Little Corella (*Cacatua sanguinea*)

Resource document

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Government of South Australia
Department for Environment and Heritage

March 2007

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1. Introduction

Most Australians value and enjoy native wildlife. Native birds are an intrinsic and colourful part of our lives. However, with changing land use, urban forestation and environmental and agricultural management practices, the balance of many species has altered. Some native species that were abundant are now threatened and conversely, some species with naturally low population numbers have become abundant.

Many Australian native birds have the potential to be labelled as pests. Given the modification and urbanisation of many natural areas, birds in both urban and rural areas are more prone to be at conflict with humans as they compete for food, water and refuge. In many parts of Australia people experience some problems related to native birds. The nature and scale of the problem differ according to the species present, type of land use (e.g. industrial, horticultural, agricultural or residential), natural biodiversity features of a region and the population dynamics of the native species concerned. The pest potential of native birds is linked to the behaviour of species, their local distribution and abundance and the nature of the habitat modification.

The most prominent native bird species causing economic, social and environmental impacts are Galahs, Little Corellas, Long-billed Corellas and Sulphur-crested Cockatoos. These species have generally been favoured by the introduction agricultural systems since European settlement, which has resulted in significantly altered natural ecological processes. The reduction in sheep numbers and adoption of minimum tillage practices during grain harvest have also resulted in more grain being available to these species for extended periods during the summer and into early autumn. The increased availability of food enables more birds to survive through to the breeding season and aid population recruitment.

Unwanted impacts have come about partly as a result of an increase in range and abundance of the species, but more particularly because of their feeding and flocking behaviour. From late summer to early winter, roaming flocks of juvenile birds can join up with adult birds from a region and focus their attention on a few prime feeding, roosting and loafing sites. The Little Corella and Long-billed Corella exemplify this behaviour where temporary flocks of tens of thousands of birds can gather and descend on a few localised sites. In such cases, a small number of farmers or residents can experience severe economic or social impacts or losses caused by the feeding or roosting of large numbers of birds. Species that are increasing their breeding range, such as Galahs and Little Corellas, also have the potential to impact on the conservation of other species, by taking over breeding hollows of threatened species such as Glossy Black-Cockatoos and Major Mitchell Cockatoos.

There are many variables that have the potential to influence the nature of native bird interactions and impacts, and their management. These include:

- climate change,
- land use patterns,
- animal welfare,
- community attitudes, and
- Government policy and implementation.

In all abundant native bird situations, individual members of the public, community groups, landholders and land managers, businesses and government agencies jointly own the problem.

Over the past 25 years, the South Australian Department for Environment and Heritage (previously the National Parks and Wildlife Service) have received consistent complaints about the large numbers of Little Corellas that invade agricultural, horticultural and metropolitan districts during the summer months. The problems associated with large numbers of Little Corellas relate to several aspects of their behaviour, in particular their tendency to:

- defoliate the red gums or other native or ornamental trees they use for roosting;
- damage installations such as tarpaulins covering temporary grain bunkers, wiring and flashing on buildings;
- take grain from newly seeded paddocks;
- create a noise nuisance to local residents; and
- create a noise nuisance that becomes an impediment to the local tourist industry.

In addition to existing problems, several communities have identified a number of potential problems such as an expansion of impacts on almond crops, and competition with stock for feed in feedlots.

Overall, most community concern is related to corella pruning behaviour and subsequent defoliation damage to roost trees and its effects on tree health and survival. Communities are also concerned that Little Corella numbers are increasing and that, without some reduction in bird numbers, problems of pruning damage to roost trees will spread.

A reduction in impacts is a key objective for community groups, Councils and landholders.

2. Scope

The purpose of this document is to:

- provide an understanding of the ecology of Little Corellas;
- provide information on the legislative requirements associated with native bird management;
- detail management strategies that have been attempted in the past; and
- identify potential management approaches that could be applied in the future.

3. Ecology: The Little Corella

3.1 Biology

The Little Corella is a small species of cockatoo, from 36-39 cm in length and weighing 430-580 grams. The species is distinguished by a short, cap-like crest, a whitish coloured bill, a ring of bare blue-grey skin around the eye and a pink tinge to the underfeathers on the head and throat, while the underwing and undertail feathers are washed with yellow (Pizzey & Knight 1997; Rowley 1997). Little Corellas can only be reliably sexed by internal examination.

Vocalisations by the Little Corella consist of a variety of nasal and guttural sounds as well as high-pitched screeches.

The Little Corella is widespread throughout inland, northern and western Australia, but avoiding the higher rainfall areas east of the Great Dividing Range (Pizzey & Knight 1997; Morcombe 2000). Four subspecies are recognised within Australia and a fifth subspecies occurs in lowland New Guinea (Rowley 1997).

Typically a bird of tree-lined watercourses and adjacent plains, the Little Corella utilises a variety of habitats including savannah woodland, mallee, mulga, rangelands, Spinifex sandhills, gibber, saltbush, native cypress, crops, stubble, mangroves, offshore islands, dams, tanks, cliffs and towns (Pizzey & Knight 1997; Morcombe 2000).

Most cockatoos form a lasting pair bond, with pairs remaining together throughout the year. Being a flocking species means that young Little Corellas can form pair bonds prior to the breeding season. Living in a flock also means that if one member of the pair dies, a replacement can be readily found from within the local flock (Rowley 1997).

Being a strong flier, the Little Corella is capable of travelling long distances to water or abundant and reliable food sources. Outside of the breeding season large flocks are formed with the members tending to roost together (Rowley 1997).

3.2 Distribution

The distribution of the Little Corella prior to European settlement is largely unknown and can only be inferred from the records of early explorers and pastoralists. In South Australia, early records suggest that until 1920 Little Corellas were largely restricted to the far north east of the State.

Since the 1920s, Little Corellas slowly extended their range southwards and from the 1960s onwards, Little Corellas were recorded continuously and increasingly in the Flinders Ranges, Mount Lofty Ranges and neighbouring districts.

Little Corellas are now widespread and common in the eastern parts of the state, namely: the North East, Flinders Ranges, Riverland, Adelaide Plains, Fleurieu Peninsula, Kangaroo Island and in the South East of South Australia. In addition to an extension of range during the last century, Little Corellas appeared to have increased in abundance. The provision of permanent watering points to service stock and the cultivation of grains probably provided the means by which water-dependent granivorous birds such as Little Corellas and Galahs could extend their range (McGilp 1937, Davies 1977, Saunders et al. 1985, MacMillen 1990).

3.3 Behaviour

3.3.1 Food and water

Little Corellas are opportunistic in terms of their use of food resources. For example, within the Fleurieu Peninsula region during spring Little Corellas are typically recorded feeding on grass seeds and bulbs in paddocks or other grassed areas. During summer they are observed congregating in large numbers to feed in paddocks where stubble remains following harvest. During late summer and into autumn, Little Corellas are regularly observed taking grain around stock feed troughs and areas where stock are provided with hay. In the southern Flinders Ranges, Little Corellas feed almost exclusively on fallen grain in stubble paddocks.

3.3.2 Breeding

Breeding usually occurs from August – October in southern Australia, although it has been recorded as early as May (Rowley 1997). The nest site is usually in a tree hollow lined with decayed woody fragments, although cavities in cliffs and termite mounds may also be used. Two to three (occasionally four) white, oval eggs are laid per clutch (Rowley 1997). The incubation period is 24 – 26 days, with the parents sharing the incubation duties and care of the young. Nestlings remain in the next hollow for about 7 weeks. After fledging, the young birds and their parents join a large nomadic foraging flock (Rowley 1997). Breeding birds are quiet in comparison to summer flocks and thus may go potentially undetected in the absence of intentional surveys.

3.3.3 Roost preference

On the Fleurieu Peninsula favoured roost trees are eucalypts, particularly River Red Gums (*Eucalyptus camaldulensis*) and various Pine species (*Pinus sp.*). Some roost sites are close to water in the form of creeks or dams, however Little Corellas are rarely observed drinking in the immediate vicinity of the roost site, indicating that the selection of trees over water may be as protection against predation. Site attachment appears to play an important part in roosting, with Little Corellas returning to given sites in successive years. The gregarious nature of this species mean that following breeding, individual birds are likely to join established roosts, thereby increasing the numbers of birds at a given roost.

The lower Flinders Ranges Little Corellas show similar roosting preferences, using the River Red Gums of some of the creeklines as their day and night roosts, and to a lesser degree, Northern Cypress Pine, Peppermint Box, and Long-leaved Box. Little Corellas tend to establish their roosts within easy access of water (creeks, troughs, dams and open tanks) and food. They prefer watering points and feeding areas where they can obtain a clear, all-round view.

3.3.4 Social interaction

Tagging studies have indicated that Little Corellas are not faithful to flock or roost site from year to year. Whilst the same individuals do return to a region each summer they are capable of moving between flocks and roost sites. Despite an appearance of cohesive flock behaviour in the lower Flinders Ranges, each Little Corella flock in the study area has a changing membership that draws on all flocks in the whole region. Therefore, birds inhabiting the study area cannot be viewed as a closed population but rather, as capable of mixing with the Little Corella flocks inhabiting other areas of the State. Furthermore, within the Fleurieu Peninsula region Little Corellas are often observed in association with Galahs and to a lesser extent Sulphur-crested Cockatoos. This is particularly the case when flocks are feeding on the ground in paddocks or on grassed areas. Both Galahs and Common Starlings are recorded as nesting in the same trees as Little Corellas.

4. Legislation

4.1 National Parks and Wildlife Act 1972

Little Corellas are listed as an unprotected species in schedule 10 of the *National Parks and Wildlife Act 1972* (NPW Act). Therefore landholders are entitled to shoot birds and discourage the formation of large destructive flocks. Landowners, and shooters acting on behalf of the landowner, do not require a destruction permit when shooting Little Corellas on that land.

To cull Little Corellas by means other than a firearm, the *National Parks and Wildlife (Hunting) Regulations 1996* require a destruction permit to be issued (pursuant to Section 53(1)(c)). Operators must also gain accreditation to undertake the trapping of birds.

4.2 Codes of Practice

The following Codes of Practice apply for the destruction of Little Corellas in South Australia:

4.2.1 Code of Practice for the Humane Destruction of Birds by Shooting in South Australia

This Code sets an achievable standard of humane conduct and details the minimum required of persons shooting birds in South Australia (refer Appendix 1)

4.2.2 Code of Practice for the Humane destruction of Flocking Birds by Trapping and Carbon Dioxide Narcosis in South Australia

This Code sets a standard of humane conduct for persons involved in the destruction of birds by trapping and carbon dioxide narcosis. In accordance with this Code, operators must also gain accreditation to undertake the trapping of birds (refer Appendix 2)

4.3 Accreditation to undertake trapping of birds

Accreditation to undertake trapping of birds is necessary to ensure sufficient knowledge of bird behaviour, planning/reporting requirements, trap mechanics, considerations of occupational health and safety to ensure that animal welfare requirements are met.

To gain accreditation, people are required to attend a DEH half-day training session. DEH staff will attend the first two trapping sessions of each newly accredited trapper to ensure compliance with the Code of Practice For the Humane Destruction of Flocking Birds by Trapping and Carbon Dioxide Narcosis in South Australia.

5. Animal Welfare

5.1 Prevention of Cruelty to Animals Act 1985

The welfare of animals that are destroyed is of paramount importance to the Department for Environment and Heritage. In all circumstances, the destruction of any animal should aim to minimise suffering of the animal and must comply with animals welfare standards outlined in the *Prevention of Cruelty to Animals Act 1985*, the regulations subordinate to that Act and any relevant code(s) of practice or animal welfare standards where they exist.

6. Impacts caused by Little Corellas

Little Corellas have extremely powerful bills. They have been reported causing damage to orchards, vineyards, cereal and pasture crops. They can cause damage to ovals, bowling greens and golf greens from digging and damage to wooden structures, tarpaulins, cars, and electrical wiring from chewing.

Pruning damage has been identified as the most significant problem associated with large numbers of Little Corellas in most affected areas. Affected communities are generally concerned that the pruning pressure caused by large and persistent roosts of these birds is adversely affecting tree health and survival.

In 2002/2003 QED Pty Ltd was engaged by the City of Onkaparinga, Alexandrina Council and Department for Environment and Heritage to

1. study the ecology of the Little Corella on the Fleurieu Peninsula,
2. determine the social, economic and environmental impacts of this species and a process for determining acceptable levels of impacts, and
3. develop an integrated management framework.

From this QED Pty Ltd prepared a report titled "Corella Research Project – Towards integrated management of the Little Corella on the Fleurieu Peninsula" dated 18 August 2003.

6.1 Social impacts

A survey of community attitudes to Little Corellas undertaken by QED in Old Noarlunga and Strathalbyn in January 2003 indicated that noise and the damage to trees were the greatest impacts caused by Little Corellas.

Other impacts identified by residents in Old Noarlunga included damage to television antennae and phone and electricity cables, accumulated leaves and droppings on the ground and in the Onkaparinga River, droppings on washing and displacement of other birdlife.

Strathalbyn residents also reported impacts from bird droppings on roofs and in rainwater, damage to cars by falling pinecones, and damage to ovals and the bowling green.

6.2 Economic impacts

The QED report found that local councils implementing 'Corella Control Programs' were sustaining high economic costs. Program costs would include:

- employee time (field rangers and managers)
- vehicle usage
- bird deterring devices (shotguns, starter pistols, helikites, etc.); and
- employment of contracted shooter.

In addition, maintenance programs to keep public areas clean and safe are required, particularly in areas where Little Corellas cause tree damage. This incorporates park maintenance, tree maintenance and street sweeping. Some maintenance of Council-owned buildings is also required.

Tree damage, noise and pollution of council reserves caused by Little Corellas can detract from the amenity of an area, which can lead to a decline in business, as reported by businesses in both Old Noarlunga and Strathalbyn.

Little Corellas also cause economic losses to agricultural and horticultural industries (e.g. sunflower, sorghum, millet, canola, wheat, barley, oats, pulses and nuts).

6.3 Environmental impacts

6.3.1 Noise

The noise levels generated by Little Corellas in both Old Noarlunga and Strathalbyn exceed the levels recommended by the World Health Organisation (WHO) guidelines to avoid sleep disturbance and annoyance. For comparative purposes, these levels are also well in excess of the maximum allowable noise levels for industries in a predominantly

industrial area, based on the Environmental Protection (Industrial Noise) Policy. Noise levels adjacent to classrooms in Strathalbyn also exceed maximum recommended design sound levels for primary and secondary school classrooms, as determined by the Australian/New Zealand Standard AS/NZS2107.

6.3.2 Tree health

The effect of damage to trees by Little Corellas is cumulative, in that it occurs incrementally over many seasons. From 'snapshot' inspections, it is difficult to separate the impact of Little Corellas from other potential impacts, such as soil compaction, inappropriate watering regimes and root disturbance. Any damage caused by Little Corellas will be in addition to the stresses already being placed on trees.

Although difficult to quantify, anecdotal evidence from numerous sources suggests that the influx of Little Corellas into Old Noarlunga and Strathalbyn is correlated with a decline in the abundance of native bird species. As a successful competitor for breeding sites the species has the capacity to significantly affect native hollow nesting species.

Little Corellas have the potential to significantly increase the nutrient input into watercourses through:

- leaf and twig fall from defoliation of vegetation;
- erosion from digging into soil along river banks or adjacent cliffs; and
- faecal deposition at roost sites adjacent to watercourses.

7. History of Little Corella Management in South Australia

A number of studies have been conducted in South Australia which trialled various methods to reduce the impacts caused by Little Corellas. Varying degrees of success were achieved, with results often differing from region to region depending on the nature of the problem in each area.

7.1 Lower Flinders Ranges

Numerous studies have been undertaken in the lower Flinders Ranges, predominantly exploring population reduction and to a lesser degree habitat modification, as a means of reducing the impacts of Little Corellas.

7.1.1 Population reduction using alpha-chloralose

Alpha-chloralose

Alpha-chloralose is a drug that, when ingested, causes depression of the central nervous system followed by coma. Animals ingesting the drug experience little pain or distress. The drug compound is slowly metabolised, resulting in a recovery within a few hours from ingestion.

Laboratory trial and field trials on use of alpha-chloralose

In the early 1990s a number of laboratory and field investigations were carried out by the Department for Environment and Heritage on Little Corellas to identify the efficacy of alpha-chloralose administered via grain and water baits to achieve Little Corella population reduction. Laboratory investigations determined appropriate dose rates and also measured dose response in Little Corellas.

Field trials using water and grain baits indicated that experimental culls were successful in reducing roost size in the short-term. The decreases evident were not necessarily the result of a reduction in bird numbers, but were more likely to be attributable to a disruption in flocking behaviour and the subsequent movement of roosting sites. Little Corellas seemed to develop a wariness of the bait station and, after several consecutive days of drugging, were sufficiently wary of the roost so as to abandon the area for several weeks.

Thus, drugging affected both bird number and bird behaviour in the short-term. No long-term effect on roost size was observed and roost sizes after drugging were similar to those before drugging due to immigration from neighbouring flocks. Therefore alpha-chloralose baits have limited application in the broad-scale reduction of Little Corella numbers in situations where large flocks cause problems. However, the deterrent effect was considered useful in reducing pruning damage to roost trees by Little Corellas. Similar deterrent effects have been observed with the use of alpha-chloralose against Starlings and Sparrows.

Future use of alpha-chloralose
The field trials demonstrated that the use of alpha-chloralose was effective in reducing roost size of Little Corellas but only had limited application in the broad-scale reduction of Little Corella numbers in situations where large flocks cause problems.

The use of alpha-chloralose as a management technique is not permitted.

7.1.2 Management of food and water at Quorn

Reducing the availability of food and water at established sites frequented by Little Corellas can disrupt flock behaviour and force the flock to move elsewhere in search of food and water. Little Corella flocks do, however, re-visit established feed and water sites as part of their behaviour pattern.

Scenario:
A temporary grain bunker was established at Quorn in late 1989. A considerable amount of grain was spilt alongside the bunker during loading.

Problem:
In January 1990, Little Corellas were observed feeding in the adjacent stubble paddock. Some birds discovered the spilt grain and then the bunker. A small feeding flock became established and flock size rapidly increased to about 6000 birds. They attacked and breached the tarpaulin, leaving the grain exposed to further bird impacts, faecal contamination and moisture.

Action taken:
Considerable efforts were made to discourage the birds from the bunker. A gas-operated scare gun was placed on the stack and a person was employed part-time to shoot Little Corellas and Galahs.

Result:
Despite early off-loading of the grain from the bunker, and a concentrated clean up, Little Corellas continued to visit the empty bunker in search of food. A reduction in available food supply before a feeding pattern was established, specifically improved hygiene around grain installations, prevented problems with bird attack to grain stacks.

In 1991, when the Quorn bunker was again used to store grain, bunker hygiene was vastly improved and little grain was spilt during loading. On several occasions, a few Galahs and Little Corellas were observed feeding in the adjacent stubble but none attacked the tarpaulin protecting the stored grain.

Similarly, when trough modifications to exclude Little Corellas from water were fitted to three favoured troughs in Quorn, the birds were forced to find alternative watering points. Whilst trough modifications installed after roost establishment did not necessarily affect roost size, modifications installed before birds establish roosts could influence choice of roost site and size of roosts.

7.1.3 Use of deterrents

Conservative use of gas operated scare guns, combined with shooting, disrupts flocking behaviour and was successful in discouraging Little Corellas from a variety of feeding and roosting sites.

Example 1
Location: grain bunker at Gladstone
Deterrent: a vehicle-mounted scaregun combined with the use of a shotgun
Result: successfully deterred Little Corellas from feeding at the grain bunkers at Gladstone.

Example 2
Location: trees within Quorn Caravan Park
Deterrent: a shotgun and scaregun were used to deter Little Corellas from roosting in the trees.
Result: Roost trees in this area have recovered from pruning pressure and now bear full canopies.

All users of this method reported that the success of the method relied on timing of use and on vigilance. Best results were obtained if the scaregun/shotgun programme was started as early as possible in the summer season. Once the daily pattern of roosting was established, the cycle was more difficult to break.

7.1.4 Summary of management techniques trialed in Lower Flinders Ranges

Attempts to reduce bird dwell time by reducing the Little Corella population were ineffective due to the mobility of flocks and individuals. This indicates that culls will not necessarily achieve a long term, low population level of Little Corellas in any area. Other studies have also shown that sustained and/or repeated culling has little effect on the population sizes of pest birds. Even if low bird numbers could be achieved, without additional input to manipulate bird behaviour, favoured roost trees would continue to sustain pruning damage. Lastly, population reduction was an expensive option, especially if being used in conjunction with other methods.

The Lower Flinders Ranges studies have also shown that the use of non-destructive techniques may be valuable in reducing chronic tree damage by discouraging bird use of trees at traditional roosts. Although the scaregun/shot gun technique has a relatively short-lived effect, efficacy may be improved when used in conjunction with food and water management.

7.2 Kangaroo Island

Actions undertaken on Kangaroo Island to reduce Little Corella numbers include selective shooting of Little Corellas at Glossy Black-Cockatoo nest sites, scare tactics, access restriction, and trapping and destroying. The following are the highlighted actions undertaken in 2002:

7.2.1 Selective shooting

A total of 22 Little Corellas were shot at Glossy Black-Cockatoo nest sites over a 6-day period in 2002. Since 1998 the total number shot is 394. This appears to have had little effect as the number of nest sites where Little Corellas are observed has increased.

7.2.2 Trap and destroy

Trapping and destroying involves attracting the birds to a location by providing abundant grain on a trapping location (free feeding). Pre-planning involves identifying an appropriate time to trap, methods for trapping the birds, and method for destruction in a humane manner.

In April 2002 a trap and destroy program was implemented on Kangaroo Island prior to the Little Corella breeding season. Free feeding attracted the birds within two weeks. However they never became reliant on the oats despite large quantities being provided. Grain from harvested crops or stock feed was always available in the paddocks and birds continued to feed in these areas throughout the trapping program.

7.3 Old Noarlunga

7.3.1 Corella Working Party

In April 2000 the Old Noarlunga Corella Working Party was formed. The purpose of the group was to:

- develop an action plan for the control of corellas in Old Noarlunga;
- obtain information regarding best practice control measures; and
- consult the community on corella control issues.

Membership of the group comprised elected members of City of Onkaparinga Council, two representatives of Old Noarlunga community, one member from a bird conservation group, a representative from the RSPCA, and representatives from DEH. The committee continued to work towards its objectives until August 2004, when it was dissolved due to the completion of its objectives.

7.3.2 Deterrence study

During a study in 2002-2003 strategies to deter Little Corellas from establishing regular patterns of activity, particularly roosting, were undertaken and found to be partially successful.

The shooting of scout birds followed by regular disturbance of flocks congregating in the town using starter pistols and Bird Frite®, largely prevented large numbers of birds from congregating in the town itself. It was evident that Little Corellas had come to associate the flashing light of the ranger's patrol vehicle with danger and moved on when this vehicle approached.

The use of other means such as helikites and tinsel placed in treetops was also useful for a period. It was noted that Little Corellas became very agitated when birds of prey (eg Wedge-tailed Eagle, Little Eagle, Black Kite, Brown Falcon) were present.

8. Bird Management Practices

Where there are problems with abundant birds, the destruction of the offending birds is often a popular option of affected community members. However, large scale destruction is expensive, time consuming and, on its own, not necessarily effective in reducing bird impacts. This option can also be contentious with people opposed to the destruction of native wildlife.

Little Corellas feed, water and roost communally. The social nature of their daily life contributes to the problem of pruning damage to roost trees by large flocks, but also suggests a number of possible solutions. Reliance on easy access to food and, in particular, water makes the flock vulnerable through manipulation of these resources.

8.1 Control Methods

There are four approved techniques available to reduce bird damage:

1. reduction of the population by culling individuals (destruction by shooting and trapping and destruction by carbon dioxide narcosis),
2. modification of feeding, watering or roosting habitat to deter birds from affected areas,
3. use of noise-generating devices to scare birds, and
4. use of decoy crops and/or netting high value crops.

In general, effective, humane population control programs utilise several techniques in combination to address problems. When devising any strategy, the welfare of individual birds must be considered and Codes of Practice strictly adhered to.

It is recommended that one or more control measures should be undertaken before a flock becomes established in an area. This should reduce the overall cost of control and, if other control methods are required, may result in fewer birds having to be deterred, trapped and/or destroyed. Being proactive in controlling birds reduces costs from damage to property or crops and can decrease the likelihood of negative community reaction to control programs.

8.1.1 Reduction of the population by culling individuals

Destruction by shooting

Shooting, to achieve a reduction in impacts being sustained, should only be used in a strategic manner as part of an integrated management program. When dealing with large flocks of cockatoos, shooting rarely achieves the goal of reducing bird impacts and population control and in isolation is not considered an effective method for large-scale control of wildlife causing impacts. The number of birds shot is usually a very small proportion of the flock. The flock also learns to avoid the shooter(s). Shooting should be avoided at times when birds are nesting and there are dependent young present.

Operators using shooting as a means to reduce bird impacts must comply with the Code of Practice for the Humane Destruction of Birds by Shooting (refer Appendix 1).

Shooting is generally neither suitable nor legal in populated areas and residential areas and requires police approval and skilled shooters.

Trapping and destruction by carbon dioxide narcosis
Substantial numbers of birds can be trapped using single or double leaf booknet traps. Trapping can be an effective means of removing abundant native birds and breaking up large flocks habitually feeding in an area. If persistently applied it can be effective at removing flocks from an area.

Birds must not be excessively distressed or injured in the process. Any suffering must be alleviated as quickly as possible. Frightened cockatoos will injure themselves and other birds. To remedy this, they must be killed as quickly and humanely as possible.

Trapping should be avoided at times when birds are nesting and there are dependent young present.

Health risks exist for people handling birds. *Psittacosis* and *chlamydia* diseases are common in parrots and can be passed on to handlers through bites and scratches.

Operators using trapping and carbon dioxide narcosis as a means to reduce bird impacts must comply with the Code of Practice for the Humane Destruction of Flocking Birds by Trapping and Carbon Dioxide Narcosis.

Trapping and carbon dioxide narcosis of flocking birds alone will not overcome detrimental social, environmental and economic impacts sustained.

8.1.2 Modification of feeding, watering or roosting habitat
Fitting modifications to stock water troughs to exclude Little Corellas can affect roost size and location, particularly if the modifications are installed before birds establish roosts. Deterring birds from a feeding area (e.g. paddock ploughed to plant a crop or grain bunker) should be undertaken when the “scout” birds arrive at the site and before flocks of birds arrive and establish a feeding pattern. Siting crops away from watering points and trees may also reduce bird impacts.

8.1.3 Use of noise-generating (scaring) devices
This is the most commonly advocated technique for dealing with abundant native birds. No permits are required from DEH. There are numerous, commercially available bird scaring devices which can include a visual stimulus, aversive sounds or a combination of these. They are used in limited circumstances and are a non-destructive method of protecting crops or assets. They are only effective if a range of techniques is applied early and regularly.

Manual scaring techniques (eg: using Bird Frite® shotgun cartridges) are often expensive and time consuming, requiring two to three hours in the early morning and late afternoon once birds have established in a location. Farmers growing a rotation of summer and winter crops may have to devote 4-6 hours a day for 6-8 weeks in both seasons to protect crops in some locations. Such strategies are most effective when the first few birds arriving are detected and scaring is carried out before a flock is established and behavioural patterns developed. This opportunity is very often missed.

Shooting can be integrated into a scaring program to achieve a dramatic improvement in effectiveness of scaring. Shotguns may be used to kill individual birds, but are probably more effective when integrated as a scaring device into flock management, crop protection and damage control.

Birds habituate to automated scaring devices if these are not linked to other forms of flock disturbances, such as shooting. Also, predator avoidance devices such as silhouettes have a short-term effectiveness in most cases and will be habituated to after some time.

Very often, effective scaring campaigns move the problem onto a neighbour who has not been as diligent in addressing the impact of the birds. In such cases, broad community-wide control programs within the region are the only realistic option for addressing the problem and preventing an escalation of the problem over time.

An overview of noise-generating devices is presented in Appendix 4.

8.1.4 Decoy crops/feeding sites and/or netting high value crops

Some potential exists to lure abundant native birds away from high value crops by supplying abundant food in an alternative location. This is a non-destructive method of avoiding damage to high value crops and reduces the time and effort required where scaring campaigns are employed to protect high value crops.

However, the cost is high and successful implementation requires a strategic and consistent food supply, which is linked to the behaviour of the birds. In some cases, additional food may increase survival rates of young birds and exacerbate the long-term problem. Also, cooperation between landholders is required for to achieve a positive outcome.

Like decoy crops, netting is a non-destructive technique for avoiding crop damage, which reduces time and effort required in scaring programs. The cost of netting is relatively high, however netting to protect a crop can be a sound long-term investment, especially when potential losses from bird impacts are calculated. Loose nets can allow birds access to crops and require monitoring.

8.2 Other management techniques

8.2.1 Screen cropping/artificial vision barriers

Some potential exists for protecting high value crops by employing screening crops, vision barriers or a variety of exclusion nets. Screening crops and vision barriers exploit the requirement for cockatoos to have a clear line of sight when feeding in a flock.

However, these methods can be costly, are only effective over small distances, and may be difficult to incorporate into many cropping situations. In addition, small failures in screens can compromise effectiveness dramatically.

8.2.2 Agronomic practices

In some circumstances, growers may be able to plan the timing, type and location of crops when planting to avoid the possibility of impacts from abundant native birds. Examples are avoiding planting sunflower in areas that are traditionally subject to high numbers of cockatoos, or planting small seed crops, which are not attractive to cockatoos. In some areas, people may choose alternatives such as grazing to avoid the problem altogether.

However, there is a limit to which primary producers can be flexible in this regard and still remain viable.

8.3 Illegal control techniques

8.3.1 Narcotising agents (alpha-chloralose)

The use of alpha-chloralose as a means to capture Little Corellas, or any other species of native birds, is prohibited.

Field trials conducted by DEH in 1990 demonstrated that experimental culls using alpha-chloralose was successful in reducing roost size in the short-term, however, the reduction in bird numbers was more likely to be attributable to a disruption in flocking behaviour and the subsequent movement of roosting sites. Therefore alpha-chloralose had limited application in the broad-scale reduction of Little Corella numbers in situations where large flocks cause problems.

8.3.2 Lethal poisons

Lethal poisons or avicides are aimed at causing the rapid death of birds. There is no poison currently registered for use as an avicide. The use of lethal poisons to destroy Little Corellas is prohibited.

Poisons such as strychnine are not acceptable, as the effective dose for a bird is about thirteen times that of a carnivorous mammal so the potential for off-target killing is high. There is a significant lag time between consumption of the poison and unconsciousness increasing the probability of consuming a large quantity and then being eaten by a predator, which would subsequently be poisoned. Most organophosphates are unsuitable to kill birds, due to highly variable individual susceptibility and high resistance.

8.3.3 Use of carbon monoxide

Carbon monoxide is humane but extremely toxic to humans and is not permitted for bird control.

8.4 Control techniques considered impracticable, unrealistic and cost prohibitive

8.4.1 Fertility control

Although fertility control is the preferred option amongst animal welfare groups, the logistic problems are enormous. It takes years of research and significant funding to develop appropriate drug induced or virally transmitted techniques to cause sterility and, if the agent is not totally species specific, such programs may result in reduced breeding of other species. Surgical desexing is extremely expensive and, as wild birds resent capture and confinement, the technique would be extremely stressful to the birds.

8.4.2 Barbiturate overdose

Injectable barbiturates are the most common means used to destroy companion animals. They are humane but they must be administered by a veterinarian and are relatively expensive.

9. Interstate Experiences

9.1 Background

Victoria experiences similar issues with cockatoos, predominantly the Long-billed Corella, as South Australia does with Little Corellas. When native forests were cleared for farming in Victoria, cockatoo numbers were originally in substantial decline. However once they adapted to new food sources, such as exotic grain crops and weeds like Onion Grass, the Long-billed Corellas population steadied, with numbers not increasing rapidly due to competition with rabbits.

Victoria has nine species of cockatoos, comprising three black-cockatoos, two corellas, the Gang-Gang Cockatoo, Galah, Major Mitchell's Cockatoo and the Sulphur-crested Cockatoo. All of these species are protected except for the Long-billed Corella, Sulphur-crested Cockatoo and the Galah, which have been declared unprotected.

Long-billed Corellas have recolonised their traditional range and are extending in an easterly direction, whilst Galahs are spreading further south.

9.2 Management Strategies in Victoria

The Victorian Department for Sustainability and Environment (DSE) has adopted a number of techniques to manage the problems caused by cockatoos. These techniques are predominantly focussed on deterring the birds, and, where possible, removing/reducing the attraction or the access to the attraction. The primary goal of DSE is to alleviate economic loss and environmental degradation resulting from damage caused by cockatoos, rather than reducing actual numbers of cockatoos.

9.3 Screening

Reducing both vision of and access to areas being damaged is often the first step taken in managing the impacts of cockatoos. Erecting hessian or shade cloth screens is an effective technique and can be enhanced if used in conjunction with other techniques listed below.

9.4 Decoy Feeding

Where birds are causing damage to crops, providing an alternative feeding site can be successful. During the main sowing and germination phase, a 'free feed' can be provided away (at least 500 m) from the paddocks being sowed. This can distract the birds away from crops. This does not always prove successful over repeated years.

9.5 Scaring Devices

Kites that simulate birds of prey have been successful in reducing crop damage by Little Corellas. The kites are constructed from heavy black plastic and dowel. The crossbars are light wood. The completed kite is roughly two metres wide and resembles a kite with a tail.

The kite needs to be launched each morning and is then fixed to a fence into the prevailing wind on 3-400 m of baling twine.

This method is only effective on paddocks of up to 40 hectares.

Other scaring devices can also prove effective, such as taped alarm calls, sporadic loud noises, shooting from bird hides using a combination of live and Bird Frite® cartridges as well as gas guns (moving hides regularly), and bright lights if problems occur at night.

A combination of scaring devices proves most successful, changing techniques regularly.

9.6 Poisons

There are currently no chemicals registered for poisoning cockatoos in Victoria. Whilst the previous Victorian Government allowed the use of poisons, the poisoning of any native birds, including Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, is now strictly illegal.

9.7 Trapping and Gassing

Trap and gas programs, run by the Victorian Department of Sustainability and Environment as part of their cockatoo management program, have been implemented for six years to varying degrees of success. Up to 300 birds are caught in a net and then moved to a drum of carbon dioxide where they are killed. Trapping and gassing has been approved by animal welfare groups and was developed as a more acceptable alternative to poisoning. In many cases it has succeeded in reducing large flocks of cockatoos, however there are also many cases where it appears to have made little difference at all.

Appendices

Appendix 1: Code of Practice for the Humane Destruction of Birds by Shooting in South Australia

Introduction

This Code of Practice sets a standard of humane conduct for persons involved in the destruction of birds by shooting. All persons involved should be aware of the legislative requirements, including animal welfare, for this activity.

When shooting, the principal objective must be to achieve rapid loss of consciousness and death of the bird. If the bird is not killed outright, rapid and appropriate action is required to ensure that it is dispatched humanely.

Legislation

The shooter must be conversant with the requirements of relevant legislation.

National Parks and Wildlife Act 1972 (NPW Act)

Introduced bird species are not protected in South Australia and may be destroyed.

Native birds are protected under NPW Act. Where necessary, a destruction permit (pursuant to Section 53(1)(c)) may be issued for the destruction of native birds causing economic and/or environmental damage. Where a destruction permit has been issued, no hunting permit is required although written permission of landowner is required in cases where the shooter is neither the landowner nor his/her agent.

Exceptions to the requirement to obtain a destruction permit include;

- unprotected bird species listed under Schedule 10 (Zebra Finch, Budgerygah, Red Wattlebird, Grey-backed Silvereye, Galah, Little Corella, Australian Raven, Little Crow, Australian Crow, Little Raven).
- bird species gazetted pursuant to Section 51A NPW Act, and
- certain duck species and stubble quail as specified under an open season gazetted pursuant to Section 52, NPW Act.

In these instances, native birds may be shot without a destruction permit. Landowners and shooters acting on behalf of the landowner do not require a hunting permit when hunting on that land. Shooters acting on behalf of a Corporation or local Council do not require hunting permits where the activity is authorised by, and confined to, the Corporation or Council area.

Hunting permits and written permission from the landowner are required by other persons hunting and/or shooting birds. Furthermore, duck and quail hunters require an open season hunting permit. Duck hunters are required to pass a waterfowl identification test.

The Prevention of Cruelty to Animals Act 1985

The destruction of any bird by shooting should aim to minimise suffering of the animal.

Note that the *Prevention of Cruelty to Animals Act 1985* states that a person ill-treats an animal if that person;

- having injured an animal fails to take reasonable steps to alleviate any pain suffered by the animal, or
- kills an animal in a manner which causes the animal unnecessary pain.

Firearms Act 1977

The shooter must comply with the provisions of the *Firearms Act 1977.*

Summary Offences Act 1953

Shooters should be aware of the *Summary Offences Act 1953* and must comply with the provisions of that Act. Note that Section 51(1) of the *Summary Offences Act 1953* states that "a person who discharges a firearm or throws a stone or other missile, without reasonable cause and so as to injure, annoy or frighten, or be likely to injure, annoy or frighten, or so as to damage, or be likely to damage, any property, is guilty of an offence".

Public Risk

No handguns should be used to destroy birds.

Any shooting activity must be planned and undertaken in a manner that avoids the possibility of injury to the public. Before discharging the firearm, the shooter must ensure that the background to the target area is free of persons, property, infrastructure and/or assets to eliminate any risk of collateral damage from spent shot.

The use of centre fire or rim fire rifles presents a serious risk to the public when fired without due regard for the background. These rifles should not be used in a built up area.

A shooter intending to use firearms in a built up area should notify the local Police.

Shooting should only take place during daylight hours.

Shooting Platform

The shooter should adequately prepare for the shot by ensuring stable footing and clear vision of the targeted birds. **Birds should not be shot from a moving vehicle or other moving platform such as a boat.**

Target Animal for Destruction

Shooters should have sufficient knowledge and skill to identify the bird species causing damage. **If in doubt, don't shoot.**

The target bird must be clearly visible to the shooter. Only one bird should be targeted at any one time. Shooting at a flock is not an acceptable practice.

If possible, shooting should be avoided at times when birds are nesting and there are dependent young present.

Injured Birds

The shooter must ensure that prior to shooting, he/she has the necessary equipment to kill any bird that is injured but not killed on the first shot.

Injured birds must be killed as quickly and humanely as possible by;

- second shot, or
- a blow with a heavy instrument to the rear of the skull to destroy the brain (the bird should be either restrained or immobile).

The shooter must take all reasonable steps to ensure that each bird is dead before another is targeted.

Disposal of Culled Birds

Killed birds must be gathered immediately and stored out of sight in an appropriate container for later disposal. Dead birds must be disposed of in a manner approved by local Council.

Human Health Issues

The transmission of avian diseases to humans is possible from the inhalation of feather dust. Persons handling dead birds should wear appropriate protective clothing including facemasks.

Other Conditions

The shooter must consider the sensibilities of any onlookers. Onlookers should be discouraged wherever possible.

Firearms and shot size specifications for the humane destruction of the birds listed.

With the exception of Cape Barren Geese, shotgun gauges other than those specified may be used. However, the shooter must make appropriate adjustments to optimum and effective ranges, accommodating the limits of the firearm. When using shotguns, ensure that choke configuration delivers a dense pattern on the target within the specified distances. For larger birds (Cape Barren Geese and injured Emus), tighter chokes are preferred e.g. ½ to full.

Bird Species	**Firearm**	**Optimum range(m)**	**Effective range (m)**	**Shot size**
Small birds to Starling size Silvereyes, Sparrows	410 shotgun 12 gauge shotgun	15 30	25 30	10's 10's – 12's
Blackbirds, Starlings	410 shotgun 12g shotgun	15 30	25 30	7's – 9's 7's - 9's
Red Wattlebirds, Rosellas, Lorikeets	12 gauge shotgun	30	30	6's – 8's
Birds up to Teal size Galahs, Little Corellas, Silver Gulls, feral Pigeons, Chestnut Teal*, Grey Teal*, Pink eared Duck*, White-eyed Duck*	12 gauge shotgun	30	30	4's - 6's
Birds up to Mountain Duck size Long billed Corellas, Sulphur crested Cockatoos, Cormorants, Magpies, Crows, Ravens, Black Duck*, Wood Duck*, Mountain Duck*	12 gauge shotgun	30	40	3's - 5's
Cape Barren Geese	Centrefire rifle with telescopic sights Shotgun – only 12 gauge	50 30	200 40	Manuf. specs 1's & 2's (36g)
Emu	Heart shot – centrefire rifle Head shot - shotgun ***(injured birds only)***	50 5	100 10	Manuf. specs 1's, 2's

- Non toxic shot must be used, adjusting shot size as necessary.

NPWSA 8 February 2001

Appendix 2

CODE OF PRACTICE

For the Humane Destruction of Flocking Birds by Trapping and Carbon Dioxide Narcosis in South Australia

BACKGROUND

This Code of Practice (CoP) sets a standard of humane conduct for persons involved in the destruction of birds by trapping and carbon dioxide narcosis. All persons involved should be aware of the legislative requirements, including animal welfare, for this activity.

The use of carbon dioxide is a humane manner to destroy birds, causing carbon dioxide narcosis, working quickly on the brain, inducing unconsciousness and death. When destroying trapped birds the principal objective must be to achieve rapid loss of consciousness and death of the bird with minimum distress.

Trapping and carbon dioxide narcosis of flocking birds alone will not overcome detrimental social, environmental and economic impacts sustained. The Department for Environment and Heritage (DEH) recommends the development of an integrated management approach including elements of hygiene management, scaring and shooting.

This CoP was developed by the Department for Environment and Heritage South Australia and has been endorsed for the listed species by the South Australian Wildlife Ethics Committee.

This CoP should be read in conjunction with the National Standard for *Trapping of Pest Birds* (BIR002) prepared by Trudy Sharp and Glen Saunders, 2004.
http://www.deh.gov.au/biodiversity/invasive/publications/humane-control/bir002-trapping-of-pest-birds.pdf

Scope

The CoP is limited to Little Corellas (*Cacatua sanguinea*), Long-billed Corellas (*Cacatua tenuirostris*) and Galahs (*Cacatua roseicapilla*). Permission to use this technique for destruction of additional species will be considered on a case by case basis by authorised DEH officers.

Legislation

Native birds are protected under the *National Parks and Wildlife Act 1972* (NPW Act) unless listed on Schedule 10.

A destruction permit (pursuant to Section 53(1)(c)) is required to cull protected birds, by either shooting or gassing, and may be issued when birds are causing economic, social and/or environmental damage.

To cull un-protected birds (listed on Schedule 10 of NPW Act) by means other than a firearm, the NPW Act Hunting Regulations (1996) require a destruction permit to be issued (pursuant to Section 53(1)(c)).

No permits are required to take birds by shooting which are listed on Schedule 10 of the NPW Act.

Written permission of the landowner is required in cases where the shooter/trapper is neither the landowner nor his/her agent. Permission is valid for a period up to six months only.

PLANNING A TRAPPING PROGRAM

Understanding Bird Behaviour

A key element to undertaking a successful trapping program is understanding the daily/seasonal movements of the flocks causing detrimental impacts. This includes knowledge of feeding habits, flock structure (including the presence of off-target species), number of flocks, roosting locations and flight paths. Such information must be gained prior to requesting a permit from DEH.

Community Consultation

Where a trapping program is being considered to alleviate damage or impacts being sustained on a community-wide scale, community consultation should be undertaken to ensure the use of this technique has the broad support of the community. This consultation should include the development of a communication/media strategy and should include the formation of a local abundant bird action group.

Permit Application Process

A destruction permit must be obtained from DEH prior to any free feeding or trapping work commencing. The destruction permit must cover all species that are the targets of the trapping program, and any likely off-target species that may be destroyed. Application forms are available from regional DEH offices or the DEH web site (http://www.parks.sa.gov.au/fauna_permits). Applicants will be required to provide details of bird behaviour, impacts, sites to be used and nominate a permit holder who will be responsible for all actions undertaken when carrying out the trapping program. Two accredited people (see below) will be required to be present on each day that trapping is to occur.

Accreditation

Accreditation to undertake trapping of birds is necessary to ensure sufficient knowledge of bird behaviour, planning/reporting requirements, trap mechanics, considerations of occupational health and safety to ensure that animal welfare requirements are met.

To gain accreditation, people are required to attend a DEH half-day training session. DEH staff will attend the first two trapping sessions of each newly accredited trapper to ensure compliance with this Code of Practice.

Human Health Issues

The transmission of avian diseases to humans is possible from the inhalation of feather dust. Persons handling live or dead birds should wear appropriate protective clothing including gloves and facemasks. The National Standard for *Trapping of Pest Birds* provides further details on occupational health and safety issues.

EQUIPMENT SPECIFICATIONS

Trap

Single or double leaf booknet traps are permitted for use. Netting hole size must be 20-25mm squares. It is suggested that 50% bunting (slack) is incorporated into traps when being built. Traps, when fired, should cover an area of between 30-60m^2, taking less than 0.5 seconds from firing to trap all birds in the trap zone.

Tarpaulin

A dark coloured PVC tarpaulin (400-700gsm weight), which is impermeable to gas, must be used to cover the trap area once fired and birds have been herded (see below). The tarpaulin needs to be large enough to cover 100% of the trap area and have no holes in it (other than eyelets around the edges).

Gas

Carbon Dioxide (CO_2) is the only gas permitted for use. At least two G-size bottles and two regulators must be available and accessible for use on each day trapping is planned. The second (full) bottle and regulator is required on site, and easily accessible, in the event of a failure of the primary regulator and/or bottle.

A regulator is required to dispense the gas from the bottle. T-pieces at either the regulator or in the hose are required to enable multiple points of gas flow. Two points of gas flow are required for traps 30-40m^2 and four points of gas flow are required for traps 40-60m^2 of trap area. Care must be taken to ensure the regulator does not freeze up and block.

Relevant Occupational Health and Safety standards must be adhered to, for the transportation and use of compressed gasses.

Chains or Weights

Heavy chains must be placed on the tarpaulin, around the group of birds trapped, to slow the rate of loss of CO_2 from under the tarpaulin (26-46 metres of chain). On very flat ground, lengths of heavy timber may also be appropriate for use.

Holding Drum

Once killed, all birds must be placed in plastic or metal holding drums, ready for disposal.

Summary

Trap size (m^2)	Tarpaulin size (m^2)	Gas points	Maximum birds targeted
30	30	2	90
40	40	2	120
50	50	4	150
60	60	4	180

UNDERTAKING A TRAPPING SESSION

Off-target Species

If the fired net contains an off-target species that has not been approved on a permit the following rules apply:

- If the individual can be removed easily from the net (eg. located at the edge of the net) with minimal stress to the individual, and within the timelines identified for tarpaulin placement, the individual should be removed and released;
- If there are multiple individuals, or individuals that cannot be removed quickly or easily from the net with minimal stress to the birds involved, all birds must be released from the net.

Approval of the destruction of off-target species on permit, will be limited in both species and number so as to reduce the likelihood that species not involved in causing the impacts are not targeted through the poor design and implementation a non species specific program.

Maximum Number to be Targeted

The maximum number of birds, which can be targeted in any one trapping session, must not exceed 3 birds per m^2 of trap area (e.g. maximum of 90, 120, 150 and 180 birds for 30, 40, 50 and 60 m^2 tarpaulin respectively). A hide is required to screen personnel from birds and must be close enough to ensure a clear view of the number and species of birds within the trapping site. From the hide, birds should be counted as they arrive on the trap site to prevent over-trapping.

Herding of Birds

To reduce the volume of space under the tarpaulin, birds are permitted to be herded to one area of the trap. This area will vary from 10-40% of total trap area depending on the number of birds trapped.

Timeframes for Efficiency

Organisation is of paramount importance to humanely and efficiently undertake a trapping session. Everybody involved must know their role in the trapping process. The tarpaulin and gas bottle should be stored either near the trap or on a vehicle, which can be driven to the trap site.

From the time of trap firing;

- all people must be at the trap site within 30 seconds,
- herding and removal of off-target species must be complete within 2 minutes of trap firing,
- tarpaulin, gas lines and chains must be in place within 3 minutes.

Introduction of CO_2 Gas

Gas should be introduced as soon as the tarpaulin, gas lines and chains are in place. Gas flow rates must be set at the maximum for the regulator. After 3-5 minutes, level of consciousness or life should be checked by gently touching the birds through the tarpaulin and feeling for breathing. Gas must be allowed to continue to flow at the maximum rate for 2 minutes after the last bird has stopped breathing. The gas flow rate should then be reduced and allowed to flow for a further 10 minutes.

If the regulator to be used is not internally heated, water will be required to pour over the regulator to prevent it freezing up and/or becoming blocked.

Disposal of Culled Birds

Culled birds must be gathered immediately and stored out of sight in a plastic or metal holding drum for later disposal (within 2 hours). Dead birds must be disposed of in a manner approved by local Council and cannot be used for a secondary purpose, sold, swapped or traded.

Onlookers

Trapping should be undertaken out of general public view to reduce risk to those not directly involved. Onlookers should be discouraged wherever possible.

Reporting

The daily trapping reporting form (provided with permits) must be completed on the day of trapping and include all of the details requested. These daily forms are to be attached to the permit return form, which must be returned to DEH on or before the day stipulated on the permit.

Appendix 3: Australian Department of Environment and Heritage Standard Operating Procedures:

Shooting of Pest Birds

http://www.deh.gov.au/biodiversity/invasive/publications/humane-control/bir001-shooting-of-pest-birds.pdf

Trapping of Pest Birds

http://www.deh.gov.au/biodiversity/invasive/publications/humane-control/bir002-trapping-of-pest-birds.pdf

These documents were prepared by Trudy Sharp and Glen Saunders, of the New South Wales Department of Primary Industries for the Commonwealth Department of Environment and Heritage. They were issued in October 2004 and are the standard operating procedures for the shooting of pest birds and trapping of pest birds in Australia. They therefore serve as a guide only and do not replace or override relevant South Australian legislation.

Appendix 4: An Overview Of Noise-Generating Devices For the Management Of Abundant Native Birds

(Compiled by Dr Ron Sinclair, Department of Water, Land and Biodiversity Conservation)

Noise Generating Devices

Noise-generating devices (NGDs) vary in their sophistication and include:

- rattling tin-cans;
- propane gas powered "gas" guns or canons;
- "Bird Frite Cartridges", which are fired from a gun launching a projectile some 70 m into the air before exploding with a loud report and giving off a puff of smoke;
- motor vehicles (usually motor bikes) without mufflers; and
- a range of electronic devices varying in complexity from a portable radio, to amplified digitised Scottish bagpipe marching music controlled by a PC, to amplified computer-generated random electronic (computer game type) noises combined with ultra-sound, to radio-signal triggering of amplified digitised bioacoustic calls (i.e. alarm and distress calls of target species with or without "hunting" calls of predator species.

These sonic devices may or may not include some visual "scaring" component, such as a pop up scarecrow or strobelights.

Functions of Devices

- Non-lethal method of scaring birds away;
- manufacturers claim NGDs create an unfavourable environment for birds;
- some manufacturers claim NGDs set up invisible sound barriers which "deter" or "repel" birds preventing them from entering a particular area.

General Method of Operation

- Scare by startling.
- Scare by simulation of a dangerous threat from either something like a gun or something like a true predator.

General Considerations

What scares birds?

Generally, it is:

- the unknown or unfamiliar;
- the unexpected;
- the unusual;

- the sudden;
- that which mimics a true predator; or
- the response by other nearby birds to the presence of a predator.

Do birds hear ultrasound?

Most birds' hearing range is similar to that of humans and therefore have very limited hearing in the ultrasound range.

Is there a difference between an alarm call and a distress call?

An alarm call is usually a response to a visual sighting of a predator and is interpreted as a warning to others of the presence of potential danger. The usual response is flight. Not all species appear to commonly produce alarm calls but there appear to be some species that act as sentinels for a range of species in the one place.

Distress calls are usually emitted by a bird when caught (either in a net or by a predator). However, it is not uncommon for a distress call to result in a flocking response drawing birds into an area (rather than repelling them).

Do birds recognise prerecorded alarm and distress calls?

Bird vocalisations, including alarm and distress calls, are extremely intricate. The chances that birds recognise amplified recorded sounds in their original form are slim unless very high quality recording and replaying equipment were used. In addition, if calls are recorded, digitised and stored on a computer chip and then amplified through mechanical speakers, there is even a greater chance of losing critical biological detail. It is more likely with most of the equipment currently available that replayed digitised bioacoustic sounds represent little more than something new and unusual in the birds' environment. Different manufacturers' devices simply present the sounds in different forms.

Are predator calls useful?

Predators tend to call when they are maintaining their territorial boundaries. It would make little sense for them to call out and warn potential prey that they are in hunting mode.

General Assessment of the Effectiveness of Noise-Generating Devices

Bomford and O'Brien (1990) reviewed the available literature on published reports on tests of sonic devices. They found that the studies could be divided into two groups, those with and those without true controls and replication. The latter they termed 'inferential' studies as they usually involved simple comparisons of damage before and after the use of the sonic device and this does not allow for a true statistical

analysis of the results. Studies with independent replicated treatments including null treatments were few and far between. The following table summarises their review.

Table 1. Tests of Auditory Devices (Summary of review by Bomford and O'Brien)

Device	*No. Designed Experiments*	*No. Inferential Studies*	*Significant Effects Designed/Inferential*	*No Significant Effects Designed/Inferential*
Ultrasonic	4	16	0/1	4/15
Fear Generating (sirens, explosives, electronic noises)	5	14	2/9	3(or < 1 week) / 5(or < 1 week)
Broadcast Alarm and Distress Calls	2	19	2/15	0/4

Bomford and O'Brien concluded that manufacturers' claims should be viewed with skepticism and that there was little evidence that simple NGDs had anything more than a very short-term effect. The extent of the benefit from their use was a function of the rate at which birds habituated to the noise(s). There was, however, some evidence that bioacoustic calls had a longer effect than other noises, but birds would eventually habituate to all sounds. Bomford and O'Brien made the following generalisations.

1. The best effects with sound are obtained when: a) the sound is presented at random intervals, b) a range of different sounds are used, c) the sound source is moved frequently, d) the sound is supported by other control methods, e) the sound is reinforced by real danger; eg from shooting.
2. Loud sounds are more aversive than quiet sounds.
3. Sounds with a wide frequency range are more aversive than pure tones.
4. Adult birds are more easily scared than juveniles.
5. All species habituate to nearly all sounds tested.
6. Broadcast alarm or distress calls show promise as a control technique but are species-specific and there is evidence that habituation develops with prolonged or frequent exposure.
7. The effect of most sound generating devices is short term.

Bomford and O'Brien's review and their conclusions are supported by this author's experience with NGDs. Eventually non-lethal threats will fail to generate a startle effect or be recognised by birds as something associated with real danger. Although some trial data appears to support the effectiveness of NGDs, they tend to be

relatively small scale studies carried out over a relatively short period of time. The author is not aware of any proven successful use of a NGD that has been sustained over an extended period of time.

General Problems with Noise-Generating Devices

1. Short term effectiveness leading to habituation.
2. Conflict with neighbours over noise trespass.
3. Non-target effects on other (desirable) bird species ie if most noises produced are of no biological significance, they can not be targeted at problem species alone.
4. Ethical/moral problem over not really solving the problem, just moving it next door where it becomes someone else's problem. They encourage the user to adopt an island mentality which is totally at odds with the biology of most problem species.
5. For there to be any hope of being effective, they must be used as only one component of an integrated coordinated program with other bird control and site/farm management techniques. The greatest problem is commitment to maintain continuity of an integrated and coordinated program.
6. Noise-Generating Devices like gas canons and "Bird Frite Cartridges" have been reported to cause bush and grass fires.

Conclusion

Noise-Generating Devices should not be seen as the solution to managing abundant native bird problems. At best, they may have some role in an integrated coordinated scaring program, but programs reliant on noise production have limited applicability in many problem situations. NGDs have no role in managing the basic problem of native species expanding in population size and range.

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