or feather samples will be obtained from trapped birds to determine genetic relatedness in individuals and between flocks.

Re-sighting records of marked birds will be collected during population surveys of the Island (Research Action 2), from reports by volunteer observers (Management Action 1), while monitoring nest hollows (Management Action 2), and will be supplemented as required by visits to known habitat areas. Data will be stored and analyzed in a computer database modified from one currently being used in a South Australian National Parks and Wildlife Service study of Australian sea lions.

Action 4: (a) Assess feasibility of a re-introduction

(b) Investigate the feasibility of captive breeding

Aims

To determine whether appropriate conditions exist for the reintroduction of the Glossy Black Cockatoo into its former range on mainland South Australia, to locate the best site for a re-introduction, and to assess what environmental preparations would be required. In addition, to determine the usefulness and likely success of establishing a captive breeding population to assist in any (re)introduction scheme.

Justification

Establishing a second population would greatly enhance the security of the South Australian Glossy Black Cockatoo population by providing insurance against any catastrophic decline on Kangaroo Island, conceivably due to bush fires or disease. Any such attempt would be futile however, unless the necessary habitat conditions exist for a successful reintroduction, including removal of the causes of the initial reduction and existence of adequate protected habitat (Kleiman 1991). The ideal re-introduction site would have permanent fresh water and substantial areas of drooping sheoak in close proximity to large eucalypts.

The very low reproduction rate in evidence on Kangaroo Island and the evidence of a reduction in recorded flock size over the last 15 years (Chapter 9), suggests that the population may be in decline. This situation will not improve markedly unless the number of young being recruited into the flocks increases (Chapter 10). Management Actions 2, 3, 4 and 5 will address this concern, but by themselves may not be adequate to turn around the evident decline or to provide supplementary birds for any (re)introduction program.

Methods

The first step in assessing the feasibility of re-introduction is to establish the amount and distribution of suitable habitat remaining within the former mainland range. This will be carried out using aerial photography to map the distribution of remnant

Allocasuarina verticillata and large eucalypts over the Eyre and Fleurieu Peninsulas, and the southern Mount Lofty Ranges, with particular attention to the Talisker and Hindmarsh Valley regions and to Deep Creek Conservation park, where observers have noted substantial habitat remnants (Joseph 1989; P. Seager, pers. comm.). If a potential site for reintroduction is found, the extent of habitat enhancement that would be required will be assessed, and a draft budget and time table for such an effort will be prepared.

The Adelaide Zoological Gardens, in broad consultation with specialist aviculturists, advise that the technology and expertise is available to confidently build a captive population of Glossy Black Cockatoo using proven techniques to minimize subsequent problems with imprinting in hand-raised birds. In controlled captive situations it would be possible to both manipulate the productivity of aviary adults and to increase the number of young in the scheme using artificially incubated fertile eggs from the wild. The Adelaide Zoo is prepared to make substantial investment to be involved in such a scheme (see Implementation Schedule), initially trialing techniques and training staff using closely related species.

RECOVERY ACTIONS - MANAGEMENT PHASE

Action 1: Maintain the observer network and records database

Aims

To support and enlarge the network of volunteer observers and maintain the database of Glossy Black Cockatoo sightings on Kangaroo Island.

Justification

A network of volunteer observers has been established and reporting forms distributed to record their sightings. Records are maintained on a computer database of all sighting records of Glossy Black Cockatoos from Kangaroo Island, currently numbering almost 1000 records. This information is useful for monitoring the population over shorter time spans than the intervals between surveys, for assessing habitat usage patterns, and for analyzing trends in population size, distribution, and habitat use (e.g., Chapter 9).

Methods

The Scientific Officer will provide feedback to volunteer observers, collect their records, and recruit new observers as necessary. Maintaining the database will involve vetting and entering records from volunteer observers and any other sources that become available (e.g., future population surveys). The total time required should be no more than one day per month.

Action 2: (a) Expand the nest box program

(b) Monitor and maintain nest hollows and nest boxes

Aims

The primary goal is to provide nest sites in suitable habitat areas where they are in short supply, and thereby increase the nesting and recruitment rate. A secondary goal is to gain more information about the severity of the nest hollow shortages in different areas. The use of natural hollows and nest boxes during the nesting season by Glossy Black Cockatoos and other competing species to be closely monitored.

Justification

A shortage of suitable nest hollows is apparently a significant factor limiting population growth in some areas. In preliminary trials the cockatoos successfully used nest boxes installed at Stokes Bay, resulting in an increased nesting rate in the local flock in 1992 (J. Pepper & T. Dennis, unpub. data). This initial success suggests nest boxes may be an effective management tool. The population's response to provision of nest boxes is also a good measure of the importance of nest hollow limitation (Waters et al. 1990).

Knowing how many hollows are occupied by other species will indicate how much hollow availability is reduced by competition, and which species are important competitors. Knowing what proportion of the available hollows the Glossy Black Cockatoos use will indicate whether they are limited by hollow availability in that area, and whether the addition of nest boxes removes that limitation. Data on how many nests fail and at what stages may shed light on other obstacles to successful breeding. Recording which hollows the cockatoos use will show what qualities they seek out in a nest hollow and whether nest boxes are attractive alternatives to natural hollows. Identification of nesting females by their individual head markings, or from leg bands, will reveal whether they re-use the same hollow repeatedly, and whether a minority of the females are responsible for most of the successful breeding.

Methods

The first stage of the project will involve testing the more cost-efficient methods of building and installing nest boxes currently being developed by the Department of Environment and Natural Resources, compared with those used in the initial trial, and refining techniques for reducing competition from other species. The boxes are designed with entrances too small for Yellow-tailed Black-Cockatoos, and tree collars will be used to exclude possums. Each spring, Shelltox pest strips will be placed in the boxes to exclude honeybees during the swarming season, also any repairs will be performed at this time. The program should be gradually expanded if justified.

The nesting effort and success rate of pairs using the boxes, as well as the effectiveness of excluding competitors, will be assessed by close monitoring during the nesting season (Management Action 2b). The effect of the boxes on local breeding rates will be evaluated during the regular surveys (Research Action 2), and correlated with spring count data noting the number of juveniles in particular flocks before and after installing nest boxes.

Both nest boxes and natural hollows used in past years will be monitored for use by Glossy Black Cockatoos and other species. Currently this includes 10 natural hollows and 12 nest boxes. During the nesting season an observer will watch each hollow once a month during either the first or last hour of daylight. Unbanded nesting females will be identified by photographing their distinctive head markings with a telephoto lens. Hollows can also be checked for occupancy by brushtail possums by climbing to the hollow or by extending evening watches for an hour after dark using the "stag watching" technique (Smith et al. 1989). On the basis of these results it may be desirable to install tree collars on trees with natural hollows as well as those with nest boxes.

Comments

The proposed design of nest boxes will facilitate the capture of the adult female as well as the periodic weighing and marking of nestlings. This would permit the tracking of nestling growth rates, which are a useful indicator of food supply and population viability (Saunders 1986), the marking of individuals, as well as enable the future deployment of radio transmitters.

Action 3: Protect existing habitat

Aims

To prevent both temporary and permanent loss of habitat by protecting it from grazing, fire, and land clearance.

Justification

Habitat destruction has been the primary cause of the Glossy Black Cockatoo's decline and is still the most immediate threat to the South Australian subspecies. A series of large bush fires on Kangaroo Island within a 10-15 year period could have a severe impact on the population. Within some National Park Reserves grazing by feral goats poses a threat to drooping sheoaks, particularly during regeneration after fires. Much of the habitat outside of Reserves is grazed by livestock, which suppresses regeneration of sheoak and often prevents all regeneration of eucalypts. Habitat clearance is also a threat in several developing areas.

Methods

Fire fighting plans for relevant Reserves will be reviewed in light of the sensitivity of drooping sheoak woodland, and revised where appropriate (Action 1). Efforts at controlling goat populations will be intensified, especially in areas recovering from fire. The Kingscote and Dudley Councils will be consulted on ways of reducing the negative effects of current and future development at Penneshaw, American River, and Western

Cove. Where appropriate, town plans may be amended to include conservation goals for Glossy Black Cockatoo habitat.

Habitat protection on private land will focus on encouraging voluntary efforts by land owners. This will be facilitated by the availability of the 'Glossy Black Rescue Fund' which will provide grants for habitat protection and creation. Projects considered will include fencing to protect habitat from livestock, and fire protection measures such as fuel breaks for critical habitat areas.

Action 4: Re-establish habitat through tree planting

Aims

To increase Kangaroo Island's carrying capacity for Glossy Black Cockatoo flocks by planting trees to create new foraging and nesting habitat.

Justification

Increasing the Island's carrying capacity is essential both to protect the current population from temporary habitat loss in bush fires, and to allow the population to grow to a more secure size.

Methods

Tree planting should focus on drooping sheoak mixed with sugar gum, or blue gum along water courses. Because complete habitat includes both drooping sheoaks and mature (slow growing) eucalypts, the most practical approach in the short to medium term is to plant drooping sheoak near existing large eucalypts. Attention should also be given to creating links and corridors between existing habitat patches to make them more accessible to the cockatoos. Where feasible, direct seeding is a more cost effective method than planting seedlings, although high rates of germination and survival may only occur in wet years, especially in drier coastal areas (Cooke 1987, pers. obs.). Tree

planting projects will make use of the seed bank at Parndana Area School which has a large supply of drooping sheoak seed.

Several areas on public land should be considered for revegetation projects. Planting should continue on the 1.4 sq. km. of cleared land in Lathami Conservation Park, several hectares of which have recently been planted with drooping sheoak. The Kingscote and Dudley Councils should be consulted on possibilities for revegetation in council reserves such as Duck Lagoon, the Middle River reservoir, and various smaller reserves. Coastal reserves in particular include large amounts of land well suited to growing drooping sheoak. Planting and fencing of coastal reserves would require negotiations with adjacent landowners who currently use most of them as pasture. The potential for re-vegetating the disused gypsum mine at Ballast Head in cooperation with its former operator should also be investigated and pursued.

Efforts to create more habitat on privately managed property will build on the strong local support for the Glossy Black Cockatoo's conservation. Voluntary efforts will be supported both logistically and financially, through grants from the 'Glossy Black Rescue Fund'. Proposals will be solicited from individuals, Landcare groups, schools, clubs and organizations, and evaluated by a selection committee in terms of their feasibility, expected benefit to the cockatoos, and cost effectiveness. The value of projects in terms of public involvement and education should also be considered.

Action 5: Conduct public outreach and education

Aims

Public outreach has two main goals: to influence land management practices to protect and enhance Glossy Black Cockatoo habitat; and to recruit volunteers for the observer network and to help with population surveys, the nest box program, and monitoring nest hollows and boxes.

Justification

The involvement and support of the public has been and will continue to be a crucial part of the recovery effort. Local land owners control most of the Glossy Black Cockatoo's habitat, and their attitudes and involvement will be important factors in the species' fate. Volunteer labor is extremely helpful and in some cases necessary for the proposed management actions, and using volunteer labor has the two benefits of lowering costs and increasing public awareness and support.

Methods

The Scientific Officer will give presentations to Island schools, clubs and organizations as opportunities present themselves. In cooperation with Dept. Primary Industry advisers, they will assist local landowners and Landcare groups in designing and carrying out habitat enhancement projects, including projects involving other programs such as Landcare, Trees for Life, and the Save the Bush. Ongoing volunteer assistance will be solicited from Island residents and organizations (e.g., Eco Action, Flora & Fauna Club, and Friends of National Parks), and mainland conservation and ornithological organizations will be approached for help with labor intensive projects such as population surveys and installing nest boxes.

Table 11.1. Implementation schedule.

Total Estimated Cost of Recovery - in \$000's/year. (\$) indicates agency funding other than ANCA.

Action #	Task Description	Priority	Feasibility	Agency	Cost Estimate (\$000's/year)				
					1994	1995	1996	1997	1998
Research Phase:									
1(a)	Map remnant habitat	1	100%	U of Ad	(20.2)	(15)	-	-	-
(b)	Sheoak autecology	2	100%	U of Ad	(2.5)	(30)	(30)	(30)	-
2	Survey/monitor population	1	100%	DENR/ESP	(4.5)	15.5 (5.5)	15.5 (5.5)	15.5 (5.5)	15.5 (5.5)
3(a)	Population demography	1	95%	ESP	-	25	25	25	25
(b)	Genetic diversity	2	95%	ESP	-	-	10	10	10
4(a)	Assess re-introduction	2	100%	DENR/ U of Ad	-	(17.5)	8.5	-	-
(b)	Investigate captive breeding	2	95%	AdZ/ESP	(2)	(5)	(10)	20 (15)	20 (15)
Management Phase:									
1	Observer network/database	2	100%	DENR/ESP/Vol	(5.5)	1.5 (5.5)	1.5 (5.5)	1.5 (5.5)	1.5 (5.5)
2(a)	Expand nest box program	1	90%	DENR/ESP/Vol	(4)	12.5 (5.5)	12.5 (5.5)	5 (5.5)	5 (5.5)
(b)	Monitor/maintain nest boxes	1	100%	DENR/ESP/Vol	(2.5)	10 (5.5)	7.5 (5.5)	7.5 (5.5)	7.5 (5.5)
3	Protect existing habitat	1	95%	DPI/GBRF/STB/Vol	(18)	(23)	(23)	(23)	(23)
4	Re-establish habitat	1	100%	DPI/GBRF/STB/Vol	(22)	(25)	(25)	10 (25)	10 (25)
5	Public outreach	2	100%	DENR/ESP?Vol	(4.5)	(4.5)	2.5 (2.5)	2.5 (2.5)	2.5 (2.5)
	Recovery Team - Admin. Trav.			DENR/ESP/Vol	(2.5)	1 (2.5)	1 (2.5)	1 (2.5)	1 (2.5)
				ESP Total:	-	65.5	84	98	98
				Other Agency Funds:	88.2	144.5	115	120	90
				Combined Totals:	88.2	210	199	218	188

AGENCIES:

AdZ - Adelaide Zoological Gardens
 DENR - Dept. of Environment and Natural Resources (SA)
 DPI - Dept. of Primary Industry (SA)
 ESP - Endangered Species Program (ANCA)

GBRF - Glossy Black Rescue Fund
 STB - Save The Bush
 U of Ad - University of Adelaide
 Vol - Volunteerism

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