ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

PROBLEMS IN VICTORIA CAUSED BY LONG-BILLED CORELLAS, SULPHUR-CRESTED COCKATOOS AND GALAHS

NOVEMBER 1995

PARLIAMENT OF VICTORIA
ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

REPORT ON PROBLEMS IN VICTORIA CAUSED BY LONG-BILLED CORELLAS, SULPHUR-CRESTED COCKATOOS AND GALAHS

NOVEMBER 1995

Ordered to be printed

VICTORIAN
GOVERNMENT PRINTER
1995

No 67 Session 1994/95

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FUNCTIONS OF THE COMMITTEE

Parliamentary Committees Act 1968

4EA. Environment and Natural Resources Committee

The functions of the Environment and Natural Resources Committee are to inquire into, consider and report to the Parliament on —

(a) any proposal, matter or thing concerned with the environment;

(b) any proposal, matter or thing concerned with natural resources;

(c) any proposal, matter or thing concerned with planning the use, development or protection of land —

if the Committee is required or permitted so to do by or under this Act.

TERMS OF REFERENCE

The Governor in Council, under section 4F of the *Parliamentary Committees Act 1968* refers the following matters to the Environment and Natural Resources Committee for inquiry, consideration and report to the Parliament.

To—

(a) investigate the nature, extent and severity of problems caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs; and

(b) identify any factors that may have contributed to damage caused by these birds;

(c) review scientific and other investigations and assess the effectiveness of current control methods carried out in relation to Corella, Cockatoo and Galah damage and recommend —

  (1) farm management systems and techniques and programs which can minimise damage;

  (2) bird control/management techniques and programs necessary to reduce the impact on private property, crops, regenerating vegetation, other environmental values and public facilities, without compromising the viability of the species;

(d) identify the implications of implementing the recommendation[s] in (c)

The Committee is required to make a final report to the Parliament on these matters before 31 March 1995.

Dated 27 September 1994
Published in the *Victoria Government Gazette*, 6 October 1994, p. 2691
Responsible Minister:
The Hon. C. G. Coleman, M.P., Minister for Natural Resources

AMENDED TERMS OF REFERENCE

The Governor in Council, under section 4F of the *Parliamentary Committees Act 1968* amends, as follows, the Order in Council dated 27 September 1994 published in *Government Gazette* No. G40 on 6 October 1994 (p. 2691) requiring the Environment and Natural Resources Committee to inquire into matters relating to Long-billed Corellas, Sulphur-crested Cockatoos and Galahs:

In that Order, for '31 March 1995' substitute 'the last day of the Spring Sittings of Parliament in 1995'.

Dated 28 March 1995
Published in the *Victoria Government Gazette*, 30 March 1995, p. 743
Responsible Minister:
The Hon. C. G. Coleman, M.P., Minister for Natural Resources

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Acknowledgement
Chapter heading illustrations were drawn by Jeff Davies (Long-billed Corella) and Nicolas Day (Sulphur-crested Cockatoo and Galah).

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EXECUTIVE SUMMARY

1 BACKGROUND

The Environment and Natural Resources Committee was given Terms of Reference asking that it inquire into problems in Victoria caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. The Committee was asked to investigate the nature, extent and severity of those problems; to identify factors that may have contributed to such problems; to assess the effectiveness of current control methods; and to identify the implications that may result from implementing any bird damage control recommendations that the Committee might make.

The Inquiry was initiated by the Minister for Natural Resources and was motivated by a desire to address a problem that has existed for some 20 years and which shows no signs of abating.

2 ENVIRONMENTAL BACKGROUND

Long-billed Corellas, Sulphur-crested Cockatoos and Galahs — referred to collectively in the Report as 'cockatoos' — are members of the parrot family. Prior to European occupation, cockatoos occurred in large numbers in parts of the region. Pioneer settlement in Victoria replaced the original major food of the Long-billed Corella in particular — the Murnong or Native Yam — with exotic grain crops and weeds including Onion Grass. These reliable, accessible food sources rapidly became staples of the Long-billed Corella diet. The removal of timber cover by primary industry combined with competition with rabbits and the uncontrolled use of poison led to a contraction in the range of the Long-billed Corella and a marked reduction in numbers.

The removal of competition with rabbits through the introduction of myxomatosis in the 1950s , and the availability of extensive food sources, are believed to have led to a regrowth in Long-billed Corella numbers. The birds are now thought to be extending their range to recolonise areas occupied prior to European settlement. The Galah has expanded its range southward with

the provision of water and reliable food sources. It can now be found throughout Victoria, with a distribution similar to that of the Sulphur-crested Cockatoo. The number of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs in Victoria is not known.

3 REGULATORY FRAMEWORK

Native bird management in Australia is subject to a three-tiered regulatory system.

Since 1960, successive Australian governments have banned the commercial export of most native animals including native birds. This ban is recognised internationally as falling within the guidelines of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), to which Australia is one of 128 signatories.

At the national level, the export of Australian native flora and fauna is regulated by the *Commonwealth Wildlife Protection (Regulation of Exports and Imports) Act 1982*. Native birds can, with Commonwealth Government approval, be exported for scientific, zoological and domestic (personal household pet) purposes. On a number of occasions, the Commonwealth Government has reaffirmed its ban on the trapping and export of native birds causing damage. Other relevant controls include the National Strategy for the Conservation of Australia's Biological Diversity, and the National Strategy for Ecologically Sustainable Development. The former relates to ecologically sustainable wildlife management practices, the latter to maintenance of ecological processes.

At the State level, Australian States and Territories permit the control of wildlife, including native birds, that cause damage. The conditions and methods vary in each jurisdiction.

Wildlife controls in Victoria are defined in the *Wildlife Act 1975* and in the Wildlife Regulations 1992. Long-billed Corellas, Sulphur-crested Cockatoos and Galahs are 'Protected Wildlife' under the Act; penalties apply for breaches of the Act. Where birds are causing damage, individual landowners may apply for an Authority to Control Wildlife (Destruction Authority). In certain

shires of Victoria, Long-billed Corellas and Sulphur-crested Cockatoos have been declared 'Unprotected Wildlife'. In such shires, landowners growing commercial crops, their families and employees are able to destroy, by shooting only, Long-billed Corellas and Sulphur-crested Cockatoos causing damage. Although the Minister for Natural Resources can authorise the use of poison, in practice this does not occur. Penalties apply for illegal poisoning.

4 BIRD PESTS AND BIRD DAMAGE

Term of Reference (a) asks that the Committee investigate the nature, extent and severity of cockatoo problems in Victoria. There are significant difficulties with defining terms such as 'bird pest' and 'bird damage'. There are also difficulties involved in measuring the economic costs of cockatoo damage.

In addressing Term of Reference (a), the Committee reviewed reported cockatoo damage associated with fruit crops; nut crops; vegetable crops; cereal crops (especially Wheat, Oats and Barley); oilseed crops (Sunflower; Safflower and Canola); and commercial flower crops. The Committee also reviewed reported non-crop damage on farms. This included damage to seedlings and young trees; damage to mature trees; removal of feed grain; cut baling twine, damaged hay; and the spreading of weeds.

Other reported problems reviewed included damage to coaxial cables, antennae and other communications equipment; damage to soft timber on houses and other structures; damage to recreational facilities; noise; and competition for food and nest hollows with other birds.

Damage can be unpredictable, variable, and locally severe. Perceptions of the extent of damage can influence responses to cockatoos. There are social costs involved in dealing with cockatoo damage problems.

The lack of adequate data on damage levels has led the Committee to recommend:

- that research be undertaken to establish the extent of cockatoo damage at local, regional and industry levels;

- that crop damage assessment processes be identified for use by primary producers; and

- that the impact of cockatoo damage on tree-planting programs be investigated.

5 FACTORS CONTRIBUTING TO DAMAGE

Term of Reference (b) asks that the Committee identify any factors that may have contributed to damage. The interaction of birds and humans has created a situation in which bird damage is difficult to avoid.

Flocking, habituation, home-range knowledge, curiosity, beak maintenance and roosting patterns are behavioural characteristics that lead cockatoos to act in certain ways. Dietary preference for cereal grains, fruits and Onion Grass combined with the replacement of native forest by grassy woodland has aided the expansion in range and numbers of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. Altered food sources and the siting of crops have further attracted cockatoos to certain favoured environments, sometimes resulting in damage.

The interaction of behaviour, environment and food source therefore creates conditions that can result in damage.

6 BIRD DAMAGE CONTROL

Term of Reference (c) asks that the Committee investigate the effectiveness of current control methods, and recommend farm management and bird damage control techniques that will minimise damage without threatening the viability of the species.

There is no single solution to bird damage problems. The Committee finds that relief from bird damage will only be achieved through the use of integrated, mutually-reinforcing damage-control and farm-management techniques.

Bird damage control methods reviewed by the Committee include scaring; noise makers; visual deterrents; visual barriers; chemical deterrents; tactile deterrents; decoy food sources; decoy birds (models); exclusion; shooting; poisoning; non-residual intoxicants; fertility control; trapping and export; trapping and gassing; and egg destruction.

This review is based on two key resolutions of the Committee. First, the Environment and Natural Resources Committee does not support a general program of cockatoo population reduction in Victoria. Second, the Committee does support, as part of an integrated bird damage control program, specific flock management by individual land holders who experience severe bird damage problems.

Based on these resolutions, the Committee recommends a number of measures that will not threaten the viability of the species. The Committee:

- supports shooting as a form of scaring;

- recommends that Long-billed Corellas, Sulphur-crested Cockatoos and Galahs be declared 'Unprotected Wildlife' for the purpose of commercial crop protection in Victoria;

- recommends that a non-residual intoxicant – alpha-chloralose – be investigated and, if proven viable, be made available to assist with the control of cockatoos causing damage;

- supports the use of trapping and gassing by land holders experiencing severe damage;

- recommends that the Department of Conservation and Natural Resources' trapping and gassing equipment be made available on a user-pays basis and that the Department evaluate the effectiveness of

the trapping and gassing program as a cockatoo damage mitigation measure;

- does not support the capture and export of wild cockatoos;

- does not support the use of poison to kill wildlife.

The Committee finds that farm management techniques, including habitat manipulation (roost site disturbance; decoy food sources; crop screening), plant breeding; crop substitution; and exclusion (throw over and permanent netting) can further assist in the reduction of damage levels.

The Committee reiterates that bird damage will only be controlled by an integrated program of bird damage control and farm management techniques that are planned, mutually-reinforcing and vigorously applied.

The Committee emphasises the importance of extension and recommends strategies and measures that will enable the community and the Government to work cooperatively in solving bird damage problems. The integration of practical experience, extension and research is judged as essential for any strategy to deal with bird damage.

7 BIRD DAMAGE CONTROL MEASURES

The Committee's response to Term of Reference (c) is continued in this Chapter. Fifteen common problems in Victoria associated with Long-billed Corellas, Sulphur-crested Cockatoos and Galahs are examined. Damage control programs are suggested.

The problems reviewed are those associated with roost trees; planted tree seedlings; germinating crops; ripening crops; fixtures (aerials, light fittings, etc.); feedlots; feed trails and stubbles; soft timber on houses and outdoor furniture; noise; commercial fruit and nut trees; hay bales; silage and grain covers; commercial flower crops; grape vines; and bowling greens, ovals, golf courses, etc.

The Committee advocates the application of bird damage control measures and farm management techniques that are practical, integrated and mutually-reinforcing. When applied in appropriate circumstances, none of the measures compromises the viability of the species, and all will assist those experiencing bird damage .

8 IMPLICATIONS

In Term of Reference (d), the Committee identifies and discusses the implications that may stem from implementing recommendations made in Chapters Four, Six and Seven. The combination of both traditional and innovative measures into coherent bird damage control strategies is expected to result in better bird damage control, more coordinated efforts and reduced levels of frustration for those affected.

An emphasis on data gathering will lead to better knowledge of the costs of damage and the relative cost:benefits of different damage control measures. Government assistance is recommended through the employment of two full-time extension officers, and through incentives to undertake group damage control programs by providing reductions in charges for bird control equipment used on a group basis as part of an integrated damage control strategy.

In the research arena, the Committee recommends investigation of the efficacy of drugs for the humane capture of cockatoos; evaluation of suitable plants to use as visual screens around certain crops; investigation of bird resistance in existing cultivars of commercial crops; and assessment of the cost-effectiveness of various damage control measures.

By recommending that Long-billed Corellas, Sulphur-crested Cockatoos and Galahs be declared 'Unprotected Wildlife' throughout Victoria under certain conditions, the Committee has sought to reduce frustration and delays in crop protection, and to enable pre-emptive bird scaring to be undertaken. None of the bird damage control measures recommended by the Committee threatens the viability of any of the three species.

The Committee considers that the range of measures provided in this Report should enable effective damage reductions. The Committee therefore sees no justification for poisoning of wildlife, and seeks to deter people from taking this action by recommending a doubling of the prescribed penalty for poisoning.

The Committee has sought to provide a means of removing a common factor leading to cockatoo damage to houses by recommending amendment to the Wildlife Act so that persons can be prevented from feeding cockatoos if consequent damage to neighbouring houses is being caused.

SUMMARY OF RECOMMENDATIONS

CHAPTER FOUR
BIRD PESTS AND BIRD DAMAGE

1 YIELD REDUCTION RESEARCH (p. 74)

That the Department for Agriculture, Energy and Minerals devote significant additional resources to:

(a) determine the extent to which horticultural, cereal and oilseed crop yields are affected by Long-billed Corella, Sulphur-crested Cockatoo and Galah damage; and

(b) develop and disseminate to the farming community reliable, simple and rapid techniques for assessment of bird damage to germinating and ripening crops.

2 ECONOMIC IMPACT RESEARCH (p. 75)

That the Department of Agriculture, Energy and Minerals survey the economic effects of agricultural and horticultural damage caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs at local, regional and industry levels.

3 TREE DAMAGE RESEARCH (p. 75)

That the Department of Conservation and Natural Resources survey the extent of damage caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs to tree-planting programs for commercial and Landcare purposes.

CHAPTER SIX
BIRD DAMAGE CONTROL METHODS

4 UNPROTECTED WILDLIFE (p. 109)

That the Minister for Natural Resources amend section 7A of the *Wildlife Act 1975* in order to declare the Long-billed Corella, Sulphur-crested Cockatoo and Galah Unprotected Wildlife for the purpose of commercial crop protection in Victoria, subject to the following conditions:

(a) destruction of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs should be by firearm only;

(b) destruction should be restricted to landowners and occupiers engaged in the rural production of commercial crops, their families and employees; and

(c) destruction should only take place on lands where commercial crops are being grown.

5 ILLEGAL POISONING (p. 114)

That the Minister for Natural Resources amend section 54 of the *Wildlife Act 1975* in order to increase the penalty for illegal poisoning of wildlife from 50 penalty units and six months imprisonment to 100 penalty units and six months imprisonment.

6 ALPHA-CHLORALOSE RESEARCH (p. 115)

That the Department of Conservation and Natural Resources investigate and report on the viability of alpha-chloralose for the humane capture of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs within 12 months of this Report being tabled.

7 ALPHA-CHLORALOSE USE (p. 116)

Provided Department of Conservation and Natural Resources' investigations establish the viability of alpha-chloralose for the humane capture of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, that the Department permit the use of alpha-chloralose subject to the following conditions:

(a) land holders must apply to the Department of Conservation and Natural Resources for approval to use alpha-chloralose;

(b) baits treated with alpha-chloralose should be supplied to land holders, at cost;

(c) there be stringent Departmental guidelines and conditions for its use;

(d) the Department should provide instruction in the use of alpha-chloralose, and in disease control;

(e) land holders should be responsible for providing their own protective equipment to reduce the risk of contracting diseases, particularly chlamydiosis, from the birds being handled;

(f) treated bait should not be stored by private persons under any circumstances outside the conditions of permit;

(g) surplus or uneaten bait either should be burned under Departmental supervision or returned to Departmental staff; and

(h) because assessment should be an integral part of the practical application of the method, the Department should give priority for access to alpha-chloralose to land holders involved in cooperative, integrated cockatoo damage control programs.

8 TRAPPING AND GASSING (p. 125)

That the Department of Conservation and Natural Resources make available trapping and gassing equipment to land holders on a user-pays, hire basis, subject to the following conditions:

(a) hire charges should be $20 per day for private land holders and $10 per day for members of Landcare groups;

(b) the Department should provide instruction in the safe operation of the equipment, and in disease control;

(c) land holders should be responsible for providing their own protective equipment to reduce the risk of contracting diseases, particularly chlamydiosis, from the birds being handled;

(d) because assessment should be an integral part of the practical application of the method, the Department should give priority for access to trapping and gassing equipment to land holders involved in cooperative, integrated cockatoo damage control programs;

(f) at least two sets of this equipment should be available in the north-east of Victoria; and

(g) land holders should be required to return gas cylinders to the Department in a refilled state.

9 IMPACT OF TRAPPING AND GASSING (p. 126)

That the Minister for Natural Resources confer with the Minister for Agriculture in order to establish a program in which their departments assess and document the impact on damage levels of the removal of large numbers of Long-billed Corellas, Sulphur-crested Cockatoos or Galahs as a damage control measure by trapping and gassing or other means.

10 DECOY FEEDING (p. 132)

That the Department of Conservation and Natural Resources coordinate demonstrations of decoy feeding of cockatoos at cereal crop-sowing time under the following conditions:

(a) that the Department of Conservation and Natural Resources donate decoy food for demonstration purposes;

(b) that growers donate the labour required and undertake to scare birds from their own crops for the duration of the demonstration;

(c) that the birds are not disturbed at the decoy food sites;

(d) that full costing of labour and materials be compiled, together with the effects, if any, on damage levels and frequency of birds feeding in crops; and

(e) that demonstrations be organised with Landcare groups or groups of cooperating growers.

11 REGULATION OF RECREATIONAL FEEDING OF COCKATOOS CAUSING DAMAGE (p. 133)

That the Minister for Natural Resources amend section 87 of the *Wildlife Act 1975* in order to prohibit or regulate the recreational feeding of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs when this action directly or indirectly leads cockatoos to cause damage to property or to the environment, or which could contribute to the spread of disease amongst wildlife.

12 SCREEN PLANTS (p. 135)

That the Department of Agriculture, Energy and Minerals investigate potential screen plants suitable for the protection of Sunflower and Safflower crops, and other crops where appropriate.

13 CULTIVARS RESEARCH (p. 136)

That the Department of Agriculture, Energy and Minerals investigate commercial cultivars of existing crops for evidence of differential susceptibility to damage by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, and convey the results to growers.

14 EXTENSION — 1 (p. 142)

That the Department of Conservation and Natural Resources:

(a) employ two full time extension officers (to cover both north-eastern and western Victoria) to liaise with the Department of Agriculture, Energy and Minerals and with the farming community, in order to motivate, assist and undertake demonstrations of integrated cockatoo damage mitigation programs in coordination with Landcare groups and other interested land holder groups. Such demonstrations must include assessment of the effectiveness and cost-efficiency of those programs. Funding should be sufficient to enable these assessments to be made;

(b) provide extension material that explains and encourages the use of integrated bird damage control strategies incorporating a range of scaring methods and decoy feeding;

(c) promote an education program on the Long-billed Corella, Sulphur-crested Cockatoo and Galah, with the aim of providing information on the biology, ecology and behaviour of the birds, and of discouraging the feeding of birds in inappropriate areas. The program should include reference to feeding of birds in urban areas; and

(d) because assessment should be an integral part of the practical application of such methods, give priority for extension support to groups of land holders involved in cooperative, integrated cockatoo damage control programs.

15 EXTENSION — 2 (p. 143)

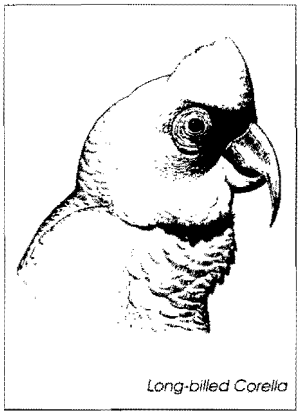
That the Department of Agriculture, Energy and Minerals provide extension material aimed at:

(a) encouraging grain transporters to minimise spillage;

(b) encouraging cereal crop growers to use rapid crop damage assessment techniques;

(c) encouraging graziers to feed grain to stock at times of the day that minimise its availability to birds; and

(d) encouraging cereal crop growers to adopt strategies that minimise grain residue in stubbles.



Long-billed Corella

CHAPTER ONE

INTRODUCTION

1.1 REPORT OF THE INQUIRY

This Report of the Parliament of Victoria's Environment and Natural Resources Committee is tabled in the Parliament pursuant to Section 40 (1) of the *Parliamentary Committees Act 1968*. It is entitled *Problems in Victoria Caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs.*

1.2 ORIGIN OF THE INQUIRY

The first official complaint concerning problems in Victoria caused by Long-billed Corellas *Cacatua tenuirostris* was recorded by the Department of Fisheries and Game in 1957. The second was in 1968[1]. Now, despite the efforts of successive governments since that time to deal with bird damage, complaints about Long-billed Corellas, Sulphur-crested Cockatoos *Cacatua galerita* and Galahs *Cacatua roseicapilla* are common.

In May 1994 in the Legislative Assembly, Mr. D. Napthine M.P. voiced a widespread frustration when, in the course of directing a question on this 'serious problem' to the Hon. C. G. Coleman, M.P., Minister for Natural Resources, he stated that

> The birds should be considered a pest and an environmental hazard[2].

The Minister replied that

> The matter should be addressed by an all-party Committee of the Parliament because the work that has been done to date suggests a need for broad support for whatever action is taken[3].

The Minister later advised the Environment and Natural Resources Committee that although —

> The issue that finally triggered my asking for an inquiry is the damage which has been done by the birds to Landcare work undertaken in western Victoria ... [4]

— he was seeking the development of

> public positions which can carry on beyond a change of government[5].

Thus, although the Environment and Natural Resources Committee received relevant Terms of Reference late in 1994, the Inquiry concerned an issue that has been widely debated for more than 20 years and which has an even longer biological, environmental and social history.

1.3 TERMS OF REFERENCE

On 27 September 1994 the Governor in Council, under section 4F of the *Parliamentary Committees Act 1968*, referred the following matters to the Environment and Natural Resources Committee for inquiry, consideration and report to the Parliament. The Committee was requested

To —

(a) investigate the nature, extent and severity of problems caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs; and

(b) identify any factors that may have contributed to damage caused by these birds;

(c) review scientific and other investigations and assess the effectiveness of current control methods carried out in relation to Corella, Cockatoo and Galah damage and recommend —

  (i) farm management systems and techniques and programs which can minimise damage;

  (ii) bird control/management techniques and programs necessary to reduce the impact on private property, crops, regenerating vegetation, other environmental values and public facilities, without compromising the viability of the species;

(d) identify the implications of implementing the recommendation[s] in (c).

The Committee is required to make a final report to the Parliament on these matters before 31 March 1995.

The Terms of Reference were published in the *Victoria Government Gazette*, of 6 October 1994 (p. 2691). The Minister responsible was the Hon. C. G. Coleman, M.P., Minister for Natural Resources. The Committee was officially notified of the reference on 11 October 1994[6]. Minister Coleman briefed the Committee on the Terms of Reference on 24 October 1994.

On 28 March 1995 the Governor in Council amended the reporting date to the Parliament from 31 March 1995 to before the 'last day of the Spring Sittings of Parliament in 1995'. This amendment was published in the *Victoria Government Gazette* on 30 March 1995 (p. 743).

1.4 SUBMISSIONS

Terms of Reference for the Inquiry and calls for submissions were published in the *Age* (11 November 1994) and *Herald-Sun* (12 November 1994). On 16 November 1994 notices appeared in the *Wimmera Mail Times*, *Mildura Sunraysia Daily*, *Wangaratta Chronicle*, *Ballarat Courier* and *Bendigo Advertiser*, and the following day in the *Ararat Advertiser* and *Hamilton Spectator*.

Print, radio and television media interest further alerted the public of the Inquiry, while letters inviting submissions were sent to farming, horticultural, Landcare and rural groups, native bird management experts, wildlife protection agencies, and relevant Government departments.

In response to such invitations, the Committee received 142 submissions. Fifty-seven per cent of submissions (81) were received from private individuals, 42% (59) came from non-government organisations, and 1% (2) from government agencies (Appendix A). Most submissions were received from individuals and organisations located in south-west Victoria (51), north-east Victoria (35) and the Melbourne Metropolitan Area (34). Submissions were also received from north-west Victoria (14), Gippsland (4) and interstate (4).

Although the viewpoints and suggestions expressed in submissions are considered more fully in subsequent chapters, the Committee here wishes to record its thanks to those individuals, groups and organisations that provided written information to the Inquiry. All submissions have been considered by the Committee and all have contributed to this Report.

1.5 CONDUCT OF THE INQUIRY

When briefing the Committee on the Terms of Reference, Minister Coleman advised that

> Broadly, it is a situation where there is a need to marry some of the long-held views of people ... with some of the contemporary information about management that has evolved and to bring those into the context of some broadly adopted government policy that can apply in Victoria[7].

In this Report the Environment and Natural Resources Committee has made policy recommendations informed both by the community's practical experience (conveyed to the Committee at inspections, public hearings and in submissions) and by the most recent local, interstate and international research findings on wild bird management and damage control.

The Committee conducted seven public hearings at which it heard evidence from 59 witnesses. Hearings were held at Wangaratta (15 March 1995, 14 witnesses); Ararat (4 April 1995, 10 witnesses); Horsham (5 April 1995, 10 witnesses); Hamilton (6 April 1995, 7 witnesses) and Melbourne (1 and 8 May 1995 and 5 June 1995, 18 witnesses). A full list of witnesses appearing before the Committee may be examined in Appendix B.

The Committee conducted a number of field inspections. A sub-committee visited Boorhaman via Wangaratta on 9 December 1994 and inspected Wheat and Oats damage caused by cockatoos. On 4 April 1995, the Committee inspected damage to Grape vines at Mount Chalambar Winery, Ararat, and cockatoo roosting sites at Lake Fyans. On 5 April 1995, the Committee examined reported damage to roofing, parkland and crops in the Horsham district. The Committee also watched a demonstration of radio-controlled bird trapping equipment used by the Department of Conservation and Natural Resources, and the use of Bird-Frite® cartridges. On 19 April 1995 an

inspection was undertaken at Red Hill South on the Mornington Peninsula (Tuck's Ridge and Morning Cloud wineries) in which vineyard damage by birds other than cockatoos was examined and a radar-activated bird-scaring system was demonstrated. Information concerning the inspections may be examined in Appendix C.

Video evidence was provided to the Committee by a number of participants in the Inquiry. Topics included documentaries on the biology and ecology of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs; community frustrations in western Victoria over bird damage and the measures that some farmers feel compelled to take; and arguments for and against native fauna exports. Photographic evidence also accompanied a number of submissions or was tabled at public hearings.

Background information relevant to the Inquiry was gathered from throughout Australia and from overseas both from government and private bodies. Major government conservation and agricultural agencies in the United States, Canada, South Africa, New Zealand and England provided information.

Primary research information was provided by bird experts in Victoria and interstate. Minister Coleman made available the files and records of the Department of Conservation and Natural Resources, while the Minister for Agriculture, the Hon. W. McGrath, M.P., provided data and various documentation collected by the Department of Agriculture, Energy and Minerals.

Finally, the Committee spoke with various farmers and horticulturalists; bird observers; native bird experts; government regional officers; and rural community representatives who provided a series of differing perspectives on the nature of bird damage and how or if it can be managed.

The Committee thanks all those who in some way contributed to the conduct of the Inquiry, and to the structure and outcomes of this Report.

1.6 STRUCTURE OF THE REPORT

1.6.1 Report Organisation

The organisation of this Report has been determined by the Terms of Reference. Background information may be found in Chapters Two and Three. In Chapter Two the Committee presents an overview of environmental and biological factors associated with Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. Chapter Three is concerned with the international, national and Victorian regulatory framework within which this Inquiry, and the recommendations that are made, must be set.

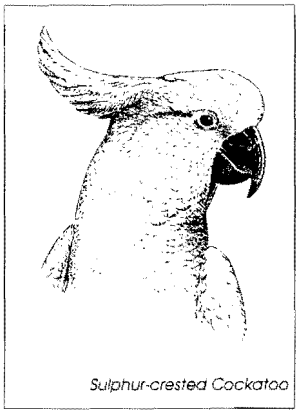
Term of Reference (a) — the nature, extent and severity of problems caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs — is examined in Chapter Four. Chapter Five addresses Term of Reference (b), or factors that contribute to damage caused by the three bird species.

In Chapter Six, the Committee assesses current control measures and their effectiveness. As requested in Term of Reference (c), the Committee makes a number of recommendations relevant to bird control and to bird damage control and farm management techniques. Chapter Seven continues this theme by identifying a number of common bird damage problems and suggesting responses to them.

In Chapter Eight, the Committee considers the implications that will arise from applying the techniques identified in Chapters Six and Seven. This meets Term of Reference (d).

1.6.2 Terminology

The term 'cockatoo' is frequently used in Australian wildlife literature to refer generally to any one or all of the 13 species of cockatoos in Australia. For the purposes of this Report, 'cockatoo' or 'cockatoos' are used as collective terms to refer specifically to the three species of cockatoos that are the subject of this Inquiry. When reference is made to any single species of cockatoo, the name of that species is presented in full.



Sulphur-crested Cockatoo

CHAPTER TWO

ENVIRONMENTAL BACKGROUND

2.1 INTRODUCTION

In Australia, as in other parts of the world, the establishment and development of primary industry brought major changes to the landscape and had a dramatic impact on the distribution and abundance of many species of wildlife. Most notably this led to a general loss of ecological diversity, since agricultural ecosystems based on extensive monocultures are inherently simpler than most natural, terrestrial ecosystems. As a result, through some combination of loss of habitat, competition with introduced species and predation, many species have disappeared.

This altered environment favours a range of native species, some of which, at least in the short-term, have been able to expand in range and/or numbers. Certain native species have therefore come to be regarded either as competitors for foods grown for the use of humans and livestock, or as agents causing other kinds of damage, and therefore conflict with human interests in the rural landscape. Birds, partly because of their mobility, dominate amongst the native species regarded as pests.

In Victoria, some of the more widespread or better known birds causing damage are: ravens *Corvus* spp. (commonly known as crows); Rainbow Lorikeets *Trichoglossus haematodus;* Musk Lorikeets *Glossopsitta concinna;* Eastern Rosellas *Platycercus eximius;* Crimson Rosellas *P. elegans;* Silvereyes *Zosterops lateralis;* Australian Wood Ducks *Chenonetta jubata;* Australian Shelducks (Mountain Ducks) *Tadorna tadornoides;* Emus *Dromaius*

novaehollandiae; cormorants *Phalacrocorax* spp.; Little Corellas *Cacatua sanguinea*; Galahs; Sulphur-crested Cockatoos and Long-billed Corellas. While the Terms of Reference for this Inquiry focus on the last three named species, many of the principles discussed within this Report apply equally to many of the other species commonly regarded as pests in some situations.

The Long-billed Corella, Sulphur-crested Cockatoo and Galah are large members of the parrot family, familiar to many people. Studies of the biology and ecology of all three species have been undertaken.[8] The following discussion is drawn largely from these studies. For the purposes of this discussion, the term 'cockatoos' is used to refer in a general sense to all three species.

2.2 DESCRIPTION OF SPECIES

The Long-billed Corella has a total length of 375 mm, and is largely white, with a band of orange-scarlet feathers across the throat and above the bill, extending back just behind the eye (Plate 1). There is a light yellow wash under the wings and tail. The bill, with a greatly elongated upper mandible modified for digging, is horn coloured and there is a grey-blue naked ring around the eye.

The Sulphur-crested Cockatoo is a large bird, some 495 mm in total length, white above and below, with a striking, forward-curving erectile yellow crest (Plate 2). The undersides of the broad wings have a strong yellow wash and the ear coverts are yellow. The bill is black and the naked eye ring is white.

The Galah, smallest of the three species, with a total length of 338-362 mm, has a pale pink crown (Plate 3). The back, wings and tail are grey. The cheeks, nape, ear coverts and underparts, including underwing coverts, are rose-red. The bill is horn coloured. The naked eye-ring is crimson in the eastern race.

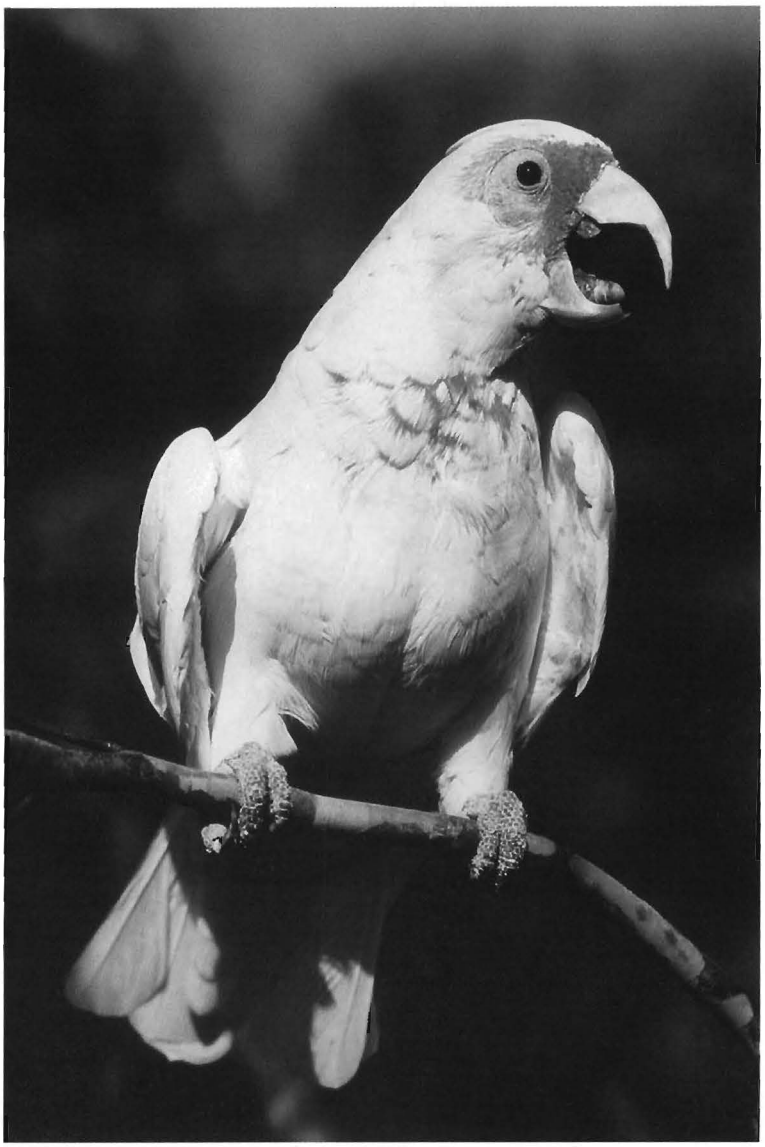


PLATE ONE
Long-billed Corella *Cacatua tenuirostris* (*Photograph: Roland Seitre*).

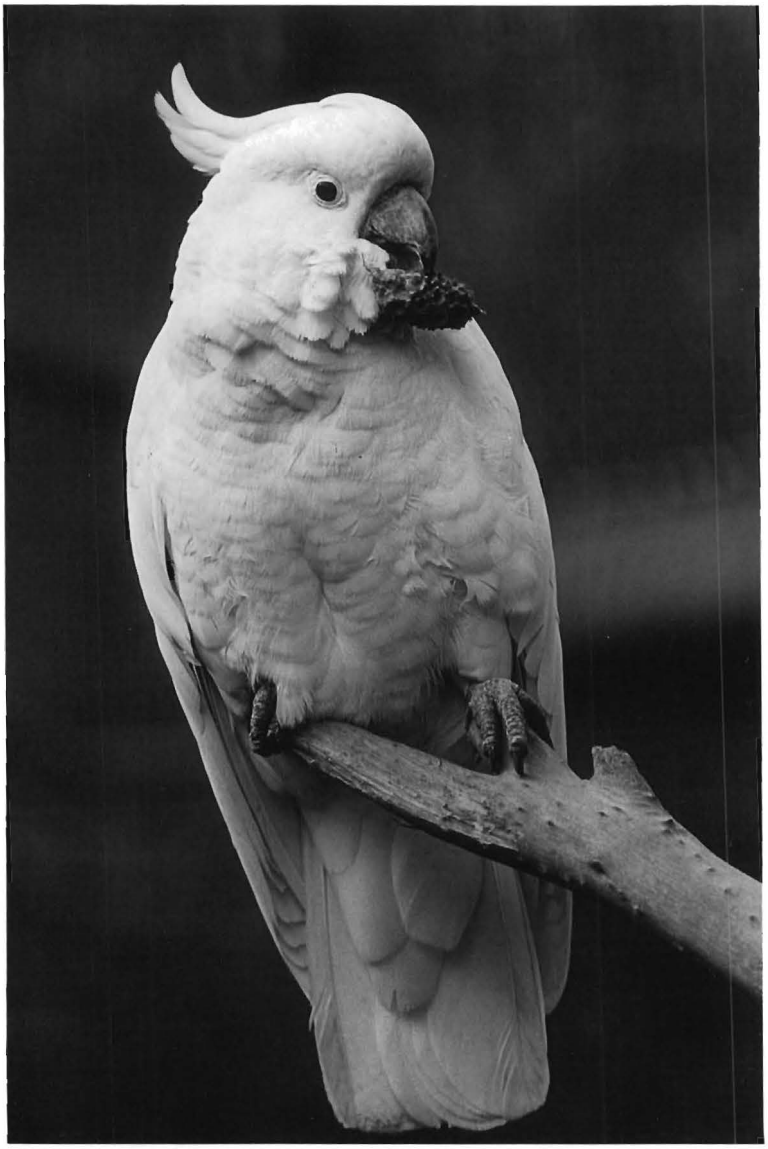


PLATE TWO
Sulphur-crested Cockatoo *Cacatua galerita* (*Photograph: Ian Temby*).

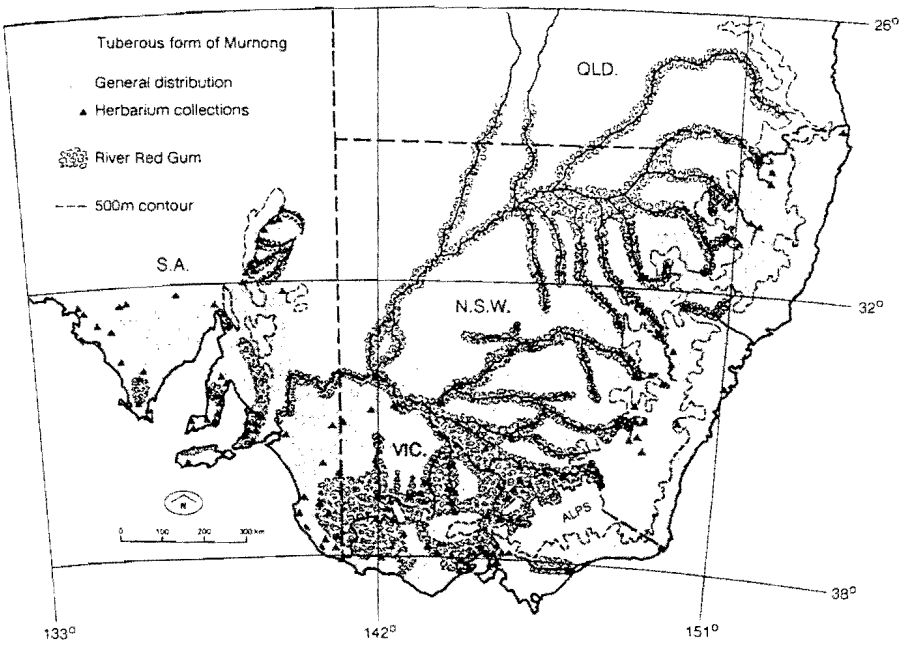
PLATE THREE
Galah *Cacatua roseicapilla* (*Photograph: Ian Temby*).

2.3 DISTRIBUTION AND HABITAT

2.3.1 Long-billed Corellas

According to accounts of early explorers, naturalists, pastoralists and others, the Long-billed Corella was an abundant species in the riverine woodlands of Victoria. This distribution corresponds with the distribution of the River Red Gum *Eucalyptus camaldulensis* and the Native Yam (Murnong) *Microseris lanceolata*, a yellow daisy with a fleshy, protein-rich tuber (Figure 1).

FIGURE 1
Distribution of Native Yam and River Red Gum in south-eastern Australia at the time of pioneer settlement.



(Source: Emison *et al.*, The Biology and Status of the Long-billed Corella in Australia, p. 238.)

During the winter and spring, the Native Yam was the main plant food of both the Aborigines and the Long-billed Corella[9]. Prior to the introduction of domestic livestock, it grew in immense numbers in the friable grassland soils of south-eastern Australia. In the Murray River and Riverina districts where rainfall was lower and less reliable, the Native Yam grew most abundantly close to the rivers, and the Long-billed Corella was reported to be exclusively a bird of the river country in that region. A variety of other perennial plants bearing fleshy underground storage organs was also likely to have figured in the diet of this bird, but there are few records in the literature. Such plants are commonest in the winter rainfall zone. The coincidence of these factors probably delineates the former stronghold of this species.

2.3.2 Decline and Recovery

By the 1860s, the Long-billed Corella had become rare or absent from parts of its range where it had been recorded as numerous only 20 years earlier. A flock numbering 'tens of thousands' was observed in central Victoria in an area where Long-billed Corellas are uncommon today. The species also disappeared rapidly from the Mornington Peninsula, where the type specimen was collected in 1802[10].

The pastoral occupation of south-eastern Australia in the 1830s had a dramatic impact on the habitat and landscape of the Port Phillip District of New South Wales (Victoria from 1851). By the 1840s experienced observers were remarking on the decline in wildlife numbers, on the noticeable increases in salinity, siltation, erosion and flooding, on the changing timber and vegetation cover, on the more frequent dust storms and bushfires[11]. The grazing and soil compaction of hard-hoofed animals, burning to clear bush and improve herbage[12], persistent timber extraction for fuel, construction and transport, and the damming of rivers and creeks for water storage reshaped the landscape of pioneer Victoria. These processes were further accelerated in the 1850s by the extension of the urban network and by the environmental transformations of the gold diggers.

One consequence of these changes was that the Native Yam (Murnong), principal food of the Long-billed Corella, persisted for only two or three

seasons before it virtually disappeared from most areas. This plant, which had been incredibly abundant, occurring by the millions[13], vanished because —

> Sheep not only learned to use their noses to root up murnong from the soft soils, but for the most part lived on them for the first year[14].

As a result the distribution of the Native Yam, and with it the range and numbers of the Long-billed Corella, became increasingly restricted. In the Port Phillip Bay area, for example, the Native Yam had disappeared by 1839, just four years after settlement. Two characteristics peculiar to the Long-billed Corella contributed to this decline:

> The sedentary habit and specialised diet of the Long-billed Corella had made it particularly susceptible to the abrupt changes in environmental conditions which happened soon after European settlement. By 1860 the range and numbers of the Long-billed Corella had been so reduced that it had ceased to be a notable feature of the Australian environment. For the following 90 years, only a few references were made to this species in the literature and many of those were comments about its scarcity or its decline[15].

Onion Grass *Romulea* spp. (a group of South African weeds) was already abundant near Melbourne by the 1860s and cereal grains were commonly grown there at that time. Together these items comprise the main modern foods of the Long-billed Corella. Despite the availability of these food sources, the Long-billed Corella continued to decline in distribution and numbers until the early 1950s[16].

It is now believed that a factor depressing the population of this species was competition by the European Rabbit *Oryctolagus cuniculus* for cereal grain at a critical time: when it was the only available food (in stubbles in mid-late summer) and that starvation, mainly of juvenile birds, suppressed the population. Pressure on the Long-billed Corella population is also thought to have been increased by the use of poisoned grain laid for cockatoos, when strychnine (applied to carrots and apples) and phosphorous (often mixed with pollard) were used for rabbit baiting prior to the use of 1080 in the 1950s.

Following the introduction of myxomatosis in December 1950 and the subsequent crash in rabbit numbers, there was a sudden increase in Long-billed Corellas, followed soon after by a range expansion. This expansion was noted by farmers and naturalists and also reported in the literature as early as

1962[17]. In ecological terms, one granivorous species expanded to fill the void left by another. The expansion of Long-billed Corella numbers and range was further facilitated by a doubling of the area under crops and pasture during the 1960s, additional clearing of forests and the provision of water.

Spread of Onion Grass was favoured by the four-year rotation of cereal cropping followed by sowing of Perennial Rye Grass *Lolium perenne* and Subterranean Clover *Trifolium subterraneum*[18]. It should be noted that the use of the poison 1080 to control rabbits will not affect cockatoos, since birds generally are far less sensitive to this substance than mammalian herbivores[19], and so would not ingest a lethal dose, even if they ate the carrot bait now used to poison rabbits.

The Long-billed Corella has recolonised much of its former range, and this expansion is occurring rapidly. Emison *et al.* predicted

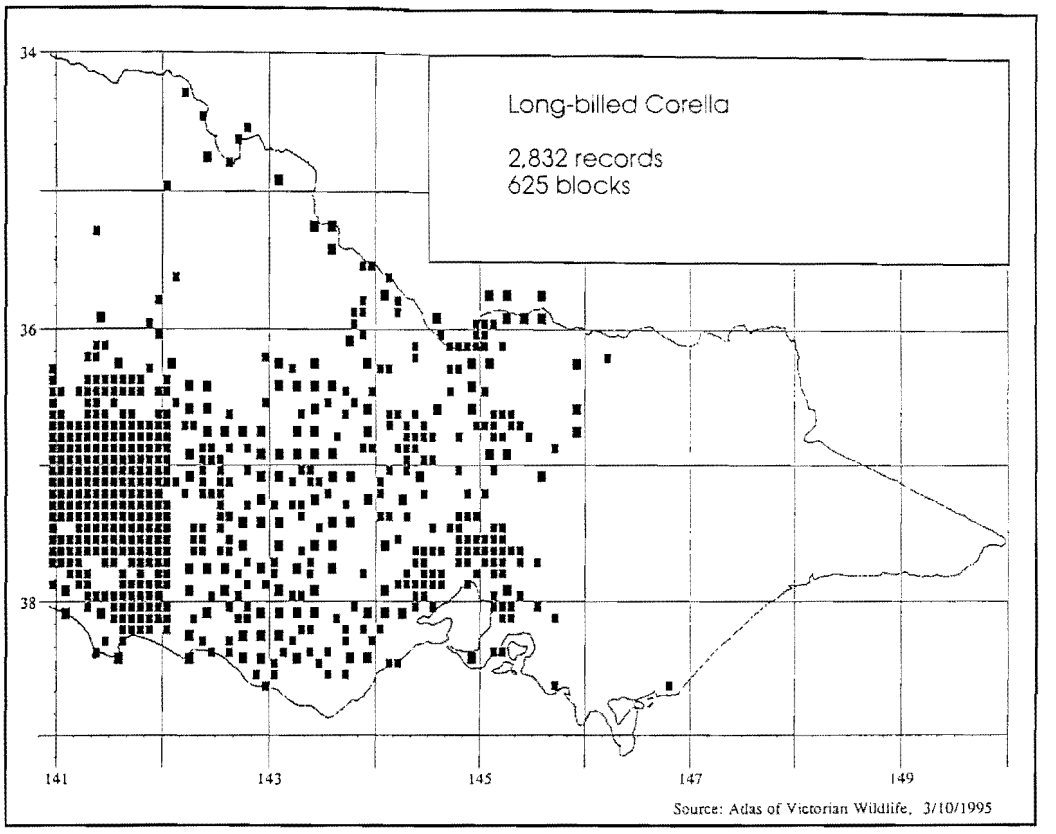
> ... that this corella will soon begin to spread into that large area of temperate grassy woodland (where rainfall >400 mm) stretching from Wangaratta in Victoria northwards through the Narrandera and Wagga Wagga area of New South Wales to at least 34°S latitude ... Our knowledge of the area of grassy woodlands north of 34°S is insufficient to allow a prediction of future expansion of corellas, but if food and nesting trees are both present such an expansion is likely[20].

2.3.3 Current Range

The Long-billed Corella now occurs in a narrow range of habitats, being found primarily in grassy woodland formations, and mainly in those dominated by the River Red Gum (Figure 2). Temperate grassy woodlands occur in a broad, continuous belt from southern Queensland inland of the Great Dividing Range through New South Wales into northern Victoria and into coastal areas of south-western Victoria and south-eastern South Australia. Grassy woodland also occurs in a broad region of the Gippsland plains in south-eastern Victoria[21].

Almost all of the present population of the Long-billed Corella occurs in grassy woodlands in the winter rainfall zone where, south of 34°S and east of 140°E, mean annual rainfall is 250-800 mm (Figure 3).

FIGURE 2
Range of the Long-billed Corella



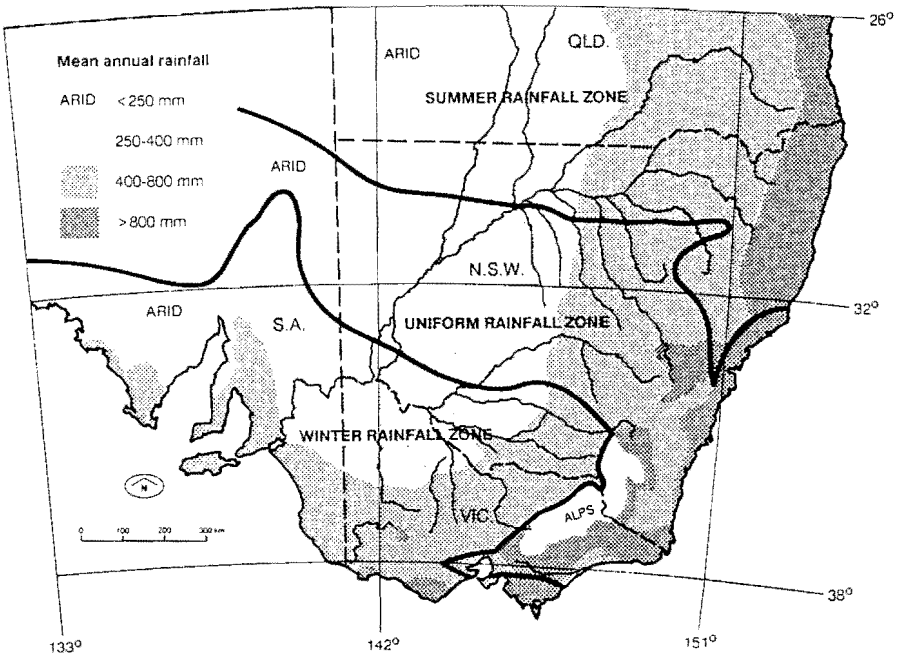
Explanatory Notes

(1) Figure 2 indicates the range of the Long-billed Corella. It does not indicate the number or density of birds, nor growth or decline in Long-billed Corella numbers.

(2) Figure 2 was assembled from the Atlas of Victorian Wildlife database. The data were compiled from field observations and reports. Observations that could be precisely located were coded to 5 minute (7 x 9 km) longitude by latitude blocks indicated by small squares. General rather than specific locations were coded to 10 minute blocks indicated by large squares.

(3) Figure 2 was compiled from sightings reported to, or recorded by, the Department of Conservation and Natural Resources.

FIGURE 3
Mean annual rainfall and rainfall zones in south-eastern Australia



(Source: Emison *et al*., p. 237)

The River Red Gum occurs in two distinct ecological communities[22]. The riverine community of River Red Gum occurs along water courses and in or around wetlands. Trees may exceed 25 m in height and often occur as strips along watercourses or groups around wetlands. Such sites are important roosting and breeding areas.

The non-riverine community is primarily found away from watercourses. Trees are usually less than 25 m high and are of a spreading habit and rounded canopy. This is the primary habitat of the Long-billed Corella.

Long-billed Corellas also occur in several other vegetation associations. The Inland Blue Gum *Eucalyptus leucoxylon pruinosa*, Pink Gum *E. fasciculosa* and Rough-barked Manna Gum *E. viminalis cygnetensis* woodland association is found in south-eastern South Australia and adjacent western Victoria, where cereal (Oats *Avena sativa*, Wheat *Triticum aestivum* and Barley *Hordeum vulgare*) and oilseed cropping provide a food source for Long-billed Corellas. The Grey Box *E. microcarpa*, Buloke *Allocasuarina luehmanii* and Yellow Gum *E. leucoxylon leucoxylon* woodland association occurs on the northern plains and foothills from the South Australian border through Victoria to New South Wales. Much of this woodland has been cleared for Wheat and Sheep *Ovis aries* enterprises and tree cover is very sparse in parts of its range. The once largely treeless volcanic plains of south-western Victoria and nearby parts of south-eastern South Australia have been planted with shelter belts of Sugar Gum *E. cladocalyx*, Blue Gum *E. globulus* ssp. and introduced conifers, especially cypresses *Cupressus* spp. and pines *Pinus* spp. These trees provide roosting sites (and limited nesting opportunities) for Long-billed Corellas in an area where the birds' major foods — Onion Grass and Oats — are abundant, but where Long-billed Corellas would not be likely to occur were it not for the presence of the planted trees.

The range of most of the Long-billed Corella population coincides with the rainfall (400-700 mm) suitable for growing Oats. Onion Grass, the other major food of the Long-billed Corella, is widespread where annual rainfall is 400-800 mm. The lower rainfall limit for Wheat growing is approximately 250 mm which also approximates the current inland limit of distribution of the Long-billed Corella. It should be noted that, as discussed in the previous section, there is still ample scope for the Long-billed Corella to extend its range within the above environmental limits. Indeed, the Long-billed Corella is now seen occasionally in the Melbourne metropolitan area in small groups, and may well become a regular inhabitant like the Galah and the Sulphur-crested Cockatoo.

The Little Corella, closely related to the Long-billed Corella and responsible for similar damage in other areas, is also expanding in Victoria. The ranges of the two corellas now overlap and there appears to be interbreeding near Melbourne[23].

2.3.4 Sulphur-crested Cockatoos

In contrast to the present rather restricted habitat of the Long-billed Corella, the eastern subspecies of the Sulphur-crested Cockatoo is found in a wide variety of environments (Figure 4). These include tropical rainforest; coastal mangroves; cultivated farmlands; sclerophyll forests; woodlands and mallee adjoining riverine vegetation; Coconut Palms *Cocos nucifera*; and Hoop Pine *Araucaria cunninghamii* forests[24]. It is also now common in timbered urban areas of Melbourne and Sydney[25].

This broad range of habitats is reflected in its distribution from Tasmania to Cape York Peninsula in a broad belt from the coast to well inland of the Great Dividing Range. It extends as far west as St Vincents Gulf in the south and the Gulf of Carpentaria in the north.

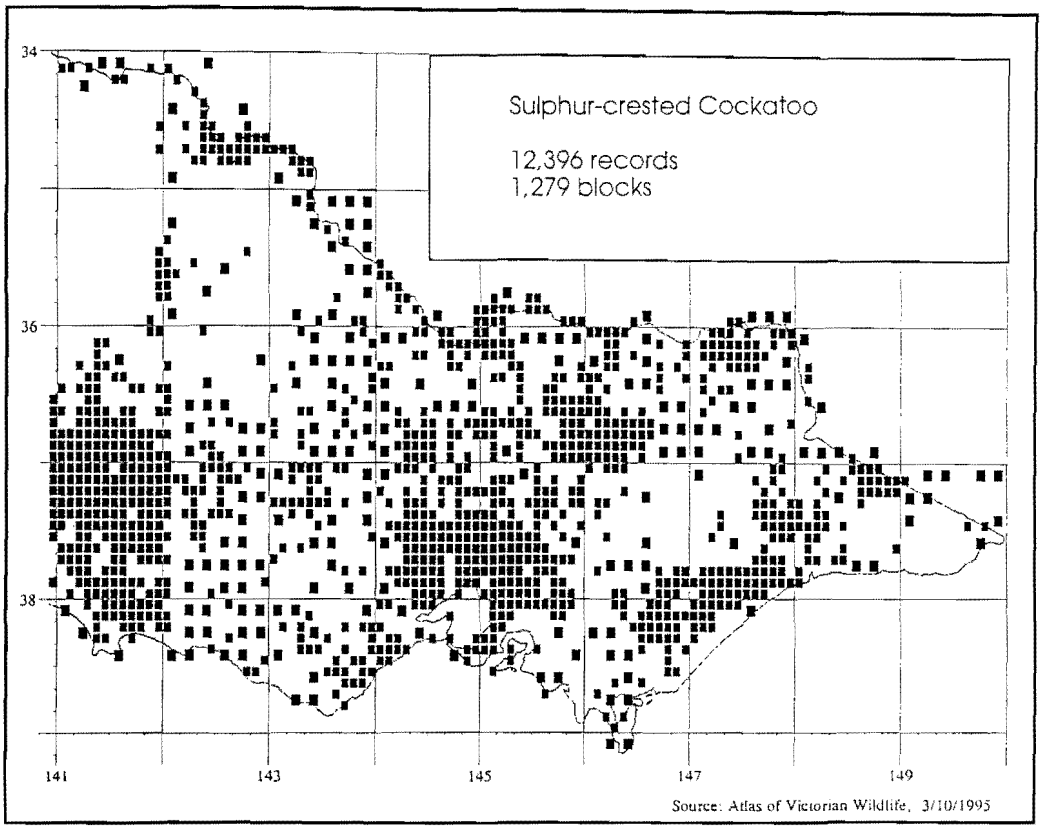
There is little historic information on the distribution and abundance of the Sulphur-crested Cockatoo in Victoria. However, the broader dietary[26] and habitat[27] preferences of this species have buffered it from the effects of clearing and habitat change which had such a dramatic impact on the Long-billed Corella. There is also little doubt that, as with the Galah, clearing, the provision of water and the extension of grain crops have benefited the Sulphur-crested Cockatoo.

2.3.5 Galahs

Galahs inhabit most types of open country throughout mainland Australia. They are typical birds of the savanna woodlands and open grasslands of the interior, but are becoming increasingly abundant in coastal and mountainous areas. They are rarely seen above 1250 m[28]. In a discussion of the effects of clearing for cereal crop cultivation and provision of water for stock in parts of the dry inland, it has been observed that:

> These changes have enabled Galahs, hitherto confined to within flying distance of tree-lined watercourses, not only to expand into the rangelands away from the rivers but also to invade the newly created wheatlands with their abundance of food suitable for such granivorous birds[29].

FIGURE 4
Range of the Sulphur-crested Cockatoo



Explanatory Notes

(1) Figure 4 indicates the range of the Sulphur-crested Cockatoo. It does not indicate the number or density of birds, nor the growth or decline of Sulphur-crested Cockatoo numbers.

(2) Figure 4 was assembled from the Atlas of Victorian Wildlife database. The data were compiled from field observations and reports. Observations that could be precisely located were coded to 5 minute (7 x 9 km) longitude by latitude blocks indicated by small squares. General rather than specific locations were coded to 10 minute blocks indicated by large squares.

(3) Figure 4 was compiled from sightings reported to, or recorded by, the Department of Conservation and Natural Resources.

Galahs occur in small numbers in Tasmania. Some birds there are known to be of captive origin, but their current distribution suggests that others may have flown there from the mainland[30].

Prior to European colonisation, the Galah typically inhabited arid and semi-arid areas of Victoria. 'The current picture', therefore,

> ...is of a vigorously expanding species thriving alongside humans as this continent continues to be developed[31].

Galahs have thus expanded south in Victoria, and are now common in some Melbourne suburbs where they were rare before 1970. This range expansion is continuing, and they occur throughout Victoria in lightly wooded areas of less than 1000 mm rainfall (Figure 5). They are still uncommon in south-eastern Victoria[32].

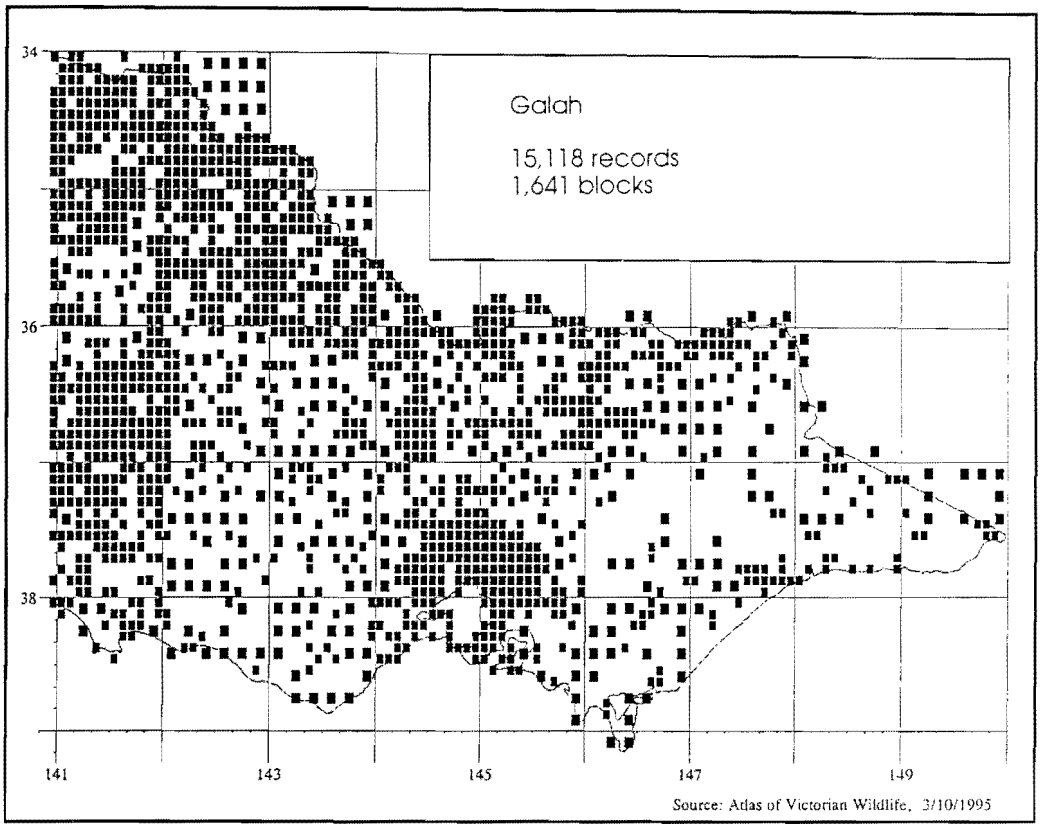
2.4 BREEDING

All three species nest in hollows in living or dead trees. Long-billed Corella nests are generally in vertical or steeply sloping hollows, usually in River Red Gum trees. Breeding has been observed in horizontal tunnels in scoria cliffs, and in nest boxes. Galahs and Sulphur-crested Cockatoos have also been recorded nesting in crevices in cliffs and Galahs in vertical concrete pipes used as fence posts. Sulphur-crested Cockatoos have been observed nesting in hollows similar to those used by Long-billed Corellas in River Red Gum trees in western Victoria. Other species of trees are used elsewhere, provided suitable hollows exist[33].

Breeding in the Long-billed Corella is strictly seasonal, as it is with the other species, at least in the southern parts of their ranges (Table 1). The Galah lines the nest hollow with fresh eucalypt leaves for several weeks before laying. In this manner, a consolidated, saucer-shaped depression is formed for the eggs. This behaviour is not observed in the other two species whose eggs are laid on decaying wood in an otherwise bare hollow.

However, two Long-billed Corella nests were recorded containing a spray of fresh eucalypt leaves brought to the nest during the week after the chicks

FIGURE 5
Range of the Galah



Explanatory Notes

(1) Figure 5 indicates the range of the Galah. It does not indicate the number or density of birds, nor the growth or decline of Galah numbers.

(2) Figure 5 was assembled from the Atlas of Victorian Wildlife database. The data were compiled from field observations and reports. Observations that could be precisely located were coded to 5 minute (7 x 9 km) longitude by latitude blocks indicated by small squares. General rather than specific locations were coded to 10 minute blocks indicated by large squares.

(3) Figure 5 was compiled from sightings reported to, or recorded by, the Department of Conservation and Natural Resources.

TABLE 1
Comparative breeding and survival characteristics of the three species

	Long-billed Corella	Sulphur-crested Cockatoo	Galah
Eggs in clutch — number	2 - 4	2 - 3	2 - 8
Incubation — days	24 (approx)	30 (approx)	22 - 26
Incubation — average	Not known	Not known	23.4
Nestlings — days	50 (approx)	66 - 74	46 - 59
Survival to 3 years old (%)	Not known	Not known	9%
Longevity (years)	50 - 60#	60 - 70#	50 - 60#
Nest height — metres	1.5-25	4.5 - 16.5	3 - 17
Laying period	July-October	August-October	July-November
Nest fidelity	Yes	Yes	Yes

In captivity: figures provided by Mr Stan Sindel, personal communication, 3 March 1995.

Note: longevity in captivity is a poor indicator of potential longevity in the wild, where many factors are likely to result in a shorter normal life span.

hatched[34]. In all three species, both parents assist with incubation and feeding of the nestlings. Newly-emerged young Long-billed Corellas accompany their parents for a number of weeks (up to two months in the Galah and two to two and a half months in the Sulphur-crested Cockatoo) as they develop flying and food-finding skills. Breeding pairs of Long-billed Corellas visit their nest hollow throughout the year, probably on a daily basis, as is the case with the other species.

2.5 BEHAVIOUR

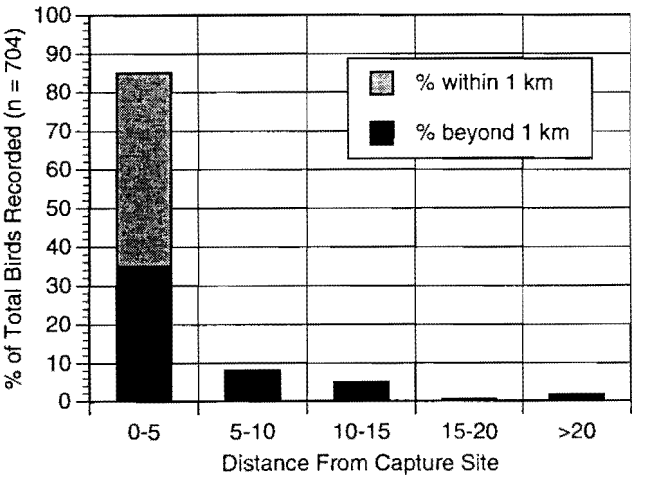
2.5.1 Movements

2.5.1.1 Long-billed Corellas

Studies of movements in the Long-billed Corella in western Victoria involved the wing-tagging of 704 Long-billed Corellas over a five year period[35]. Re-

sightings of marked Long-billed Corellas up to nine years after being tagged showed that most Long-billed Corellas do not routinely move long distances. The mean distance of sightings from tagging sites was only 2.7 km and more than 85% of sightings were within 5 km of where the birds were tagged. Nearly 50% of sightings were less than 1 km from tagging sites (Figure 6).

FIGURE 6
Long-billed Corella movement distances



(Source: Emison *et al.*, p. 233).

The longest movement recorded during this study was of one bird observed 77 km from where it was tagged. At one site, the mean distance of tagged birds from the tagging site was 11.3 km, while at another tagging site, tagged Long-billed Corellas were recorded feeding some 12 km from the site. The researchers involved in this study suggested that such relatively long movements in this species were in response to a temporary abundance of cereal grain some distance from the birds' normal roosting areas. Similar movements to food sources were suggested in a study of the Long-billed Corella in the south-east of South Australia[36]. Most observations of tagged birds were made in River Red Gum woodland country. It is possible that, in other parts of the Long-billed Corella's range, where roosting sites are restricted to trees along watercourses or in swamps, such as the southern

Wimmera west of Horsham, these birds travel greater distances from the roost site to feeding areas. Indeed, observations during a trial of trapping and gassing cockatoos suggested that Long-billed Corellas regularly moved up to 20 km from the roost site during the day's feeding activities, in a series of brief flights between short term resting sites and feeding sites. The round trip from the overnight roost to feeding sites and back to the roost could cover as much as 50 km[37]. No evidence was detected of any regular movement of young birds away from the area in which they originated, following the breeding season. Indeed, one bird tagged as a nestling in 1979 was resighted a number of times until 1988, always within 2.5 km of its natal tree. However, the data are few, and it is possible that movements occurred which were not detected during this study.

2.5.1.2 Sulphur-crested Cockatoos

While the Sulphur-crested Cockatoo is described as sedentary[38], and in north-eastern New South Wales there is a sedentary component of the population comprising both breeding and non-breeding birds, there is also a vagrant or nomadic component of the population, at least in north-east New South Wales, which swells the numbers present in autumn and winter. The nomadic group is assumed to comprise juveniles, immatures and some adult non-breeding birds[39].

2.5.1.3 Galahs

The situation with Galahs, based on one long-term study in Western Australia, appears to be rather different. While breeding adults appear to be sedentary, juvenile Galahs, once they cease to be fed by their parents, disperse from their natal areas, either by following the prevailing morning winds or in response to changes in food availability in winter. In their second year, they join the Local Nomadic Flock[40] and forage over a home range of over 1000 km^2.

2.5.1.4 Other cockatoo species

In the above three species, a significant component of the population comprising at least the breeding pairs is present year-round. This characteristic contrasts markedly with Carnabys Cockatoos *Calyptorhynchus*

funereus latirostris, Little Corellas and Major Mitchell's Cockatoos *Cacatua leadbeateri* which all disperse from their breeding areas in Western Australia with their young, not returning until late autumn (Little Corellas) or late winter, and with Yellow-tailed Black Cockatoos *Calyptorhynchus funereus* in Victoria, which apparently undertake regular seasonal movements to winter feeding areas[41].

2.5.2 Communal behaviour

There are many reasons why birds may forage in flocks and exhibit communal behaviour (Plate 4). Such behaviour is particularly noticeable amongst some granivorous birds which feed in open environments such as woodlands and grasslands. Predator avoidance is often cited as the primary reason, but there are other possibilities. Optimal use of concentrated, abundant yet short-lived or patchy food resources (such as germinating cereal crops) is facilitated by a process known as local enhancement, whereby birds seeking food are attracted by the conspicuous appearance or behaviour of feeding flocks. The information being transferred (here is a good food source) is used at a local level to optimise the efficiency of finding adequate food resources. Information transfer occurs at a broader scale in communal roosts, where a bird or group of birds which have exhausted a patch of food may follow successful birds as they leave the roost in the morning, perhaps in a different direction[42].

These three species are by nature sociable. Predators such as birds of prey or humans can be detected at a distance by sentinel birds whose role is to alert the rest of the feeding flock that there is danger. While the use of sentinels has been reported in the literature of the Sulphur-crested Cockatoo and the Long-billed Corella[43], this behaviour was not observed during an intensive study of the Sulphur-crested Cockatoo over two and a half years in north-eastern New South Wales[44]. The Galah responds to the alarm of the Sulphur-crested Cockatoo, but does not exhibit this sentinel behaviour itself[45].

Cockatoos frequently feed in large, noisy and conspicuous flocks. Other birds flying in the vicinity (and even up to one kilometre away) will change course to join such an aggregation of birds at a food source (Plate 5).

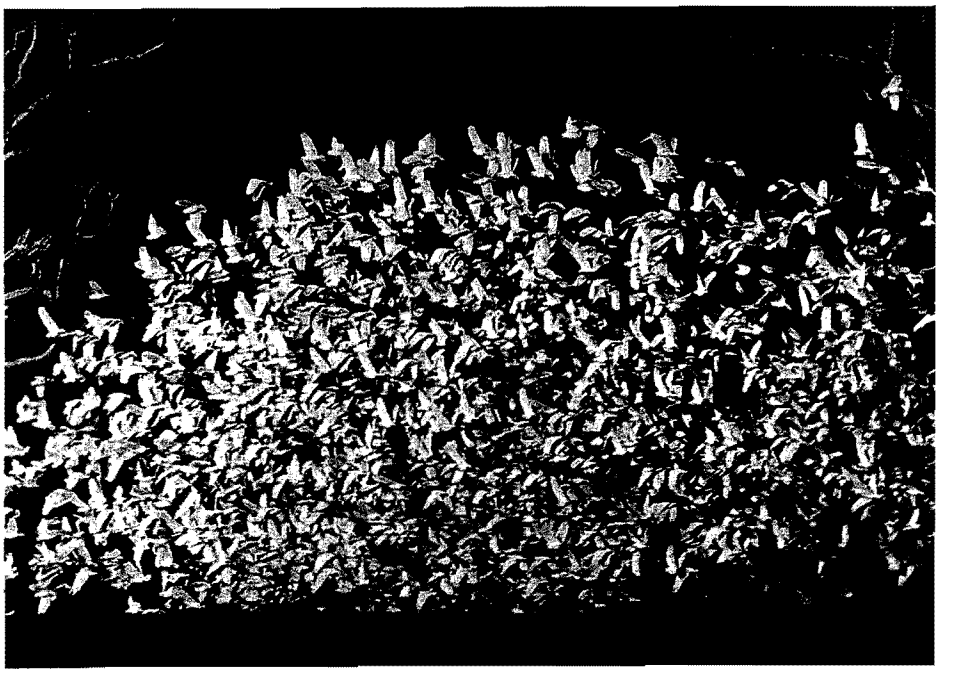


PLATE 4
Typical large flock of Long-billed Corellas with some Sulphur-crested Cockatoos and Galahs *(Photograph: Geoff Ampt,* The Age, *15 June 1992, p. 16).*

Flock sizes observed during a study of the Long-billed Corella were largest when the birds were feeding (mean flock size 142 birds; number of flocks observed 3238), with flocks flying (mean 33; number 1319) or roosting (mean 70; number 1724) being smaller. Flock size varied through the year, according to distribution and abundance of food resources, and the influence of the breeding season. However, the pattern of the largest aggregations of birds being at feeding sites, and larger groups roosting than flying, was observed in both this species and the Sulphur-crested Cockatoo.

This emphasises the gregarious nature of these birds[46], and confirms their tendency to join others already feeding. The largest flocks form when food becomes scarce, and up to 1000 Galahs may feed together at such times[47].

PLATE 5
Sulphur-crested Cockatoos, Charlton, 1995 *(Photograph: Stuart Giles, submitted by Charlton Advisory Group)*

In contrast, some of the largest flocks of Long-billed Corellas (several thousand birds) were observed on germinating cereal crops in May/June, a time when alternative food sources are readily available, although equally large flocks may be observed feeding in late summer in cereal stubbles[48]. It may be that food is easier or energetically less costly to obtain from germinating crops than it is to dig for in unploughed ground. In this case, local enhancement would lead to large flocks forming even though other food sources were available, whereas in summer it is the lack of availability of other foods that leads to large flocks forming in stubbles.

2.5.3 Daily activity patterns

A cockatoo's day starts at first light, when the first calls can be heard. As the light grows, birds begin to move about the roost trees and calling intensifies. Birds may fly to other trees, often with exposed or dead branches at the top, to

catch the first sunlight and bask for a period. At this time, there is often a brief period of *Mad Flight*[49], where the birds fly fast, weaving erratically between trees and calling frequently, before returning to their perches. This behaviour is exhibited by both Long-billed Corellas and Galahs and resembles a play activity, but its function is not known. *Mad Flight* also occurs frequently late in the day near the evening roost site.

Galahs in Western Australia have been observed to drop to the ground and spend some time apparently feeding below the morning basking site. This 'feeding' may be the collection of gravel to assist with the grinding of seeds in the gizzard. Similar behaviour has been observed in Galahs in eastern Australia[50]. It is usual to find gravel in the gizzards of Long-billed Corellas[51]. The birds then fly off to commence foraging in a sown crop, a pasture, stubble, or a roadside. The first bout of feeding lasts for a variable period, determined in part by temperature[52], abundance of food and whether there are young to feed, and can last from half an hour up to four or five hours[53], although feeding bouts in the Galah are usually shorter than in the Sulphur-crested Cockatoo[54]. Sulphur-crested Cockatoos then usually return to a rest site to digest food, preen and rest. During summer, this resting period may last for a number of hours, until the day is cool enough for the birds to resume feeding late in the afternoon (if the weather is hot). In winter, feeding may continue throughout the day[55]. Drinking occurs after the afternoon feeding bout, but birds may also drink at other times. Sulphur-crested Cockatoos return to the evening roost site near sunset, and are often noisy while settling to roost. On moonlit nights, Sulphur-crested Cockatoos often call and move about the roost site, flying to other trees on occasion.

2.6 ESTIMATED NUMBERS

It is not known how many Long-billed Corellas, Sulphur-crested Cockatoos and Galahs there are in Victoria. While the Committee has received numerous written submissions and taken evidence from many witnesses indicating that the numbers of such birds have increased over recent decades, it is not possible to quantify such impressions.

Two estimates of the numbers of white cockatoos (Long-billed Corellas and Sulphur-crested Cockatoos) were made during the 1980s in part of western Victoria and adjacent South Australia. The first was compiled by the Victorian Fisheries and Wildlife Service in 1983, using an aerial survey technique. A series of north-south transects was flown during winter, when most cockatoos could be expected to be seen feeding for much of the day. Two observers estimated numbers of white cockatoos seen within one kilometre on either side of the aircraft. The proportion of Sulphur-crested Cockatoos and Long-billed Corellas was known from an extensive series of ground surveys conducted in that area over several years. This ratio was used to assign the white cockatoos seen during the survey to species. On this basis, a minimum estimate of approximately 250 000 Long-billed Corellas was determined for the survey area[56]. The second estimate, compiled by the South Australian National Parks and Wildlife Service in 1988, using a similar survey technique, provided broadly comparable results[57].

The Committee notes that these surveys covered only a proportion of the Victorian ranges of the Long-billed Corella and the Sulphur-crested Cockatoo. As a result, they do not provide any indication of the total population of either species. The Committee further notes that while the surveys covered the area of greatest density of the Long-billed Corella at that time, and a significant proportion of its total range, only a small proportion of the Victorian range of the Sulphur-crested Cockatoo was covered. Information provided in submissions and at public hearings, and by Department of Conservation and Natural Resources' personnel field observations, suggests that the density of the Sulphur-crested Cockatoo is greater in the north-eastern part of the State than in south-western Victoria.

No data were collected on Galah numbers during the surveys. The Committee observes that impressions of Galah numbers were remarked upon much less frequently in submissions and at public hearings. So consistent was this absence that the Committee is of the view that, with the exception of problems associated with Almond orchards (discussed in Chapter 4), Galahs pose less of a threat to farm operations than do the other two cockatoo species.

The more recent of the two surveys referred to was conducted seven years ago. The lack of reliable and recent quantitative information means that

Department of Conservation and Natural Resources and community perceptions of the increase in bird numbers cannot be tested. The Committee again notes, however, the consistency of these impressions throughout Victoria, and particularly in the south-west and north-east of the State.

The Committee considers that this lack of objective data needs to be addressed. Wildlife and farm management strategies aimed at bird damage control should be based on reliable estimates of bird numbers. Having emphasised that requirement, the Committee readily acknowledges the difficulties involved in compiling such data.

Counting birds such as Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, which are patchily distributed, is not simple. In summer, the birds spend much of the day roosting in trees. Most therefore remain unseen. In winter, when a greater proportion of the birds feed through the day, large flocks form at favoured food sources. Surveys that miss some of these large flocks may seriously underestimate total numbers in a local area.

One way to compensate for the possibility of missing some feeding flocks is to survey a sufficiently large area in a short time, so that the chance of encountering most large flocks along the survey route is high. The Committee considers that aerial survey can achieve this. The difficulty of such a method is that the number of birds that are not recorded, due to concealment by trees in which they are roosting, is unknown. However, if the surveys are conducted in winter, when the birds spend much of the day feeding in the open, the problem is minimised.

The Committee acknowledges that the expense involved in conducting a State wide aerial survey would be considerable. The Committee therefore suggests that the Minister for Natural Resources investigate the viability and justification for conducting such a survey in the light of recommendations made elsewhere in this Report.

2.7 SUMMARY

Major changes have been made to the environment of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. This led to a depression in numbers and contraction in range in the Long-billed Corella that lasted nearly a century. After rabbit numbers were contained following the introduction of myxomatosis, the Long-billed Corella was able to benefit from these environmental changes, as did the Sulphur-crested Cockatoo and the Galah. Range expansions have now been noted in all three species, with these being most dramatic in the Long-billed Corella. An expansion in the area where Long-billed Corellas cause problems can be expected.

The sedentary nature of at least components of the populations of these three cockatoos may increase the potential for damage problems to occur more frequently, but it also means that local damage control measures are more likely to be effective.

Ignorance of the size of the populations of these birds in Victoria precludes assessment of their dynamics over time.


Galah

CHAPTER THREE

REGULATORY FRAMEWORK

3.1 INTRODUCTION

Any assessment of problems in Victoria associated with Long-billed Corellas, Sulphur-crested Cockatoos and Galahs must be placed in its appropriate regulatory framework. This framework comprises international, national and State controls.

3.2 INTERNATIONAL CONTROLS

Australia is a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)[58]. CITES was formalised in Washington on 3 March 1973 and entered into force in Australia on 27 October 1976. One hundred and twenty-eight nations are parties to CITES.

A key recommendation of CITES is that member nations

> endeavour to restrict the collection of wild animals for the pet trade and encourage the breeding of animals for this purpose with the objective of eventually limiting the keeping of pets to those species which can be bred in captivity[59].

Member nations therefore ban or restrict commerce in wild fauna according to one of three criteria. These are:

- fauna threatened with extinction as listed in Appendix I of the Treaty: trade in such species must only be authorised in exceptional circumstances[60];

- fauna not presently threatened with extinction but which may become so if trade is not strictly regulated; such species are listed in Appendix II of the Treaty and trade is subject to strict regulation and monitoring;

- fauna that the laws of a member nation identify as being subject to domestic regulation within its borders; such species are listed in Appendix III of the Treaty and the cooperation of other parties is sought to control trade[61].

In addition, Article XIV of CITES states that member nations have the right to adopt:

> (a) stricter domestic measures regarding the conditions for trade, taking, possession or transport of specimens of species listed in Appendices I, II or III, or the complete prohibition thereof; or
>
> (b) domestic measures restricting or prohibiting trade, taking, possession, or transport of species not included in Appendices I, II or III[62].

CITES members have therefore developed a system of international controls that apply to trade in wildlife and wildlife products.

CITES further provides for export/import restrictions to be eased for scientific, educational, zoological and household pet purposes. These and other trade-approval criteria therefore constitute an international mechanism for the control of trade in endangered, threatened or export-restricted species.

Since 1 January 1960, successive Australian governments have banned the export of most native wildlife including native birds[63]. This ban is recognised internationally as falling within CITES guidelines and accordingly is observed by member parties[64].

3.3 NATIONAL CONTROLS

3.3.1 *Wildlife Protection (Regulation of Exports and Imports) Act 1982*

The export of Australian native flora and fauna, and the import of species and specimens from overseas, is regulated by the Commonwealth *Wildlife Protection (Regulation of Exports and Imports) Act 1982*. The object of the Act is to comply with the obligations of Australia under CITES and to further —

> the protection and conservation of the wild flora and fauna of Australia [65]

— and other countries[66] .

The principles and schedules of the Act affirm Australia's commitment to CITES guidelines. Appendices I, II and III of CITES, for example, appear as Schedules 1, 2 and 2A of the Act[67].

The Act is all-inclusive, referring to

> transactions undertaken by museums, zoos and scientific institutions, commercial organisations, tourists, migrants and the general public[68].

As noted above, the Australian Government banned the commercial export of most live Australian wildlife, including birds (but excluding fish), in 1960. Although subject to considerable debate in subsequent decades, this position has never been altered. Successive Federal governments have reaffirmed the policy while meetings of the Council of Nature Conservation Ministers (CONCOM), now subsumed under the Australian and New Zealand Environment and Conservation Council (ANZECC), have consistently endorsed the position.

More specifically, in 1985 CONCOM considered the question of whether approval should be given to the trapping and export of native birds causing damage. The idea was rejected on the grounds that the advantages of permitting export were outweighed by the disadvantages. As a result the export ban on native birds, including those associated with damage, remains in force. Indeed, the ban is regarded as being consistent with the principles

and practices defined in the *Wildlife Protection (Regulation of Exports and Imports) Act 1982*.

Subject, however, to government approval native birds, including viable eggs, may be exported for scientific, zoological or domestic purposes[69]. Export of native birds as domestic pets is limited to individuals taking up permanent residence overseas. Such exports are restricted to a maximum of six birds of which not more than two may be of any one species. The species are:

- Sulphur-crested Cockatoo *Cacatua galerita*
- Galah *Cacatua roseicapilla*
- Little Corella *Cacatua sanguinea*
- Long billed Corella *Cacatua tenuirostris*
- Cockatiel *Nymphicus hollandicus*
- Budgerigar *Melopsittacus undulatus*

Such exports must not contravene any State laws. The Environment and Natural Resources Committee notes, however, that at the time of adopting this Report, the Wildlife Protection (Regulation of Exports and Imports) Amendment Bill 1995 was before the Federal Parliament, having being introduced into the Senate on 9 May 1995. It cleared the Senate on 20 September 1995 and was introduced into the House of Representatives on 28 September 1995. The Bill makes provision for a reduction in pet exports from a total of six to a total of two birds.

Finally, it should be noted that in Australia, trade in products derived from non-endangered species can occur provided domestic laws permit wildlife export, a recognised conservation management plan is in place, and government permits have been issued[70]. Only then can commercial wildlife trade occur.

The Act is administered by the Director of National Parks and Wildlife as the Chief Executive Officer of the Australian Nature Conservation Agency. Enforcement of the Act is primarily the responsibility of the Australian Customs Service and the Australian Federal Police.

3.3.2 National Strategies

Victoria is a signatory to a number of national strategies, two of which are relevant to issues associated with the control and management of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs.

The National Strategy for the Conservation of Australia's Biological Diversity promotes the adoption of ecologically sustainable agricultural and pastoral management practices in the interests of encouraging and sustaining biological diversity. The strategy also promotes ecologically sustainable wildlife management practices.

The National Strategy for Ecologically Sustainable Development commits signatories to: protect biodiversity and maintain essential ecological processes and life-support systems; promote the rapid completion and implementation of national and regional strategic plans for the management of pests and weeds; and review legislation for the control of pests.

3.4 STATE AND TERRITORY CONTROLS

Legislation relevant to wild bird management and control of damage caused by native birds is found in each State and Territory of Australia.

3.4.1 Australian Capital Territory

All wildlife in the Australian Capital Territory is protected by the *Nature Conservation Act 1980*. Penalties are imposed for the killing or taking of wildlife.

Wildlife may only be killed if it is considered by wildlife authorities to be a danger to people. Destruction permits are not issued for any species of native birds, even if they are considered to be causing damage to crop or stock [71].

3.4.2 Australian External Territories

Norfolk Island, the Coral Sea Islands Territory, the Ashmore and Cartier Islands Territory, Christmas Island, Cocos Island, Heard Island, Macdonald

Island and the Australian Antarctic Territory constitute Australia's offshore territories. Under the provisions of the Commonwealth *National Parks and Wildlife Conservation Act 1975* all species, including imported species, are protected. A Ministerial Declaration is required for a species to be declared unprotected. In the case of Norfolk Island, national parks are subject to the controls of the National Parks and Wildlife Conservation Act, while the remainder of the Island is controlled by Norfolk Island Legislative Assembly ordinances[72].

3.4.3 New South Wales

The *National Parks and Wildlife Act 1974* protects all Australian native birds. The Act is administered by the New South Wales National Parks and Wildlife Service.

Schedule 12 of the Act identifies three wildlife categories for which special protection applies. Two of these categories refer to vulnerable or rare fauna, and to threatened fauna (the third refers to marine mammals). Penalties apply for taking or killing birds that fall within any of the special protection categories.

Section 121 of the Act permits land owners and occupiers to take or kill protected and unprotected wildlife, including birds, in order to control damage. Licences are issued specifying the number of birds of a given species that may be taken and the time period in which damage control may be conducted. Licences are not issued for those species that are specially protected. It should be noted that the Sulphur-crested Cockatoo is one of the species for which damage control licences are issued.

Section 96 of the Act permits the Governor in Council to declare protected species 'unprotected' in defined districts and areas. Sulphur-crested Sulphur-crested Cockatoos and Galahs have both been declared locally unprotected in the Central and Western Divisions of New South Wales.

3.4.4 Northern Territory

The *Territory Parks and Wildlife Conservation Act 1993* protects all native birds in the Northern Territory. The Act is administered by the Conservation

Commission of the Northern Territory. Under Division 2, section 29 of the Act, the wildlife authority may issue a permit to kill or take any protected fauna. Permits are generally issued only when horticultural or agricultural activities are threatened, and only after other management alternatives have been exhausted (scaring, netting, Bird Frite® cartridges, etc.). The number of birds to be so killed or taken must be specified on the permit.

3.4.5 Queensland

The regulation of native birds is controlled by the *Nature Conservation Act 1992* and the Nature Conservation Regulation 1994. The Queensland Department of Environment and Heritage (Queensland National Parks and Wildlife Service) has advised the Committee that a Damage Mitigation Permit may be granted to take common wildlife causing damage which, if unchecked, may cause significant economic loss to individuals. Native birds so taken cannot be used in trade or commerce unless a Conservation Plan approved under the Act allows such use[73].

Notwithstanding such a permit, all native birds are protected in Queensland. Special provision also applies to bird species in need of 'permanent protection'. Such permits are designed to be of limited duration and for the minimum number of birds necessary to reduce the damage or injury.

3.4.6 South Australia

In South Australia the *National Parks and Wildlife Act 1972*, administered by the Department of Environment and Natural Resources, is the relevant legislation under which native birds are protected. Penalties for breaches of the Act are defined by a 1987 amendment which identified three further categories of protection: 'endangered', 'vulnerable' and 'rare'. Under section 53 of the Act, destruction permits can be issued for species causing, or likely to cause, damage to the environment, crops, stock or other property. Permits are issued for the destruction of Long-billed Corellas and Sulphur-crested Cockatoos.

3.4.7 Tasmania

The *National Parks and Wildlife Act 1970*, the Wildlife Regulations 1971, and subsequent amendments protect native birds in Tasmania. However, while Sulphur-crested Cockatoos and Galahs are protected, the Long-billed Corella is not. Indeed, the Long-billed Corella is considered an introduced pest species in Tasmania and it is the policy of the Government to eradicate it (there are approximately 100 Long-billed Corellas in Tasmania)[74].

The Tasmanian Parks and Wildlife Service receives relatively few complaints about damage caused by Sulphur-crested Cockatoos. If, however, a flock of fewer than 25 Sulphur-crested Cockatoos is causing damage, a 'shoot to scare' permit can be issued for the duration of one month. If the flock numbers more than 25 then a 'shoot to kill' permit may be issued. Five birds a day may be shot, and a maximum of 25 birds over a one month period. The Department of Environment and Land Management (Tasmanian Parks and Wildlife Service) has advised that it receives 'fewer than 5 complaints per annum which require such action'[75].

3.4.8 Western Australia

All native birds are protected under the *Wildlife Conservation Act 1950*. The Act is administered by the Department of Conservation and Land Management. This Act, and the *Agriculture and Related Resources Protection Act 1976* administered by the Agriculture Protection Board of Western Australia, provide for the declaration of year-round open seasons on certain species causing damage. Both management bodies cooperate to ensure that declarations of native species as pests are similar.

There is no limit on the number of such birds that can be taken and a licence is not required. Such open seasons tend to be applied within defined areas. Sulphur-crested Cockatoos are listed as non-protected south of 20 degrees latitude south; shooting, trapping and poisoning are permitted. It should be noted that, as with Long-billed Corellas in Tasmania, Sulphur-Crested Cockatoos are not native to Western Australia. An open season on Galahs, albeit controlled by shooting only, is declared for the South-West Land Division, Eucla Land Division and two additional shires[76]. Wildlife officers

may also issue destruction permits in other locations for any protected bird that is considered dangerous.

3.5 VICTORIAN CONTROLS

Control of native species in Victoria is characterised by what has been termed a 'transition from exploitation to regulated management'[77]. Victoria's first wildlife management legislation was *An Act to Provide for the Preservation of Imported Game and during the Breeding Season of Native Game (1862; 25 Vic. No. 161)*. While ostensibly concerned with imported game, it marked a break from the uncontrolled exploitation of all fauna that had characterised pioneer settlement since the early 1830s. The focus, however, of this and subsequent Game Acts was on the protection of imported game, an emphasis that continued to be expressed until the 1890s.

By the 1890s Victorian colonists were better equipped to assess the impact that pastoral, agricultural and urban activities had on native habitat. With the new century Victorians increasingly questioned both the desirability of causing wildlife to retreat before the spread of settlement, and the exploitation of native wildlife for export purposes. Motivated, therefore, by a combination of utilitarian and humanitarian values, Victorians called for greater protection of native wildlife, including birds. Gradually Victoria's Game Acts were amended to provide the desired protection and the schedules of birds and mammals that were to be protected were increased.

Passage of the *Game (Licences) Act 1958* in November 1958 was a significant step in the promotion of a wildlife conservation ethos in Victoria. With this Act the Government

> accepted responsibility to manage and research fauna under its control, and realised that the community at large operated within an ecological framework[78].

This legislation, however, as with earlier Game Acts, continued the practice of listing wildlife that was protected. Any fauna not listed was by default unprotected. Passage of the *Wildlife Act 1975* fundamentally altered this orientation. Under this Act, all wildlife is protected unless listed as noxious wildlife or gazetted under section 7A as unprotected wildlife.

Although there is no explicit Government policy on damage caused by native wildlife in general and by native birds in particular, the Department of Conservation and Natural Resources considers that the provisions of the current Act may be regarded as a 'de facto policy' on wildlife damage control[79].

The long development of wildlife controls in Victoria, initially in Game Acts designed to protect imported wildlife, to passage of the *Wildlife Act 1975* that protects all wildlife unless otherwise listed, therefore provides the context within which current management of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs in Victoria takes place.

3.5.1 *Wildlife Act 1975*

Wildlife controls in Victoria are defined in the Wildlife Act. Certain sections of the Act are directly relevant to this Inquiry.

3.5.1.1 Protected Wildlife

In Victoria, Long-billed Corellas, Sulphur-crested Cockatoos and Galahs are 'Protected Wildlife'. Section 3 of the *Wildlife Act 1975*, defines 'Protected Wildlife' as:

> all wildlife other than those kinds or species which —
>
> (i) if a pest animal within the meaning of the Catchment and Land Protection Act 1994; or
>
> (ii) the Governor in Council from time to time by Order published in the *Government Gazette* declares to be unprotected wildlife.

Protected wildlife may not be taken. Section 43 of the Act provides for sanctions against

> Any person who takes, destroys, or hunts protected wildlife of any kind or species ...

Similarly,

> Any person who buys, sells, consigns, or has in his possession or under his control any protected wildlife ... or the skins, flesh, feathers, skeletal material, organs or other portions shall be guilty of an offence ... [80].

Anyone found guilty of offending against these measures is liable to a penalty of not more than $2,000 (or 20 penalty units, currently valued at $100 for each penalty unit) and not more than $200 (or 2 penalty units) for every head of wildlife so taken.

Finally, it should be noted that section 54 of the Act forbids the killing of wildlife by poison:

> Any person who kills, destroys, takes or injures wildlife by any bait impregnated with poison or any substance, whether liquid, solid, or gaseous, which is prescribed to be a poison for the purposes of this section or lays any such poison or substance with intent to kill, destroy, take, or injure wildlife shall be guilty of an offence against this Act.

The Act prescribes a penalty of $5,000 (50 penalty units) or imprisonment for 6 months for any person found breaching section 54 of the Act. Section 54 (2) empowers the Director-General (Secretary) of Conservation and Natural Resources, his officers or his agents to use poison for the eradication of pest animals, and land holders to use poison to eradicate wildlife declared as vermin under the *Land Act 1958*. Under the Wildlife Act, the Minister for Natural Resources may authorise persons to use poison.

The Wildlife Act, which is administered by the Department of Conservation and Natural Resources, is therefore the principal Victorian management guide for the control of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs.

3.5.1.2 Damage control

Provision is made within the Act for the Minister for Natural Resources to authorise the control of wildlife. Section 5 empowers the Minister to

> authorise the killing or destruction of wildlife in any matter specified in the authority by or under the direct supervision of any person or persons named in the authority.

It is, however, section 7 that has been identified as serving as a form of de facto Government policy on the issue of wildlife damage control[81]. Section 7(1) states:

> Whenever it appears to the Minister that wildlife is causing damage to any building, vineyard, orchard, garden, or other property or any crop, grass, or trees upon land owned or occupied by any person the Minister may by authority in writing authorise that person to kill or capture wildlife upon or in proximity to such land or property in such numbers and subject to such conditions, limitations, and restrictions as are set forth in the authority.

Such damage may be confined to a specific location or region. Accordingly, the Act makes provision for the 'protected status' of wildlife that is causing damage to be waived in such areas. This is outlined in section 7A (1) of the Act:

> Whenever it appears to the Minister that a species or kind of protected wildlife is causing injury or damage to —
>
> (a) any building, vineyard, orchard, garden or other property;
> (b) any crop, grass, trees or other vegetation; or
> (c) any species or kind of animal (including fish) —
>
> in an area of Victoria, the Governor in Council may upon the recommendation of the Minister by an Order published in the *Government Gazette* declare that species or kind of wildlife to be unprotected wildlife in the area and for the period specified therein.

In Victoria, Long-billed Corellas have been declared 'Unprotected Wildlife' in 34 shires and Sulphur-crested Cockatoos in 51 shires (Figure 7)[82]. In these shires (old shire boundaries) —

> the killing or taking of wildlife in accordance with the provisions of an Order declared pursuant to this section shall not constitute an offence against this Act or be unlawful by virtue of any of the provisions of this or any other Act[83].

In such areas Long-billed Corellas and Sulphur-crested Cockatoos

> may be taken or destroyed by landowners or occupiers who are engaged in the rural production of commercial crops and by members of the families of such landowners or occupiers, and the employees of such landowners or occupiers[84].

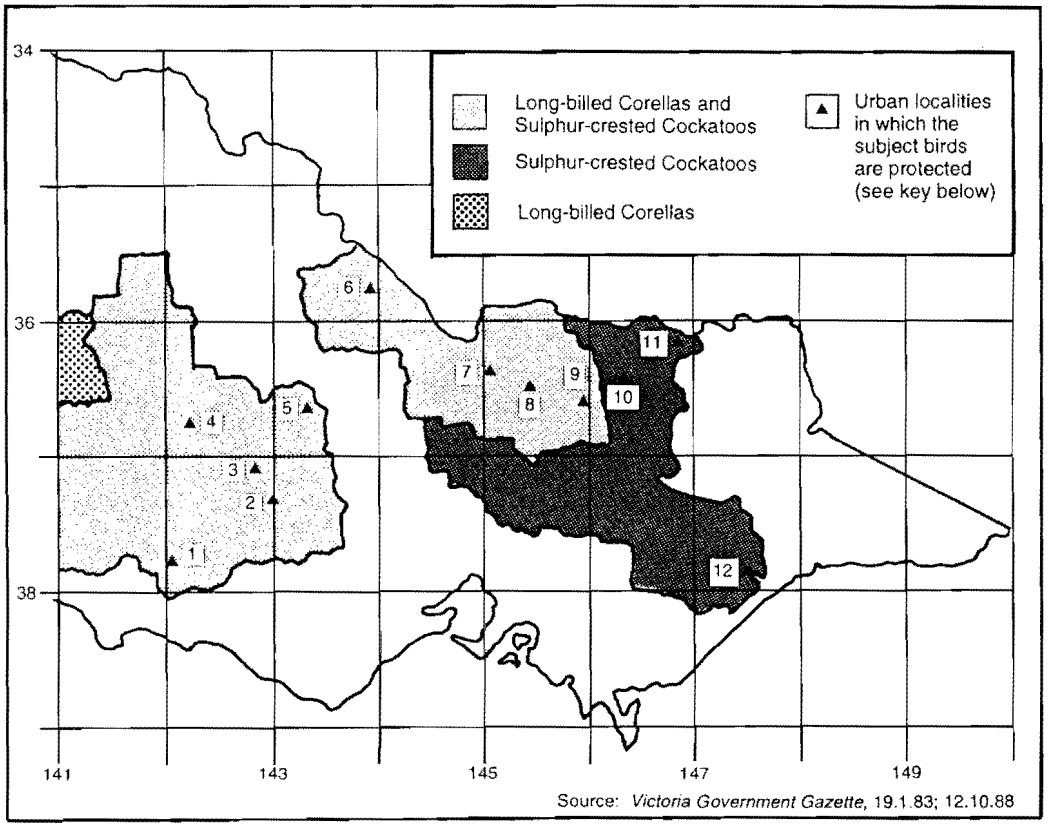
Further, the birds

> shall be taken or destroyed by the above-mentioned persons only by the use of fire-arms on freehold and leasehold property used for the purpose of growing commercial crops[85].

In addition, section 30 of the Wildlife Regulations 1992 provides for a 'Commercial Wildlife (Wildlife Controller) Licence'. Licensed controllers — of which there are currently 12 to 15 — are authorised to take Long-billed Corellas, Sulphur-crested Cockatoos and Galahs[86]. A land holder may therefore engage a Wildlife Controller to remove birds causing damage. Wildlife controllers must pay a royalty at a rate of $5 for each bird captured[87].

FIGURE 7

Shires in which Long-billed Corellas and Sulphur-crested Cockatoos are 'Unprotected Wildlife'.



Explanatory Notes

(1) Figure 7 indicates Victorian Shires where Long-billed Corellas and Sulphur-crested Cockatoos are 'Unprotected Wildlife'. Refer to Figures 2 and 4 for the ranges of thesespecies.

(2) Long-billed Corellas and Sulphur-crested Cockatoos are protected wildlife within the following urban localities (refer to map): (1) Hamilton City; (2) Ararat City; (3) Stawell City; (4) Horsham City; (5) St Arnaud Town; (6) Kerang Borough; (7) Kyabram Town; (8) Shepparton City; (9) Benalla City; (10) Wangaratta City; (11) Wodonga Rural City; (12) Bairnsdale Town.

(3) Note that the Shire boundaries are those as defined in 1983 and 1988. They do not take into account the recent restructuring of Victorian local government.

In summary, wild native birds causing damage in Victoria can be controlled:

- on individual properties provided the property owner has been issued with an Authority to Control Wildlife (Destruction Authority)

- within shires where they have been declared 'Unprotected Wildlife'.

Finally, it should be emphasised that the Act prohibits the destruction of any native wildlife declared either to be 'Endangered Wildlife' or 'Notable Wildlife'.

3.5.2 Other Victorian Legislation

Two other pieces of Victorian legislation are relevant to this Inquiry.

The *Agricultural and Veterinary Chemicals (Control of Use) Act 1992* prohibits the deliberate misuse of agricultural chemicals. This may be regarded as complementing section 54 of the Wildlife Act which regulates the use of poison to kill wildlife.

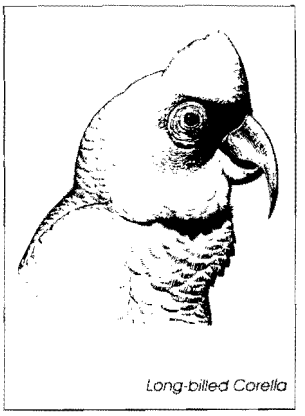
The *Flora and Fauna Guarantee Act 1988* outlines the Government's commitment to the conservation of Victoria's native flora and fauna. Among its various objectives, the Act seeks:

> (a) to guarantee that all taxa of Victoria's flora and fauna other than the taxa ... [that seriously threaten human welfare] ... can survive, flourish and retain their potential for evolutionary development in the wild; and
> (b) to conserve Victoria's communities of flora and fauna; and
> (c) to manage potentially threatening processes; and
> (d) to ensure that any use of flora and fauna by humans is sustainable; and
> (e) to ensure that the genetic diversity of flora and fauna is maintained; and
> (f) to provide ... [various community education, land management and conservation programs;] ... [88].

3.6 SUMMARY

Within Victoria wild bird management is defined in the *Wildlife Act 1975* and in the Wildlife Regulations 1992. National bird controls (import and export) are specified in the Commonwealth *Wildlife Protection (Regulation of Exports and Imports) Act 1982*. International wild bird controls are regulated according

to standards agreed upon by nations which are party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Other Victorian Acts, and national strategies to which Victoria is a signatory, are also relevant. This three-tiered system forms the regulatory framework within which the issues being considered in this Report must be set.



Long-billed Corella

CHAPTER FOUR

BIRD PESTS AND BIRD DAMAGE

4.1 INTRODUCTION

In Term of Reference (a), the Committee is asked to investigate the nature, extent and severity of problems caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. In addressing Term of Reference (a), the Committee considers the definition of 'bird pests'; perceptions of bird damage associated with grain crops, other primary industry activities, infrastructure, and private property; and the difficulties involved in measuring the scale and economic consequences of bird damage.

4.2 BIRD PEST PROBLEMS

4.2.1 Defining bird pests

Birds are attracted to crops and may cause damage in most parts of the world where crops are grown. Such birds have a number of common characteristics. They tend to be gregarious, forming flocks at food sources. They tend, at least locally, to be abundant. In many cases they tend to produce large numbers of young or have multiple broods[89]; in species such as the cockatoos, low productivity is compensated by their longevity. They also tend to be labelled 'pests'.

There is, however, no rigid definition of a 'pest', a 'pest species' or 'pest status'. Nor is any species intrinsically a 'pest'. Rather, the use of such terminology is entirely contextual and based on personal values, attitudes, background and

understanding of the nature of a given situation. Such factors determine not only how and when, but also if, a particular species is defined as a 'pest'[90].

The point at which a species is defined as a 'pest' is therefore based on an impression of the problems attributed to that species — and so is arbitrary.

4.2.2 Scale of problems

Problems caused by cockatoos are typically localised, often unpredictable and extremely variable. This is highlighted by the distribution of submissions, as noted in Chapter One, which shows clusters of submissions from south-western Victoria, north-eastern Victoria and Melbourne. A scattering of submissions was received from central Victoria but very few from Gippsland and north-western Victoria. Bird damage to crops is thus highly skewed, a characteristic of wildlife damage in general, with a small number of farmers suffering severe damage while most sustain little or none[91]. This unpredictability relates to time as well as locality, in that there can be several years when there is little corella damage, followed by a 'bad corella' year in which there can be widespread problems[92].

Such factors as the proximity of roost areas, the location of alternate food sources, the degree of human activity in the area, the range and intensity of use of devices for scaring birds, the numbers of birds in the area, time of year, seasonal conditions and whether a feeding pattern has become established will all have a bearing on the nature and severity of damage and the relative difficulty of minimising it.

Further, it is commonly found that losses to birds can be severe on certain farms or within restricted localities, while being of little significance on an industry or regional basis, a point emphasised by the Victorian Farmers Federation Grains Group[93]. Small-scale growers, who may have little economic resilience to withstand crop losses, are at greater risk of loss due to bird damage. This is because small crops suffer similar amounts of damage to larger areas (the birds' requirement for food does not change), but the loss as a proportion of crop value is greater with a small crop and the investment in the crop per unit area is higher[94]. This highlights the need for some support strategies to be provided for these growers, but also indicates why support has seldom been provided by the relevant industry body.

Problems caused by cockatoos are not confined to Victoria. Cockatoos are regarded, with some other parrot species, as the most damaging pest group to a range of fruit, vegetable and field crops and flowers in the Northern Territory[95]. Elsewhere in Australia, cockatoos damage newly-sown cereal crops, take grain fed to stock in late summer, damage trees, attack ripening oilseed, cereal and other crops and damage a range of non-crop items[96].

4.2.3 Measuring economic costs

The problem of separating bird damage from other causes of loss is compounded by the inherent difficulty of measuring the cost of such damage in many situations. For example, removal of some germinating grain from a newly-sown cereal crop may have no effect on subsequent yield due to compensatory growth in the remaining plants (although removal of whole rows or areas of seeds is significant)[97]. Uneven growth within a crop arising from variations in soils, moisture, other pests, diseases and other factors may be greater than the apparent variability attributed to the removal of grain or plants by birds[98]. In a recent series of trials to assess the effects of cockatoo damage on cereal crop yields, the Department of Agriculture, Energy and Minerals found that the variability of seed germination made it very difficult to identify specific areas of damage except where the damaged seedlings could be seen on the ground[99]. Damage to maturing cereal crops, on the other hand, is usually confined to edges, and therefore more readily quantified than diffuse removal of grain from a newly-sown crop, with its uncertain effects on subsequent yield.

Methods for assessing damage to ripening Sunflower *Helianthus annuus* crops have been developed but, as with cereal crops, the effect of damage to young Sunflower and other crop plants on the subsequent yield of the crop is more difficult to determine.

Despite these problems, the Committee considers it important that realistic evaluations of the economic magnitude of bird-induced crop losses are undertaken, so that control measures can be economically justified. Without a clear understanding of the nature and extent of losses caused by birds, it is economic folly to put resources into controlling perceived problems, since without objective information it is impossible to determine cost:benefit ratios.

The Committee sought such objective economic data from various government, industry and private sources. The Committee was advised that such information does not exist. The Committee therefore sought, and received, considerable assistance from primary producers and others who provided personal estimates of losses (Appendix D). These estimates provide an indication of the range, severity and economic variability of bird damage in Victoria. They emphasise the selective, localised and unpredictable nature of bird damage in Victoria, and demonstrate that economic costs and economic losses associated with bird damage and bird damage control are neither uniform on a regional basis nor on an industry basis.

Information submitted by primary producers is central to any understanding of bird damage problems and to the development and application of any subsequent bird damage control measures. The Committee is concerned, however, that such estimates can only be fully appreciated when viewed in their wider regional and industry contexts — which leads the Committee back to its initial request where it sought, and failed, to obtain appropriate economic information from government, industry and private sources.

The lack of sufficiently detailed economic data collected in a consistent, reproducible and standardised manner over a number of seasons represents a major impediment not only to the Committee, but also to those government and non-government agencies seeking to provide strategic and material assistance to Victorians affected by bird damage. The Committee is therefore of the view that the economic assessment of bird damage constitutes a significant farm management and agronomic problem that needs to be addressed as a matter of urgency.

The Committee notes that a designed experiment with exclosures to keep birds out, and experimental control plots where birds have free access, will enable the separation of losses due to cockatoos from losses due to other causes, provided the scale of the experiment is large enough to allow for inherent variability both within and between crops[100]. Such an experiment would require considerable resources, but is arguably the only way to obtain a reliable measure of bird damage to germinating cereal crops and its effects on subsequent yield. The Committee considers that with the use of efficient methods to obtain reliable, repeatable estimates of economic loss, data on crop

damage can be collected over a number of seasons. The Committee further considers that the Department of Agriculture, Energy and Minerals is the appropriate agency to conduct such assessments.

The Committee notes that the collection of data in this way represents an important though long-term project. In the interim, the problems caused by these birds need to be addressed. That is, the Committee is of the view that there needs to be both immediate and longer-term strategies put in place for dealing with bird damage problems.

While direct measurements may be desirable, there are many inherent problems relating to variability within and between crops, resources required to undertake assessments, and separating damage due to other causes from that caused by birds, as discussed above. Such damage may greatly exceed the damage caused by birds. This is often not recognised, since there is

> The tendency for farmers in [for example] the United States to exaggerate bird damage because of its high visibility, just as African farmers do ... American losses of maize caused by insects, weeds, disease, fungi, and harvesting techniques exceed about 25% of the total potential harvest ... Sampling of over 95% of the maize-producing areas in the United States ... to estimate damage by blackbirds ... revealed that 0.13% of maize was destroyed in 1971 and 0.16% in 1970[101].

In New Zealand the Kea *Nestor notabilis*, a cockatoo-sized parrot which can caused injury to Sheep, is often a scapegoat for a proportion of Sheep mortality that may be due to a variety of other factors[102].

The Committee further notes that indirect measurement of damage can be more cost-efficient, given adequate biological data. Indirect measurements of bird damage involve assessment of the potential intake of birds, based on a knowledge of their metabolic rates and population size. With this information, maximum potential losses due to grain being eaten can be estimated with some confidence, if the time that the birds spend feeding in the crop is known. These estimates can be validated by comparison with sampling surveys. Of course, in some feeding situations, losses are due to damage in addition to what is actually eaten. In ripening Sunflower crops, Sulphur-crested Cockatoos were shown to waste half as much again as they ate[103]. Similarly, some fruit crops may sustain significant damage beyond what the birds actually eat. In other cases, ripe Grape *Vitis vinifera* bunches

may be snipped off the vines but not eaten[104]. Many other kinds of damage caused by these birds are not related to feeding behaviour, and assessment of costs must be based on other criteria.

4.3 DAMAGE TO AGRICULTURAL AND HORTICULTURAL PRODUCTS

4.3.1 Fruit crops

4.3.1.1 Nature of reported damage

Damage reported to the Committee includes:

- eating citrus *Citrus* spp. seeds;
- eating young Apples *Malus pumila* and stone fruit;
- pruning growth off fruit trees and Grape vines; and
- snipping off mature bunches of Grapes.

All three cockatoo species have been implicated in these problems, although in any one area, only one or two of the species may be involved.

4.3.1.2 Extent of reported damage

According to reports, this kind of damage occurs sporadically over a wide area. Reports of damage to Grape vines have come from Ararat, Kingower, the Benalla area and near Wangaratta[105], while damage to other fruit crops has been reported mainly from the north-east of Victoria, with one report from the southern Wimmera. Musk Lorikeets and, to a lesser extent Sulphur-crested Cockatoos and other birds, damaged orchards in the Shepparton region[106].

4.3.1.3 Severity of reported damage

This kind of damage, like other forms of damage caused by cockatoos, is unpredictable and patchy. For example, in an examination by a researcher of over 25 vineyards in central Victoria where cockatoos are common, only one sustained damage by cockatoos and that was estimated at less than a one per cent loss[107]. In contrast, damage by Sulphur-crested Cockatoos to one vineyard in the Benalla area was estimated by the grower at $14 000 over three years. This included the cost of replacing 800 of 1400 newly-planted vines[108].

A relatively small number of submissions provided actual costs of damage. A number indicated that backyard fruit trees were stripped by cockatoos[109]. One orchardist estimated that he would lose up to 30% of his Apples if he undertook no control, but did not indicate the magnitude of losses sustained in the presence of controls[110]. A neighbour claimed that more damage was caused by fruits being knocked to the ground than losses through fruit being eaten, but again without quantifying the damage[111].

A 1992 survey by the Northern Victoria Fruitgrowers' Association of 45 orchards in the Goulburn Valley showed that fewer than 30% of respondents believed that cockatoos were a problem, while 71% believed that 'crows' and Musk Lorikeets were a problem. From the figures provided, it was not possible to determine the extent of losses due to cockatoos [112]. A more recent Northern Victoria Fruitgrowers' Association survey of bird damage in the 1994/95 season compiled information from 89 orchards in the Goulburn Valley. The reported losses were $354 620 (Musk Lorikeets), $62 650 (Sulphur-crested Cockatoos) and $59 800 ('Other')[113]. In the Mansfield area it is alleged that many farmers will not grow fruit, nut or cereal crops out of fear or experience of damage by cockatoos[114]. In general, there was a lack of explanation of how estimates were derived. No comment was made about other causes of damage (other bird species, disease, weather effects). The Committee considers that the estimates given may be of important indicative value, but equally that they cannot be considered a reliable basis for cost:benefit assessment of control measures.

Not all reports of damage lead to demands for action against the birds. Sulphur-crested Cockatoos and Galahs feeding on Apples in East Gippsland caused slight damage, not enough to warrant preventive measures being implemented[115].

4.3.2 Nut crops

4.3.2.1 Nature of reported damage

Reported damage (Plate 6) includes:

- pruning growth off nut trees;
- eating Walnuts *Juglans nigra*, Chestnuts *Castanea sativa*, Hazelnuts *Corylus avellana*, Pistachios *Pistacia vera* and Almonds *Prunus amygdalus*;

PLATE 6
Cockatoo damage to Chestnut trees, Glenburn, 1995 *(Photograph: Australian Nut Industry Council).*

- ringbarking mature Almond trees.

Species involved are the Sulphur-crested Cockatoo, Long-billed Corella, Galah and Little Corella.

4.3.2.2 Extent of reported damage

Occurs sporadically over a wide area; tends to recur annually in some nut groves. Almond and Pistachio crops along the Murray River in northern Victoria are frequently attacked. Walnuts, Chestnuts and Hazelnuts are grown commercially in the Dandenong Ranges, West Gippsland and the Ovens Valley and may be attacked in any of these areas[116].

4.3.2.3 Severity of reported damage

A submission from the Australian Nut Industry Council (ANIC) provided some information on the costs of damage ascribed to cockatoos (Table 2).

TABLE 2
Estimated losses due to cockatoo damage, nut crops, 1995

Crop Type (1995)	Production (tonnes)	Value of Production ($)	Value of Loss ($)	Estimated Loss (%)
Hazelnuts	18	65 000	6 500	10
Pistachios	120	700 000	35 000	5
Chestnuts	600	3 000 000	150 000	5
Walnuts	123	492 000	204 000	42
TOTAL	**861**	**4 257 000**	**395 500**	**9**
Source: Australian Nut Industry Council 1995				

These data were supplied to ANIC by the respective grower associations[117], but the basis for the estimates is unknown. The total loss of a Hazelnut crop over two successive years from 3000 trees in the Toolangi area was reported to cost an estimated $4500-6000[118]. Nuts being knocked to the ground was reported to be an equal or greater source of loss than those that are eaten[119]. There is an opportunity cost: some land holders were not prepared to grow nuts out of fear of cockatoo damage[120]. In addition to damage to the nuts, costs involved in patrolling and purchase of scaring devices were mentioned, although not quantified[121]. Galahs were implicated in the ringbarking and killing of several hundred Almond trees in north-west Victoria, with an estimated cumulative loss of production of $380 per tree, over seven years (the time for replacement trees to achieve the same level of production), at 1995 prices[122].

4.3.3 Vegetable crops

4.3.3.1 Nature of reported damage

Reported damage includes:

- digging up of Potatoes *Solanum tuberosum;*
- destroying vegetables in domestic vegetable gardens.

The Sulphur-crested Cockatoo is the only species implicated in this damage.

4.3.3.2 Extent of reported damage

Two submissions were received relating to vegetable patches being destroyed[123]. One submission reported Sulphur-crested Cockatoos digging up part of a commercial crop of Potatoes as the plants emerged[124], but no estimate was provided of the scale of loss in this case. There is the potential for this to become a significant problem if knowledge of this food source spreads and it is a favoured resource.

4.3.3.3 Severity of reported damage

The Committee has received reports of minor damage only.

4.3.4 Cereal crops (mainly Wheat, Oats, Barley)

Commercial grain cropping is the second most extensive land use in Victoria, after grazing, and occurs predominantly in the northern half of the State. The most important grain crop is Wheat, followed by Barley and Oats. Grain legumes and oilseeds have become important in recent times.

Oat crops tolerate wet conditions and are the most reliable cereal crops to grow in high rainfall areas. The most productive areas for Wheat and Oats are in the Wimmera and southern Mallee.

Cropping rotations are now evolving to incorporate grain legumes and oilseed crops in areas once devoted to cereals and pasture. These crops are relatively profitable and act as profitable rotation crops to break the life cycle of soil borne cereal pathogens. Grain legumes (peas and lupins) also improve soil structure and water use, and because of their nitrogen fixing ability improve soil fertility[125].

Of the cereal crops grown, Oats is a favoured food and one of the major dietary components of the Long-billed Corella[126].

4.3.4.1 Nature of reported damage

Reported damage (Plates 7 and 8) includes:

- digging up of newly-sown and germinating cereal crops;
- damage to maturing cereal crops by snipping plants at the base, starting at the edges of the crop;
- attacking thin spots within maturing cereal crops.

4.3.4.2 Extent of reported damage

Sixty-five submissions (47%) referred to damage to cereal crops as being a significant problem. Damage to cereal crops is reported widely within cereal growing areas, but is very localised in its occurrence and severity.

4.3.4.3 Severity of reported damage

Damage by birds to cereal crops is not always assessed objectively. In particular, there is a lack of knowledge of the relationship between different levels of damage at germination and their effect on subsequent yield. While there is no doubt that cockatoos can cause severe damage to some crops, this damage needs to be assessed on a rational, objective and repeatable basis, and other causes of loss taken into account. Otherwise, it is not possible to know when the cost of bird damage control exceeds the cost of bird damage.

A number of submissions from farmers provided estimates of the costs of cereal crop damage (Appendix D)[127]. The basis for these estimates is rarely given. No submissions provided information on the contribution of other known and regular causes of reduced harvest, such as poor germination due to waterlogging, cold conditions, fungal or other disease, lodging, other birds, mice or damage by invertebrates. Instead, all of the estimated loss of yield is apparently attributed to cockatoos. However, the Committee understands that an experienced farmer is likely to know and assess the causes of damage to germinating crops. Damage due to birds at this time is unmistakable, when young plants pulled or dug up are clearly visible. In recent Departmental damage assessment trials, as noted earlier, the variability of crop germination, however, made it very difficult to identify specific areas of damage except where the damaged seedlings could be seen on the ground[128]. Damage

PLATE 7
Sulphur-crested Cockatoo damage to Wheat, Boorhaman, December 1994 *(Photograph: Ray Wright).*

PLATE 8
Long-billed Corella damage to Maize *Zea mays*, 'Tarndwarncoort', east of Colac, January 1982 *(Photograph: Ian Temby).*

immediately prior to harvest is again obvious to an experienced farmer and if it is due, for example, to cutworms (*Heliothis* moth caterpillars) or mice, again that damage will be assessed in order that appropriate remedial action can be taken.

Some crops are believed to be sufficiently damaged that they are resown. Where resowing is required it is acknowledged that yield will be reduced because optimum sowing time has been missed. One grower estimated resowing to cost from $70 to $111 per ha[129]. Damage at germination can cause thin patches in the maturing crop, which increase edge and hence potential for further damage prior to harvest. Mature crops with short stems (eg. 'Echidna' Oats) or long stems which have lodged (fallen over) facilitate feeding by cockatoos within a crop and can lead to more damage than might otherwise occur[130]. Figures for the costs of crop protection were also provided in some cases[131]. Estimates provided by farmers reinforce the extreme variability of damage not only between, but also within, key areas.

4.3.5 Oilseed crops (Sunflower, Safflower, Canola)

Oilseed crops are grown for two principal reasons. They are relatively profitable compared with other crops, and they are used to break the cycle of cereal pathogens in the soil. Safflower *Carthamus tinctorius* and Canola *Brassica napus oleifera* account for 88% of the oilseeds grown in Victoria. The area of land devoted to growing Sunflower crops has declined in recent years, partly due to the depredation of birds[132] but also due to better wool prices which reduce the economic incentive to grow Sunflowers[133]. Sunflower crops are particularly attractive to birds, which can be very difficult to deter. Damage to these crops is facilitated by thin patches which allow birds to enter the crop other than at edges[134]. The Committee has been advised, however, that it is perhaps only once every 20 years or so that there is a sufficiently wet winter, particularly across the Wimmera, that provides the opportunity to sow Sunflowers in the spring[135]. Dense Safflower crops grown on the correct soil type are less likely to be affected by birds[136].

4.3.5.1 Nature of reported damage

Reported damage includes:

- biting off young plants, thus creating open areas within crop;
- damage to mature seed heads.

4.3.5.2 Extent of reported damage

Oilseeds have been grown in the Wimmera, south-west Victoria, north-central and north-east Victoria. Species: Long-billed Corella, Sulphur-crested Cockatoo, Galah and Little Corella.

4.3.5.3 Severity of reported damage

Damage to young plants, which can reduce potential yield and create openings in the crop that give easy access to birds, can facilitate damage at maturity. There was at least one report of almost total destruction of a Sunflower crop by cockatoos[137]. Nine submissions referred to growers' refusal to attempt growing Sunflower or Safflower crops again. This represents a potentially substantial opportunity cost. Constant patrolling as Sunflowers are maturing can reduce yield losses due to bird damage to around 12%, but the cost of patrolling is high and profitability reduced to the extent that other uses of the land may be more rewarding[138].

4.3.6 Damage to commercial flower crops

4.3.6.1 Nature of reported damage

Reported damage includes:

- biting off or pulling up young plants or seedlings;
- pruning the flowers or stems off producing plants.

4.3.6.2 Extent of reported damage

Two submissions were received, one from west of the Grampians and one from the Dandenong Ranges.

4.3.6.3 Severity of reported damage

Damage to proteas (Proteaceae) and Daffodils *Narcissus pseudonarcissus* was estimated at many hundreds of dollars in one case[139] while costs in excess of

$30 000 were incurred in lost seedlings over a four-year period, in the other case[140].

4.4 NON-CROP DAMAGE ON FARMS

4.4.1 Damage to tree seedlings and young trees

In many areas, cockatoos are one of several factors that lead to poor establishment of trees planted for amenity, future timber, erosion and salinity control, shade and shelter or other purposes. Long-billed Corellas and Sulphur-crested Cockatoos bite through the stems of seedling trees, or pull them out of the ground, often very soon after they are planted. They also bite through or break the tops or branches out of young trees, affecting their form and growth rate. There are reports of large numbers of young trees being apparently systematically destroyed by these birds[141]. At Wangaratta the Committee was informed that Sulphur-crested Cockatoos were —

> ... responsible for widespread damage to a 3000-unit wood lot planting of *Casuarina cunninghamiana*, or River She-Oak, and a large scale planting of *Eucalyptus blakelyi*, or River Red Gum [Blakely's Red Gum] ...[142]

— to the extent that 30% of the trees were lost.

In some situations, the growers are deterred from replanting, out of frustration or unwillingness to expend further resources in what may be a wasted effort. Fifty-eight submissions (42%) referred to tree damage to either young or mature trees as being a problem. The Committee also took evidence from numerous witnesses reaffirming this problem.

Not all, however, were of the view that it was a major problem:

> I have damaged trees on the farm but they will recover; they will push up. If you plant enough trees it is not a problem[143].

4.4.2 Damage to mature trees

The Committee has taken evidence that mature trees are also susceptible to cockatoo damage. One witness advised the Committee that —

> They just nip off all the new shoots ...

— adding that

> my biggest worry is the Red Gums, some of which are up to 800 years old[144].

It is common for trees used as roost sites to have the uppermost branches pruned by cockatoos, sometimes to the extent that branches may be stripped bare. Cockatoos also select trees with already bare upper branches as roost sites (eg. dead trees). Where roost trees are close to habitation or have been planted for ornamental purposes, this pruning is regarded as unsightly and often as a cause of death of River Red Gums in particular[145].

This last interpretation, however, is not confirmed, and there are many other factors that stress remnant trees in modified habitats[146]. These include severe infestations of defoliating and/or leaf-skeletonising and/or scale and other sap-sucking insects; raised nitrogen content of soils, especially where stock camp under trees; altered soil hydrology through soil compaction, watering or rising water tables; browsing by possums; fungi; and exposure or mechanical damage to roots by the actions of hoofed stock or machinery. There has been some study of these factors in Western Australia:

> Investigations by the Agriculture Protection Board, Department of Agriculture and Department of Conservation and Land Management have indicated that increased salinity, excessive fertiliser runoff, herbicide spray drift and insect attack are the principal causes of damage to the trees and not the birds[147].

Senescence, or old age, and lack of recruitment of young trees, are yet other contributing factors.

All these effects are compounded by the diminishing number of mature trees in many areas and lack of understorey with its complement of native birds and beneficial insects[148]. It is far from clear what the relative contribution of these different factors is to the decline and death of such trees. However, cockatoos have probably always been in large flocks[149], and would have certainly always exhibited this pruning behaviour. In itself, this activity seems unlikely to be the cause of death of otherwise healthy trees. In the Glenthompson area, and in the Mortlake area[150] in south-western Victoria, there has been a continuing and dramatic decline in the numbers of red gums. Much of this decline has

occurred within living memory, but before cockatoos were in the large numbers commonly seen today. At least in these cases, it is certain that factors other than the activities of cockatoos were responsible for this decline. A current rate of decline of mature trees in remnant River Red Gum woodlands in western Victoria is cited at one per cent per annum[151].

4.4.3 Removal of feed grain

A common complaint (20 submissions) is that of feed grain put out for stock being eaten and fouled by cockatoos. The proportion of grain provided for stock that is consumed by these birds has been estimated at 5-10% and 20%[152]. There are reports that cockatoos will scare some lambs from the grain trail, thus reducing their food intake[153].

A related concern is that of cockatoos foraging for remnant grain in cereal stubbles, and competing with stock for this resource. It is claimed that this competition may reduce by up to two months the time that stubbles provide a food source for stock. Estimates of the extra cost of feeding 1000 lambs and 1000 Sheep for two months to compensate for what the birds take were provided. Feeding the lambs would cost $1200 and the Sheep $6000[154]. These stubbles are also thought to be important in the survival of young, at least of the Long-billed Corella, and may enhance the survival of adults, since cereal grains provide the major component of the diet from December through April in this species[155].

4.4.4 Baling twine cut, hay damaged, bagged grain eaten, bags holed, covers on silage and grain storages holed

These problems are not common. Five submissions and three witnesses referred to baled or other hay being damaged and five referred to bagged grain being eaten. Three witnesses referred to covers over grain, silage and hay being holed. In a letter from the Grain Elevators Board, damage to covers on temporary grain bunkers was cited as a minor problem. The economic impact of this activity is unlikely to be severe except in very isolated cases[156]. No costs were provided.

4.4.5 Spreading of weeds

Five submissions referred to concerns that cockatoos were spreading a variety of weeds, resulting in weed infestations under trees as well as on a broader scale. While observations of cockatoos feeding on the seeds of a variety of weeds may suggest that it is the birds that spread these weeds, this seems very unlikely. Cockatoos remove the husk from seeds as small as the individual seeds of the Dandelion *Taraxacum officinale*, 3-4 mm long[157]. These seeds are then ground up in the birds' muscular gizzard which contains small stones to aid the grinding process. It is extremely doubtful that intact seeds would survive this process or that they would be viable after being husked and part-digested.

In the case of thistles, for example, elevated nitrogen levels and bare soil result from stock camping under trees. This creates an ideal seedbed where thistles, which are dispersed by wind, can become established. It is not cause and effect but mere coincidence that cockatoos sometimes roost in these same trees.

4.5 OTHER PROBLEMS

4.5.1 Damage to coaxial cables, antennae and other communications equipment

Such damage is infrequent, but can have serious consequences. Sixteen submissions referred to these problems, attributed in most cases to Long-billed Corellas. A fire in the Pigeon Ponds area in 1980 is widely believed to have been started by a coaxial power cable being shorted by a Long-billed Corella[158]. This fire burnt out a large area of grassland. Domestic electricity supplies can be cut, with the potential loss of food in freezers, and other problems[159]. Damage to antennae[160] can affect reception and accelerate corrosion by removal of protective coatings[161]. Galahs are also reported to cause all these problems[162], although this was not evident from submissions received by the Committee.

The Committee heard evidence that Telecom Australia has experienced considerable difficulties with cockatoos destroying dielectric windows used to

transmit or collect microwave beams in parabolic dish antennae used in microwave telecommunications systems. Telecom Australia has now found that using replacement windows of 1.5 mm rather than 0.15 mm thickness appears to deter the birds. Nevertheless, the example demonstrates how problematical and diverse cockatoo damage can be[163].

4.5.2 Damage to soft timbers on houses and other structures

Cockatoos need to chew materials to maintain the beak in good condition. Much of the pruning of trees is thought to be a result of beak maintenance behaviour. Where cockatoos are attracted close to houses by the provision of food, or have a natural food source nearby, they may discover that parts of the neighbouring buildings contain timbers soft enough to chew. Imported softwood timbers such as western red cedar and meranti are particularly vulnerable, but there are recent cases of the slightly harder oregon being severely damaged. Window and door frames are most commonly damaged, but balustrades, pergolas, fascia boards, weatherboard cladding and timber picnic furniture may also be damaged (Plates 9 and 10). It is interesting that only five submissions referred to this problem, in spite of it being frequent, widespread and costly.

During the period 1986-1992, 114 cases of this kind of damage were reported to just one office of the Department of Conservation and Natural Resources[164]. A common factor was the attraction of cockatoos to food provided by a nearby house holder. Other damage, such as pruning of trees and destruction of garden plants, is also frequent in these cases. In one more recent episode, at least 12 houses were damaged by cockatoos attracted to their vicinity by one person providing food. It is common for repairs to cost three to five thousand dollars, but estimates of up to $25 000 damage have been received. This problem is made worse by the refusal of some insurance policies to cover such damage.

4.5.3 Damage to recreational facilities

Digging in managed grass surfaces by Long-billed Corellas and Sulphur-crested Cockatoos is a common source of complaint (24 submissions). Golf courses, bowling greens, tennis courts, ovals and racecourses are all affected

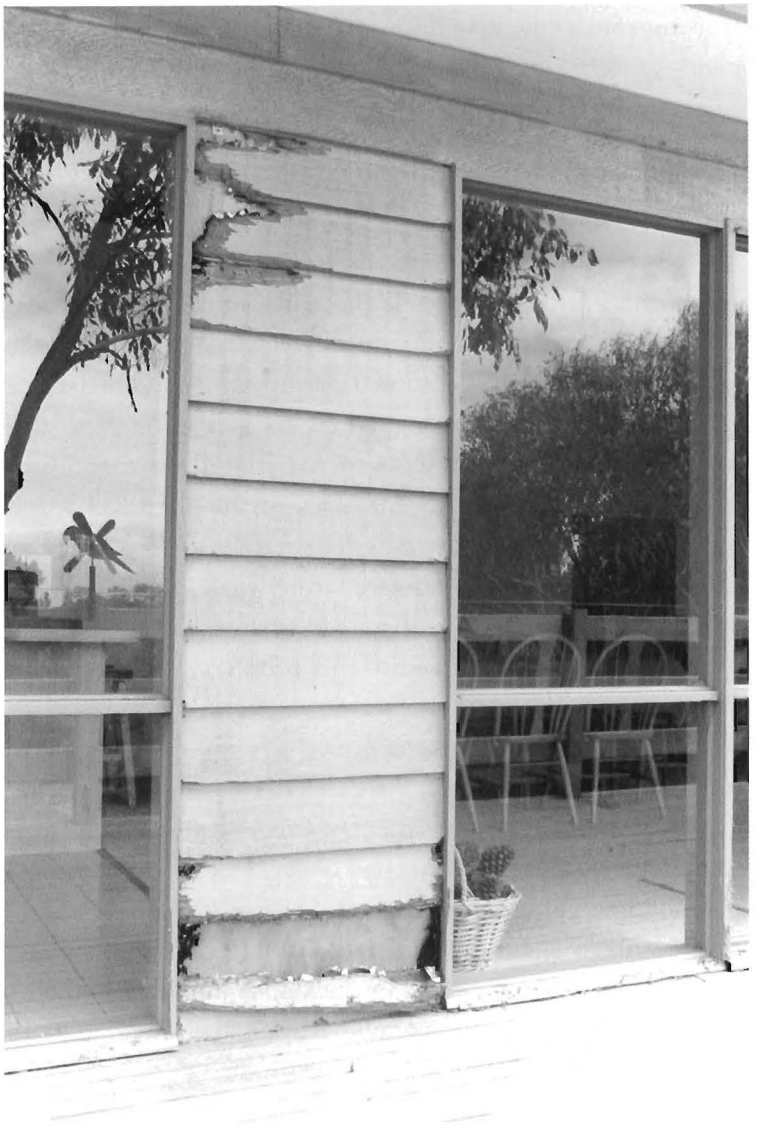


PLATE 9
Sulphur-crested Cockatoo damage to western red cedar timber on house, Anglesea, March 1995. Note devices intended to deter cockatoos (model bird and humming tape) reflected in the windows *(Photograph: Ian Temby).*

PLATE 10
Sulphur-crested Cockatoo damage to oregon picnic table, Bundoora Park, March 1995 *(Photograph: Ian Temby)*

by this activity[165]. Other species of birds may also be implicated in this damage. For example, ravens dig for invertebrates including the larvae of scarabaeid (cockchafer) beetles and can turn over extensive areas of grass.

Cockatoos dig for vegetable matter, usually either Onion Grass corms or the stems and rhizomes of certain grasses. Damage can be extensive.

Widely quoted as a problem is the claim that Long-billed Corellas pull out roofing nails from iron roofs[166]. It is likely that Long-billed Corellas do indeed remove nails from roofs, but it is certain that such nails must have been loosened, and likely worked their way partly out with the expansion and contraction of the roofing material. Such loose nails can be found readily in old iron roofs, contribute little to structural security of the roof and can often be removed by hand. The Committee considers that proper maintenance and

the use of roofing screws will not only reduce this problem but will also reduce the likelihood of storm and wind damage.

Light fittings and other fixtures are also damaged at sporting facilities[167] and an artificial surface (plexipave) tennis court sustained damage at Jeparit when Long-billed Corellas dug holes in it[168].

4.5.4 Noise

Cockatoos frequently roost near dwellings. These birds cause other problems that are difficult to resolve and often cause intense frustration. Cockatoos start calling before dawn and may call during the night. They roost in large groups. Noisy flocks fly over during the day, so farmers are constantly reminded of their presence. Frustration can be fuelled by the sound of these ever-present birds and lead to significant stress levels and lowered quality of life. This cannot be quantified in dollar terms, but is nevertheless an important aspect of the cockatoo issue[169].

4.5.5 Competition for food and nest hollows with other bird species

Eleven submissions expressed concern that cockatoos compete with other bird species for food and for nest hollows. The diet of the Long-billed Corella is known in some detail, and introduced plant species, especially cereal crop grains and Onion Grass corms, form the major part of its diet[170]. Few other woodland bird species rely on such a narrow base of plant foods for the bulk of their diet. Observations suggest that it is unlikely that Long-billed Corellas, at least, compete in any significant way for food with other bird species. While both the Galah and the Sulphur-crested Cockatoo also eat cereal crop grains and Onion Grass corms, these species have broader diets and may overlap with the diets of other birds which are, however, not likely to be significantly affected by competition for one or two food types.

Bird species likely to be affected by competition for nest hollows are similar-sized or larger birds, since smaller species usually select hollows with small entrances, effectively excluding the possibility of competition with the large cockatoos. In addition, it is common to find several species nesting at the same time in a large River Red Gum. For example, three pairs of Long-billed Corellas, one pair of Sulphur-crested Cockatoos, several pairs of Common

Starlings *Sturnus vulgaris* and Tree Martins *Cecropis nigricans* and a pair of Striated Pardalotes *Pardalotus striatus* were observed nesting in the same tree in the Victoria Valley[171]. Cockatoos do not appear to exclude other species from their nest trees. The possibility that Long-billed Corellas may exclude the endangered Red-tailed Black-cockatoo *Calyptorhynchus magnificus* from nest hollows in far western Victoria is under investigation[172]. This is likely to be the only species for which competition for nest sites with the commoner cockatoos could create problems at the present time.

During studies of the breeding of the Long-billed Corella in western Victoria, it was frequently observed over a number of years that there were apparently suitable hollows that were not used by Long-billed Corellas, or other species. These observations suggested that competition for nesting hollows was not a major constraint for Long-billed Corellas or other bird species, at least at that time, and in that area[173].

4.6 THE WIDER SOCIAL CONTEXT

In evidence and in submissions presented to the Committee, mention was made of other, less tangible but no less real pressures imposed on the community by cockatoo behaviour and damage. The Committee was reminded that perceptions of the severity or persistence of problems associated with bird damage can be vitally important in determining responses to those problems. Similarly, the Committee has been advised that the social costs involved in dealing with bird damage and bird problems should not be underestimated. It is to these two themes — perceptions and the social costs of bird damage arising from those perceptions — that the Committee now turns.

4.6.1 The role of perceptions

Just as definitions of bird pests can be subjective then so too can perceptions of the causes and effects — particularly the economic effects — of bird damage. Opinion, belief and viewpoint can be as influential in determining people's understanding, and therefore explanations, of the role and effects of birds, as can supposedly objective facts and figures.

Explanations of bird behaviour are especially susceptible to perceptions of cause and effect. It is not uncommon for conspicuous bird species to be blamed for damage when other species, rendered less visible by their appearance or behaviour, may be responsible for a greater amount of damage[174]. 'Damage' may sometimes be claimed because birds are seen in or near a crop when in fact the birds may have been feeding on Onion Grass corms or other material rather than on the crop itself. In other cases, despite claims of damage because of the presence of birds, none can be found. In addition, other factors that may contribute to the damage or loss, if considered at all, are considered to be less important than in fact they are: weather, soil variability, insect attack and disease can all affect crops.

The Committee emphasises that this is not to suggest that Victorian farmers consistently make incorrect assessments or are not able to make appropriate judgements of cause and effect. But it is to acknowledge that there can be difficulties involved both in separating and then determining the relative importance of a whole series of interacting influences[175]. In other words, the fear of damage may lead to the assumption that damage has occurred. Alternatively, evidence of damage may be too readily attributed to birds as the most obvious cause. In many cases, but not necessarily all, this will of course be correct.

Economic assessments of bird damage are similarly variable. In Ohio (USA), for example, a subjective estimate of damage by birds to Corn (Maize) was $15 million, a figure eventually shown to be 15 times too high[176]. Weatherhead et al. have observed that

> Basing management programmes on damage estimates that may be orders of magnitude away from the true values provides not only for bad economics, but also for the possibility of jeopardising the existence of the pest species through overzealous persecution[177].

The importance of such perceptions, however, lies in the fact that primary producers understandably act on them. The Committee has received a number of submissions referring to situations where growers will not plant crops out of fear of damage by birds[178]. This is clearly an opportunity cost arising from perceptions, whether well-founded or otherwise, of bird damage and its control. In keeping with many farmers, industry bodies and wildlife managers, the Committee observes that damage assessments must be realistic

to enable rational research and management strategies to be developed and applied[179]. At the same time, the Committee also recognises that

> if a problem is perceived to exist, a problem exists. If the perception does not reflect reality, the appropriate resolution of the problem may lie in sharing information rather than actual damage reduction, but resolution of the problem is still imperative for wildlife managers[180].

The Committee has been advised that one of the findings of a 1985 inquiry conducted by the Land Protection Regional Advisory Committee made

> very clear that we were not just dealing with an actual problem of bird damage; we were also dealing with the very strong perception in the farming community of the problem. In my view that is perhaps a more significant problem than the actual damage caused by the birds[181].

The Committee therefore reiterates: the perception of bird damage problems is an important aspect of the farm and bird management equation. It should neither be ignored nor dismissed.

4.6.2 Social Costs of Dealing with the Problem

A consistent message received by the Committee from many people affected adversely by the activities of cockatoos is that they are frustrated at their inability to control the problems the birds cause. This is often translated as an inability to control the birds. Much time is spent in scaring the birds and attempting to kill as many as possible, in some cases, in the belief that this will reduce damage, or perhaps just for the psychological relief it gives to feel that something is being achieved, the achievement being measured in bird carcasses. Substantial reductions in bird numbers cannot be achieved by shooting. Trapping and gassing is seen to be time consuming and of variable effectiveness. Poisoning is commonly believed to be the most useful method to achieve the scale of reductions desired. However, although poisoning is illegal, the Committee has been informed repeatedly by witnesses that personal and economic stress levels are such that they would not be surprised if some primary producers felt driven to risk substantial fines and public condemnation and use poison.

That there is an opportunity cost in not being prepared to grow a variety of crops is undeniable. This reduces the ability of some growers to take advantage of seasonal conditions or changing commodity markets and

therefore reduces their potential income. The extent to which this is the case is difficult to quantify.

4.7 CONCLUSION

A wide variety of problems caused by cockatoos has been described. Damage, or fear of damage to crops was the most common complaint in submissions, with 119 instances cited of problems being caused to various crops. People's perceptions of apparent bird damage situations, and of the birds themselves, influence the nature and extent of their responses to these perceived problems. Bird damage can be obvious and easily quantified, but in some cases, the economic implications and magnitude of these problems are ill-defined. This precludes a clear evaluation of the cost:benefit of damage mitigation strategies and could lead to more resources being spent on controlling the perceived problem than is saved by undertaking control.

Primary producers, wildlife managers and agriculture professionals all need to have a sound knowledge of the costs of bird damage to enable rational, environmentally sound and cost-effective management actions to be taken.

The Committee therefore makes the following recommendations:

Recommendation 1

That the Department of Agriculture, Energy and Minerals devote significant additional resources to:

(a) determine the extent to which horticultural, cereal and oilseed crop yields are affected by Long-billed Corella, Sulphur-crested Cockatoo and Galah damage; and

(b) develop and disseminate to the farming community reliable, simple and rapid techniques for assessment of bird damage to germinating and ripening crops.

Recommendation 2

That the Department of Agriculture, Energy and Minerals survey the economic effects of agricultural and horticultural damage caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs at local, regional and industry levels.

Recommendation 3

That the Department of Conservation and Natural Resources survey the extent of damage caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs to tree-planting programs for commercial and Landcare purposes

Sulphur-crested Cockatoo

CHAPTER FIVE

FACTORS CONTRIBUTING TO DAMAGE

5.1 INTRODUCTION

In Term of Reference (b), the Committee is asked to identify any factors that may have contributed to damage caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. In addressing Term of Reference (b), the Committee considers aspects of the birds' behaviour; their diet; the distribution of natural and current food sources; crop damage management practices; crop siting; deliberate feeding of birds; the role of rabbit control; and preferred roost trees.

5.2 BEHAVIOUR

Flocking, habituation, home-range knowledge, curiosity, beak maintenance and roosting patterns are innate behavioural characteristics that contribute in various ways to the damage associated with these three species.

5.2.1 Flocking

One of the most conspicuous aspects of the behaviour of these species is their tendency to form large feeding aggregations. The process of 'local enhancement' and reasons for such flock formation are discussed in Chapter Two. This behaviour can lead to large flocks forming at selected food sources within a very short period, with obvious potential to cause damage (Plate 11).

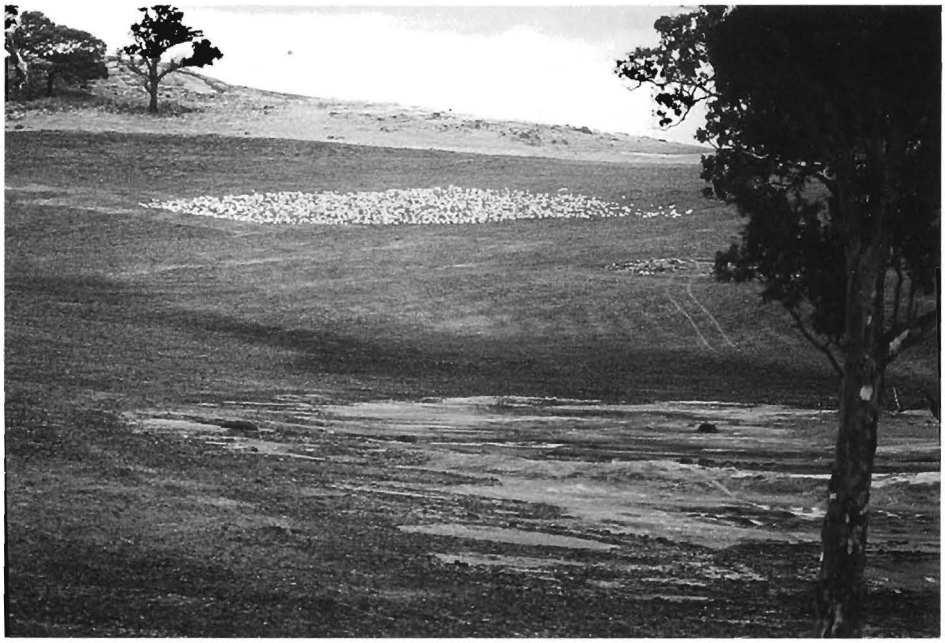


PLATE 11
Long-billed Corellas in newly-sown Oats crop, Mirranatwa, Grampians, May 1981 *(Photograph: Ian Temby).*

For the Long-billed Corella, mean flock size peaks in May and June, coinciding with the sowing and germination of cereal crops and the maturing and harvest of Sunflower, but is consistently high in all months except during the breeding season, from September through November[182]. The flocking behaviour of the Sulphur-crested Cockatoo and the Galah in north-eastern New South Wales is comparable with that of the Long-billed Corella[183]. Post-breeding aggregations of birds, including juveniles, congregate in ripening cereal crops and later in cereal stubbles in early to mid-summer, when, at least in the Long-billed Corella, alternative foods are not readily available. Significant losses can therefore occur at this time and the birds may be difficult to deter in the absence of accessible alternative food sources.

5.2.2 Habituation

Once the birds have discovered and fed at a suitable food source, they will return to it repeatedly for many days or even weeks, unless sufficiently disturbed at that site or attracted by an alternative food source. Hence there is the potential for a large flock of cockatoos to cause a considerable amount of damage to a crop or orchard in a short time. Similarly, if Sulphur-crested Cockatoos are attracted by food provided by a householder, they will quickly develop a pattern of visiting that site daily and spending time in the area. Their curiosity and the need to chew (see below) can then result in significant damage to garden plants, houses and fittings in the vicinity. Local enhancement can lead to an increase in the numbers attracted to such sites, just as it does in more natural situations.

5.2.3 Home range

The relatively small home range of the Long-billed Corella and of at least components of the populations of the other two species (Chapter Two), coupled with their longevity and intelligence, means that these cockatoos have an intimate knowledge of the location and the availability of food and other resources of their area. Birds can therefore be expected to become aware of, for example, new crops being planted, or nuts becoming ripe, as these events occur.

5.2.4 Curiosity

In common with other large parrots, such as the Kea *Nestor notabilis* of New Zealand, these cockatoos are intelligent and very curious. They investigate everything in their environment, often testing and manipulating objects with the beak. It has been shown that Keas are attracted to novel and unusual objects and that if these objects can be manipulated the attraction is stronger[184]. Cockatoos may be attracted by newly-dug soil, or may investigate where they have seen people working. Whatever the motivation, cockatoos visit newly-planted trees and either pull them out of the ground or bite them off[185]. The Committee has received evidence that this damage is not done to naturally regenerated trees at the same stage of growth[186], lending support to the suggestion that this behaviour may be stimulated by novelty in the environment, as is the case in the Kea.

Where cockatoos are encouraged to spend time near houses by being fed, their curiosity often leads to objects around the house being damaged.

Some damage is associated with what appears to be 'play'. Thus cockatoos swinging on coaxial cables and antennae may be indulging in what Rowley called 'acrobatics' in his observations of the Galah[187]. Similarly, Long-billed Corellas have been observed on many occasions rolling on their backs clutching clods of soil in their feet, and biting at the soil in an apparently excited manner, for no apparent purpose[188]. The *'Mad Flight'* of the Galah[189], (fast, erratic flight between tree trunks), is also commonly observed in the Long-billed Corella.

It is possible that damage to newly-planted trees falls into this category of behaviour characterised as 'play', with the initial attraction being the novelty of the trees having been planted.

5.2.5 Beak maintenance

The beaks of cockatoos grow continuously, and need to be maintained in peak condition. This is achieved by chewing on inedible objects[190]. It appears that anything able to be chewed is at risk. Hence, for example, the damage to cedar timber on houses; polythene pipe hot water systems on roofs; light fittings and antennae; and Grape vines and nut-trees by ring-barking and pruning. Tree pruning is almost certainly undertaken for this reason as well as being, in the Galah, associated with nesting behaviour[191].

5.2.6 Roosting

All three species of cockatoo tend to roost in the canopies of large trees at night. These may be some distance from feeding areas. Long-billed Corellas often roost in mature River Red Gums growing around swamps or beside watercourses, but will use non-indigenous trees such as Sugar Gums or cypresses where red gums are absent.

Trees used for resting during the day, between bouts of feeding, are often closer to the feeding site. Such trees are used for refuge if the birds are alarmed while feeding. If these trees are close to a crop, then scaring will be difficult because the birds do not have to fly far to safety. It follows that if it is

possible to grow crops distant from trees, then damage from cockatoos is less likely to occur, and is more readily resolved if it does occur.

5.3 DIET

5.3.1 Past and present diet

The diets of the three cockatoos have been described in some detail[192]. It is clear that, prior to the extensive changes to plant distribution and abundance following the introduction of livestock and agriculture to this country, all species dug for components of their natural diet, to a minor extent in the Galah and to a major extent in the Long-billed Corella, with the Sulphur-crested Cockatoo in between. All three species were therefore pre-adapted to dig for sown grains.

While the Long-billed Corella excavated a considerable portion of its diet in the form of tubers and other plant storage organs[193], the seeds of various grasses were of greater importance in the diets of the other species.

Now, a major component of the diets of all three species comprises the seeds of commercially grown cereal and/or oilseed crops, at least in some parts of their ranges. Adoption of cereal grains as a food source occurred soon after these crops were first grown in the vicinity of Port Phillip Bay. Wheat was first grown in this region in 1835 and Oats and Barley shortly after 1840[194]. Gould, in 1848, observed of the Long-billed Corella that

> it not unfrequently makes inroads to the newly-sown fields of corn, where it is the most destructive bird imaginable[195].

The narrow dietary range of the Long-billed Corella does not mean that it is more of a pest in cropping areas than the other species, but that it is less likely to thrive away from areas where its major foods, cereal grains and Onion Grass corms, occur. Over 90% of the diet of this species is now composed of plants of exotic origin[196], and the Long-billed Corella's distribution coincides with that of cereal crops and Onion Grass (see Chapter Two).

5.4 OTHER FACTORS

5.4.1 Habitat changes favouring cockatoos

A number of other factors have facilitated the expansion in numbers and range of the three species. The effects of clearing and creation of greater areas of habitat suitable for these species are described in Chapter Two. Expansion of the area of crop land and pasture doubled during the 1960s, after some three decades of relative stability[197]. For example, some 15% (161 500 ha) of the State's remaining forest on private land was cleared for agriculture in the period 1972 to 1987[198], and a further 2.2% (20 102 ha) of that remaining took place during the period 1987 to 1990[199]. While clearing of native forest for farming purposes is now minimal, any further expansion of the area of grassy woodland habitat favours these birds.

5.4.2 Altered food sources

The extensive monocultures of cereal crops now provide an abundant, concentrated and reliable food source for much of the year. For example, the Long-billed Corella feeds on cereal grains in all months, except during the vegetative phase of growth of cereals in August and September, when corms of the ubiquitous Onion Grass comprise more than 80% of its diet. During the first months after Long-billed Corellas leave the nest (December to April), cereal grains in stubbles and grain trails laid for stock form up to 90% of the food intake of this species. Availability of grain at this time undoubtedly enhances the survival of young birds at a critical period[200] and contributes to population growth. The probable role of rabbits in suppressing the population of the Long-billed Corella until the Myxoma virus was introduced in 1950, and the subsequent increase in Long-billed Corella numbers, is discussed in Chapter Two.

The practice of tilling the land prior to the onset of autumn rains facilitates access to Onion Grass corms at a time when the ground is hard and these corms are difficult to excavate. This not only provides another readily accessible food source for cockatoos, but local enhancement ensures that large flocks form at these food sources, and the birds habitually return to these sites. Therefore, when the crop is sown, birds used to feeding there may cause problems immediately.

Extensive plantations of Almond trees along the Murray River provide a high-energy, highly attractive food source for Galahs and Sulphur-crested Cockatoos adjacent to prime roosting habitat along the river. Nut trees grown elsewhere readily attract cockatoos quick to exploit a new food resource.

5.4.3 Crop siting

Growing crops in an area susceptible to attack by cockatoos but where frequent patrolling or scaring is not feasible increases the risk of damage. Of cereal crops it has been said

> ... early sown, fast emerging crops seem less affected, however crops sown at less than ideal times are extremely vulnerable to the point of requiring weeks of protection, difficult with multiple paddocks and impossible for absentee landlords, farmers working off farm, and if normal farmwork is to be continued, often all available measures are ineffective[201].

If birds begin to feed in a crop, the likelihood of severe damage being caused is high, if scaring is not undertaken. Crops grown close to trees are more likely to be damaged than crops well away from trees. The effectiveness of scaring strategies is greater if there are no trees nearby, since the birds have to go further to shelter, once they have been scared. Crops in paddocks that contain trees will have more edge than those grown in paddocks without trees. This is likely to lead to greater damage to the crop at ripening, when damage is concentrated at the edges.

The Committee acknowledges that should damage be extensive and resowing of the crop be necessary, crop yield will be reduced because the optimum sowing time to gain the best results has passed.

5.4.4 Scale and economics

As outlined in Chapter Four, small enterprises are more vulnerable to damage by birds because there is little latitude to absorb losses, yet it may be these same enterprises where the owner engages in share-cropping on other properties to boost income. Protection of such crops is problematic because they may be several kilometres from where the farmer lives, and he or she may have several such crops.

Economic conditions change constantly. Commodity prices dictate which crops are more likely to provide a profitable return on investment. A key factor to include in the calculation of potential returns from a proposed cropping program is the anticipated nature and extent of bird damage problems, and the magnitude of these problems compared with other pest and weed problems, climatic variability, and the effects of soil structural decline on plant growth through increasing the risk of waterlogging during wet periods[202]. It is clear that there will be difficulty in determining the likely magnitude of problems caused by cockatoos if there are inadequate data on past damage levels in a range of crops and a lack of techniques for assessing such bird damage simply.

5.5 SUMMARY

Factors contributing to crop yield losses are complex. Soil structural decline in cereal cropping areas can lead to poor plant growth. Other pests, and climatic variables can, either singly or in combination, reduce crop yields. In addition, the biology of the Long-billed Corella, Sulphur-crested Cockatoo and Galah predispose them to patterns of behaviour that may lead to crop and infrastructure damage.

Changes to the Victorian landscape since the early 1830s have created more extensive habitat suitable for the Long-billed Corella, Sulphur-crested Cockatoo and Galah. The steady replacement of forests by agriculture — a process that continues if now on a more restricted scale — has eliminated many of the natural foods of the three species, and particularly of the Long-billed Corella, and replaced them with an alternative source of food in the form of a range of exotic crop and weed species. The provision of such food, a consequence of past and continuing agricultural expansion, is therefore a significant factor that contributes to damage caused by birds.

Bird damage control techniques, if used inappropriately, can likewise create conditions that do not necessarily discourage bird damage. Integrated bird scaring strategies, for example, can be effective but reliance on any one technique, or failure to continue varying the scaring stimulus, may lead to

poor results. Indeed, an inability to undertake regular patrols and scaring may increase the potential for bird damage.

Crops sited near trees or crop paddocks containing trees have increased potential for bird damage, and increased difficulty in implementing an effective scaring campaign. Thin or bare patches and trees within a ripening crop increase its edge and hence its potential for damage by birds. Grain available in stubbles after the harvest, spillage of grain during transport and storage, and feeding stock in trails accessible to birds makes grain available to cockatoos at a critical period and possibly enhances the survival of young birds. Farm management techniques can thus contribute to bird damage.

The behavioural characteristics of cockatoos are another contributing factor. The birds will return repeatedly to favoured feeding sites. This same behaviour results in birds becoming used to feeding near houses where food is provided and leads in some cases to extensive damage being caused.

In sum, a combination of human controlled elements and the birds' inate behaviour constitutes a significant feature of problems associated with Long-billed Corellas, Sulphur-crested Cockatoos and Galahs.


Galah

CHAPTER SIX

BIRD DAMAGE CONTROL

6.1 INTRODUCTION

In Term of Reference (c), the Committee is asked to review the effectiveness of methods used to control damage caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. In this Chapter, the Committee addresses Term of Reference (c) by reviewing bird damage control methods and farm management techniques, both of which aim to reduce, minimise or eliminate bird damage.

Bird damage control measures are techniques that directly repel or remove birds threatening or causing damage. Such measures involve immediate and active intervention to manipulate the birds' behaviour. Farm management techniques are agricultural systems and programs that will deter or discourage birds that threaten or cause damage. These measures involve the passive, defensive, and strategic manipulation of bird behaviour. The former measures are therefore oriented to wildlife management, the latter to agricultural methods. Together they constitute a mutually-reinforcing system of bird damage controls.

6.1.1 No single solution

Bird damage and bird damage controls are thought to have occurred since crops were first grown. Indeed, the long history of human interaction with birds has been characterised by the use of damage control techniques that

remain today entirely familiar. Shooting, scaring, repellency, exclusion, scarecrows, bounties, and overplanting in order to provide sufficient harvest despite feeding birds have for centuries been used as measures to combat bird damage. In 1424 King James 1 of Scotland introduced an Act for the destruction of Rooks *Corvus frugilegus*. In 1668, a book by Gervase Markham included a chapter on techniques and suggestions for minimising bird damage to crops and orchards[203]. Today's farmers and wildlife managers have therefore inherited a range of techniques that, while now more sophisticated, remain little different in intent and method from those of centuries past.

This long experience has not, however, identified a fool-proof method of bird damage control. Put differently, there is no single solution to bird damage control.

6.1.2 An integrated approach

The Committee is persuaded that relief from bird damage will only be achieved by the application of a range of integrated, mutually-reinforcing damage-control and farm-management techniques. The choice of which combination of techniques and strategies would be best included in a damage control program will always be dependent on local conditions and circumstances. The potential success of a bird damage control program therefore lies not in any one technique but in the range, mix and compatibility of the measures that are applied.

The Committee considers that integrated strategies will most effectively result in damage reduction when applied by groups of cooperating land holders, such as Landcare groups, rather than by individuals on an uncoordinated basis. A cooperative approach offers greater potential for efficient and effective bird damage control and so should be encouraged. The Committee further considers that the Government, through the Department of Conservation and Natural Resources and the Department of Agriculture, Energy and Minerals, should assist land holder groups who seek to implement bird damage control programs.

As an incentive to encourage such groups, the Committee finds that priority for departmental advice, extension support and demonstrations or application

of certain techniques should be given to groups which intend to implement, or have established, integrated damage control programs, rather than to individuals. Individuals who implement integrated damage control programs should, however, be supported and such individuals should be given priority for departmental advice and assistance over individuals who seek single solutions or apply 'one-off' measures.

These perspectives underlie the discussion of bird damage controls, farm management techniques, and extension initiatives that comprise this Chapter.

6.2 BIRD DAMAGE CONTROL METHODS

Bird damage control measures include scaring; noise makers; visual deterrents; chemical deterrents; tactile deterrents; behavioural manipulation; shooting; poisoning; humane capture through the use of chemical agents; fertility control; trapping and export; trapping and gassing; and egg destruction.

To assist readers, a summary of the various bird damage control measures discussed in Section 6.2 may be found in Table 3. The Committee emphasises that Table 3 is designed solely to provide readers with an overview of Section 6.2. An equivalent table (Table 4) summarising farm management techniques can be found in Section 6.3 of this Chapter.

6.2.1 Scaring methods

Scaring involves the use of various means to encourage or frighten birds to go elsewhere to forage or roost, usually by evoking a neophobic response — that is, a response to something new in the bird's environment. Alternative food sources or roosting sites must be available, or it will be extremely difficult to keep birds away. For cockatoos, such alternatives are frequently available, so scaring strategies at least have the potential to be effective. Actual effectiveness depends upon a number of common factors:

- persistence: that is, instant results are unlikely, but persistent application of scaring methods will improve damage control;

TABLE 3
Summary of bird damage controls examined in Section 6.2

SECTION	TECHNIQUE	SUPPORT NO	SUPPORT YES	ENRC COMMENT	ENRC OUTCOME
6.2.1	Scaring methods		X	Part of an integrated strategy	
6.2.2	Noise makers		X	Part of an integrated strategy	
	• scaring sounds		X	Part of an integrated strategy	
	• bioacoustic sounds		X	Part of an integrated strategy	
	• gas guns		X	Part of an integrated strategy	
	• Bird Frite® cartridges		X	Part of an integrated strategy	
6.2.3	Visual deterrents		X	Part of an integrated strategy	
	• objects		X	Part of an integrated strategy	
	• birds of prey		X	Should be encouraged	
	• movement		X	Part of an integrated strategy	
6.2.4	Chemical deterrents			Further research required	
	• Mesurol®	X			
	• Concorde Grape		X	Further research required	
	• Cinnamic acid		X	Further research required	
	• existing compounds		X	Further research required	
6.2.5	Tactile deterrents	X		Not practicable for industry	
6.2.6	Decoy models		X	Further research required	
6.2.7	Flock management		X	Part of an integrated strategy	
6.2.8	Shooting		X	Part of an integrated strategy	REC 4
6.2.9	Poisoning	X		ENRC rejects use of poison	REC 5
	• DRC 1339	X			
	• Avitrol	X			
	• Surfactants	X			
	• Toxic perches	X			
6.2.10	Intoxicants (non residual)		X	Supports in principle	
	• Alpha-chloralose		X	Further research required	REC 6, 7
6.2.11	Fertility control	X		Further research required	
6.2.12	Trapping			Supports in part	
	• and export	X			
	• and gassing		X	Part of an integrated strategy	REC 8, 9
6.2.13	Egg destruction	X		Not feasible	

Note
ENRC: Environment and Natural Resources Committee
REC: Recommendation

- integration: that is, a combination of techniques such as shooting, visual and acoustic scaring to maintain constant variety and novelty in the frightening stimuli. This will reduce the likelihood that birds will become used to the deterrents employed, or will increase the time before this occurs;

- advance planning: that is, scaring must begin when the first few birds arrive, before damage is being caused, to prevent a feeding pattern being established;

- timing: that is, the scaring effort should be timed according to when the birds are most troublesome. This is usually early in the morning and late in the afternoon;

- variation: that is, the timing and route of patrols must be varied so that birds cannot anticipate danger; and

- decoy feeding: that is, providing an alternative, undisturbed source of food to attract birds elsewhere.

The Committee notes that scaring is commonly criticised for simply shifting the problem elsewhere, but there are advantages in doing this. Damage may be spread over several crops or roost sites, with damage to any one crop or roost site being tolerable. Crops that are thinned at germination may suffer little or no loss in yield due to compensatory growth, provided the thinning is not too extensive. Spreading the damage may achieve this. Birds may not move to another crop, but may feed instead on Onion Grass corms or other foods in the vicinity. If an alternative food source is provided, scaring from crops may ensure that the birds use the alternative food source in preference to crop sites where they receive regular scaring reinforced by shooting.

Birds adapt rapidly to stimuli, and will learn to ignore scaring devices unless variety and uncertainty are built into their use by varying the timing and position of their operation, and by changing the range of devices or measures used to scare the birds. Furthermore, the Committee is aware that

> Once birds have started to ignore a 'neophobic' scarer, it is important to remove the device as they may then associate the previously novel stimulus with a good source of food...[204]

In other words, a scare gun, for example, once it has lost its scaring impact may signal to birds a good source of food.

6.2.2 Noise makers

The mechanisms by which auditory devices are supposed to repel birds include pain, fear, communication 'jamming', disorientation, internal thermal effects, biosonics (taped alarm or distress calls) or electronic mimics of these, and ultrasound[205].

6.2.2.1 Scaring sounds

Audible sound above 130 dB and infrasonic or ultrasonic sound above 140 dB causes pain and sometimes sickness in vertebrates. The Committee notes that the range over which birds hear sound is similar to that of humans and it is therefore unlikely that birds can hear much ultrasound. Very loud and high intensity sound under experimental conditions has been shown to cause internal thermal effects but this is not a feasible control method in practice. At pain-inducing intensities sound is likely to be a nuisance to people, be expensive to produce and conflict with animal welfare considerations. So-called 'white noise' has been used to confuse birds (eg Silvereyes) that vocalise to maintain group cohesion during feeding[206].

Most common and frequently used sonic devices rely on fear for their scaring effects. Most of the sounds are generated by mechanical, electronic or explosive devices that include sirens, bangers, crackers and hooters.

6.2.2.2 Bioacoustic sounds

Bioacoustic sounds include distress, alarm and feeding calls that are recorded, amplified and broadcast over crops or other situations to scare birds. Many calls are species-specific and it is difficult to learn and record the right call. For example, distress calls of the Galah attract, rather than repel, other Galahs[207], while alarm calls of the Sulphur-crested Cockatoo elicit a fleeing response[208]. There appears to be some convergence between species in the general characteristics of alarm calls such that calls by one species may alert other species[209]. In Australia, there appear to be sentinel species such as Noisy Miners *Manorina melanocephala* whose alarm calls alert other species[210]. Calls of the Whistling Kite *Haliastur sphenurus* effectively but unexpectedly dispersed Galahs from a feeding site[211]. More research is needed to determine

which alarm calls will elicit a response by different pest species. Not all species appear to have alarm calls but may rely mainly on visual signals.

Digitising recorded alarm calls with computers, enhancing particular elements of the calls and randomising frequency, amplitude and duration of significant elements has been investigated and preliminary results are promising[212].

An improvement on just playing recorded calls at set intervals is to have a device that can be triggered to play only when birds enter the area to be protected. This should increase the time before habituation occurs. If a range of different calls is played at random, then habituation is likely to take even longer, provided the calls are biologically significant, and are only played for short periods.

The Committee examined a prototype of a such a device that was being tested at a vineyard to deter birds from near-ripe Grapes. This device is triggered by birds entering a radar field set up to cover the vineyard. Disturbance to this field as birds enter the vineyard activates the device which then plays one of a range of distress or alarm calls. Initial results suggest that this system may be of some benefit[213].

Some electronic noise-generating devices are claimed to produce sounds that simulate alarm or distress calls of various species. However, considering the intricacies of birds' vocalisations, any scaring response these synthesised calls achieve is likely to be due to the sounds being little more than something new in the birds' environment, and therefore of only short-term effect if any, before they are ignored.

A sonic device called the Hi-tec Electronic Scarecrow was sold in Australia as a 'proven deterrent for diverting most land and flying creatures' according to accompanying literature. In careful tests of this device on the feeding behaviour of starlings, where food was set out in segments with and without exposure to the device, –

> Neither starling numbers nor food removed from the segments were affected by the scarecrow signal[214].

6.2.2.3 Gas guns

Gas-operated scare guns (gas guns) are commonly used and often criticised as being useless or ineffective[215]. They come in a variety of models, producing a single, double or triple bang. Some models swivel to face a different direction following each blast. Scare guns are useful provided they are moved regularly, the firing interval is varied and they are turned off at night. Some models are automatically turned off by a photoelectric switch, so they only operate during daylight hours. As with most scaring strategies, reinforcement of the scaring stimulus by actual shooting is required.

6.2.2.4 Bird Frite® cartridges

Cracker cartridges (Bird Frite® cartridges) are explosive projectiles fired from a 12 gauge shotgun. They are designed to explode 80-100 m from the shooter and can be directed to explode over or within a flock of birds. The loud report emitted does scare birds, but habituation will occur unless these devices are combined with recorded alarm or distress calls or other scaring measures and some shooting[216].

6.2.2.5 Summary

The effect of auditory devices for bird scaring was reviewed recently by Dr Mary Bomford[217], who scanned the scientific literature on tests of sonic devices. She concluded that few devices have been tested effectively and manufacturers' claims should be viewed with scepticism. However, the Committee finds that some generalisations can be made:

1. The best effects with sound are obtained when:
   (a) the sound is presented at random intervals;
   (b) a range of different sounds is used;
   (c) the sound source is moved frequently;
   (d) the sound is supported by other control methods; and
   (e) sounds are reinforced by real danger, such as shooting.

2. Loud sounds are more disturbing than quiet sounds.

3. Sounds with a wide frequency range are more disturbing than pure tones.

4. Adult birds are more easily scared than juveniles.

5. Hunted species take longer to habituate to bangs.

6. All species habituate in time to nearly all sounds tested.

7. Broadcast alarm or distress calls show the most promise as a control technique but are species-specific and there is evidence that habituation does develop with prolonged or frequent exposure.

8. The effect of most sound generating devices is short term.

6.2.3 Visual deterrence

6.2.3.1 Objects

The use of visual deterrents is undoubtedly one of the oldest bird scaring methods. Human activity in the crop is perhaps the simplest form of this and has been employed since at least 10 000 BC and the first growing of crops.

Since that time, a great range of devices has been used. Many of these, or their modern equivalents, are still employed today. Scarecrows; dead birds hung or spread on the ground; plastic bags; wine cask inners; balloons displaying big eyes; reflective tapes and mirrors; humming tapes; real birds of prey; plastic bird of prey; silhouettes or kites; model and real aircraft; and motor vehicles, are all used to enhance the scaring of birds.

Many of these devices or techniques can be of use as part of an integrated damage management program. If there is no real threat present, however, the problem of habituation to most stimuli remains. This is a significant problem, as indicated above. Birds will come to use scarecrows as perches, and may use them as signals to indicate favourable conditions[218].

The combination of methods, such as eye-spot balloons with hawk kites attached, often yields longer-lasting effects than either method on its own.

Furthermore, the responses of different bird species vary, with some species habituating very quickly, while others remain wary for many days or weeks[219]. For example, cormorants were found perching next to stationary owl decoys within two days of the 'scaring' decoys being placed[220].

Tests by the Agriculture Protection Board of Western Australia of a variety of visual devices in fruit crops failed to demonstrate any significant effect against parrots. Numbers of birds and damage levels did not change[221]. In New Zealand, it is claimed that all such devices have a role to play, in combination with other devices, since they help to create uncertainty around the crop[222].

6.2.3.2 Birds of prey

Trained birds of prey have been used successfully at a number of airfields in Europe, Britain and North America, usually in some combination with cracker cartridges, distress calls and shooting. Gulls were one of the main target species, but several others were also successfully deterred. Factors such as cost; availability; inability to fly at night; while moulting; during strong winds, rain or fog; the requirement for trained handlers; and access to several trained birds have curtailed the use of these birds in most situations[223]. Trained falcons, particularly Peregrine Falcons *Falco peregrinus*, have been used at Mascot Airport in Sydney to control Silver Gulls *Larus novaehollandiae*. This project was abandoned because of excessive costs and limited effectiveness. The Committee has been briefed on a proposed raptor rehabilitation scheme to be conducted by Healesville Sanctuary personnel in which raptors would be flown over vineyards. While the Committee wishes the project well, it is not, for the reasons just stated, currently regarded as a viable method of crop and vineyard protection[224].

6.2.3.3 Movement

Movement enhances the effectiveness of scarecrows and other visual devices. Thus an animated crow-killing owl model was more effective at protecting vegetables from crows than the owl alone or dead crows[225]. Human-shaped scarecrows that shake their heads and slowly wave their arms up and down are reported to be effective. A variation on this theme is a model man with a gun that pops up periodically from the undergrowth with a loud bang, and is also reported to be reasonably effective[226].

6.2.4 Chemical deterrence

6.2.4.1 Birds and chemicals

There is currently no registered chemical that can be used on crops or grain in Victoria to deter birds. However, studies are progressing in a number of countries on several potential repellents. Initial work on these is promising.

Birds lack discrimination of what humans perceive to be foul tasting or smelling substances[227]. Conversely, some chemicals which humans find pleasant are distasteful or harmful to birds. Starlings learn to avoid sucrose because it makes them ill: they lack the enzyme sucrase to enable them to digest it[228]. In a series of tests of bad-tasting but non-toxic compounds compared with a toxicant-food mixture, it was shown that bad taste alone was not significant in determining food preferences[229]. Other work supports this finding[230]. In most cases, repellents that work do so because they cause a physiological ill-effect which the bird associates with the particular substance and a conditioned aversion is created. In other words, most repellents work because they make the bird feel sick and/or display distress signals.

6.2.4.2 Mesurol®

The chemical methiocarb (sold as Mesurol®) was reported to be highly effective for protecting fruit crops. This chemical is aversive to birds due to its emetic – or nauseating – effect[231]. Due to residue problems, Mesurol® is no longer available for this purpose[232]. Some work with this chemical, however, showed that a conditioned aversion could be developed, so that treatment of only part of a crop may be sufficient to confer protection on the whole crop, thus reducing the amount of repellent chemical required[233]. This characteristic is likely to apply to other repellent materials.

6.2.4.3 Concorde Grape

A range of non-toxic food flavourings derived from the American Concorde Grape *Vitis labrusca*, particularly methyl anthranilate (MA) and dimethyl anthranilate (DMA), have been shown to work at least partly by odour characteristics rather than by taste. This suggests that in some circumstances, birds may not even have to eat foods treated with these compounds to learn to

avoid them[234]. In spite of this, trials of a variety of bitter, hot or smelly compounds, including MA, applied to timber in a cockatoo aviary were not repellent to the birds. In this case, the timber was not being ingested, but chewed[235]. With respect to MA, it is claimed that

> Every avian species examined to date (including laughing gulls, ring-billed gulls, starlings, sparrows, waxwings, red-winged blackbirds, grackles, cowbirds, mallard ducks, Canada geese, snow geese, crows, chickens, guinea fowl, pheasants, bobwhite quail and turkeys) avoids normally preferred foods when the foods are adulterated with MA[236].

A summary of experiments with anthranilates shows that:

- DMA was repellent to birds when added to stock feed at feedlots[237];
- DMA and MA were both repellent to waterfowl when added to Corn in outdoor pen trials[238];
- MA as a seed dressing on Rice *Oryza sativa* was effective in cage and field trials against Red-winged Blackbirds *Agelaius phoeniceus* where alternative foods were available, but the efficacy declined rapidly over time[239];
- trials of DMA and MA in New Zealand failed to demonstrate any repellent effect at 1% concentration on Wheat presented to House Sparrows *Passer domesticus*[240];
- MA was highly repellent to Adelaide Rosellas *Platycercus elegans adelaidae*, Silvereyes, Little Corellas and Common Starlings in cage trials in South Australia at concentrations of 0.5-0.75%, w/w, when an alternative food source was available. Where there was no choice, repellency was diminished[241].

The Committee notes that field trials of MA-treated cereal grain to assess its palatability to cockatoos will be undertaken in Victoria during 1995 and 1996.[242]

6.2.4.4 Cinnamic acid

A number of other potential repellents are the subject of investigation. Cinnamic acid derivatives — non-toxic compounds present in the buds of some Pear *Pyrus communis* varieties — have been shown to have repellent qualities. Cinnamamide, one of the most repellent of these compounds, reduced food intake significantly in captive pigeons[243], as did methyl cinnamate with captive Red-winged Blackbirds[244]. Cinnamamide reduced Silvereye damage to Grapes in field trials in New Zealand, and reduced food intake by Rooks and Chaffinches *Fringilla coelebs* in field trials in England[245]. Further investigation of these compounds appears to be worthwhile. The costs of registration and commercial development of such compounds could, however, make them uneconomic[246].

6.2.4.5 Existing compounds

A more economically realistic approach may be to investigate repellency of existing, registered compounds, perhaps used for other purposes but exhibiting some repellent qualities. One such compound is imidacloprid, a systemic insecticide for treating Rice, Cotton, *Gossypium* spp., Wheat and other crops. This chemical does not appear to be a sensory irritant like methyl anthranilate (and cinnamamide), but rather causes distress after being ingested. It appears to pose a low hazard to birds while appearing to be an effective bird repellent, based on trials where it was applied to Rice seeds presented to Red-winged Blackbirds[247].

6.2.4.6 Other methods

Two other mechanisms for conferring repellency have been investigated. One is to increase the time it takes for birds to process seeds by coating them with a non-toxic clay-based seed coating. Cage and field trials showed that birds did take longer to handle coated than uncoated seed, and treated field plots received roughly 14 times less bird use than did control (untreated) plots[248]. The other mechanism is to coat plants, fruit or seed with non-toxic, inert particulate materials that will inhibit digestion of organic materials by adsorbing them onto the particles.

In one series of trials, captive Starlings avoided foods treated with quartz sand and with two activated charcoal preparations. The Committee observes that while further work needs to be conducted on these potential repellents, their registration for use as repellents would be relatively uncomplicated and inexpensive, given that the compounds are inert and non-toxic[249]. While treatment of Wheat, Barley and Rice seeds may inhibit feeding by cockatoos, their removal of the husk of Oats is likely to remove the repellent as well, rendering the treatment ineffective on Oats.

In preliminary work, a peppermint extract applied as a surface coating to Wheat seeds was significantly repellent to House Sparrows in recent cage trials in New Zealand[250]. This result suggests the value of further work with this and related chemicals.

In summary, the Committee commends the Department of Conservation and Natural Resources for investigating the efficacy of methyl anthranilate as a potential repellent seed dressing and encourages the Department to liaise with other organisations in Australia and overseas regarding their research into alternative repellent compounds, so that effective repellents can be tested in Victoria as they become available.

6.2.5 Tactile deterrence

Non-toxic sticky gels are available for application to ledges and other sites where birds perch. Birds do not like perching on the soft material and avoid the surface where it has been applied. Such gels are used on buildings, mostly for control of Feral Pigeons *Columba livia* and Starlings. The Committee observes that there does not appear to be any practical application of this method for deterrence of cockatoos in agricultural settings. However, the Committee believes that tactile deterrents may be of use in situations where cockatoos cause problems to fixtures or buildings.

6.2.6 Decoy models

Manipulation of the birds' own behaviour shows promise for future damage control. Many birds have an alert posture or other visual signal to indicate to other birds that there may be danger about. Brent Geese *Branta bernicla* stretch their necks upwards and shake their heads before flying off. Dummy geese

mimicking this posture were effective in deterring most incoming flocks from landing nearby[251].

Woodpigeons *Columba palumbus* in England are a serious crop pest. These birds have distinctive white wing bars, visible only when they take flight. It has been shown that models of pairs of outstretched wings are sufficient to stop other Woodpigeons from landing, and that this effect can last over a 9-week period[252]. Models of spread Black Swan *Cygnus atratus* wings, showing their white wing bars, combined with alarm calls, was an effective strategy to reduce damage by swans to pastures at Werribee[253].

The use of decoy (model) ducks to attract wild ducks close to shooters is well known. Long-billed Corellas are attracted to the sight of other white cockatoos feeding and will change course to join them (see 2.5.2 Communal behaviour). During research on the Little Corella in the Flinders Ranges, it was shown that dead Little Corellas were useful as decoys to attract other corellas to a water trough[254].

When alarmed, cockatoos feeding on the ground assume an alert posture, in which all birds stand erect just before flying off. Model Long-billed Corellas or Sulphur-crested Cockatoos set out in this alert posture in a sown crop may be effective at deterring other birds from landing in the vicinity, rather than attracting them. Conversely, model cockatoos in feeding posture may be effective at attracting other birds to join them at decoy feeding sites, for example. The Committee therefore suggests that the Department of Conservation and Natural Resources should investigate the effectiveness of models of Long-billed Corellas in different postures as attractants and as deterrents to other cockatoos.

6.2.7 Flock and population management

The presentation of arguments for and against the need for population reduction has been a feature of this Inquiry. In submissions, evidence and the wider wildlife management literature, this issue underlies debate concerning various measures suggested as necessary for bird damage control. The Committee has welcomed such debate and recognises that the positions being

presented were motivated by experience and values important to their proponents.

A brief overview of those arguments — confined to general principles — is therefore presented by way of background to the summary of the various lethal control techniques — shooting, poisoning, humane capture, fertility control, and trapping and gassing — to which the Committee now turns.

6.2.7.1 Arguments for population reduction

The Committee received numerous submissions and took evidence from many witnesses that the three subject species, and the Long-billed Corella in particular, had grown to 'plague proportions' in Victoria[255]. While not defined, this notion of a 'plague' reflects a widespread perception that there are too many birds causing unacceptable levels of damage. A selection of such statements demonstrates the nature of this viewpoint:

> These birds seem to have no predators and are breeding uncontrollably[256].
>
> ... the balance has been upset by no control in recent years[257].
>
> ... cockatoo flocks grow every year[258].
>
> ... in plague proportions ... the number of birds was well above their natural population and action was needed to reduce numbers[259].
>
> ... the key to tackling the problem of cockatoo damage is to reduce the number of birds to a manageable level[260].
>
> We agree wholeheartedly about exporting them, humanely killing them or poisoning them[261].
>
> The reduction in numbers is of the utmost importance[262].
>
> ... culling by shooting and poisoning ... is the only long term answer ... This would need to be done Statewide...[263].

Some 85 per cent of submissions received by the Environment and Natural Resources Committee, advocated population reduction as the principal solution to damage caused by birds (a number of submissions suggested more than one means of reducing numbers). By reducing bird numbers, it is suggested, the threat to agriculture, horticulture, silviculture, infrastructure, and the environment, and the attendant capital, labour and social costs, would be if not eliminated then at least made manageable. Proponents of this

argument directly link the number of birds with the amount of bird damage, and a reduction of bird numbers with a reduction in damage.

The Committee notes that this argument has been advocated at two different scales. Many witnesses and written submissions recommended that a general culling program be undertaken with the aim of reducing Long-billed Corella, Sulphur-crested Cockatoo and Galah numbers throughout the State. The actual proportion of a total species' population that would have to be reduced was rarely specified.

Other witnesses and written submissions advocating the need to reduce bird numbers suggested that any culling program should be targeted at specific districts and neighbourhoods. This position was motivated by the view that there was a need to reduce highly localised economic and social pressures exerted on individuals and districts by the birds. This was regarded as a method of removing specific and local flocks of birds, and of imposing population reduction in a location or neighbourhood where bird numbers were considered to be too high. Advocates of this view argued that the birds causing damage either had to be eliminated, or had to have sufficient of their number removed to break up those flocks causing damage.

Irrespective, however, of the scale of approach, the basic principle being expressed was that the solution to bird damage could be solved by population reduction.

6.2.7.2 Arguments against population reduction

The Committee does not wish to over-simplify debate on the merits of population reduction. However, it is helpful to regard arguments presented to the Committee against bird population reduction as falling into six closely related categories.

First, it has been claimed that the spread of grain cropping and other primary industry activities in Victoria has significantly altered the balance between birds and habitat that existed before European settlement. Environmental conditions were created that encouraged the growth and spread of some native birds to the extent that in many places they are now abundant and in

some places they are troublesome. Bird damage problems currently experienced by some Victorians are therefore claimed to be a result of environmental changes introduced by humans and not because of any alteration in the behaviour of cockatoos. The solution, according to proponents of this position, does not lie in population reduction but in rebalancing the environmental requirements of both humans and native wildlife.

Second, opponents of population reduction argue that perceptions of 'plagues' and of the need to reduce 'plague numbers' seem inevitably to lead to the conclusion that the only solution is to 'restore the balance' by population control. This is considered a 'knee-jerk' reaction that has no demonstrable economic or social justification. Opponents of lethal control argue that it has never been shown —

> that direct action on bird populations will result in proportionately reduced depredation levels[264].

Rather, it is suggested that

> Trapping and killing are used to try and solve a political problem. It looks a temptingly simple solution on the surface yet it has to come down to where there are virtually no birds left before every farmer is satisfied[265].

A third and closely related argument suggests that there is 'a poor link'[266] between population density and the amount of damage that farmers or a district might experience. Similarly, it cannot be assumed that population reduction in a region will directly result in reduced damage. This is because such a reduction in numbers is unlikely to affect basic behavioural patterns such as the tendency of the birds to congregate in flocks at favoured food sources. Consequently, population numbers may well be reduced, but surviving birds still have the potential to cause significant levels of damage.

A fourth argument relates to the response of bird populations to a reduction in numbers. Many population reduction techniques selectively remove young, naive birds, a high proportion of which are not in any case likely to survive to breeding age. Remaining birds often have larger clutch sizes and enhanced survival through reduced competition. The effect of even large-scale

reduction in bird numbers can be negated by these compensatory mechanisms so that potential for damage in the following season is unchanged.

A fifth, and again related argument, is that the principal focus of bird and farm management should be damage control. That should be the purpose. Simply to advocate lethal control does not directly address the primary needs of those suffering from bird depredations. Caughley and Sinclair have argued that

> Control operations must have clear objectives framed in terms of damage mitigation. Their success must be measured by how closely those objectives are met, not by the number of animals killed. The operations must be costed carefully to ensure that their benefit exceeds their cost. And their success or failure must be capable of independent verification[267].

It is therefore preferable to explore a full range of bird damage control measures, if necessary with government assistance and based on defensible measurements of cost efficiencies, rather than resort to extreme and economically unsustainable measures designed solely to kill birds.

Finally, the Committee notes the concerns of those people and organisations concerned with animal rights. Such advocates have argued strongly to the Committee that there is no justification under any circumstances for the lethal control of birds, particularly as lethal damage control techniques either have been shown to be ineffective or have not yet been adequately evaluated[268]. From their perspective, population reduction is indefensible.

6.2.7.3 Position of the Environment and Natural Resources Committee

The Environment and Natural Resources Committee finds that there is insufficient justification to support a Victoria-wide program of population reduction of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. Necessarily, any such program must be based on a clear understanding of the effects such a program might have. Current biological, environmental and economic knowledge does not permit the mechanics of such a program and, therefore, the likely outcome of such a program, to be clearly stated. The Committee observes that the absence of information both on actual population numbers of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, and on their reproduction and growth rates, combined with an inability to state

what proportion of the total population must be culled, is fundamental. Further, the lack of certainty that any generalised population reduction would directly assist those primary producers and others who suffer from bird damage must be acknowledged. The Committee considers that such uncertainty is sufficiently compelling to justify the rejection of wholesale population reduction in Victoria.

The Committee finds that some individual farmers' crops are severely damaged by cockatoos. The Committee further finds that Long-billed Corellas, Sulphur-crested Cockatoos and Galahs are not endangered species; the birds are currently abundant and have adequate food stocks to maintain their numbers. In such circumstances the Committee considers that there is sufficient justification for localised bird damage control programs that include targeting specific flocks. The purpose of such programs is to relieve the pressure placed on individual land holders by destroying some birds from these specific flocks. The Committee emphasises that such a strategy must not be interpreted as a series of focussed extermination programs that in total are designed to achieve widespread population reduction across Victoria. As noted in the paragraph above, the Committee rejects such a notion. It is instead to acknowledge that individuals can suffer, and equally to acknowledge a responsibility to provide relief to such individuals.

The Committee is therefore advocating local flock management as one part of a much wider program of integrated, mutually reinforcing bird damage control and farm management techniques that are designed to minimise damage, not as a strategy to achieve generalised population reduction. This position — bird damage control rather than population reduction — underlies the review of flock and population control methods to which the Committee now turns.

6.2.8 Shooting

6.2.8.1 Population reduction versus scaring

Shooting is the most commonly used means of trying to reduce pest bird populations. It is also one of the least effective. Experienced primary producers have repeatedly advised the Committee that cockatoos learn to avoid shooters[269]. They also emphasise the difficulties involved in actually

hitting individual birds much less killing sufficient numbers to reduce flock sizes meaningfully[270].

> They possess incredible judgement when it comes to getting out, and staying out, of the range of shotguns. They have us worked out. If my vehicle drives into the paddock, I do not have to even stop and they are gone. They must suspect that I am on to them[271].

Shooting is therefore costly in time, ammunition and fuel (Appendix D), and may increase damage levels in some crops (where birds may drop the fruit or Sunflower head they are feeding on when frightened off, then attack a new one on their return[272]). The Committee therefore finds that shooting is ultimately ineffective as a primary population reduction technique.

However, shooting to kill the occasional bird has value as a way of reinforcing the message presented by other measures in an integrated strategy, by showing the birds that there is real danger associated with the devices in use[273]. Used this way, shooting can be an effective scaring method, particularly when used in conjunction with other scaring techniques[274].

Shooting of birds by spotlight at roosts during the night has been seen by some as a way of reducing the numbers of birds in an area. Results vary, with remaining cockatoos often abandoning that roost for a time, or roosting in many small groups, thereby minimising the impact of such a strategy on the population[275]. The Committee finds, however, that shooting, including shooting at night, may be an effective way to manage or eliminate a small, localised flock of birds or cause them to move to another roost site [276].

Use of a high-powered rifle can further enhance a scaring strategy, by impressing cockatoos that they need to do more than just keep out of the range of a shotgun[277]. There are, however, understandable concerns in the community about the hazard this may pose to neighbours[278]. The Committee emphasises that the onus is always on a shooter to ensure that firearms are used in a way that will minimise risk to people, livestock and property. It does not favour the use of such weapons unless adequate precautions are taken.

The Committee therefore finds that while shooting is largely ineffective as a population control technique it is a necessary part of a scaring strategy.

6.2.8.2. Unprotected Wildlife

The Committee notes that, in Victoria, there are some 60 species of bird, 21 mammals and eight reptiles listed on the Schedule of Species for which an Authority to Control Wildlife may be issued by the Department of Conservation and Natural Resources . This schedule includes the Long-billed Corella, Sulphur-crested Cockatoo and Galah. An Authority to Control Wildlife permits the destruction of wildlife where damage is being caused to crops or property. About 2000 of these authorities are issued by the Department of Conservation and Natural Resources each year, with the majority being issued to permit the destruction of kangaroos (*Macropus* spp. and *Wallabia bicolor)*.

The Committee further notes that, while the Galah is currently protected throughout Victoria, Long-billed Corellas and Sulphur-crested Cockatoos are declared 'Unprotected Wildlife' under section 7A of the Wildlife Act in certain municipalities (see Chapter Three). This status enables land holders growing commercial crops in such municipalities to shoot or scare these cockatoos without requiring an Authority to Control Wildlife. A further advantage of this status is that shooting can be undertaken before damage has been caused and before large flocks build up on new crops.

One of the benefits of requiring land holders to apply for an Authority to Control Wildlife to permit the destruction of wildlife is that this provides the Department of Conservation and Natural Resources with information on the scale, location and frequency of problems caused by that wildlife. For example, some 35 of these authorities were issued during the period 1 March 1995 to 22 September 1995, to permit the destruction of a total of 1242 Galahs. This valuable information can be used, depending on resources and priorities, to direct research or extension work to those areas or problem situations. In the case of Long-billed Corellas and Sulphur-crested Cockatoos, their Unprotected Wildlife status in most of the municipalities where they cause problems means that this source of information is not available.

The Committee observes, therefore, that there does not appear to be any administrative or other practical reason why land holders who live in other municipalities and have similar problems caused by these cockatoos should be

required to obtain an Authority to Control Wildlife from the Department of Conservation and Natural Resources before they can legally destroy the birds. This is particularly so given that applications by commercial crop growers for such authorities are rarely rejected, and that, for the reasons outlined above, little information would be foregone. Therefore, to enable commercial crop growers throughout Victoria to react quickly to threats of cockatoo damage, and for administrative efficiency, the Committee finds that Long-billed Corellas, Sulphur-crested Cockatoos and Galahs – the last named species can cause considerable damage in some commercial crops[279] – should be declared Unprotected Wildlife throughout Victoria for the purpose of protecting commercial crops. The Committee emphasises that such 'Unprotected Wildlife' status, and the legal right to destroy these birds, is suggested only for the purposes of protecting commercial crop growing by land holders, their families and employees. It does not confer an indiscriminate lack of protection throughout Victoria. The Committee therefore recommends:

Recommendation 4

That the Minister for Natural Resources amend section 7A of the *Wildlife Act 1975* in order to declare the Long-billed Corella, Sulphur-crested Cockatoo and Galah Unprotected Wildlife for the purpose of commercial crop protection in Victoria, subject to the following conditions:

(a) destruction of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs should be by firearm only;

(b) destruction should be restricted to landowners and occupiers engaged in the rural production of commercial crops, their families and employees; and

(c) destruction should only take place on lands where such commercial crops are being grown.

6.2.9 Poisoning

In many countries the use of chemicals to kill birds is illegal or may only be undertaken under Government authority. Few chemicals have been developed specifically for use as bird killing agents (avicides). Many agricultural chemicals such as insecticides are lethal to birds, and have been used illegally to destroy birds. This may result in significant numbers of non-target species being destroyed, as was observed in 15 cases in Victoria in which prosecutions resulted[280]. Secondary poisoning of birds or mammals that eat carcasses may be a further problem.

6.2.9.1. Effectiveness and Implications of poison

The Committee observes that it is possible to kill large numbers of birds with a variety of poisons. There are, however, three significant problems associated with poisoning. Firstly, poisoning is not selective: many non-target species, including rare species, may be killed. Secondly, there is little evidence to show that poisoning is effective either in reducing damage or in reducing numbers other than in a localised area and for a short period.

> Large-scale poisoning was widely practised in the past but is not generally acceptable nowadays; it only ever provided a temporary palliative, skimming off the recent crop of young birds, most of which would probably have died anyway in a few months. Our efforts at reducing Galah numbers have not been noticeably successful[281].

Thirdly, the cost-effectiveness of poisoning is questionable.

Despite these comments, the perception remains that, because bird carcasses can be seen following poisoning, the method is effective. Few, if any, primary producers evaluate the effect of removal of some birds on subsequent damage levels. One witness, in support of poisoning of cockatoos, commented that House Mouse *Mus musculus* plagues are controlled by poisoning[282], yet it is instructive to examine the effects of poisoning mice with strychnine-treated grain during the 1994 mouse plague, when three of six sites in the Wimmera and two of four sites in the Mallee were poisoned:

> Strychnine was not effective in reducing the number of mice and did not reduce the level of damage to crops in the Mallee, but did reduce damage in the Wimmera. The cost-benefit analysis for the application of strychnine is not complete, but would

> indicate that it was too expensive for the small benefit realised in the Wimmera, and too expensive for no benefit in the Mallee[283].

It is clear that the perception that poisoning of mice had been effective, possibly based on observations of carcasses, or hearsay, was not supported by cost:benefit evaluation of the effect of poisoning on damage levels. Furthermore, even though this poisoning program was very strictly controlled by the Department of Conservation and Natural Resources in order to minimise non-target mortality, considerable non-target bird deaths were discovered[284].

In Victoria, the scale of illegal poisoning is difficult to determine, but one farmer from the Wimmera commented in 1990 that

> all farmers had tried poisoning – frustration leads to trying everything[285].

While this is no doubt an exaggeration, it does suggest that the practice was widespread[286].

Some poisoning continues, with non-target species being frequent victims.

> In fact quite often from investigations of poisonings by our office it has been found that the impact on the corella, the target species, has been minimal and the impact on other non-target species has been fairly significant[287].

Brolgas *Grus rubicundus*, listed as a rare species,[288] were killed in one poisoning incident in 1992[289]. The impact on non-target species was mentioned by a number of witnesses, usually as an objection to the adoption of poison as a non-specific control method.[290] A recent episode of illegal poisoning in the Timboon district near Warrnambool saw 80 ravens, 10 Magpies *Gymnorhina tibicen* and 'several' Galahs killed[291]. In contrast, several other witnesses commented that poisoning of cockatoos was quite selective, because no other birds feed with them[292]. Furthermore, a number of witnesses presenting evidence to the Committee during public hearings observed that poisoning often had the effect of making cockatoos depart from the paddock where the poison was laid, once a few birds were killed[293]. Numerous submissions and witnesses supported the adoption of poisoning, often recommending that it be under the control of the Department of Conservation and Natural Resources.

Various chemical methods have been used to reduce bird numbers in other parts of the world. These include DRC 1339, Avitrol, surfactants, toxic perches and alpha-chloralose.

6.2.9.2 DRC 1339

DRC 1339 is a bird poison, specifically developed for bird control by the United States Department of Agriculture's Denver Wildlife Research Center. It is a slow-acting poison, taking 1-3 days to kill birds. It does not cause distress symptoms, and has low toxicity to predatory birds[294]. Thallium sulfate (sic) and DRC 1339 ('Starlicide') have been used on baits in the USA, and killed millions of birds by baiting at cattle feedlots. A number of studies reported on these poisoning episodes, but no cost:benefit evaluations were presented[295]. DRC 1339 is currently registered in the USA for the control of blackbirds and starlings at feedlots; gulls near seabird colonies; crows and ravens preying on livestock; and pigeons in and near structures[296]. If a poison were to be considered for use in Victoria against cockatoos, this one would have the benefit of having been designed for bird control, and could be considered relatively humane. However, the issue of non-target species taking baits is problematic. The Committee notes the relatively low risk of secondary poisoning of raptors characteristic of this toxicant but because of the risk of poisoning non-target birds, and immeasurability of the effects (1-3 days to death), rejects DRC 1339 as a potential cockatoo control agent.

6.2.9.3 Avitrol®

Another chemical used to control bird damage is 4-aminopyridine, sold as Avitrol®. This acts by causing distress to birds affected. Their distress cries and aerial distress displays alarm other birds and assist in scaring. With some kinds of birds, it is necessary to administer a lethal dose to produce distress behaviour. It is used in the USA, mainly for control of blackbirds and starlings. While use of this chemical to protect Maize has reduced damage by up to 70%[297], there is some debate about its effectiveness in bringing about long-term reductions in bird problems at cattle feedlots[298].

This chemical is registered in Australia for use on Silver Gulls, and for the control of some exotic species under the proprietary name 'Scatterbird'. It is not regarded as humane, and is unlikely to be registered for use on cockatoos

or other native birds for this reason. Its use in the field for cockatoo control would, in any case, be problematic, since it would be difficult to prevent non-target species being affected, as is the case when other chemicals are used to control cockatoo numbers.

6.2.9.4 Surfactants

A further chemical approach to the destruction of birds has involved spraying birds that roost communally with a toxicant or a surfactant (wetting agent). Large numbers of birds have been killed by these means (up to one billion Red-billed Queleas *Quelea quelea* annually in Africa), but usually there is little long-term impact on bird populations. It is common for damage levels not to be evaluated either before or after such operations. Cost:benefit analyses cannot therefore be undertaken. These methods have been used in the USA, France and various African countries. Unknown environmental impacts, considerable costs and little or unknown impact on damage levels suggest that this method requires further investigation[299].

Spraying of communal roosts has not been used in Australia as a means of reducing the numbers of any species of bird.

6.2.9.5 Toxic perches

Toxic perches provide another avenue for the destruction of birds. With this technique, perching areas inside buildings are coated with a grease containing a toxicant which is absorbed through the skin of the birds' feet. A variation of the method is to provide perches covered in a material connected to a reservoir of poison. The material acts as a wick and, again, the birds absorb the chemical through their feet. While the former method is registered for use in Australia, the Committee notes that toxic perches are neither appropriate for outdoor situations nor for cockatoo control[300].

6.2.9.6 Penalties for poisoning

A number of witnesses appearing before the Committee have emphasised the frustration caused by bird depredations, and how that frustration, unless relieved, may well lead some farmers to 'take matters into their own hands' and use poison. Indeed, both confirmed and unconfirmed reports of illegal

poisoning have been conveyed to the Committee. The Committee absolutely opposes the illegal, uncontrolled use of poison. The non-selective nature of most poisoning methods for bird control and the well-documented effects of illegal poisoning on non-target species of wildlife in Victoria represent significant threats to Victorian wildlife. As a result, the Committee recommends:

Recommendation 5

That the Minister for Natural Resources amend section 54 of the *Wildlife Act 1975* in order to increase the penalty for illegal poisoning of wildlife from 50 penalty units and six months imprisonment to 100 penalty units and six months imprisonment.

The Committee notes that at the time of adopting this Report, penalty units are valued at $100 each.

6.2.10 Alpha-chloralose

Alpha-chloralose is a narcotic agent that, depending upon the dose administered, is used for the capture or destruction of birds. An advantage of the use of this substance is that it provides the opportunity for non-target species to be revived.

Rapid replacement of birds removed, combined with the effort involved in collecting birds stupefied during a starling control operation in Britain, led to the conclusion that the method was unsatisfactory[301]. A similar conclusion was reached following an attempt to control Little Corellas with alpha-chloralose administered in water, in the Flinders Ranges[302]. A further disadvantage of this chemical is the relatively long time until birds are completely immobilised. This may be 20-50 minutes in the Feral Pigeon, 20-25 minutes in House Sparrows and Rooks, 12-60 minutes in the Little Corella and 15-30 minutes in Silver Gulls[303]. In spite of these limitations, alpha-chloralose is recommended for the lethal control of a number of bird species in New

Zealand. An overdose, combined with some shooting, is recommended for lethal control, or a lower dose sufficient to capture birds may be used[304].

The Committee notes that, in spite of some difficulties experienced with the use of this substance, it does offer a significant potential chemical alternative to trapping and gassing birds for localised flock control where land holders perceive that they have a large and urgent problem caused by cockatoos. This drug has the great advantage over other, illegal chemical control methods, in that it offers the possibility of greatly reducing the problem of non-target species being killed either directly or by secondary poisoning. The Committee believes that its use for cockatoo control should be investigated as a matter of urgency. In particular, the Department of Conservation and Natural Resources should liaise with Landcare Research, New Zealand, regarding its use. The Committee therefore recommends:

Recommendation 6

That the Department of Conservation and Natural Resources investigate and report on the viability of alpha-chloralose for the humane capture of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs within 12 months of this Report being tabled.

The Committee finds that if appropriate dosage levels can be established to enable cockatoos to be quickly and humanely captured, alpha-chloralose should then be used in Victoria as a humane method of capturing birds for the purpose of specific flock reduction. The Committee observes that field assessments of the practicality of using alpha-chloralose, and of the effect that removing birds has on damage levels (Recommendation 9), could be conducted as part of wider demonstrations of bird damage control measures proposed later in this Chapter in Recommendation 14. Availability of the technique should not be dependent upon the results of these assessments. Rather, the assessments should be an integral part of the practical application of the method. However, the Committee emphasises that, for the reasons noted in 6.1.2, priority for access to alpha-chloralose should be given to land

holders involved in cooperative, integrated cockatoo damage control programs. The Committee therefore recommends:

Recommendation 7

Provided Department of Conservation and Natural Resources' investigations establish the viability of alpha-chloralose for the humane capture of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, that the Department permit the use of alpha-chloralose subject to the following conditions:

(a) land holders must apply to the Department of Conservation and Natural Resources for approval to use alpha-chloralose;

(b) baits treated with alpha-chloralose should be supplied to land holders, at cost;

(c) there be stringent Departmental guidelines and conditions for its use;

(d) the Department should provide instruction in the use of alpha-chloralose, and in disease control;

(e) land holders should be responsible for providing their own protective equipment to reduce the risk of contracting diseases, particularly chlamydiosis, from the birds being handled;

(f) treated bait should not be stored by private persons under any circumstances outside the conditions of permit;

(g) surplus or uneaten bait either should be burned under Departmental supervision or returned to Departmental staff; and

Continued next page

Recommendation 7 continued

(h) **because assessment should be an integral part of the practical application of the method, the Department should give priority for access to alpha-chloralose to land holders involved in cooperative, integrated cockatoo damage control programs.**

The Committee advocates the continued search for other non-residual intoxicants. In principle, any such chemicals should be environmentally benign; enable the humane capture of birds; and permit the resuscitation of non-target birds.

6.2.11 Fertility control

Fertility control is regarded by some as an ideal technique of population control, since it does not rely on killing animals. However, there are many difficulties with the method. As with most other damage control techniques, fertility control would need to be combined with other methods: it is not a panacea[305]. In some bird species breeding is regulated by dominant individuals. Where this is not the case, the difficulty of treating all potential breeding birds is increased, and even in short-lived species, fertility control is less likely to reduce populations. In long-lived bird species, this difficulty is compounded, because birds have many more opportunities to breed[306]. Further, in long-lived species, there is a lengthy time lag between initiating fertility controls and subsequent decline in numbers, simply because of the extended life span of individuals.

While the use of hormones and hormone analogues shows promise for controlling fertility in male birds in cage trials in Canada, research in this area is in an embryonic state[307], and may prove to be misdirected, since

> Sterilants that affect males only are not likely to be effective for reducing breeding success to a level that achieves population control. Therefore research should be directed at techniques to produce female rather than male sterility[308].

Having a technique that targets females is only the first step. Other factors may render the method ineffective for large-scale or field use. For example, the chemical Ornitrol was designed to produce temporary sterility in female birds by affecting embryo formation. Target birds must feed almost exclusively on Ornitrol for 10 days, at a cost of $1.00/bird/day[309], to achieve an effective dose, which then provides sterility for six months. Cost is commonly a significant factor in fertility control:

> Although technology for fertility control does exist for some pest species, its implementation can be prohibitively expensive. Usually for pest populations it is desirable to manage density at a level that is most cost-effective when the cost of control, the cost of damage, and discount rates are taken into account. None of the available techniques for fertility control have been demonstrated to be cost-effective for reducing pest density[310].

Assessment of cost-effectiveness requires a fuller knowledge of the costs of cockatoo damage and control measures than is currently the case. The Committee therefore finds that at this time there are no agents that could be used in the field to achieve an effective level of fertility control in cockatoos, were this to be considered a desirable goal.

6.2.12 Trapping

There is a perception that trapping and removal of cockatoos (whether for sale, destruction or other use is not relevant) will be simple and will enable large numbers of birds to be removed. A further motivation is the belief that big flocks will be split up by this operation, thereby spreading damage. In practice, trapping and removal of birds is both time consuming and expensive, and may not create any splitting of large flocks:

> It is not an easy task to trap large numbers of birds but it is expensive. It costs between $3000 and $4000 just to set up a trap. It is then necessary to service the traps and one person can service at the most only two or three traps[311].

There is a perception amongst some land holders that trapping has little success; that mostly young birds are caught; and that birds get very suspicious of the trapping area and increasingly difficult to capture[312]. This is not always the case. At one site on a property near Edenhope, for example, some 2400 Long-billed Corellas were attracted to grain provided at the trap site, trapped in remotely-operated nets, and destroyed over a period of several weeks. Numbers of birds returned frequently to the site, with no apparent suspicion,

following each trapping event. Furthermore, there was no splitting of the flock as a result of the trapping. It is unfortunate that no evaluation of damage levels was undertaken either before or after the trapping[313]. This means that it is not possible to evaluate any possible impact that the trapping might have had on damage levels.

There are situations where large numbers of birds have been captured, and in one case in Israel, where effects on damage were examined, it was shown to be cost-effective. In California, another example demonstrated cost-effectiveness where trapping was combined with poisoning[314].

6.2.12.1 Parlour trapping

One trapping method where captive birds are confined in the trap to attract wild birds is called Parlour Trapping. This method has been used in orchards in Western Australia. Problems with maintaining birds alive in the traps, welfare issues and the labour required to monitor and service the traps made this method impractical[315].

Trapping of cockatoos appears to enjoy variable success. There is no doubt that, in some cases, large numbers of birds can be captured, but whether this reduces damage levels, or is cost-effective, is yet to be determined. There is likely to be some psychological satisfaction to be gained by some growers in seeing birds trapped and killed, but this alone should not be used as justification for a procedure of uncertain practical value. Trapping does, however, enable large numbers of birds to be caught and removed in some way. The Committee therefore observes that trapping currently offers the only viable method of removing large numbers of birds from specific flocks in a short period, and therefore may be valuable in dealing with severe, localised problems.

The Committee now turns to the question of how best to deal with the trapped birds, and warns of potential disease risks inherent in handling wild birds.

6.2.12.2 Trapping and human health

There is a human health risk involved in trapping and handling wild birds[316]. Wild, apparently healthy birds can be symptomless carriers of the disease

ornithosis (also called psittacosis), a potentially dangerous respiratory disease in humans, caused by the bacterium *Chlamydia psittaci*. In birds, inhalation of the bacteria favours the development of acute infections, whereas ingestion of bacteria leads to latent infections[317]. Infection in humans trapping and handling cockatoos is most likely to be through inhalation.

Four officers handling a shipment of Australian Ringnecks *Barnardius zonarius semitorquatus* in 1990 contracted this disease[318], and a researcher handling wild Little Corellas in South Australia contracted the disease more recently[319].

The Committee emphasises that, if wild birds are being handled, masks should be worn to inhibit the inhalation of feather dust, and clothes and hands should be washed after contact with these birds. Warnings of the potential danger of this disease were recorded as early as 1939:

> The occurrence of deaths from psittacosis amongst wild birds is at least to be taken as another warning of the potential danger to human health of the trade in parrots and cockatoos and provides a strong argument for its total prohibition[320].

6.2.12.3 Trapping and export

Commercial bird trappers have a vested interest in creating a political environment in which trapping for export is permitted. Land holders have been encouraged by the belief that they will gain financially and see bird numbers reduced to levels where damage is not an economic concern. These sentiments were expressed in some of the 25 submissions to the Inquiry supporting trapping and export.

Conversely the merits of trapping and export have been questioned:

> Bird-trappers like to pretend they can solve all the farmer's problems by catching his pests and selling them as pets to defray the costs. Unfortunately no animal trapper has ever solved a pest problem – they always give up when it gets too hard, leaving the farmer with an even more wary pest. And wild-caught birds make very bitey pets![321]

Indeed, it has been suggested that:

> Export would mostly only provide temporary relief and would do little to alleviate long term pest problems. It would not address the underlying problem of trying to grow crops in favourable habitat of native birds.

and

> Governments are rightly reluctant to set up the costly infrastructure to administer such a program. The only people likely to benefit would be a small group of dealers[322].

The Committee has considered the issue of export and concludes that export would not address the scale of problems caused by cockatoos. The Committee also notes that there is a Federal Government ban on the export of wild-caught native birds. Finally, the Committee observes that an independent ACIL investigation into the export potential of Australian wildlife specifically recommends against the export of wild-bred birds and recommends against regarding the export of wild-bred native birds as a pest control measure[323]. Under these circumstances, export is not considered a viable solution for the disposal of trapped wild birds.

6.2.12.4 Trapping for the local pet trade

There are currently 11 commercial wildlife trappers authorised by the Department of Conservation and Natural Resources to trap Long-billed Corellas, Sulphur-crested Cockatoos and Galahs for the local pet trade. These birds may be trapped in two situations: where there is a current Authority to Control Wildlife for one or more of these species; and in areas where the Long-billed Corella and Sulphur-crested Cockatoo are declared Unprotected Wildlife.

Information on numbers trapped is limited. For example, for the period 31 March to 30 June 1995, 93 Long-billed Corellas, 516 Sulphur-crested Cockatoos and 250 Galahs were reported to have been trapped. It is estimated that these figures represent some 70% of the numbers likely to have been captured over this period.[324] The database held by the Department of Conservation and Natural Resources does not indicate how many of these birds may have entered the pet trade. However, the Committee notes that the numbers trapped are not likely to have a significant impact on the size of flocks or on damage levels, and concludes that this method is not therefore a worthwhile means of controlling damage by these cockatoos.

6.2.12.5 Trapping and gassing

The Committee observes that five years of direct Department of Conservation and Natural Resources field experience has shown that an effective and humane technique for removing cockatoos causing damage in Victoria has been by trapping (Plates 12 and 13) and gassing the captured birds. Trapped birds are removed from the nets and placed in a drum of carbon dioxide. This causes rapid death and is considered the most humane method of killing birds. The Committee notes that the RSPCA endorses this method of destroying these cockatoos[325]. The Committee further notes that the use of alpha-chloralose – if proven viable – would permit unconscious birds to be placed in the drum of carbon dioxide, removing any possible source of stress to the birds.

In the interim, the Committee endorses the continued use of trapping and gassing as a method of reducing the size of specific flocks demonstrated to be causing severe, localised damage. The Committee therefore recommends that, subject to two stipulations, the Department of Conservation and Natural Resources use trapping and gassing as a means of providing relief to land holders subject to bird damage caused by large numbers of cockatoos. The stipulations emphasised by the Committee are:

1. that the use of Departmental traps should be on a user-pays basis; and

2. that the Department of Conservation and Natural Resources, in conjunction with the Department of Agriculture, Energy and Minerals, should assess and document the impact on damage levels, if any, of trapping and removal of birds.

The question of payment by land holders for the use of government equipment and services is not new. It is well-established practice that the Department of Conservation and Natural Resources charges land holders and Landcare Groups for the use of rabbit fumigators and certain other rabbit control equipment and spray units. Current charges for a rabbit fumigator are $20 per day to an individual farmer, or $10 per day to a member of a Landcare

PLATE 12
Bird trap being operated, Laharum, March 1993 *(Photograph: Ian Temby).*

PLATE 13
Bird trap in sprung position, Laharum, March 1993 *(Photograph: Ian Temby).*

Group, at least in the north-west of the State. The income is placed in a trust fund and used for maintenance or replacement of the equipment[326] . Where safety equipment is required for the safe operation of the equipment, that is provided by land holders at their expense.

It is often claimed that governments should pay for, or contribute to, the cost of resolving problems caused by native wildlife, since governments protect these species. Yet the Committee observes that considerable public funds are invested in developing solutions to problems caused by wildlife. For example, many thousands of dollars were spent on research into the biology and behaviour of the Long-billed Corella during the 1980s.[327] Further investigations of potential repellents and of trapping and gassing techniques were and continue to be undertaken with public funds. The Department of Conservation and Natural Resources has constructed and maintains six sets of trapping and gassing equipment for use by the farming community.

The Committee notes that other species of wildlife that cause problems to land holders, such as kangaroos, are controlled at the land holders' own expense. Apart from cockatoos, the only species of wildlife in Victoria to be declared Unprotected Wildlife in certain areas is the Common Wombat *Vombatus ursinus*. Any control of this species is undertaken entirely at the expense of the land holders who perceive that they have a problem caused by this species.

There is thus little distinction between the treatment of fungous diseases, insect pests or other pest problems, and the problems caused by wildlife, except that an Authority to Control Wildlife is required before wildlife can legally be destroyed. Apart from that restriction, the onus is on land holders in all such cases to bear the cost of controlling the problems being caused to their enterprises. It is also consistent with current practice that land holders pay for the use of equipment owned by the government.

The Committee therefore considers that land holders who believe that they have an immediate problem caused by Long-billed Corellas, Sulphur-crested Cockatoos or Galahs should be able to hire the necessary trapping and gassing equipment from the Department of Conservation and Natural Resources. Charges imposed by the Department should include hire costs for equipment

rental and gas use. The Committee emphasises that , for the reasons noted in 6.1.2, priority for access to trapping and gassing equipment should be given to land holders involved in cooperative, integrated cockatoo damage control programs. The Committee therefore recommends:

Recommendation 8

That the Department of Conservation and Natural Resources make available trapping and gassing equipment to land holders on a user-pays, hire basis, subject to the following conditions:

(a) hire charges should be $20 per day for private land holders and $10 per day for members of Landcare Groups;

(b) the Department should provide instruction in the safe operation of the equipment, and in disease control;

(c) land holders should be responsible for providing their own protective equipment to reduce the risk of contracting diseases, particularly chlamydiosis, from the birds being handled;

(d) because assessment should be an integral part of the practical application of the method, the Department should give priority for access to trapping and gassing equipment to land holders involved in cooperative, integrated cockatoo damage control programs;

(e) at least two sets of this equipment should be available in the north-east of Victoria; and

(f) land holders should be required to return gas cylinders to the Department in a refilled state.

Recommendation 9

That the Minister for Natural Resources confer with the Minister for Agriculture in order to establish a program in which their departments assess and document the impact on damage levels of the removal of large numbers of Long-billed Corellas, Sulphur-crested Cockatoos or Galahs as a damage control measure by trapping and gassing or other means.

The Committee again observes that the assessment program outlined in Recommendation 9 could be conducted as part of wider demonstrations of bird damage control measures proposed later in this Chapter in Recommendation 14. Assessment of such techniques should be concurrent with their use in other areas, as required.

The Committee further notes that trapping and gassing is currently facilitated by the Department of Conservation and Natural Resources, free of charge. Charges and monitoring introduced by Recommendations 8 and 9 are progressive moves, in that accountability will now be an integral aspect of the use of this equipment. Use of this measure at current levels will not compromise the viability of any of the three cockatoo species, thus satisfying one of the requirements of Term of Reference (c).

6.2.13 Destruction of eggs

Destruction of eggs is undertaken to control the numbers of some colonial, ground-nesting birds, where nests are readily found and accessible, and where repeat visits can be made to destroy subsequent clutches of eggs laid in response to the initial visit. Even in these ideal conditions, it is difficult to prevent sufficient reproduction for a population to maintain itself[328]. Re-laying may be inhibited by spraying the eggs in the nest with an oil to render them infertile. Many birds will continue to incubate such eggs until it is too late in the season to re-lay. Unless there is a likelihood of being able to destroy a very high percentage of all eggs laid in an area, there is little prospect of egg destruction achieving any reduction in the population, since removal or

destruction of eggs is attacking the birds at the least vulnerable stage of the life cycle.

With cockatoos, none of the requirements to make this a feasible option can be met. Nests are often inaccessible, and may be widely spaced. Galahs, at least, are able to lay a replacement clutch of eggs if the first clutch is lost[329]. Only a very small proportion of all eggs laid is needed to survive, so not treating just a few nests may negate the exercise. With a proportion of cockatoo nests that are accessible, special climbing techniques would be required. In long-lived species such as these cockatoos, destruction of all eggs in an area would have to be repeated for many years before there was any noticeable decline in the number of adult birds.

The Committee therefore concludes that this cannot be considered a practical means of controlling cockatoo populations.

6.3 FARM MANAGEMENT

Bird damage control measures can be further supplemented by farm management techniques designed to discourage bird damage. The Committee now summarises a number of farm management techniques that will repay appropriate application. These include habitat manipulation, plant breeding, crop substitution, and exclusion measures. A summary of these measures, and of the Committee's response to them, may be found in Table 4.

6.3.1 Habitat manipulation

Habitat manipulation encompasses a number of possible strategies designed to modify the birds' use of an area. These include modifying roosting areas; altering the crop environment by providing visual barriers around the crop; enhancing the attraction of other areas in the vicinity and reducing the attraction of the crop to be protected.

6.3.1.1 Roost site modification

Roost site modification is achieved in the USA by the use of herbicides to

Table 4
Summary of farm management strategies examined in Section 6.3

SECTION	TECHNIQUE	SUPPORT NO	SUPPORT YES	COMMENT	OUTCOME
6.3.1	Habitat manipulation			Effective in some situations	
	• roost site modification	X		Impractical	
	• decoy food sources		X	Part of an integrated strategy	REC 10
	• visual screening		X	Effective in some situations	REC 12
6.3.2	Plant breeding		X	Effective in some situations	REC 13
6.3.3	Crop substitution		X	Primary producers to assess	
6.3.4	Exclusion		X	Effective in some situations	
	• throw over nets		X	Effective in some situations	
	• permanent netting		X	Effective in some situations	

remove emergent vegetation in wetlands where vast numbers of blackbirds (a collective term for several pest species, including Red-winged Blackbirds and European Starlings) roost. This causes many of the birds to roost elsewhere, including away from vulnerable crops[330]. Control of wetland vegetation is now being combined with growing Bamboo *Bambusa* spp. as alternative roost sites, to manipulate where the birds roost[331]. Tree thinning or total removal has been suggested as a way of making large areas of farmland less attractive to birds[332].

Removal of roosting vegetation is environmentally untenable for cockatoo control, and given that this would involve tree removal on a large scale, would not be economically feasible. Roost sites can be made unattractive to cockatoos, however. Proposals for manipulating Little Corella use of roost trees in the Flinders Ranges included managing access to water and feed, combined with a scaring campaign[333]. While this may be effective in dry country, with few, concentrated water and feed sources, such conditions do not apply in Victoria where cockatoos cause problems.

The Committee therefore finds that roost site modification is an essentially impractical solution in Victorian conditions.

6.3.1.2 Decoy food sources

The Committee is aware of the common perception that the provision of an alternative food source for cockatoos to divert them from crops will inevitably

lead to an increase in numbers, either through enhanced survival (increased breeding success) or by drawing birds in from surrounding areas[334]. Indeed, the Committee notes that a number of authors, when recommending the provision of alternative foods, have warned that this strategy should only be undertaken if there is sound knowledge of the target species. Further, they stress that if such food is provided at a time of year when food is not a limiting factor to the population, there can be no effect on population size. Finally, it must be observed that when food is not limiting the population, provision of extra food will not attract birds from other areas[335]. The basis for recommending this strategy is neatly expressed by a British farmer:

> They are there because they are hungry and if we chase them around by scaring them they will go to our neighbours. Should we be looking for a cheap means of feeding them to keep them off an expensive crop rather than an expensive means of chasing them off our farm onto the next farm?[336]

In Victoria, enough is known about the diets and biology of the three species of cockatoos to be certain that provision of extra food at cereal crop sowing time, in autumn and winter, will not lead to an increase in population numbers.

There are many examples of the successful use of decoy or lure crops (crops grown or bought from farmers for the birds) and bait stations or feeding stations. Lure crops have been used in the USA for many years:

> As early as 1944 lure-crops were used in parts of California. In one instance, 323 ha (800 acres) of leased land were planted to rice and subsequently used by an estimated 1 million ducks: the result was excellent protection to surrounding commercial rice fields[337].

In North Dakota,

> ...lure-crop plantings of barley and wheat, mostly averaging 12 ha, were highly effective in several areas where complaints were highest, and produced an overall positive benefit to cost ratio of at least 2:1[338].

Up to 200 000 blackbirds used decoy Sunflower crops rather than feed on commercial crops, with an average cost:benefit ratio over three years of 1: 3.7[339].

Positive results were obtained when bait stations were established for waterfowl:

> In the rice growing areas of the San Joaquin Valley, 41-54 t (45-60 tons) of barley were distributed annually to keep ducks, mostly American widgeons (*Anas americana*), from commercial rice fields. The results were impressive. Difficulties in driving ducks from commercial fields diminished after the program was initiated; birds began to learn the locations of the undisturbed baited areas[340].

In New Zealand, Silvereyes were successfully diverted from Kiwi Fruit *Actinidia deliciosa* crops to honey-troughs placed for that purpose, and Grapes in that country were protected from House Sparrows simply by scattering stale bread over nearby rough ground [341]. In an analogous situation in British Columbia, Red Squirrels *Tamiasciurus hudsonicus* can be deterred from feeding on the stems of young Lodgepole Pine *Pinus contorta* trees by aerial spreading of Sunflower seeds over the forests; squirrels prefer the alternative food source over the pines[342].

Several species of geese in Britain have increased in number and modified their diet to include managed pastures and winter cereal crops, where flocks of several thousand birds can cause serious economic damage. Scaring is costly and habituation difficult to prevent. It has been found that provision of alternative feeding areas (refuge areas) can minimise conflict with agricultural interests[343] and that

> There are, however, no satisfactory means of preventing damage unless refuges or alternative feeding areas are available where the birds can feed unmolested[344].

It is relevant to note further that, in Britain,

> The relatively small area of agricultural land required to alleviate the current situation to a large extent makes the creation of a refuge system not only the most effective but also the cheapest system of solving the problem in the long term[345].

The challenge now (in Britain) is to encourage the local farming community to take up the idea[346].

In discussing problems caused by ducks on Rice fields in New South Wales, emphasis was placed on the need for evaluation of diversionary feeding programs, particularly in light of the success of such programs in North America[347].

In a trial of decoy feeding in South Australia in 1989, up to 4000 Long-billed Corellas were fed 20 tonnes of Oats over a ten-week period, while the main seeding and germination phase of winter cereals was completed. Taking into account the value of the grain, wages and on-costs, there was estimated to be a 10 to 15-fold benefit. This accounting did not consider the lower costs to farmers of the reduced scaring effort required at their crops or the extra time available for other tasks[348].

There are examples from Victoria which demonstrate that cockatoos can be attracted to a low-cost, alternative food source in large numbers, as the following evidence presented to the Committee at public hearings in Wangaratta indicates :

> ...rice hulls have been put in the paddocks, and I have seen many thousands of corellas and cockatoos there[349].

and that the use of such a site by these birds can reduce damage to a cereal crop:

> This year they (cockatoos) were not so bad because rice hulls were dumped over the river[350].

Indeed, the Victorian Department of Agriculture, Energy and Minerals advocates:

> tactically boosting feed supplies to decoy birds away from crops at risk[351].

Almond skins and fragments, a by-product of Almond processing, were used as a free source of decoy food, and placed some two kilometres from a 500 acre Almond crop in north-west Victoria to lure 'crows', Galahs and Sulphur-crested Cockatoos from the crop. A single shooter was employed full time for three months during ripening to reduce the crop's attraction. This program was highly successful, with $20 000 more being spent on scaring in years before the decoy was used. During the eight months following harvest, birds (especially crows) are wanted in the orchard to eat unharvested Almonds that harbour pest insects, particularly the Carob Moth *Ectomyelois ceratoniae* (Pyralidae), a potentially serious pest of Almonds. Offal obtained from the local abattoir was used to lure crows back into the orchard post-harvest. The

next-door property, also a large Almond orchard, employs five shooters and an aircraft to keep 'crows' and Galahs away[352], at far greater cost.

These examples show the savings that can arise from manipulating the behaviour of birds by the provision of food. The Committee considers that the provision of decoy food at crop germinating time therefore represents, in conjunction with other bird damage control and farm management techniques, an important measure that has been shown to be successful.

Given the success of this measure elsewhere, and the understandable reluctance of some growers to provide food for birds seen as pests, the Committee recommends:

Recommendation 10

That the Department of Conservation and Natural Resources coordinate demonstrations of decoy feeding of cockatoos at cereal crop-sowing time under the following conditions:

(a) that the Department of Conservation and Natural Resources donate decoy food for demonstration purposes;

(b) that growers donate the labour required and undertake to scare birds from their own crops for the duration of the demonstration;

(c) that the birds are not disturbed at the decoy food sites;

(d) that full costing of labour and materials be compiled, together with the effects, if any, on damage levels and frequency of birds feeding in crops; and

(e) that demonstrations be organised with Landcare groups or groups of cooperating growers.

In contrast, there are situations where provision of food has resulted in significant damage problems. While this further illustrates that cockatoos – in this case Sulphur-crested Cockatoos – can be attracted habitually to a food source provided for them, this is not always desirable. Soft timber window and door frames, in particular those made of western red cedar, are attacked and sometimes severely damaged by cockatoos engaged in beak maintenance chewing, after having fed at a source of food provided in somebody's back yard.

In these situations assistance should be available to house holders to prevent further damage being caused. This should comprise a graded strategy, starting with extension and education material designed to alert persons feeding birds of some of the undesirable consequences of their well-intentioned actions. The next stage should comprise direct requests to these persons to cease providing food, referring to the consequent damage being caused to neighbouring properties. If these measures fail, then there should be a legal mechanism to prohibit further food being provided for the birds in cases where such damage is being caused. This is consistent with the intent of section 7 of the Wildlife Act, which provides a mechanism for the reduction of damage caused by wildlife, in that case through the destruction of wildlife (see Chapter Three). The Committee therefore recommends:

Recommendation 11

That the Minister for Natural Resources amend section 87 of the *Wildlife Act 1975* in order to prohibit or regulate the recreational feeding of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs when this action directly or indirectly leads cockatoos to cause damage to property or to the environment, or which could contribute to the spread of disease amongst wildlife.

The prohibition of feeding should be invoked only if the first two parts of the strategy referred to above have failed to resolve the issue. The existence of this mechanism should, in itself, assist with resolving many such cases without the provision having to be used.

6.3.1.3 Visual screening

Sunflower crops appear to be a highly attractive food source which coincides with the annual increase in cockatoo populations[353]. The Committee has been advised that many Victorian growers, having had bird problems with this crop, or relying on anecdotal evidence of these problems, will not grow Sunflowers. Yet there are measures available that can reduce damage to low levels by manipulation of the crop environment.

Visual screens are barriers placed around a crop and as transects through it to block the birds' ability to see out of the crop. Studies in New South Wales have shown that birds will concentrate their feeding in areas which provide the best position for surveying the approach of predators, chiefly birds of prey and humans. The Committee notes that at a public hearing, one witness (a farmer) reported that when feeding, cockatoos —

> ... like to be able to see all around them[354].

For this reason, areas of ripening crop — not just Sunflowers but grain crops — are typically attacked along the edges and on the high ground within a crop. If visibility within these areas is reduced, the birds will be unable to see the approach of predators, and the attraction of the crop as a feeding site will be reduced[355]. Trials have demonstrated that by manipulating the visibility of feeding birds, Sunflower crops can indeed be made unattractive to cockatoos[356].

Screens of tall, forage Sorghum *Sorghum bicolor* reduced bird damage significantly in trials comparing screened and unscreened Sunflower crops at a number of sites over two growing seasons in northern New South Wales. Sorghum screens are thought likely to enhance Sunflower production because of increased soil moisture retention caused by the Sorghum reducing the evaporation rate. An additional benefit arising from screened crops was reduced overall damage to the crop, not just to the susceptible areas, because the birds appeared insecure and readily disturbed by traditional scaring measures (shooting), when they would fly off as a single, tight flock. This contrasts with flocks disturbed in unscreened crops which fragment, but continue to feed. Labour and ammunition costs are reduced, and trials suggest that screening can be up to 300% more cost-effective than conventional controls[357].

In a further demonstration that screening can be effective in some situations, a hessian screen was erected around a valuable 1.4 ha Wheat trial crop. This was combined with the construction of two 15 m long, three-strand wire perches 50 m from the crop, where Wheat grain was scattered on the ground. The Wheat crop sustained no bird damage although it had been unharvestable due to Galah damage in an earlier trial without screens [358].

These examples are not intended to suggest that this measure is a panacea but simply to demonstrate that the technique can be very cost-effective in some situations. Although the method has been ridiculed by growers in Victoria[359], the Committee has no evidence that it has been attempted seriously, if at all, in this State. The Committee fully recognises that crop screening, in conjunction with other scaring and management strategies, will only work in certain circumstances and under certain conditions. The Committee urges farmers to keep an open mind and consider ways in which the method could be adapted to protect some Victorian crops. The Committee therefore recommends that:

Recommendation 12

That the Department of Agriculture, Energy and Minerals investigate potential screen plants suitable for the protection of Sunflower and Safflower crops, and other crops where appropriate.

6.3.2 Plant breeding

Birds often show clear preferences for certain cultivars of a particular crop. An ideal long-term means of reducing damage to crops is to breed cultivars that are resistant to bird damage. Resistance may be based on physical features, such as the length of awns on cereal seeds; chemical attributes like tannin or other chemical content; or colour. Deterrence by such non-preferred cultivars is most marked when alternative foods are available and the deterrence usually declines if other foods are lacking[360]. Fortunately, in Victoria, other foods are usually available for cockatoos, thereby increasing the potential of this approach. Bird resistant cultivars often suffer from low yield or reduced acceptance by humans, negating the benefits of reduced bird

damage. Further, it is estimated that to develop a hybrid variety of Sunflower, Maize or Sorghum may take 10 years[361].

A great deal of research has gone into developing bird-resistant Maize cultivars to reduce damage by Red-winged Blackbirds in the USA, with some encouraging results[362]. However, since the number of farmers affected by economically significant bird damage is proportionately small both here and in the USA, it seems unlikely that commercial seed companies or agricultural research stations would be prepared to invest resources in development of bird resistant varieties. A compromise suggested in the USA was to select characteristics likely to confer resistance to bird damage from some 299 existing commercial cultivars. On this basis, a number of relatively resistant cultivars can be recommended to growers in areas where blackbird damage is likely, without the cost and lead time required to breed such characteristics[363]. Investigation of the susceptibility of crop varieties grown in Victoria to cockatoo attack may reveal that there are similar differences that could be exploited in areas subject to a high likelihood of damage by cockatoos. The Committee therefore recommends:

Recommendation 13

That the Department of Agriculture, Energy and Minerals investigate commercial cultivars of existing crops for evidence of differential susceptibility to damage by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, and convey the results to growers.

6.3.3 Crop substitution

Where a particular crop appears highly prone to damage by cockatoos, there is a good case for investigating whether other crops which could be grown on the same site would be commercially as viable, but less attractive, to the birds. Many Victorian farmers who used to grow Sunflower, for example, have switched to Safflower, a crop less severely affected by cockatoos, or have elected not to grow oilseeds at all, thereby limiting their options for crop

rotation for sustainability[364]. Opportunity costs arising from not growing a particular crop may be substantial, but are largely unquantified.

6.3.4 Exclusion

6.3.4.1 Throw over nets

A variety of nets is available to protect small area, high value crops, in particular. These include seasonal use barriers, often called throw-over nets, commonly used to protect Grapes and high value berry crops from bird damage. Throw-over nets are mostly cheap extruded or loosely knitted or woven nets. Such nets provide good protection against some species of birds, but they can cause problems. Extruded nets often catch and strangle birds. Placing and removing nets can be labour intensive. Problems of fungus and other diseases can be increased by having nets in place, while exclusion of birds that eat invertebrate pests can lead to increases in these pests. Most throw-over nets are designed to give one or two seasons' use.

6.3.4.2 Permanent netting

Permanent netting structures (Plate 14) can be cost-effective and are used increasingly to protect new vineyards, cherry orchards and some other crops. These structures should be adequate deterrents to cockatoos. Exclusion by netting has been used effectively to prevent further damage to soft timber on a house. The Committee finds, however, that netting is not the solution to all bird problems. It is clearly not a practical measure for the protection of broadacre, relatively low-value crops.

6.3.4.3 Exclusion economics

In trials conducted in Western Australia, shooting; shooting and scaring; and mistnetting (catching); as control techniques for reducing damage to fruit crops by parrots, were compared with the costs of installing exclusion netting. Results indicated orchardists would be better off installing exclusion netting provided they could afford the capital outlay, and that this was also likely to be the only solution to the problem of damage to protea flowers by parrots and other birds[365].

PLATE 14
Permanent bird exclusion netting over vineyard, Red Hill South, April 1995
(Photograph: Ray Wright).

Netting becomes an acceptable solution when the increase in returns due to excluding birds, together with the savings from not having to carry out any other bird control, exceeds the cost of erecting and maintaining a netting structure. Although this seems straightforward, growers generally respond that netting is far too expensive[366]:

> The truth of the matter really lies in the fact that most growers do not know the cost/benefits of netting. They rarely attempt to make a realistic estimate of the level of damage they sustain nor do they account for the costs of their current bird control practices[367].

With properly applied permanent bird exclusion netting, risk of bird damage is zero. Birds do not get tangled in the netting, and parrots do not eat their way through the nets. Such nets are guaranteed by manufacturers for at least 10 years and

> ...they are probably the most effective way to protect particular high-value crops...[368]

With the conventional system for growing Cherries *Prunus* spp., damage and potential production levels need to be high for netting to produce a large benefit and short pay-back period. Intensive growing systems have a higher yield potential, making netting worthwhile at moderate to low levels of bird damage[369].

Cockatoos damage Grape vines by chewing stems and by snipping off Grape bunches[370]. If this damage, and the costs of its control, are ascertained together with any other bird damage sustained, then the basis for determining the cost:benefit of permanent netting will be established.

6.4 BIRD DAMAGE CONTROL STRATEGIES

6.4.1 Integrated strategies

An integrated scaring strategy has been described by Dr Ron Sinclair[371] as being potentially useful in prolonging the effectiveness of each of its components.

The program commences with some shooting, to establish the link between loud noise and danger. Several bird hides are established near points where birds approach the crop. Shooting should be undertaken from these hides, but is switched to other hides regularly. Once the birds associate the hides with danger, the birds are pursued by stealth, until they cannot be approached readily. At this point, the shooter adopts bright clothing and becomes as obvious as possible. The same coloured bright clothing is worn each time the crop is approached and other people working around the crop also wear the same colours. Scarecrows are then used at this stage, dressed in the same bright colours. Again they are moved regularly.

Scare guns are next introduced, set to operate at long intervals, and only when birds are likely to be feeding in the crop (usually early and late in the day). The scare guns are moved every two to three days. Experience suggests that they may be more effective if concealed. The bird hides could be used for this. Scare guns should be out of sight when not in use. Scare guns should be reinforced with some shooting.

The scaring strategy may be enhanced by the provision of a decoy food source. No control should be undertaken near the decoy, no matter how tempting this may be. A similar strategy is recommended for bird scaring in Britain.[372] The Committee emphasises that the important characteristic and strength of this strategy is that it is based on the integration and interaction of a number of scaring devices, not a reliance on any one.

6.4.2 Strategies recommended by the Environment and Natural Resources Committee

The Committee has summarised various strategies and techniques concerned with population control, with bird damage management and with farm management. The Committee cannot emphasise strongly enough that there is no single solution to problems in Victoria caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. Rather, those affected must employ a suite of management techniques appropriate for their particular circumstances.

The Committee has suggested that the following measures will, in a coordinated strategy, assist those subject to bird damage:

- declaring Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, Unprotected Wildlife under certain conditions;
- shooting to scare;
- possible humane capture of birds through use of alpha-chloralose;
- trapping and humane gassing on a user-pays basis;
- various scaring measures including noise makers, gas guns, scarecrows, bird hides, etc.;
- manipulation of bird behaviour by the use of visual screens;
- manipulation of bird behaviour by the use of models;
- chemical deterrence;
- habitat manipulation, including provision of decoy food sources;

- plant breeding;
- crop substitution;
- exclusion netting.

The Committee does not support:

- wholesale destruction of Long-billed Corellas, Sulphur-crested Cockatoos or Galahs in Victoria;
- use of poison;
- trapping and export of birds as a solution to bird damage problems.

6.5 EXTENSION

In this Chapter and in Chapter Seven, the Committee has identified a range of options and strategies that will assist those subject to bird damage problems. The Committee considers that the promotion of integrated bird damage control strategies will be achieved most effectively by field demonstrations that are conducted cooperatively between the Government and land holders. In order to support such demonstrations, the Committee recommends that the Government provide extension expertise and the cost of supplying alpha-chloralose (Recommendation 7), trapping and gassing equipment (Recommendation 8), bird decoy models and decoy food (Recommendation 10). Cooperating land holders should provide labour, scaring, visual deterrents and farm management techniques.

The Committee commends the Department of Conservation and Natural Resources for its commitment to support a continuous and significant involvement in an extension and education program[373], and the Department of Agriculture, Energy and Minerals for its preparedness to commit trained agronomists to develop methods of assessing and quantifying crop damage if funding is made available[374]. The Committee welcomes these commitments and considers it essential that the Department of Conservation and Natural Resources and the Department of Agriculture, Energy and Minerals should provide adequate extension support that directly addresses the problems

identified elsewhere in this Report, and promotes and evaluates the merits of localised, integrated bird damage control strategies. To that end the Committee recommends:

Recommendation 14

That the Department of Conservation and Natural Resources :

(a) employ two full time extension officers (to cover both north-eastern and western Victoria) to liaise with the Department of Agriculture, Energy and Minerals and with the farming community, in order to motivate, assist and undertake demonstrations of integrated cockatoo damage mitigation programs in coordination with Landcare groups and other interested land holder groups. Such demonstrations must include assessment of the effectiveness and cost-efficiency of those programs. Funding should be sufficient to enable these assessments to be made;

(b) provide extension material that explains and encourages the use of integrated bird damage control strategies incorporating a range of scaring methods and decoy feeding;

(c) promote an education program on the Long-billed Corella, Sulphur-crested Cockatoo and Galah, with the aim of providing information on the biology, ecology and behaviour of the birds, and of discouraging the feeding of birds in inappropriate areas. The program should include reference to feeding of birds in urban areas; and

Continued next page

Recommendation 14 (Continued)

(d) because assessment should be an integral part of the practical application of such methods, give priority for extension support to groups of land holders involved in cooperative, integrated cockatoo damage control programs.

Recommendation 15

That the Department of Agriculture, Energy and Minerals provide extension material aimed at:

(a) encouraging grain transporters to minimise spillage;

(b) encouraging cereal crop growers to use rapid crop damage assessment techniques;

(c) encouraging graziers to feed grain to stock at times of day to minimise availability to birds; and

(d) encouraging cereal crop growers to adopt strategies that minimise grain residue in stubbles.

Finally, the Committee suggests that the Department of Conservation and Natural Resources, and the Department of Agriculture, Energy and Minerals establish stronger lines of communication that will encourage and improve the exchange of relevant information.

6.6 SUMMARY

The Environment and Natural Resources Committee has identified a series of practical measures that it considers will assist land holders and other individuals who experience problems associated with bird damage. A principal theme of these findings, which the Committee once again

emphasises, is that there is no single solution to problems caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. Any damage mitigation strategy must comprise a number of integrated, mutually reinforcing measures. Failure to apply sustained, interactive techniques will not solve bird damage problems.

In conclusion, the Committee finds that bird damage will only be controlled through a combination of:

- **research** necessary to provide information, guidelines and practical solutions to bird damage problems; relevant Committee recommendations are —
    1. bird damage assessment
    2. economic impacts
    3. bird impacts on tree planting programs
    6. alpha-chloralose
    9. effectiveness of trapping and gassing
    12. potential screen plants
    13. bird resistant cultivars

- **practical application**, depending on need and location, of bird damage controls and farm management measures identified by the Committee; relevant recommendations which reinforce measures advocated by the Committee include —

    4. declaring cockatoos Unprotected Wildlife in Victoria
    5. penalties for poisoning
    7. potential use of alpha-chloralose
    8. trapping and gassing for the purpose of specific flock control
    11. regulating recreational feeding of cockatoos

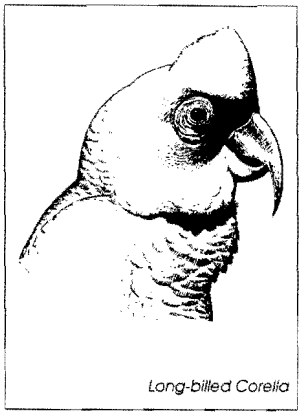
- **extension** that is appropriately targeted and adequately funded from both the Department of Conservation and Natural Resources, and the Department of Agriculture, Energy and Minerals; relevant recommendations include —

    10. decoy food sources

14. bird damage control and farm management information and demonstrations
15. grain spillage and stock feeding controls

Research, extension and practical experience represent, in combination, a unified, cooperative, and informed approach to a significant Victorian problem. It is a three-tiered approach, in which extension provides a two-way link between research and practical experience.

Having reviewed bird and farm management techniques relevant to damage control, the Committee next provides a series of practical responses to common cockatoo damage problems in Victoria.



Long-billed Corella

CHAPTER SEVEN

BIRD DAMAGE CONTROL MEASURES

7.1 INTRODUCTION

This Chapter continues the Environment and Natural Resources Committee's response to Term of Reference (c). In it, the Committee identifies 15 common problems in Victoria caused by Long-billed Corellas, Sulphur-crested Cockatoos and Galahs, and suggests possible damage control strategies.

The problems discussed are those associated with:

- roost trees (section 7.3)
- planted tree seedlings (section 7.4)
- germinating crops (Oats, Wheat and Barley in particular) (section 7.5)
- ripening crops (section 7.6)
- fixtures — aerials, light fittings, power lines, etc. (section 7.7)
- feedlots (section 7.8)
- feed trails and stubbles (section 7.9)
- soft timber on houses and outdoor furniture (section 7.10)
- noise (section 7.11)
- commercial fruit and nut trees (section 7.12)
- hay bales (section 7.13)
- silage and grain covers (section 7.14)
- commercial flower crops (section 7.15)
- Grape vines (section 7.16)
- bowling greens, ovals, golf courses, etc. (section 7.17)

The Committee is aware that not all of the measures outlined below in response to these problems will be effective in all situations. However, as was emphasised in Chapter Six, a damage control program that is carefully planned, persistent, integrated and mutually-reinforcing has greater potential for success than reliance on any one measure, or reliance on a badly planned control program. Practical experience and research findings demonstrate that cockatoos are able to exploit, or ignore, a poorly executed strategy that fails to maintain novelty, reinforce scaring stimuli, and apply a control program conscientiously. It is therefore necessary to be more persistent than the birds, and to understand something of the reasons behind their behaviour.

7.2 BIRD DESTRUCTION CAUTIONS

The Committee has outlined its position with regard to the destruction of Long-billed Corellas, Sulphur-crested Cockatoos and Galahs. The Committee reaffirms that it does not support general population reduction throughout Victoria. Nor does it support flock reduction either as a first resort or as a single-solution measure. The Committee does support specific flock control provided it is part of a larger, integrated strategy comprising diverse, mutually-reinforcing bird damage control measures, and only in those circumstances where individuals are experiencing severe damage problems. The aim of such bird destruction is therefore localised bird damage control and flock management, provided it is not part of a program intended to achieve indiscriminate cockatoo population reduction.

In a number of the examples described below, destruction of *some* birds could be undertaken. The Committee emphasises, however, that several criteria need to be borne in mind if this is considered:

- destruction of birds is futile unless it can be demonstrated that it leads to a reduction in the damage being caused;

- destruction should not be undertaken if it costs more than the damage being caused, since this is economically unsustainable;

- most methods for destroying birds target young birds, a component of the population that suffers high mortality anyway. Destruction of these

birds is therefore not likely to have any lasting effect on the potential of the population to continue breeding and causing damage;

- some destructive measures bring people into close contact with cockatoos. These people are at risk of catching chlamydiosis (psittacosis) from the birds and should take protective measures; and

- destruction of birds may result in a short-term change in behaviour. This can often be brought about at less expense by other means, such as using decoys, combined with a scaring strategy, or through reducing the attraction of the environment by manipulating visibility.

The Committee notes that the strategies described below are recommended to alleviate problems as they are perceived. In recommending these strategies, the Committee stresses that it is in the interests of those intending to use these, or any other damage control measures, to evaluate the scale of the problem and the cost of any particular strategy for its control, in order to ensure that resources are expended only in proportion to the size of the problem.

Finally, the Committee cautions that where destruction of birds is being considered as part of a scaring or behavioural modification strategy, it is incumbent upon those undertaking the destruction to ensure that they are appropriately authorised to do so.

7.3 ROOST TREES

7.3.1 Aim

To reduce the time the cockatoos spend in roost trees already affected by excessive pruning.

7.3.2 Strategy

The Committee considers that it will be necessary to use a combination of Bird Frite® cartridges and taped alarm calls, reinforced by some shooting, as the birds return to the roost. If it is considered necessary to move a night roosting

site, then a similar strategy should be employed, with the addition of scaring at night with spotlights and Bird Frite® cartridges. It should be possible to persuade the birds to move elsewhere within a week of commencing the program, but it could take longer. Deterrence of birds will often be achieved with less effort where they have just adopted a particular roost site, than where they are well established.

7.3.3 Comment

This kind of damage is more a feature of day roosting sites than night roosts. The Committee reminds those affected by this problem that many other factors affect the health of trees. Indeed, pruning by cockatoos, while visually distressing, may not in many situations lead to long-term damage (see Chapter 4).

7.4 PLANTED TREE SEEDLINGS

7.4.1 Aim

To prevent the occurrence of damage to recently planted tree seedlings.

7.4.2 Strategy

The Committee suggests that if strips of vegetation such as long grass are left or planted on either side of the area planned for planting with tree seedlings, and across it at intervals, these should function as visual screens and inhibit the activity of cockatoos between such screens. Planting of seedlings should be delayed until the screens are 0.6 to 1 m high. For small area plantings, fences of hessian or shade cloth will function adequately as visual screens. The effect of these screens can be enhanced by limited patrolling combined with some shooting if necessary.

7.4.3 Comment

Direct seeding has been reported in some cases to be one way of avoiding this damage. Similarly, natural regeneration is seldom reported to suffer from this

damage. Consider promoting natural regeneration wherever possible, or using direct seeding techniques, if feasible. Advice on these measures can be obtained from the Department of Conservation and Natural Resources.

7.5 GERMINATING CROPS (OATS, WHEAT AND BARLEY IN PARTICULAR)

7.5.1 Aim

To reduce damage to acceptable levels by cost-effective, legal means.

7.5.2 Strategy

The Committee has identified the following measures as being important for the protection of germinating crops:

1. Do not allow a pattern of feeding to develop at the crop site . The first few birds on the crop site are the most important ones to deter, since their presence will attract other birds.

2. Start the program with some shooting, to establish the link between loud noise and danger.

3. Set up several bird hides of hessian or other material near the birds' main approach routes. Shoot from these hides, but switch to other hides regularly. Vehicles could be used as mobile hides and left near the crop.

4. Once the birds associate the hides with danger, pursue the birds by stealth, until they cannot be approached readily. At this point, the shooter should adopt bright clothing and become as obvious as possible. The same coloured bright clothing should be worn each time the crop is approached and other people working around the crop should wear the same colours. Scarecrows can be used at this stage, dressed in the same bright colours. Move them regularly.

5. Scare guns may now be introduced, set to operate at long intervals, and only when birds are likely to be feeding in the crop, usually early and late in the day. Move scare guns every two to three days. They may be more effective if concealed — use the bird hides. Keep scare guns out of sight when not in use.

6. Reinforce the scaring with some shooting, and with the use of Bird Frite® cartridges.

7. Consider the provision of an alternative, low-cost food source such as Rice hulls, for example, to enhance the scaring strategy. This decoy food source should be at least 500 m from the crop so that scaring activities at the crop do not disturb the birds at the decoy site. No control should be undertaken near the decoy, no matter how tempting this may be. The decoy site is likely to be more effective if it is close to the flight path of the birds and close to trees which can be used as perches or roost sites.

8. Consider making or obtaining some decoy model cockatoos in feeding posture, to lure birds to the decoy feed site.

9. Consider participating in trials of potential repellent seed dressing chemicals. Several candidate chemicals look promising.

10. Where possible, coincide planting of crop with other, nearby growers; grow crops away from trees and water; minimise crop edge.

11. Plant varieties suited to your local conditions to promote dense, even growth. Thin or open patches in a crop, whether created by bird damage or other factors, will provide a focus for bird attack at ripening.

7.5.3 Comment

These suggestions may not be practical in all cases. Nevertheless, where there is the capacity to undertake a number of these measures, the Committee recommends that effort as being worthwhile, since there is sufficient evidence to show that damage is likely to be reduced as a result of an integrated program. Patrolling and shooting costs are also likely to be reduced.

7.6 RIPENING CROPS

7.6.1 Aim

To minimise damage to ripening crops.

7.6.2 Strategy

The Committee has identified the following measures as being important for the protection of ripening crops:

1. Do not allow a pattern of feeding to develop at the crop site. The first few birds on the crop site are the most important ones to deter, since their presence will attract other birds.

2. Start the program with some shooting, to establish the link between loud noise and danger.

3. Set up several bird hides of hessian or other material near the birds' main approach routes. Shoot from these hides, but switch to other hides regularly. Vehicles could be used as mobile hides and left near the crop.

4. Once the birds associate the hides with danger, pursue the birds by stealth, until they cannot be approached readily. At this point, the shooter should adopt bright clothing and become as obvious as possible. The same coloured bright clothing should be worn each time the crop is approached and other people working around the crop should wear the same colours. Scarecrows can be used at this stage, dressed in the same bright colours. Move them regularly.

5. Scare guns may now be introduced, set to operate at long intervals, and only when birds are likely to be feeding in the crop, usually early and late in the day. Move scare guns every two to three days. They may be more effective if concealed — use the bird hides. Keep scare guns out of sight when not in use.

6. Reinforce the scaring with some shooting, and with the use of Bird Frite® cartridges.

7. Consider the provision of an alternative, low-cost food source such as Rice hulls, for example, to enhance the scaring strategy. This decoy food source should be at least 500 m from the crop so that scaring activities at the crop do not disturb the birds at the decoy site. No control should be undertaken near the decoy, no matter how tempting this may be. The decoy site is likely to be more effective if it is close to the flight path of the birds and close to trees which can be used as perches or roost sites.

8. Consider making or obtaining some decoy model cockatoos in feeding posture, to lure birds to the decoy feed site.

7.6.3 Comment

Damage usually occurs at edges. Edge is created not only around the perimeter of a crop, but occurs around trees, dams and bare or thin patches within a crop. Minimising the likelihood of edge occurring within a crop will reduce the number of sites from which birds can attack the crop.

7.7 FIXTURES — AERIALS; LIGHT FITTINGS; POWER LINES, ETC.

7.7.1 Aim

To reduce or eliminate damage.

7.7.2 Strategy

Placing powerlines to farm buildings underground will eliminate the possibility of bird damage.

Light fittings may be protected by providing perches above them, furnished with 50 mm sections of black poly pipe. The pipe sections roll under the birds' feet when they land and the birds are unable to balance sufficiently to damage

the fittings. Perches would need to be placed such that they prevented the birds perching on the fittings themselves.
Cross-pieces on aerials could have sections of black poly pipe fitted to prevent perching, if practical. Sheathing communications cables in PVC or metal conduit should prevent further damage by cockatoos.

Where roof nails are being removed because they have worked their way loose, replace them with roofing screws, which have a reduced tendency to become loose.

If it is possible to remove food sources or other features in the vicinity that may attract the birds, such as roost sites, this may lessen these problems.

7.7.3 Comment

In some cases bird damage can be avoided if it is considered when designing and/or placing fittings. Often, a little ingenuity will enable existing fittings to be protected from cockatoos. Fine wires, for example, when stretched above some structures that the birds roost on or damage by chewing, may prevent further damage. Fine wires are difficult for the birds to perch on. Alternatively, the use of poly pipe 'rolling perches' will be appropriate in some situations.

7.8 FEEDLOTS

7.8.1 Aim

To reduce feeding and fouling of stock feed by cockatoos.

7.8.2 Strategy

Place hoods over feed troughs, or erect shade cloth screens on three sides and above the troughs. Cockatoos like to have a clear view when feeding and may be inhibited by this.

7.8.3 Comment

There may shortly be bird repellent additives available to mix with stock feed. Cost:benefit of using additives will depend on extent of damage being done.

7.9 FEED TRAILS AND STUBBLES

7.9.1 Aim

To reduce the amount of grain taken from feed trails and stubbles by cockatoos.

7.9.2 Strategy

Place feed trails for stock late in the day, as the cockatoos are going to roost. This will allow stock to feed through the night. Feed out enough to ensure there is a minimum left next morning. Feed smaller amounts more frequently; keep birds away until stock have eaten grain[375].

Wastage will be reduced if feed is placed in bird-proof troughs.

Set harvesting machinery to minimise the amount of grain left in stubbles after the harvest. Collect chaff and grain for stock feed or for burial[376].

When non-toxic bird repellents are available, consider the addition of these to grain fed out to stock. This may allow feeding during the day. The economics of this would depend on the value of grain lost to the birds under normal conditions.

7.10 SOFT TIMBER ON HOUSES AND OUTDOOR FURNITURE

7.10.1 Aim

To reduce or eliminate damage to timber fittings and furniture.

7.10.2 Strategy

Determine whether there is some attraction for the birds to the area. For example, this problem often occurs when somebody in the vicinity is providing food for the cockatoos. If this is the case, ask those providing food for the birds to stop, and explain the nature of the problems being caused.
Initiate a scaring strategy, using alarm calls, loud noises (this may not be possible in built-up areas, where this problem is most common).

Protect timber with metal sheathing, hang netting or shade cloth from eaves on rollers so that it can be rolled up when home.

Replace western red cedar window frames and door frames with hardwood or metal.

Exclude birds using permanent protective screens or netting over parts affected.

Notify the Department of Conservation and Natural Resources so it can take action if necessary.

Apply to the Department of Conservation and Natural Resources for an Authority to Control Wildlife to enable the trapping and humane destruction of the birds responsible for the damage.

Contract a Licensed Wildlife Controller to trap and remove the offending birds. A list of Controllers is available from the Department of Conservation and Natural Resources.

7.10.3 Comment

An alternative way of capturing these birds may be to feed them with alpha-chloralose-treated baits. This would enable humane destruction of these birds. At present this option is not available (see Recommendations 6 and 7).

7.11 NOISE

7.11.1 Aim

To relocate roosting sites of cockatoos when the noise they make is considered unacceptable to residents in the vicinity.

7.11.2 Strategy

It will be necessary to use a combination of Bird Frite® cartridges and taped alarm calls reinforced by some shooting, as the birds return to the roost each evening. In addition, it may be necessary to scare roosting birds at night with spotlights and Bird Frite® cartridges in the early stages of the program, if they persist in coming to roost despite scaring in the evening. It should be possible to persuade the birds to move elsewhere within a week of commencing the program, but it could take longer. It is important to persist until the birds move elsewhere. If their alternative site will also create noise or other problems, then immediate scaring there is likely to make them shift readily. Be ready to recommence scaring at the original roost site if birds begin to use it again.

7.11.3 Comment

This strategy should be implemented under the guidance of the Department of Conservation and Natural Resources.

7.12 COMMERCIAL FRUIT AND NUT TREES

7.12.1 Aim

To reduce pruning damage and losses of fruit and nuts.

7.12.2 Strategy

1. Establish hides of hessian or other material, or use vehicles, from which some shooting can be done. Do not allow a pattern of feeding on the crop site to develop.

2. Combine the use of concealed gas guns, moved every two days and turned off at night and with the firing interval varied frequently, with use of Bird Frite® cartridges and some shooting. It is important to deflect the birds as they approach the crop.

3. Consider the provision of an alternative, low-cost food source such as Rice hulls or Almond processing residue, for example, to assist with deflecting the birds from the crop. This decoy food source should, ideally, be at least 500 m from the crop so that scaring activities at the crop do not disturb the birds at the decoy site. The decoy site is likely to be more effective if it is close to the flight path of the birds and close to trees which can be used as perches or roost sites.

4. Consider making or obtaining some decoy model cockatoos in feeding posture, to lure birds to the decoy feed site.

7.12.3 Comment

Assess value of losses caused by cockatoos and other birds and determine whether netting to exclude birds would be cost-effective.

7.13 HAY BALES

7.13.1 Aim

To reduce damage to baled hay.

7.13.2 Strategy

Shade cloth or chicken wire on three sides of haystacks should inhibit cockatoos from attacking any but the outermost bales on the open side of the stack. Removable panels could be used, so that access to other sides of the stack is still possible. If this problem is sufficiently serious, then four sides of the stack could be covered in this way.

Where round bales are stored in paddocks, damage by cockatoos may be minimised by the erection of walls 2-2.5 m high around them, of shade cloth or hessian. Shade cloth is likely to last longer than hessian and be reusable in later seasons.

7.14 SILAGE AND GRAIN COVERS

7.14.1 Aim

To reduce damage to the covers.

7.14.2 Strategy

Silage covers can be protected by the erection of walls 2-2.5 m high around them, of shade cloth or hessian. Shade cloth is likely to last longer than hessian and be reusable in later seasons.

Damage to grain covers is often the result of birds being attracted by spilt grain around the covers. If care is taken either not to spill grain, or to remove it promptly, then birds are less likely to be attracted to the covers and cause damage. If cockatoos still tend to damage covers in spite of good hygiene being practised, then erection of visual screens of shade cloth or other material should eliminate the problem.

7.15 COMMERCIAL FLOWER CROPS

7.15.1 Aim

To reduce damage by pruning of bushes and removal of flowers.

7.15.2 Strategy

Determine whether there is any particular feature of the area that creates a source of attraction for the cockatoos. If so, determine the feasibility of reducing its attraction for the birds. For example, nearby roost sites should be relocated, if possible. The strategy recommended above for moving a roosting site should be employed. If the birds are discouraged from roosting in the vicinity, their beak maintenance behaviour (a non-feeding activity), which results in damage to the plants, may be directed elsewhere.

Visual screens of shade cloth or other material 2-2.5 m high may deter cockatoos from entering the crop. This strategy could be especially effective for protecting seedlings.

A combined scaring and shooting strategy, using bird hides, Bird Frite® cartridges, taped alarm calls and gas guns, may be effective.

If the number of birds involved is small, destruction may be a useful and cost-effective response, provided there are no specific attractions in the vicinity that will continue draw more birds into the area.

7.15.3 Comment

Assess value of losses caused by cockatoos and other birds and determine whether netting to exclude birds would be cost-effective.

7.16 GRAPE VINES

7.16.1 Aim

To reduce damage by pruning of vines and Grape bunches.

7.16.2 Strategy

Determine whether there is any particular feature of the area that creates a source of attraction for the cockatoos. If so, determine the feasibility of reducing its attraction for the birds. For example, nearby roost sites should be relocated, if possible. The strategy recommended above for moving a roosting site should be employed. If the birds are discouraged from roosting in the vicinity, their beak maintenance behaviour (a non-feeding activity), which results in damage to the vines, may be directed elsewhere.

Visual screens of shade cloth or other material 2-2.5m high may deter cockatoos from entering the crop.

A combined scaring and shooting strategy, using bird hides, Bird Frite® cartridges, taped alarm calls and gas guns, may be effective.

If the number of birds involved is small, destruction may be a useful and cost-effective response, provided there are no specific attractions in the vicinity that will continue draw more birds into the area.

7.16.3 Comment

Assess value of losses caused by cockatoos and other birds and determine whether netting to exclude birds would be cost-effective.

7.17 BOWLING GREENS; OVALS; GOLF COURSES; ETC.

7.17.1 Aim

To reduce damage to these sites.

7.17.2 Strategy

Determine whether there is any particular feature of the area that creates a source of attraction for the cockatoos. If so, determine the feasibility of reducing its attraction for the birds. For example, nearby roost sites should be relocated, if possible. The strategy recommended above for moving a roosting site should be employed. If the birds are discouraged from roosting in the vicinity, they may be less inclined to feed at the above sites.

For relatively small sites, such as bowling greens, it may be practical to erect removable vertical screens of shade cloth 2-2.5 m high during periods when the greens are not in use.

At golf courses, bird hides could be erected, from which birds are shot at with both live ammunition and with Bird Frite® cartridges, combined with the playing of alarm calls. Such hides should be moved frequently. This strategy can be enhanced by staff posing as golfers, with a shotgun in the golf buggy, enabling a close approach to cockatoos which are often habituated to golfers nearby. Some shooting in this manner may reduce the total time the birds spend at the course, since they will become wary of any golfer after a short time.

Some repellents with the potential to deter feeding on pasture by some bird species may be of use in this situation. However, no research on the effects of these repellents on the feeding behaviour of cockatoos in pastures has been undertaken at this stage.

7.18 SUMMARY

In Chapters Six and Seven, the Committee has outlined strategies and responses as required in Term of Reference (c).

From the perspective of policy and general strategy, the Committee has advocated a coordinated approach in which practical experience, extension and research are utilised in the interests of developing demonstrably effective bird control measures.

At the level of immediate practical need, the Committee has emphasised the importance of applying bird damage measures and farm management techniques that are practical, integrated, and mutually-reinforcing. As requested in Term of Reference (c)(ii), none of the measures so identified compromises the viability of the species.

In Chapter Eight, the Committee considers the implications of the formal recommendations made in response to Term of Reference (c).

Sulphur-crested Cockatoo

CHAPTER EIGHT

IMPLICATIONS OF THE REPORT

8.1 INTRODUCTION

In Term of Reference (d), the Committee is asked to identify the implications of implementing the recommendations made in response to Term of Reference (c). To this end, the Committee assesses recommendations made in Chapters Four, Six and Seven of this Report.

8.1.1 Planning integrated strategies

It should be clear from information provided in earlier Chapters that there is no single solution to problems caused by the three cockatoo species under consideration. Rather, the Committee emphasises that in many situations an approach which integrates a number of mutually-reinforcing measures is more likely to provide an effective reduction in damage problems.

The Committee stresses the need to plan for the possibility of birds being a problem, particularly to crop establishment, and to prepare strategies that can be implemented, if the need arises, when unanticipated damage occurs. This should reduce the feelings of frustration or helplessness that can lead to possibly ineffective, poorly thought out or even illegal 'knee-jerk' reactions. In other words, there needs to be a shift away from crisis management which characterises many bird damage control approaches at present, to a situation where contingency planning for bird damage control is a normal part of farm management planning. Pre-emptive action can then be taken to avert problems before they become severe.

8.1.2 A three-tiered approach

Recommendations and suggestions in this Report fall within three interconnected areas.

First, and immediately applicable, are currently available techniques combined in strategies that will lead to reductions in damage.

Second is the emphasis on extension. This provides the vital link between Departmental research findings and practitioners – those growers and others with problems caused by cockatoos.

Third is research. There will always be a need to undertake further research to investigate or evaluate new materials or methods for alleviating problems caused by cockatoos. Several areas for research are indicated in this Report. Much of this research will be undertaken in conjunction with the field application of the various strategies recommended in this Report. Those strategies can be employed elsewhere while the research proceeds.

What follows, then, is a summary of the major findings of the Committee, organised according to which of the three areas – currently available techniques, extension or research – they belong, and a brief discussion of the implications of their implementation.

8.2 CURRENTLY AVAILABLE TECHNIQUES

Many of the strategies recommended in Chapter Seven incorporate well-known devices and practices. The important departure from current practice in this Report lies in the emphasis on the intelligent integration of a range of measures, combined with persistence, to modify the behaviour of the birds. While some of these strategies may seem elaborate, the Committee believes that their use will result in greater reductions in damage levels than are normally achieved, and that their effects will last longer than the effects of responses relying on only one or two measures used in isolation. The cost-effectiveness of damage control is expected to be increased through use of these strategies.

The Committee has sought to extend the range and number of available cockatoo damage control measures by: removing the requirement for commercial crop growers to have an Authority to Control Wildlife before they can shoot cockatoos (Recommendation 4); promoting decoy feeding (Recommendation 10); facilitating the humane capture of birds for the purpose of specific flock control (Recommendations 7 and 8); encouraging the use of visual screens to protect crops and other values; and emphasising the importance of combining measures into a coherent program and providing examples of such programs. These measures increase significantly the strategic possibilities available to the community. Equally important, however, is the recommendations' insistence on levels of accountability that are not possible given the current haphazard responses to cockatoo damage.

The implication of the Committee's recommendations is therefore that cockatoo damage control in Victoria will become pre-emptive rather than reactive, directed rather than random, and of known rather than unknown effect.

8.3 EXTENSION

Extension provides an essential link between research and application. It is also important in increasing knowledge and acceptance of innovative techniques and of the value of integrating existing techniques into a coordinated strategy. Thus use of visual screens to protect hay bales, silage covers, seedling trees and feed troughs at feedlots, for example, may be better accepted as useful practices if discussed and demonstrated by extension officers.

Another important role of extension, and one which will improve bird damage control in the future, is to encourage the use of contingency planning for bird damage control as a normal part of farm management planning.

Extension staff will be involved in conveying the implications of all the recommendations of this Report to the various stakeholders. Several recommendations relate directly to the role of extension officers. Thus Recommendation 14 requires the Department of Conservation and Natural

Resources to appoint two full-time extension officers to work principally on issues associated with problems caused by cockatoos.

As required by Recommendation 14, extension officers will be involved in collecting information on the cost-effectiveness of various strategies and options of the kind identified in Table 4. As this information is compiled, those experiencing bird damage problems will be better able to make informed choices about the most cost-effective means to reduce such damage.

The Committee recognises that it is hard for growers to accept the provision of food for birds seen as pests. There is a widely held view that such action will inevitably lead to increased bird populations. To overcome these understandable misgivings, it is necessary that the Department of Conservation and Natural Resources coordinate demonstrations of decoy feeding. If these demonstrations show that bird damage to crops is indeed reduced cost-effectively, and that less effort is required to keep birds off germinating crops, then it is likely that some growers will adopt this practice. Recommendation 10 relates largely to the use of extension staff to coordinate such demonstrations of decoy feeding.

Recommendation 15 requires the Department of Agriculture, Energy and Minerals to provide extension material on grain management during and after harvest, and during feeding out to stock, in order to minimise access by cockatoos. Survival of young Long-billed Corellas in particular may be reduced by minimising the amount of grain left in stubbles. Feeding grain to stock during the evening will also prevent access by cockatoos. This may lead in the long term to lower Long-billed Corella numbers in such areas.

Recommendation 1(c) refers to the need for rapid damage assessment techniques to be developed. Extension staff will be required to convey knowledge of such techniques to interested land holders.

The Committee recognises that recommending an increased commitment to extension imposes additional costs on the Government (salaries, on-costs and equipment). The Committee regards such expenditure as an investment in Victorian primary production, wildlife conservation, and in helping other Victorians who variously experience cockatoo damage. The Committee

judges that the economic, environmental and social benefits to be gained from a more robust extension program will more than repay the costs involved.

8.4 RESEARCH

8.4.1 Damage control efficacy and other damage factors

A number of areas for research are indicated in the recommendations. Specifically, Recommendations 1 to 3 require the assessment of bird damage and its role relative to other forms of damage or loss, and its effect on yield.

Recommendation 6 requires investigation of the viability of alpha-chloralose as an alternative, humane method for capturing cockatoos. As with trapping, the use of this method will require the training of cockatoos to feed at the trap site before drugged baits are laid. Therefore, knowledge of flight paths and feeding areas will be required, so that feeding sites with a high probability of being used are established. Extension officers will provide advice on ways of implementing the use of alpha-chloralose and other techniques.

If alpha-chloralose proves to be acceptable, then this chemical may provide a means of capturing Sulphur-crested Cockatoos involved in damaging houses in areas where other methods may be inappropriate.

Recommendation 9 requires the Department of Agriculture, Energy and Minerals and the Department of Conservation and Natural Resources to assess whether programs aimed at reducing the size of specific flocks of birds actually lead to reductions in damage to the crops this action is intended to protect. Once this information is available, growers should be in a better position to evaluate the benefit of using such measures.

Recommendation 10 requires the assessment of the effectiveness of decoy feeding in reducing damage, and is closely aligned with Recommendation 14, which is broader in scope but similarly requires assessment of the efficacy of various damage control programs. Knowledge of the cost-effectiveness of different options will facilitate choice of the most appropriate control programs for particular situations in future and should lead to the rejection of methods that are shown to be too costly for little or no effect.

8.4.2 Farm management research

Recommendation 12 requires the Department of Agriculture, Energy and Minerals to investigate suitable plants to use as visual screens around appropriate crops, to deter feeding by cockatoos. If such plants can be found, then use of such screens should be feasible in Victoria, and may help to reduce damage to oilseed crops such as Safflower and Sunflower, and may have value in other situations.

Similarly, Recommendation 13 requires the Department of Agriculture, Energy and Minerals to investigate whether there are bird-resistant cultivars of commercially viable crops that could be substituted for cultivars attractive to birds. Conceptually at least, this is one of the simplest ways of avoiding damage caused by birds, although the likelihood of a positive outcome may be low.

8.5 ADMINISTRATIVE CHANGES

A number of recommendations effect administrative changes that may have little impact on most people affected by bird damage, but do provide mechanisms for facilitating various actions.

8.5.1 Cockatoo status changes

Recommendation 4 extends the Unprotected Wildlife status of the Long-billed Corella and the Sulphur-crested Cockatoo throughout the State, and introduces this status for the Galah, also on a Statewide basis to facilitate protection of commercial crops.

Commercial wildlife trappers will now be able to trap all three cockatoo species throughout the State, subject to obtaining approval from the land holders upon whose properties they wish to trap. However, the trappers' operations are limited by the size of the local market and little change in the number of birds trapped is expected. Trappers may not need to travel as far to obtain birds as they did in the past. Other than a possible saving on travel costs, trappers will benefit little from this recommendation.

Little difference in the numbers of birds killed or captured for the pet trade is anticipated as a result of this change, but a source of frustration to land holders will be removed.

8.5.2 Poisoning penalties

It is recommended that the penalty for poisoning wildlife be doubled as a deterrent to those tempted to undertake this action. The Committee believes that increased extension work, combined with the wide range of actions set out in this Report to alleviate damage by cockatoos, including the likely availability of alpha-chloralose as a method of catching cockatoos with minimal risk to non-target species, will also contribute to a reduction in the frustration that leads some growers to resort to illegal poisoning. Further, given that poisoning is an indiscriminate and uncontrolled method for the destruction of wildlife, the Committee finds that there is no justification for illegal poisoning.

8.5.3 User pays

The Department of Conservation and Natural Resources currently facilitates the trapping and gassing of Long-billed Corellas and Sulphur-crested Cockatoos by providing the required equipment to crop growers, free of charge, if the growers believe that this will alleviate their problems. The introduction of charges (Recommendation 8) for the use of this equipment and for staff time, may help to defray the costs of maintaining the equipment. Where equipment is provided free of charge there is a tendency for it to be used in some cases where there may not really be a need for such action. Equipment that is paid for is also more likely to be looked after – and hence requires less maintenance – than equipment that is available free of charge. It is also more likely to be returned when no longer needed.

Assessment of the impact of trapping and gassing on damage levels should enable a realistic assessment of whether the method is cost-effective. Growers will then be in a better position to evaluate this option against other methods on an economic basis.

8.5.4 Active intervention

Recommendation 11 suggests an amendment to section 87 of the Wildlife Act to enable action to be taken to prevent feeding of wildlife where this can lead to problems to that wildlife or to other values. Where houses are being damaged by cockatoos attracted to food provided by a well-meaning person, this provision in the Wildlife Act creates the power to prohibit further provision of food for these birds if other measures are not effective, and may lead to the saving of thousands of dollars in averted damage.

8.6 COCKATOO NUMBERS

The recommendations made in Chapters Four, Six and Seven seek to enlarge the range and effectiveness of cockatoo damage control measures in Victoria. It does not necessarily follow that the population of cockatoos in Victoria will significantly decrease. The Committee reiterates that trapping and gassing is already used in Victoria. The Committee's recommendations for its use and administration will lead to more scrupulous control and evaluation than currently takes place. Shooting is primarily a means of scaring rather than a method of culling. Alpha-chloralose, if viable, may present the most humane bird capture method for specific flock reduction. The purpose of such measures, as repeated often in this Report, is cockatoo damage control and not general population reduction.

8.7 SUMMARY

The major implication stemming from this Report is that bird damage can be controlled effectively, efficiently and economically by the use of an integrated strategy of damage control measures, supplemented by on-going research and vigorous, interactive extension.

Committee Room

23 October 1995

APPENDIX A
SUBMISSIONS RECEIVED BY THE ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

Submission No.	Surname	Affiliation
1	Campbell	Private
2	Mawson	Private
3	Thomson	Private
4	Martin	Shire of Cohuna
5	Crosbie	Private
6	Flanagan	Private
7	Iddles	Private
8	Begg	Private
9	Woodward	Private
10	Bjorksten	Private
11	Kerr	Private
12	Barber	RSPCA
13	Parker	Private
14	Coutts	Private
15	Smith	Private
16	Tippett	Private
17	Brown	Private
18	Hildebrand	Private
19	Berryman	Freedom for Birds Inc
20	Hoser	Private
21	Walker	Private
22	Hilton	Snowline Fruits
23	Fleming	NSW Agriculture
24	Darby	Myrtlerise Nut Groves
25	Delahooy	Private
26	Burton	La Trobe University
27	Hobbs	Private
28	Wallace	Private
29	Scott	Swan Hill City Bowls Club Inc
30	Wymond	Australian Nut Industry Council
31	Howell	Warrenbayne Boho Land Protection Group
32	Fogarty	Boorhaman and District Landcare Group
33	Brown	Private
34	Dunning	Private
35	Wolcott	Cavendish Branch VFF
36	Learmonth	Harrow Branch, Liberal Party of Australia

37	Ampt	Western Victorian Cockatoo Control Committee
38	Thompson	Private
39	O'Connor	Private
40	Bickford	Private
41	Bell	Private
42	Dunn	Private
43	Hobbs	Private
44	McDonald	Bird Observers Club of Australia
45	Mannion	Nathalia-Picola Branch VFF
46	Willsher	Private
47	McQueen	Wimmera Branch ACF
48	Napier	Savage Farming
49	Balharrie	Private
50	Smith	Private
51	Napier	Private
52	Walsh	Private
53	Junghenn	Private
54	Gillespie	Private
55	Hobbs	Harrow Branch VFF
56	Keith	Private
57	Schiftan	Private
58	Buchan	Victorian Avicultural Council
59	Anson	Private
60	Braidie	Private
61	Fox	Hume District Pastoral Council of VFF
62	Colman	Private
63	Killmister	Private
64	Wood	Private
65	Cook	Grains Group, Victorian Farmers Federation
66	Trudinger	Private
67	Scates	Private
68	Parsons	Mansfied Branch VFF
69	Wood	Tarrawingee Branch VFF
70	McColl	Private
71	Brady	Ararat Branch VFF
72	Borg	Wildlife Controllers Association of Victoria
73	Coleman M.P.	Minister for Natural Resoures Department of Conservation and Natural Resources
74	Simpson	Tanjil Valley Landcare Group
75	Nicholls	Frankston College of Technical and Further Education
76	Kingston	Private
77	Brown	Settlers Creek Awareness Group
78	Bain	Private
79	Morris	Western Port Bird Observers Club
80	Herbertson	Lexton Landcare Group

81	Nicholls	Private
82	Scroggie	Private
83	Clugston	Private
84	Driscoll	Navarre and District Landcare Group
85	Perry	Private
86	Kent	Mt Martha Naturalist's Club Inc.
87	Beith	Walwa Landcare Group
88	Gifford	Private
89	Hanlon	The Swanpool and District Land Protection Group
90	Gaudion	Warby Range Landcare and Rabbit Control Group
91	Maher	Lubeck/Wal Wal Landcare Group
92	Leeming	Culla/Pigeon Ponds Land Management Group
93	Ross	Telangatuk East Landcare Group
94	Weedon	East Moorabool Landcare Group
95	Murray	Bunnugal Landcare Group
96	Jindra	Private
97	de Fraga	Australian and New Zealand Federation of Animal Societies Inc.
98	Donovan	Sunday Creek/Kilmore East Landcare Group
99	Preuss	Australian Wildlife Protection Council
100	Sims	South Gippsland Conservation Society Inc.
101	Watt	Pawbymbyr Landcare Group
102	Fisher	Private
103	Kennedy	Humane Society International
104	Jobling	Northern Victorian Fruitgrowers Association
105	Larmour	Buloke Shire Council
106	Wright-McInness	Private
107	Hancock	Wombelano Landcare Group
108	Baker-Gabb	Royal Australasian Ornithologists Union
109	Waldron	Private
110	Guthrie	Private
111	Perkins	Jeparit Tennis Club
112	Johnson	TESCA (Technical and Engineering Services and Consultants of Australia
113	Hardware	Private
114	Keens	Private
115	Evans	Private
116	Forster	Private
117	Close	Private
118	Smith	Horsham South Branch VFF
119	Dark	Mirranatwa Landcare Group
120	McInnes	Private
121	Guest	Wonwondah Landcare Group
122	Davis	Ararat Branch Avicultural Society of Australia
123	Jenkinson	Private
124	Waser	Private
125	Gehrig	John Gehrig Wines

126	Killmister	Private
127	Brewis	Private
128	Lyons	Private
129	Campbell	Private
130	Hobbs	Wombelano Landcare Group
131	Schedlich	Private
132	Bibby	Stawell Branch VFF
133	Morris	Private
134	Levey	Brimpaen Landcare Group
135	Cole	Midway Afforestation Investment Service Pty Ltd
136	Hoffmann	Hindmarsh Shire Council
137	Shady	Private
138	Cuming	Private
139	Cooper	Private
140	Martin	Australian Almond Improvement Society
141	Ziccone	Sporting Shooters' Association of Australia (Victoria)
142	McGrath M.P.	Minister for Agriculture Department of Agriculture, Energy and Minerals

APPENDIX B
PUBLIC HEARINGS

List of witnesses who presented evidence to the Environment and Natural Resources Committee at Public Hearings.

WANGARATTA PUBLIC HEARING
Wednesday, 15 March 1995

Mrs H R Smith	Private, Picola
Mr T Mannion	Nathalia-Picola Branch VFF
Mr J Killmister	Private, Picola
Mr M Waser	Private, Numurkah
Mr S C Brown	Private, Nathalia
Mr W C Chandler	Private, Picola
Mr I D Quarrell	Private, Picola
Mr T Muir	Private, Picola
Mr J Gehrig	John Gehrig Wines, Oxley
Mr K C Campbell	Private, Wangaratta
Mr M Boothby	Boorhaman and District Landcare Group
Mr R A C McDonald	As above
Mr D J O'Donoghue	As above
Mr M Lowry	As above

ARARAT PUBLIC HEARING
Tuesday, 4 April 1995

Mr D A Keith	Private, Elmhurst
Mr P Forster	Private, Ararat
Mr D Clark	Lexton Landcare Group
Mr R J Muller	As above
Mr A H Briody	As above
Mr D Marshall	Ararat Branch VFF
Mr C J Bibby	Stawell Branch VFF
Mr M McRae	Montara Wines, Ararat
Mrs P Morris	Private, Ararat

HORSHAM PUBLIC HEARING
Wednesday, 5 April 1995

Mr G T Tippett	Private, Horsham
Mr G A Ampt	Western Victorian Cockatoo Control Committee
Mr S R Hobbs	Harrow Branch VFF
Mr M Schedlich	Private, Harrow
Mr W R Anson	West Wimmera Shire Council
Mr R R Hawkins	As above
Mr D C Hobbs	Wombelano Landcare Group
Mr I Smith	Horsham South Branch VFF
Mr J D McQueen	Wimmera Branch VFF
Mr J F Close	Private, Coleraine

HAMILTON PUBLIC HEARING
Thursday, 6 April 1995

Mr P J Dark	Mirranatwa Landcare Group
Mr T Napier	As above
Mr J C Lyons	Private, Coleraine
Mr T G Evans	Private, Hamilton
Mr G G Brewis	Private, Hamilton
Mrs C K S Hindhaugh	Private, Balmoral
Mr D J Jenkinson	Private, Glenthompson

MELBOURNE PUBLIC HEARING
Monday, 1 May 1995

Mr G Goode	Telstra Research Laboratories
Dr J Auty	Private, Flemington
Mr A D Balharrie	Private, Daylesford
Mr P N Jobling	Northern Victorian Fruit Growers Association
Mr A M Cross	As above
Mr D Lane	As above
Ms C Hull	Freedom For Birds Inc.
Mrs S A G Andersson	As above

MELBOURNE PUBLIC HEARING
Monday, 8 May 1995

Mr R Hoser	Private, Doncaster
Mrs L Gillespie	Private, Kingower
Mr M P Flanagan	Private, Bacchus Marsh
Mrs H Jindra	Private, Vermont South
Mr D M McLaren	Australian Nut Industry Council
Ms C de Fraga	Australian and New Zealand Federation of Animal Societies
Ms G Oogjes	As above

MELBOURNE PUBLIC HEARING
Monday, 5 June 1995

Mr M R Kitchell	Department of Conservation and Natural Resources
Hon W D McGrath MP	Minister for Agriculture
Mr K Dowsley	Department of Agriculture, Energy and Minerals

APPENDIX C
INSPECTIONS

Inspections conducted by the Environment and Natural Resources Committee, 1994-1995.

BOORHAMAN/WANGARATTA INSPECTION
Friday, 9 December 1994

Location:	Boorhaman District
Briefing:	Mr R A C McDonald, Mr M Lowry, Mr M Boothby, Mr D J O'Donoghue and members of the Boorhaman and District Landcare Group

ARARAT DISTRICT INSPECTION
Tuesday, 4 April 1995

Location:	Mt Chalambar Winery, Ararat
Briefing:	Mr M McRae and Mr T Mast
Location	Lake Fyans Caravan Park, Lake Fyans
Briefing	Mr J McGuire, Department of Conservation and Natural Resources (DCNR)

HORSHAM DISTRICT INPECTION
Wednesday, 5 April 1995

Location:	Horsham District
Briefing:	Mr J McGuire, Mr I Voigt, and Mr D Venn, DCNR Mr K Bormann, Parks and Gardens, Rural City of Horsham

MORNINGTON PENINSULA INSPECTION
Wednesday, 19 April 1995

Location:	Tuck's Ridge Winery, Red Hill South
Briefing:	Ms D Graham, Tuck's Ridge Winery Mr S Strange, Tuck's Ridge Winery Mr G Rees, TESCA
Location:	Morning Cloud Winery
Briefing:	Mr Peter Maxwell

APPENDIX D
SELF-REPORTED FINANCIAL ESTIMATES OF DAMAGE

The data presented in this Appendix are extracted from submissions made to the Environment and Natural Resources Committee. As an indication both of stakeholders' perceptions of costs attributed to bird damage, and of the range and variability of such costs, the Committee considers the data to be of important documentary value.

The Environment and Natural Resources Committee must emphasise, however, that the information is indicative rather than definitive. The Committee was frequently not informed of the bases of the calculations, of the reasons for including or excluding certain costs and revenues, and of other factors that might have contributed to or exacerbated losses. It is not possible to compare the information within and between regions and under no circumstances should the data be used as a basis for any local, regional or State calculation of bird damage 'losses'.

The data remain as they were intended by those making submissions: self-reported information designed to provide some appreciation of the economic scale of bird damage problems in Victoria. The Environment and Natural Resources Committee thanks those who provided such information.

Note
'Sub No' refers to Submission Number; also in this column will be found references to Public Hearings at which data were presented; these take the form Melb and a date, indicating the location and day of the Public Hearing.

1. FRUIT AND VINE LOSSES

SUB NO	LOCATION	DAMAGE TYPE	Total ($)
89	Benalla	Vine damage; three year total	14 000

2. NUT LOSSES

SUB NO	LOCATION	DAMAGE TYPE	Total ($)
57	Toolangi	Hazelnuts (600-1000 kg)	5000
Melb 8.5.95	Various*	Hazelnuts (1.8 tonnes)	6500
	Various*	Pistachios (6 tonnes)	35 000
	Various*	Chestnuts (30 tonnes)	150 000
	Various*	Walnuts (51 tonnes)	204 000
	* Data supplied	by the Australian Nut Industry Council	

3. GRAIN CROP LOSSES

SUB. NO.	LOCATION	SIZE	TYPE O: Oats W: Wheat	ESTIMATES OF COSTS ($)					
				Grain Loss	Scaring Costs	Time/ Labour Cost	Stock Feed Loss	Other	Total
32	a. Boorhaman	12 acres	O W	1569	130				1699
	b. Boorhaman	58 acres	O W	5400					5400
	c. Wangaratta	40 acres	O	4000					4000
	d. Rutherglen	100 ha	O W	5450			1660	2800	9910
	e. Wangaratta	4 acres	N/A	800	125		200		1125
	f. Boorhaman	8 tons	O	1600					1600
	g. Peechelba East	17 acres	O W	1540					1540
	h. Peechelba East	20 acres	W	2160	1000				3160
	i. Wangaratta	3 acres	O W	575	168	449	800	1440	3432
	j. Rutherglen	25 acres	O W	2100	65				2165
	k. Rutherglen	26 acres	O W	5755	130	500	600		6485
	l. Wangaratta	25 acres	W	3000	125	300			3425
	m. Wangaratta	9 acres	O W	1210	130				1340
42	Euroa	N/A	O	5000					5000
50	Picola	120 ha	N/A	1300	1250	5000			7550
55	Harrow	N/A			973	2600			3573
65	VFF Melbourne	N/A	O	14 000					14 000
84	a. Navarre	75 acres	O	4710	93	912			5715
	b. Navarre	170 acres	O W						11 060
93	Telangatuk East	17 ha.	O	6100	326	2425			8851
117	Coleraine	142 acres	N/A	16 472					16 472
118	a. Telangatuk E.	10 acres	N/A	1000	326	720			2046
	b. Telangatuk E.	8 acres	O	990	130	625			1745
	c. Telangatuk E.	6 acres	W	920	465	955			2340
	d. Horsham	2.5 ha	N/A	1000	250	50			1300

4. ORCHARD LOSSES

SUB. NO	LOCATION	DAMAGE TYPE	Total ($)
104	Goulburn Valley	Regional estimates of losses	$2-3 m.
106	Shepparton	Orchard	3000
Melb 1.5.95	Goulburn Valley	89 Orchards	477 070

5. RED CEDAR/BUILDING LOSSES

SUB. NO	LOCATION	DAMAGE TYPE	Total ($)
13	Bonnie Doon	Redwood garden furniture; handrail; veranda posts	1880
57	Toolangi	Red cedar door and window frames	5000

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