PP 219/71

Interim Report from the
House of Representatives Select Committee
on Wildlife Conservation

CONSERVATION AND COMMERCIAL EXPLOITATION OF KANGAROOS

November 1971

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA
1971—Parliamentary Paper No. 219

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA
1971—Parliamentary Paper No. 219

Interim Report from the
House of Representatives Select Committee
on Wildlife Conservation

CONSERVATION AND COMMERCIAL EXPLOITATION OF KANGAROOS

November 1971

Brought up and
ordered to be printed 23 November 1971

COMMONWEALTH GOVERNMENT PRINTING OFFICE
CANBERRA: 1972

First published 1971
Reprinted 1972

PERSONNEL OF THE COMMITTEE

Mr E. M. C. Fox, M.P. (*Chairman*)

Mr R. N. Bonnett, M.P.

Mr S. E. Calder, M.P.

Mr F. W. Collard, M.P.

Dr H. A. Jenkins, M.P.

Mr M. J. R. MacKellar, M.P.

Mr R. H. Sherry, M.P.

Clerk to the Committee:
Mr T. J. P. Richmond

Printed by Authority by the Government Printer of the Commonwealth of Australia

CONTENTS

15475/72—2

CONTENTS—continued

Recommendations

The Committee, finding that none of the larger species of kangaroo is under present threat of extinction and that there is no requirement for a total ban on the commercial exploitation of kangaroos, recommends:

1. That controls over the harvesting of kangaroos must at all times rest with governments. (Para. 103)
2. That the Commonwealth Government should approach the State Governments with a view to obtaining greater uniformity of laws relating to the taking of kangaroos. (Paras. 44; 103)
3. That the Commonwealth Government recommend to the State Governments that, where not already in effect:
   (i) limits to the numbers of kangaroos to be taken be established, having regard to seasonal conditions. (Para. 103)
   (ii) a policy of declaring from time to time areas to be spelled from harvesting of kangaroos be adopted. (Para. 103)
   (iii) a tagging system be adopted to control trading in kangaroo meat and skins. (Para. 52)
   (iv) kangaroo shooters be issued licences on an annual quota basis for both full-time and part-time shooters. (Para. 52)
   (v) a royalty be paid on each kangaroo shot for commercial use, and that such royalties be applied by the States to the conservation of wildlife. (Para. 52)
   (vi) permits be issued to graziers to allow the culling of excess kangaroo populations and that they be permitted to sell the meat and skins. Where these are sold royalties should be paid. (Para. 167)
   (vii) pet food manufacturers using kangaroo meat in their products be obliged by regulation to indicate this on their packages. (Para. 147)
4. That Customs regulations relating to the export of live fauna should be liberalised to allow kangaroos to be collected and reared by Australian zoos for export to approved overseas zoos. (Para. 118)
5. That regulations controlling the export of kangaroo skins should be administered to ensure that local requirements by Australian manufacturers are adequately met. (Para. 115)
6. That the Commonwealth Government offer financial assistance to the States for:
   (i) the acquisition of land for the creation of national parks and wildlife reserves for kangaroos and other native fauna. (Paras. 31; 198)
   (ii) research into the biology and ecology of kangaroo species. (Para. 179)
   (iii) the provision of increased staff for management, inspection and control of kangaroo and other wildlife populations. (Para. 103)
7. That recommendations concerning action suggested to State Governments be referred to the Fauna Authorities Conference.
8. That recommendations made to State Governments be implemented by the Commonwealth Government in its own Territories.

The Committee, in conclusion, would emphasise the need for more research into the biology and ecology of kangaroo species and other native fauna by the appropriate State and Commonwealth authorities.

A. Introduction

GENERAL

1. This interim report of the House of Representatives Select Committee on Wildlife Conservation is confined to the kangaroo aspects only of term of reference 1 (d). The commercial exploitation of other forms of wildlife covered by that term of reference will be dealt with in the final report of the Inquiry which will cover all terms of reference. Matters covered by other terms of reference of the Inquiry are discussed in this report only insofar as they relate to kangaroos.

2. The development of an industry based on the processing of kangaroo meat has met with increasing opposition and has led to increased public concern being expressed on wildlife conservation matters generally.

3. The opposition to commercial exploitation of kangaroos has been reflected in increasing pressure on the Parliament by conservationists who have called for action to ensure their protection. Individual Members and Senators have received many letters on the subject and a very sharp rise in the number of petitions presented to Parliament has occurred.

4. On 12 May 1970 Mr E. M. C. Fox, MP presented a petition from certain residents of Victoria praying that the export of all kangaroo products be banned immediately. Mr Fox informed the House that he proposed to take action in connection with the petition and moved for its printing. On 14 May 1970, on the motion of Mr Fox, the House of Representatives resolved:

(1) That a Select Committee be appointed to inquire into and report on—
  (a) The need for an urgent and comprehensive survey of wildlife populations including birds, mammals of the land and water, and reptiles, and their ecology to enable conservation measures to be effectively applied to threatened species;
  (b) The adequacy of the several systems of National Parks, Reserves, etc., of the States and Territories to ensure that at least minimum areas of the major animal habitats and the wildlife of the continent are preserved, held securely, and are properly managed in the national interest;
  (c) The effects of pollution and the widespread use of pesticides on wildlife population;
  (d) The effect on the population of kangaroos of the trade in meat and hides and the effect of other industrial exploitation on wildlife;
  (e) The need for international and interstate agreements for the effective conservation of migratory animals;
  (f) The threat presented to wildlife by the large numbers of domestic animals gone wild, particularly in Northern Australia, and
  (g) The need for a Commonwealth wildlife conservation authority.

(2) That the committee recognise the control in these matters exercised by the States and seek their co-operation in all relevant aspects.

(3) That the committee consists of seven members, four to be appointed by the Prime Minister and three to be appointed by the Leader of the Opposition.

(4) That every appointment of a member of the committee be forthwith notified in writing to the Speaker.

(5) That the Chairman be appointed by the Prime Minister.

(6) That the Chairman have a deliberative vote, and, in the event of an equality of votes, also have a casting vote.

(7) That the Chairman of the committee may from time to time appoint another member of the committee to be Deputy Chairman, and that the member so appointed act as Chairman of the committee at any time when the Chairman is not present at a meeting of the committee.

(8) That the Deputy Chairman, when acting as Chairman, have a deliberative vote and, in the event of an equality of votes, also have a casting vote.

(9) That the committee have power to send for persons, papers and records, and to move from place to place.

(10) That the committee report to the House as soon as possible.

(11) That the foregoing provisions of this resolution, so far as they are inconsistent with the standing orders, have effect notwithstanding anything contained in the standing orders.

5. On 4 June 1970 the Speaker informed the House that Mr R. N. Bonnett, Mr S. E. Calder, Mr E. M. C. Fox and Mr M. J. R. MacKellar had been appointed as members of the Committee by the Prime Minister, and that Mr F. W. Collard, Dr H. A. Jenkins and Mr R. H. Sherry had been appointed by the Leader of the Opposition. The Prime Minister appointed Mr E. M. C. Fox as Chairman, and Dr H. A. Jenkins was appointed Deputy Chairman by Mr Fox.

ASSISTANCE FROM STATE PREMIERS

6. The Committee, obliged by its second term of reference to recognise control by the States in wildlife conservation matters, advised each of the State Premiers of its establishment and terms of reference, and sought their assistance in the Inquiry. All Premiers offered to assist the Committee and nominated officers for this purpose. The Committee subsequently received evidence and guidance from officers of various Departments in each State and records its appreciation of their valuable assistance in furthering the Inquiry.

ASSISTANCE FROM COMMONWEALTH DEPARTMENTS, PRIVATE ORGANISATIONS AND PRIVATE CITIZENS

7. The Committee invited Commonwealth Departments and instrumentalities, known private conservation organisations and individual conservationists with interests within the terms of reference of the Inquiry, to present submissions, comments or advice. In addition, the Committee advertised widely in the daily press and specialist publications inviting submissions from interested organisations and/or persons.

SUBMISSIONS

8. The Committee received nearly 500 replies to its request for submissions and these varied in nature from extensive, well documented submissions covering all terms of reference to letters from private citizens supporting the aims and objectives of the Inquiry. A large proportion of the submissions concerned the kangaroo issue.

TECHNICAL ASSISTANCE

9. The Australian Conservation Foundation agreed to its Deputy Director, Dr J. G. Mosley, providing technical assistance in relation to the National Parks aspects of the Inquiry.

10. The late Dr F. N. Ratcliffe, OBE, a former Chief of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Division of Wildlife Research, was appointed as Technical Adviser on wildlife matters. Dr Ratcliffe's untimely death in December 1970, was a great loss, not only to the Committee in its Inquiry, but also to wildlife conservation in Australia.

MEETINGS AND INSPECTIONS

11. An extensive series of public hearings and field inspections have been achieved covering all States and the Northern Territory. Some 6,000 pages of evidence have been taken both at formal public hearings and in the field, a considerable proportion of which has related to the kangaroo issue. In addition, more than 80 exhibits have been included in the Committee's records, a considerable proportion again relating to the kangaroo issue.

B. The Need for a Special Report on Kangaroos

GENERAL

12. The Committee was given full and comprehensive terms of reference. However, it soon became evident that the question of the commercial exploitation of kangaroos was assuming more than a proportionate share of public interest in the Inquiry. There was a tendency in certain quarters to identify the Committee solely with the kangaroo problem: great emphasis was given to the urgency of the kangaroo situation and the need for immediate remedial measures.

13. Many ecologists and others advised the Committee that to look at any one group of animals in isolation is undesirable. However, the Committee agrees with the view that

> to the great majority of Australians wildlife means kangaroos, first and foremost, and wildlife conservation means looking after kangaroos.[1]

The Committee, in view of both the pressure for guidance on the kangaroo issue, and the fact that the completion of its Inquiry into all terms of reference would take considerable time, decided therefore that the presentation of an interim report on kangaroos was warranted.

THE SCOPE OF THE PRESENT REPORT

14. This report relates to those species of kangaroo which are commercially exploited for their meat, skins and hides. It excludes smaller species of kangaroos which may be under threat of extinction for reasons other than commercial harvesting.

15. Consideration of only the commercially exploited species confines the report to the following species:

The Red Kangaroo (*Megaleia rufa*)
The Eastern Grey Kangaroo (*Macropus giganteus*)
The Western Grey Kangaroo (*Macropus fuliginosus*)
The Euro (*Macropus robustus*)

Commercial exploitation also includes a number of wallaby species harvested for their hides only, namely, the Whiptail, Brush, Swamp, Sandy, Bennetts and Rufous Wallabies. These species were seldom referred to in evidence before the Committee.

16. The Committee found that a wide diversity of opinion existed on the issue. Many kangaroo conservationist groups, both by submissions to the Committee and by petitions to the Parliament, claimed that the larger species of kangaroo commercially harvested are on the verge of extinction, and unless such harvesting is stopped, kangaroo numbers will fall to levels from which recovery will not be possible.

17. This claim has not been supported fully by other groups concerned with the kangaroo issue. Wildlife authorities, pastoralists and graziers and the kangaroo industry alike, informed the Committee that none of the larger species of kangaroo is in danger of extinction. Some wildlife scientists suggested that kangaroo numbers

[1] Ratcliffe, F. N., *The Commercial Hunting of Kangaroos*, Occasional Publication No. 4, Australian Conservation Foundation, Melbourne, 1970, p. 4.

now are far in excess of the levels existing at the time of European settlement of Australia. An exception is the Forester Kangaroo in Tasmania, a sub species of the Eastern Grey, which is threatened because of habitat loss.

18. Evidence was given that a number of smaller species are either threatened with extinction or thought to be extinct including the Parma Wallaby (*Macropus parma*), the Toolache Wallaby (*Macropus greyi*), the Eastern Hare Wallaby (*Lagorchestes leporides*) and Lesueur's Rat Kangaroo (*Bettongia lesueur*). It is significant that none of these species has been utilised commercially.

19. There have been numerous complaints from the general public that by contrast with the position years ago it is now rare to see kangaroos in the wild, close to settled areas. Many tourists have complained of having travelled widely throughout Australia without seeing a kangaroo. Evidence was given that Australian native fauna is largely nocturnal in nature. This was illustrated during the Committee's visit to Tuttaning Reserve in Western Australia, a research reserve of some 4,000 acres. During an afternoon tour of the reserve the Committee saw no wildlife at all. At night, aided by spotlights operated by the research staff of the Western Australian Department of Fisheries and Fauna, more than 200 sightings covering 10 different species were made. Without spotlights very few animals, if any at all, would have been seen.

20. Mr Vincent Serventy, a noted Australian conservationist, pointed out:

> For the average Australian any population of kangaroos which is hunted has become visually extinct. He will not be satisfied with census figures which indicate there are still kangaroos in the bush. As far as he is concerned they are gone.[1]

21. The Committee has been made very much aware of the general lack of knowledge about wildlife ecology. This applies even in the case of kangaroos which have probably been more intensively studied than any other species of Australian wildlife. It is apparent to the Committee that there is a paucity of scientific fact and a surfeit of scientific and other opinion on kangaroos. Professor G. B. Sharman of Macquarie University, advised the Committee:

> If any of the scientists have told you that they are dealing with scientific facts in this whole confused kangaroo situation, they are wrong; because nobody knows the facts.

THE NATURE OF EVIDENCE

22. The Committee early in the Inquiry determined that representatives of each field of interest in the kangaroo issue should be invited to appear at public hearings in order to make their views known. As a result, the Committee has been confronted with often contradictory evidence, much of which was of a subjective nature.

23. The kangaroo, as one of the emblems on the Australian coat of arms and our best known form of wildlife, evokes an emotional response. Consequently, the fact that this animal is slaughtered in large numbers for pet food is a moral issue for many people. Even if it could be proved that with proper management kangaroos are a sustainable resource, many would still oppose the killing of kangaroos for profit.

24. By contrast, many pastoralists and graziers regard kangaroos as vermin which directly compete with stock for feed and water and inflict damage to their properties.

---

[1] Serventy, V., 'Kangaroos and the General Public', *The Australian Zoologist*, Vol. XVI, Part 1, 1971, p. 85.

15475/72—3

25. The tourist industry in general regards wildlife, and particularly the kangaroo, as an extremely important tourist attraction and wishes to see adequate numbers of kangaroos to meet this need. The Kangaroo Industries Association claims that its operations are self-regulatory, in that the economics of the industry cause shooting to be discontinued in harvest areas before kangaroo numbers are reduced to danger levels. Some evidence indicated that experiments in commercial farming of kangaroos are being undertaken.

26. Wildlife scientists and State Government fauna departments in their evidence, generally agreed that there is no basis for any claim that the larger species of kangaroos are presently under any threat of extinction, although in some specific areas over-harvesting may have occurred.

27. The spectrum of opinion covered by the evidence ranges from that of extreme preservationists who do not want kangaroos shot under any circumstances, to those who advocate exploitation of the kangaroo as a renewable economic resource. The task of this Committee has been to consider the issues involved and to arrive at recommendations based on the evidence submitted.

C. Ecology of the Kangaroo

GENERAL

28. The Committee found that a knowledge of kangaroo ecology is a prerequisite to an understanding of sound conservation measures. A section containing details of the more important aspects of kangaroo ecology is contained at Appendix 1.

29. Much misunderstanding exists about the larger kangaroos. The spread of grazing and pastoral activities and the associated provision of watering points has led to an overall increase in their numbers. This development, however, has resulted in the extinction or threatened extinction of many smaller marsupials. The Committee is concerned that many conservationists have misdirected their attention to the larger species.

30. The kangaroo has no predators of significance other than man, but seasonal conditions, particularly drought, have a very marked effect on kangaroo populations and the Committee finds that any control measures must take these factors into account.

31. The Committee found that little detailed knowledge exists about the degree of competition between kangaroos and stock for feed and water, what constitutes a safe harvesting rate to ensure kangaroo numbers do not decline, and accurate methods of assessing changes in populations or population structures. Research which has been carried out tends to be related to particular circumstances and conditions and does not necessarily have overall applicability.

The Committee recommends that the Commonwealth Government offers financial assistance to the States for research into the biology and ecology of kangaroo species.

D. Commercial Exploitation

THE ISSUES

32. Two principal issues have arisen concerning commercial exploitation of kangaroos first, what might be termed a moral objection of feeding native fauna to pets; and, second, the assertion that uncontrolled harvesting must inevitably lead to extinction of the species being exploited.

HISTORY OF EXPLOITATION

33. Harvesting of kangaroos for their skins has been carried out for a considerable period. However, the sale of kangaroo meat is of much more recent origin and became significant only from about 1958. The trade corresponded with a decline in the export of rabbits as a result of myxomatosis; early techniques and equipment were adapted from the rabbit industry.

34. Initially skins of kangaroos shot for meat were seldom utilised and the meat from those shot for skins was discarded. With the expansion of the industry, the skins of kangaroos harvested primarily for meat are also taken for processing. However, a number of witnesses considered that there is still a degree of wastage between the skin and meat users and there is room for more efficient utilisation of animals harvested.

35. The total numbers of kangaroos killed for meat and skins for both the home and the export markets is difficult to assess. Exports, however, are subject to Department of Customs and Excise approval and annual export figures for meat and skins are available from the Commonwealth Bureau of Census and Statistics.

36. The difficulty of assessing the extent of local trade lies in the fact that statistics can be collated efficiently only at the point of marketing and this is not necessarily the point of harvest.

37. Kangaroo skins have always been articles of commerce. The skins make very good leather which is used in the manufacture of shoes, gloves and garments. They are also made up by the fur trade as bags and souvenirs, rugs, vests and coats.

38. The scale of kangaroo harvesting for meat increased very greatly in 1958 and 1959 with the development of markets in Europe and Asia for kangaroo meat for human consumption and pet food. In 1960–61, of a total export of 6mlb, 3½mlb of meat was exported to Germany. Markets have fluctuated largely as a result of changes in import regulations in importing countries, but after a fall in 1961–62 to 2½mlb, exports built up to 8½mlb in 1966–67. Exports have decreased markedly from this peak and in 1970–71 totalled only ½mlb. The table at Appendix IIA shows the fluctuations in the quantity of meat and skin exported from Australia between 1954–55 and 1970–71. Kangaroo meat exports are not included in total meat exports recognised by the Australian Meat Board and represent less than 1 per cent of domestic meat exports. The table at Appendix IIB shows the proportion of kangaroo meat exports to total meat exports from 1965–66 to 1970–71.

39. The local demand for kangaroo meat as pet food is not known but has been assessed as the equivalent of at least half a million kangaroos a year.

40. The development of processing of kangaroos for meat, predominantly pet food, and the resultant publicity have given rise to the demands by conservationists and protectionists that the slaughter of 'the national emblem' must stop.

41. The Kangaroo Industry Association emphasises that its members have the most to lose if kangaroo numbers decline, and that there is a natural safeguard in that long before kangaroos could become extinct in an area it would have become commercially unprofitable to harvest them. The Association has assured the Committee that it welcomes legislation regulating the harvesting of kangaroos.

42. In assessing the effect of the kangaroo meat industry on kangaroo populations, it must be remembered that knowledge of kangaroo ecology was very limited when the industry began to expand. The industry in Queensland and New South Wales began at a time when kangaroos were unusually abundant and the critical effects of drought were not recognised.

43. CSIRO research has stated that in New South Wales, where the industry initially was strongest, kangaroo populations were seriously depleted between 1961 and 1965. The industry, in order to sustain itself, had, by 1966, moved into Queensland and Western Australia where numbers taken grew rapidly. From 1965 the New South Wales Government, concerned at the apparent decline in numbers, began to impose controls over harvesting. Queensland and Western Australia have now followed this example by introducing regulations aimed at maintaining a controlled kangaroo industry.

44. Measures to control exploitation vary quite considerably between States. New South Wales and Western Australia have both adopted a tagging system, but differ on where the point of control should apply. Western Australia has applied it to the shooter and New South Wales to the processor. Queensland exercises control through the licensing of shooters and chiller boxes. The attitudes and approaches of the Commonwealth and State Governments are set out in more detail in the section 'Policies, Legislation and Attitudes of the States and Commonwealth on Commercial Exploitation of the Kangaroo.'

The Committee recommends that the Commonwealth Government should approach the State Governments with a view to obtaining greater uniformity of laws relating to the taking of kangaroos.

THE INDUSTRY

45. The sale of kangaroo skins has long been a source of extra income for many landholders, casual shooters, station hands, and others. However, the regular occupations of these people meant that they could devote only a limited amount of time to shooting. The expanding market for meat could only be met by more regular harvesting and professional shooting being developed, for meat or skins or both. Professional skin shooters usually operate only in the winter months when skins are of better quality, but the meat shooter can operate all year round.

46. The combination of shooting for both meat and skins since the late 1950s has had a greater effect on kangaroo populations than the former practice of shooting for skins only. It is generally accepted by wildlife scientists that in New South Wales and Queensland, when the industry was first established, kangaroos were in abnormally

high numbers due to a succession of good seasons. This meant that graziers and the Governments concerned welcomed the industry as a cheap means of reducing the pest from plague proportions.

47. However, the industry initially was based on chiller boxes located in country towns, and the reduction of kangaroos did not necessarily occur in those areas where the animals were in pest proportions, with the result that overharvesting occurred in some areas. In addition, a large number of part-time shooters seeking to supplement their incomes was attracted to the industry. Part-time shooters were also localised, tended not to be concerned with the long term future of the industry, and contributed to overharvesting in their particular areas.

48. The States differ in their attitudes to professional and part-time shooters. Queensland, for instance, makes no distinction, whereas Western Australia, under its new regulations has licensed only professional shooters.

49. Well established shooters normally operate at night using spotlight equipped four-wheel drive vehicles and high powered rifles with telescopic sights. They make arrangements with property holders who allow them to operate on their land, although not all property owners allow shooting to take place on their properties.

50. Discussions with shooters and chiller box operators during field inspections made by the Committee in Queensland revealed that shooters on any given night may travel more than 100 miles, and usually operate on or close to roads or tracks.

51. Evidence given to the Committee indicated that the use of spotlights and telescopic sights by professional shooters was the most humane method of killing kangaroos. Pouch young incapable of supporting themselves are killed. The head, paws, feet, tail and viscera of the animal are removed in the field, and at the conclusion of the night's shooting the carcasses are taken to a chiller box, which is emptied periodically and the contents delivered to a boning-out works. Shooters are normally paid on the basis of the carcass weight (including the skin), the payment varying from 4 cents to 9 cents per pound.

52. Kangaroo meat may be sold as fresh pet meat, in frozen meat packs, or be processed into canned pet food. Some of the skins produced are used by local tanneries, but most are exported in the uncured state to be processed by overseas tanners.

The Committee recommends that the Commonwealth Government approach the State Governments recommending that: where not already introduced, a tagging system be adopted to control trading in kangaroo meat and skins; that kangaroo shooters be issued licences on an annual quota basis for both full-time and part-time shooters; and that a royalty be paid on each kangaroo shot for commercial use, and that such royalties be applied by the States to the conservation of wildlife.

E. Policies, Legislation and Attitudes of the States and the Commonwealth to Commercial Exploitation of the Kangaroo

GENERAL

53. The State Governments and the Commonwealth Government within its Territories exercise control over wildlife within their borders. However, policies and legislation on kangaroos vary considerably between governments.

QUEENSLAND

54. In Queensland all native fauna in its natural environment is the property of the State. Fauna policy is administered by the Fauna Branch of the Department of Primary Industries.

55. Before 1917 kangaroos were considered only as pests and between the years 1877 and 1917 £1m was paid in bounties for 26 million scalps. During the next forty years a marsupial skin industry developed and for the thirty years up to 1950 it is estimated that annual harvest was about 350,000 kangaroos.

56. From 1950–60 the annual harvest of kangaroos was about 400,000. In 1959 the utilisation of kangaroos for meat as well as skins began, and by 1965 35 per cent of the harvest served this dual purpose. For the years 1961–65 the total harvest was nearly 4 million, and for 1965–70 about 4½ million, some 65 per cent of animals being used for both meat and skin. The ratio of reds to greys during this whole period was about 1 : 3. The table at Appendix III shows the fluctuation in the size of the total harvest of marsupials in Queensland from 1954–70 and the percentage of each species to the total harvest for the same period.

57. Prior to 1970 there was little control over the killing of kangaroos. As long as shooters had the required licence and sold the kangaroos through a licensed operator, no limitations as to size or quantity existed. This has been the case since 1954 when kangaroos had been brought under the provisions of *The Fauna Conservation Act of 1952*. Their status changed from that of vermin to that of protected animals, but open seasons on them could be declared. If the Government believes that kangaroos are under threat of extinction open seasons can be shortened or suspended. However, the Government's view has been that the area of natural cover available to both the reds and greys ensures their continued existence.

58. Early in 1970, as a result of mounting public pressure, and a belief that in some areas numbers had been drastically reduced, the Queensland Government introduced controls aimed at restricting the harvest. These controls provided for a reduction in the number of chiller boxes with a minimum distance of 50 miles between boxes.

59. Accordingly, in January 1970 the number of chiller boxes was reduced from about 180 to 87. One of the effects of this was to remove all major New South Wales operators from Queensland. Provision exists to reduce further not only chiller box numbers, but also their capacity.

60. The effects of the reduction in chiller numbers are difficult to assess. In the first three months of 1971 the harvest was down to 73,000, compared with previous levels

for that time of year of about 200,000. It could well be, however, that seasonal conditions played a significant part in this reduction as well as the reduction in the number of chillers.

61. Nonetheless, the fauna authorities in Queensland feel that this control combined with regular monthly samplings of the skulls of 1-2 per cent of the total kangaroo harvest in Queensland can determine both the age structure of the population in any region and the need for protective measures. The authorities divide kangaroos into three basic groups for this purpose; the under 3-year old group; the 4-9-year old breeding group (the most important); and the over 10-age group.

62. There is no minimum carcass weight enforced, although some companies impose a 25 pound weight limit.

63. Queensland has rejected the idea of a tagging system and the authorities have said that even if it were introduced it would be extremely difficult to police, especially since most fauna officers are primarily stock inspectors.

64. The authorities decided not to differentiate between part time and full time shooters in the regulations, and all are issued with licences under the same conditions. In 1970 some 2,000 licences were issued to shooters, 280 of whom described themselves as professional hunters. A royalty payment of 20 cents per carcass has to be paid by the shooters and this goes to consolidated revenue. All carcasses and skins delivered to a dealer have to be recorded by species and weight and the shooter's number noted by the dealer.

65. The value of the industry is estimated at the shooter/dealer level as being about $2m a year. This does not include the value of a range of ancillary services and in fact the kangaroo industry plays a significant role in the economy of some rural centres.

66. A peculiar feature of Queensland law is that shooting kangaroos (and other native fauna) with spotlights is illegal under *The Fauna Conservation Act of 1952*; yet no action is taken to prosecute offenders. The measure was introduced at a time when kangaroos were regarded as vermin and there was no kangaroo meat industry.

67. Mr C. R. R. Roff, Queensland Department of Primary Industries, informed the Committee that the development of the meat carcass industry led to its exploitation over a much wider region of the State, so that the increased production was gained from a much greater area than previously. The facts that access and economics prevented all kangaroos in an area being taken, and that many property owners do not allow shooting on their properties, were considered to be additional safeguards against kangaroos becoming extinct.

WESTERN AUSTRALIA

68. In Western Australia the Department of Fisheries and Fauna has the final responsibility with respect to fauna such as kangaroos.

69. The kangaroo meat trade in Western Australia began in about 1955 and initially concentrated on the reasonably accessible western grey. Evidence suggests that the total kill of greys may have reached 40,000 to 50,000 a year before 1969 when major

commercial operations with this species ceased as a result of over-exploitation and encroachment on habitat by agricultural development. The potential for further extensive and sustained commercial exploitation of this species no longer exists.

70. The red kangaroo has, however, always been regarded as the cornerstone of the industry in Western Australia. Before 1967, when records were first kept, the harvest was probably between 100,000 and 150,000 a year. However, there was a rapid increase in harvesting after 1967, largely due to over-exploitation and drought in eastern Australia. The harvest increased to 173,000 in 1967, 174,000 in 1968, 344,000 in 1969 and 390,000 in 1970.

71. Concern with this rapid increase in the numbers harvested led to studies indicating that in selected areas over-exploitation was taking place, a trend which was shown mainly by falling carcass weights. The data indicated that given the right combination of price and weather, rapid increases in exploitation can take place, independent of a change in total kangaroo population. The Department took the view that continued uncontrolled exploitation would result in:

(*a*) reduction of existing field populations to fugitive remnants of inaccessible marginal areas of habitat; and
(*b*) the collapse of the kangaroo trade.

72. The undesirable effects of these factors would be that fugitive populations may be vulnerable to induced mortality from other causes, and their decline would represent the loss of a productive and unique resource. Further, the authorities believed it unlikely that the loss would appreciably effect the economic position of the pastoral industry—it would represent the squandering of a national asset.

73. The Western Australian Government's introduction of controls in 1971 is based on the concept of optimisation of the total value of a natural resource. Controlled exploitation it is considered, can help resolve the conflicts associated with populations on the open range and still lead to the retention of these populations. The Western Australia Department of Fisheries and Fauna noted:

> In this respect the kangaroo trade may be viewed as a tool of management.

74. The controls on exploitation in Western Australia came into operation in February 1971 and initially were aimed at reducing the annual rate of commercial harvesting to approximately 200,000 a year. Significant changes in the composition of populations being exploited can then be assessed.

75. The new regulations regard the shooter as the basic 'operator' and have limited both the number of shooters and their tag quotas—forty-three licences giving each holder 4,000 tags, and eight licences giving each holder 2,000 tags have been issued. A royalty of 10 cents applies to each tag.

76. Property holders have the right to destroy as many kangaroos on their properties as they wish, but they are not permitted to trade in the skins or carcasses unless issued with tags. They are, in practice, dependent on professional shooters who will be prepared to operate only if the number and size of kangaroos justify it.

77. The decision to allow only full-time professional shooters to operate is based on the belief that, since their livelihood depends on the continuation of the industry, they will act responsibly. The Department also hopes that professional shooters will

be more mobile than part time shooters could be, and will move on to new locations rather than overshoot in particular areas. No carcass weight limit is imposed although it is in the interests of a shooter, since he is limited to 4,000 tags, to shoot the largest animals possible.

NEW SOUTH WALES

78. The National Parks and Wildlife Service is the principal Authority involved in controlling the commercial harvesting of kangaroos in New South Wales. The kangaroo meat industry commenced in New South Wales in 1956.

79. The kangaroo population in New South Wales fell during the early and mid 1960s, but the Service feels that this must be considered in relation to the large increase in kangaroo numbers which took place in the early 1950s.

80. By 1967 the Service was concerned about declining kangaroo numbers and imposed stricter controls on commercial operators. The issue of licences under Section 25 of the *Fauna Protection Act* 1948–1967, which enables the taking of kangaroos by property owners, was tightened. At the same time a royalty was imposed on each carcass sold commercially. During recent years there has been a substantial decline in Section 25 licences issued, a decline in the number of licensed shooters and a restriction in the number of licensed fauna dealers. Each dealer operates within a zone, the boundaries of which are altered from time to time to take into account population densities. Each shooter is also licensed to operate only in a prescribed zone. From time to time zones are spelled completely from shooting.

81. A tagging system came into operation in 1971, chiefly as a check on the geographic origin of animals. The tags are sold to dealers or shooters for a 20 cent royalty payment. The tags, with the Section 25 permit number, must be attached to all carcasses traded. The royalty payment goes to the National Parks and Wildlife Service. The shooter is required to provide a return of the number and type of kangaroos he has shot, and also the number of the Section 25 licence. The chiller operator and the skin dealer are also required to record this information.

82. Before kangaroos are allowed to be harvested from a property an inspection by an officer of the Service must take place. If the officer is convinced that kangaroos exist in such numbers as to cause economic loss to the property owner, a Section 25 licence is issued specifying the number of kangaroos that can be taken.

83. Increased staff has enabled the National Parks and Wildlife Service to assess more accurately the number of kangaroos which might be taken off a property, and to police the activities of operators. The Service believes that harvesting is now confined to culling excess numbers. It believes there is some evidence that numbers are increasing and that the level of harvesting may have to be raised, with areas currently closed to harvesting being reopened.

84. A minimum carcass weight of 42 lb is specified for red kangaroos, 25 lb for grey, i.e., with head, feet, tail and viscera removed. However, due to the difficulty of accurate assessment by shooters, and also because it may be better to take a cross section of the population when reducing numbers, there are doubts whether the minimum weight limit should be maintained. Spotlight shooting is legal.

85. Twenty dealers are licensed in New South Wales to trade in kangaroo meat. Seven of these operate entirely within the State and control forty-two chillers. The other thirteen import carcasses from Queensland.

86. The number of licensed shooters in New South Wales has declined from 282 in 1969 to 174 in 1971. Shooters who did not have a licence in December 1969 have not been issued with one since, except under special circumstances. Some graziers have licences, which means that if they can obtain a Section 25 permit, they can kill and sell kangaroos taken on their properties.

87. The kangaroo harvest in New South Wales for the past four years has declined with the fall in the number of shooters. 170,000 animals were taken in 1967; 71,000 in 1968; 44,000 in 1969; and 77,000 in 1970. The decline in 1968 coincided with the closing of a large part of the State to commercial harvesting. The decline in the number of licensed shooters probably reflects the reduced number of kangaroos available under Section 25 permits.

88. The National Parks and Wildlife Service sees the requirement that all sectors of the industry must be licensed and that licences can be revoked at any time as one of the major controls.

VICTORIA

89. The eastern and western grey and the red kangaroo all occur to some extent in Victoria. The conditions under which they can be killed are far more restrictive than in other States: only landowners with a legitimate complaint of damage caused by kangaroos can apply to the Department of Fisheries and Wildlife for the issue of a permit to destroy kangaroos.

90. The conditions under which a permit is issued are:

(a) no more than sixty animals may be destroyed per permit;

(b) the permit is valid for four months after issue;

(c) the permit is valid only on lands owned or occupied by the applicant—shooting is not permitted on adjoining crown land;

(d) each permit holder may appoint two agents to carry out the destruction;

(e) animals may be destroyed only by shooting;

(f) no portion of the killed animal other than skin and fur may be removed; and

(g) all skins taken for sale must be sold through authorised dealers and forwarded with the permit holder's name and address.

91. Large quantities of meat and skins from interstate are marketed in Victoria, which is also the main pet food processing centre. Some witnesses suggested in evidence that kangaroos shot in Victoria are being used in the pet food trade but they were unable to substantiate the claim. In 1967 about 10,000 kangaroos were shot under permit. Numbers taken have probably declined since then.

TASMANIA

92. The only large kangaroo species in Tasmania is the Forester, which is in fact the southernmost representative of the eastern grey kangaroo. This animal is fully protected and is not commercially exploited. Its habitat is restricted to the north east of

Tasmania where it is declining in numbers due to habitat loss as a result of agricultural development.

93. There is limited commercial exploitation of the commonly occurring Bennetts and Rufous wallabies. This, however, is confined to skins. A decision is made each year by the Fauna Authorities on the length of the open season. Skin dealers must be licensed.

SOUTH AUSTRALIA

94. The policy of the South Australian Department of Fisheries and Fauna Conservation is that commercial exploitation of a fish or fauna resource must be rational and regulated.

95. All kangaroos are protected in South Australia, permits being issued for their destruction only when they are known to be causing damage to pastures or property. To ensure that kangaroos can only be harvested in these circumstances, the Department is planning to introduce controls based on weight limits, tagging and registration of processors, chillers and shooters. As an interim measure a minimum carcass weight of 30 lb has been introduced.

96. Permits specify the species to be taken, and are issued to the station operator who then calls in a licensed shooter. The shooter is required to submit returns showing the number of kangaroos shot. The chiller operator buying from him is required to provide the same information.

THE COMMONWEALTH

97. The Commonwealth's powers in relation to kangaroo exploitation are confined to the Northern Territory and the Australian Capital Territory, and its control over exports.

NORTHERN TERRITORY

98. The red kangaroo is the only species which has been subject to commercial exploitation in the Northern Territory. However, due to the effect of over exploitation and drought there has been no harvesting since 1960.

99. The Northern Territory Administration gives partial protection to the kangaroo and supports the concept of controlled harvesting if kangaroos are in pest proportions. A pastoralist, if he feels that kangaroos are increasing to pest proportions, may apply for a licence in order to destroy. A licence will be granted only after inspection by a wildlife officer and will specify the number that can be taken.

100. Commercial harvesting is considered uneconomic at this stage due to the small size and relative inaccessibility of kangaroo populations. However it is believed numbers are now increasing and that in the future harvesting may occur again.

AUSTRALIAN CAPITAL TERRITORY

101. There is no exploitation of wildlife in the Australian Capital Territory.

CONCLUSIONS

102. The attitude of Fauna Authorities in general terms is that they have a dual responsibility to conserve wildlife and to ensure that relief can be given to landowners should wildlife numbers reach pest proportions. There is general agreement that at some times and in some places kangaroos reach pest proportions and reduction of their numbers is justified.

103. The Committee finds that, since it is wasteful to permit the destruction of a resource without utilising it as far as possible, the controlled harvesting of kangaroos and the utilisation of their meat and skins should be seen as a tool of management. The Committee emphasises that the interests of the kangaroo industry should be subservient to both the needs of conservation and the needs of the primary producer, and that exploitation should be controlled in such a way as to meet their needs rather than to guarantee a regular supply to the industry.

The Committee recommends that controls over the harvesting of kangaroos must at all times rest with governments; that the Commonwealth Government should approach the State Governments with views to obtaining greater uniformity of laws relating to the taking of kangaroos, to establishing limits to the numbers of kangaroos to be taken, having regard to seasonal conditions, and to adopting a policy of declaring from time to time areas to be spelled from harvesting of kangaroos; and that the Commonwealth Government offer financial assistance to the States for the provision of increased staff for management, inspection and control of kangaroo and other wildlife populations.

F. Commonwealth Control over Exports of Kangaroos and Kangaroo Products

INTRODUCTION

104. Constitutionally the Commonwealth has the power to control the export of fauna either alive or dead. It has similar powers over products made from fauna.

EXPORTS OF MEAT AND SKINS

105. Early in 1960 the Government decided not to restrict exports of kangaroo meat. The present position is that providing the exporter has a permit to export, issued by the relevant State fauna authority, and a Commonwealth Customs export licence, there are no restrictions on the export of either meat or skins.

106. The Department of Trade and Industry has a role in promoting the export of fauna and fauna products previously approved by the Department of Customs and Excise. The Department believes that conservation of fauna has absolute priority over commercial interests, but if approval for export is given by relevant authorities for the killing of kangaroos, then the Department is interested in gaining the maximum trade advantage from the export of kangaroo products. The Department also expressed its interest in the implications of continued harvesting from the point of view of tourism.

107. The Department of Primary Industry which is responsible for certifiying approved meat exports, has frequently been approached by representatives of the kangaroo industry seeking to have kangaroo meat brought under the Exports (Meats) Regulations to improve its acceptability overseas. The Department has refused to do so mainly because it could have no control over the manner in which carcasses were handled from the point of killing to the meatworks, and also because of staffing problems and the expense to the industry of meeting approved export standards.

108. The Department's view is that even if approved export standards could be met, the demand for kangaroo meat overseas would not be great and that certification of kangaroo meat for human consumption could react adversely on the export of other meat products.

109. The Committee received evidence representing a wide range of opinion, on the effect that control over exports of kangaroo meat, skins or manufactured products have on conservation of the kangaroo.

110. By direct evidence and by petitions to Parliament, many conservationists called for a total ban on exports of kangaroo products. Their case was based on the premise that such action would make commercial harvesting of kangaroos unprofitable, causing the industry to decline to an uneconomic level.

111. Although this argument appears to be sound in principle it is not supported by the evidence of wildlife scientists. They generally point out that a cessation of professional shooting would lead to a rapid increase in kangaroo numbers, which, in turn, could endanger the species. Dr Newsome stated to the Committee the inherent dangers of a policy of complete protection:

> Total protection of the species could well result in its food supplies being destroyed.

112. Wildlife scientists believe that a prohibition of commercial harvesting of kangaroos would need to be replaced by culling programmes of almost similar intensity. They consider that not to utilise the carcasses in such circumstances would be unnecessary wastage of a valuable and renewable economic resource. Their view is that any ban on the export of kangaroo products would be unlikely to have any real effect on the conservation of kangaroos.

113. Further evidence was received from a section of the kangaroo industry, calling for quota control over the export of kangaroo skins. A group of witnesses representing fur toy manufacturers sought quota controls in order to guarantee supplies of skins to local manufacturers. They claimed that, at present, a high level of demand for kangaroo leather in the United States of America is diverting a major proportion of the skins harvested in Australia to that country. They state that this situation is reinforced by the fact that two firms, which largely control the skin supply in Australia, have forward contracts to supply two large United States skin importing firms.

114. The toy manufacturers pointed out that recently they have experienced a sharp decline in the number and quality of skins made available to them. They stated that according to their suppliers this decline is likely to continue. They claimed that price is not a real factor as local and export prices do not differ significantly and that unless their requirements are guaranteed, employment in the industry, which comprises some 67 firms throughout Australia, would be substantially reduced. They pointed out that the export of kangaroo products earns more export income than the direct overseas sale of skins.

115. These manufacturers requested the Commonwealth to consider quota controls over the export of skins to ensure that their requirements are adequately met in order to preserve the viability of their businesses.

The Committee recommends that regulations controlling the export of kangaroo skins *should be administered to ensure that local requirements by Australian manufacturers* are adequately met.

EXPORTS OF LIVE FAUNA

116. Strict control over the export of live native Australian fauna is exercised under the Customs (Prohibited Exports) Regulations. Exportation of live fauna, including kangaroos, may be permitted only for bona-fide zoological purposes on a zoo-to-zoo basis or for scientific purposes. In addition, only animals bred in zoos and surplus to zoo requirements can be exported. Animals taken in the wild cannot be exported.

117. Mr R. Strahan, Director of Taronga Zoological Park Trust, Sydney, informed the Committee that limitation of exports to animals bred and raised in Australian zoos has led to the situation where a constant backlog of orders for kangaroos from approved overseas zoos exists because Australian zoos cannot breed sufficient surplus animals to meet these orders. He pointed out that by contrast there is no restriction on the export of kangaroo meat or skins.

118. Commercial harvesting of kangaroos results in large numbers of young joeys being killed or left to fend for themselves.

The Committee recommends the liberalisation of Customs regulations relating to the export of live fauna to allow kangaroos to be collected and reared by Australian zoos for export to approved overseas zoos.

G. Views of Major Interest Groups

CONSERVATIONISTS

119. The Committee believe that a distinction should be noted between preservationists, who oppose the killing of kangaroos under any circumstances, and conservationists, who recognise the need for management and control of kangaroo populations but disagree with the present methods. However, there are basic disagreements among conservationists as to management techniques.

120. The Australian Conservation Foundation recognises that there can be no satisfactory compromise between those who want to see kangaroos destroyed as pests and those who would not have them killed at all. It believed that:

> Between landholders who want the numbers pruned down when they are over abundant, and the ordinary citizen who likes to see kangaroos with reasonable frequency when travelling through the country, a practicable compromise is possible.

and that

> Kangaroos constitute a natural resource which should be managed to ensure its perpetuation, and the provision of a continual harvest, with main reliance being placed on professional shooters to collect the commercial crop and to provide the degree of local control required.

121. The Committee sees no moral argument against the economic utilisation of native animals, provided that it is carried out under strict control, and is based on biologically sound management practices.

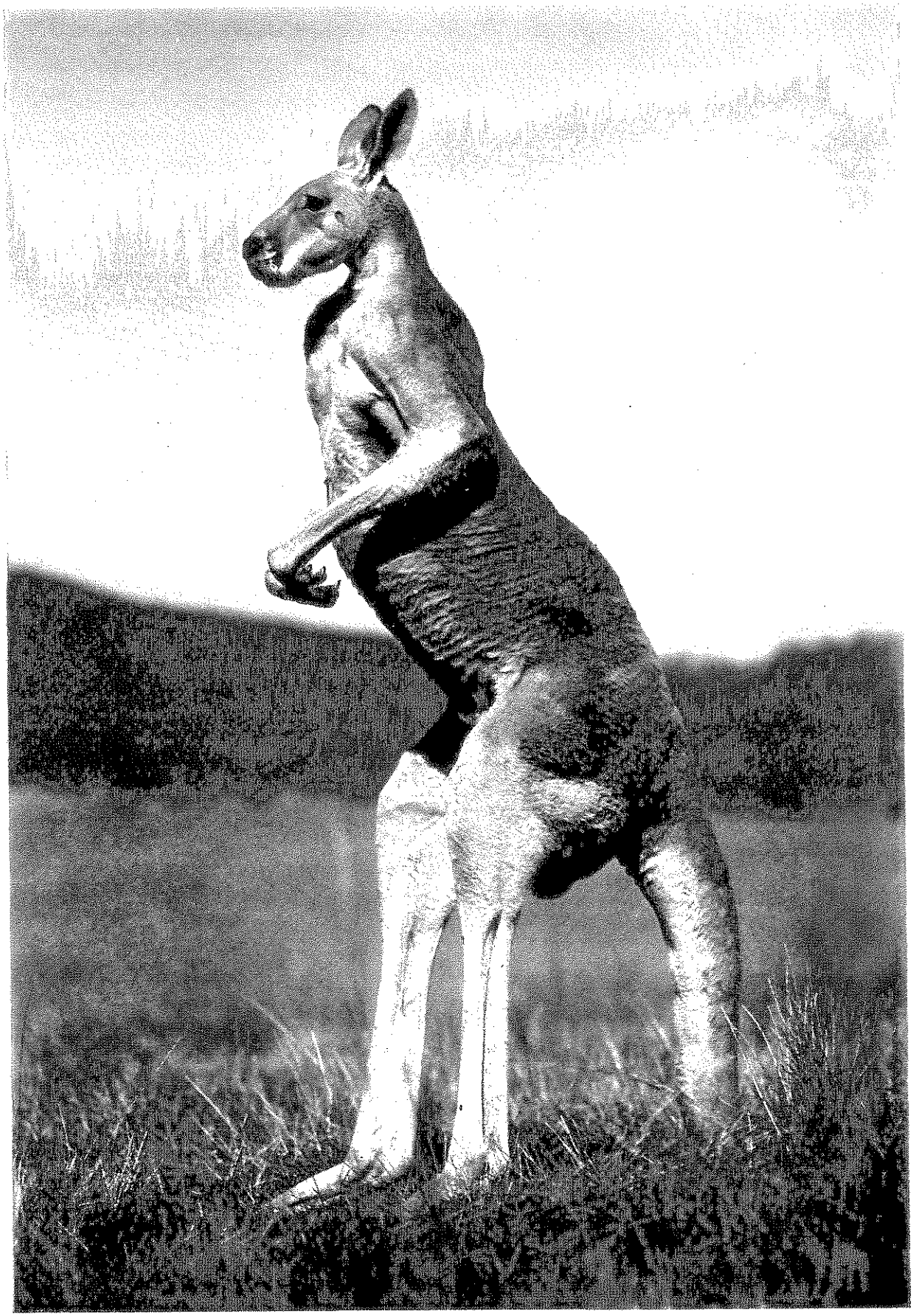
122. The Committee heard a considerable volume of evidence from groups concerned specifically with conservation of the kangaroo. The Committee was impressed by their obvious sincerity and is fully aware of the time and energy taken by these groups in compiling submissions.

123. Representatives of the Save the Kangaroo Committee of Victoria expressed the view that from all the information available to them they believed the red kangaroo was being hunted towards extinction. They suggested as a first step that all exports of kangaroo products should be banned. In addition they believed that a moratorium on shooting should be introduced and that marketing of kangaroo products within Australia should be prohibited.

124. The group recognised that kangaroos can be a problem to the grazier. They suggested that provided the grazier can demonstrate substantial damage, provision should exist for reduction of numbers. They advocated that this should only follow inspection by the relevant fauna authority. They would oppose the sale of meat of the animals.

125. The Save the Kangaroo Committee strongly supported the establishment of large parks and reserves and believed that these would provide a very great tourist attraction.

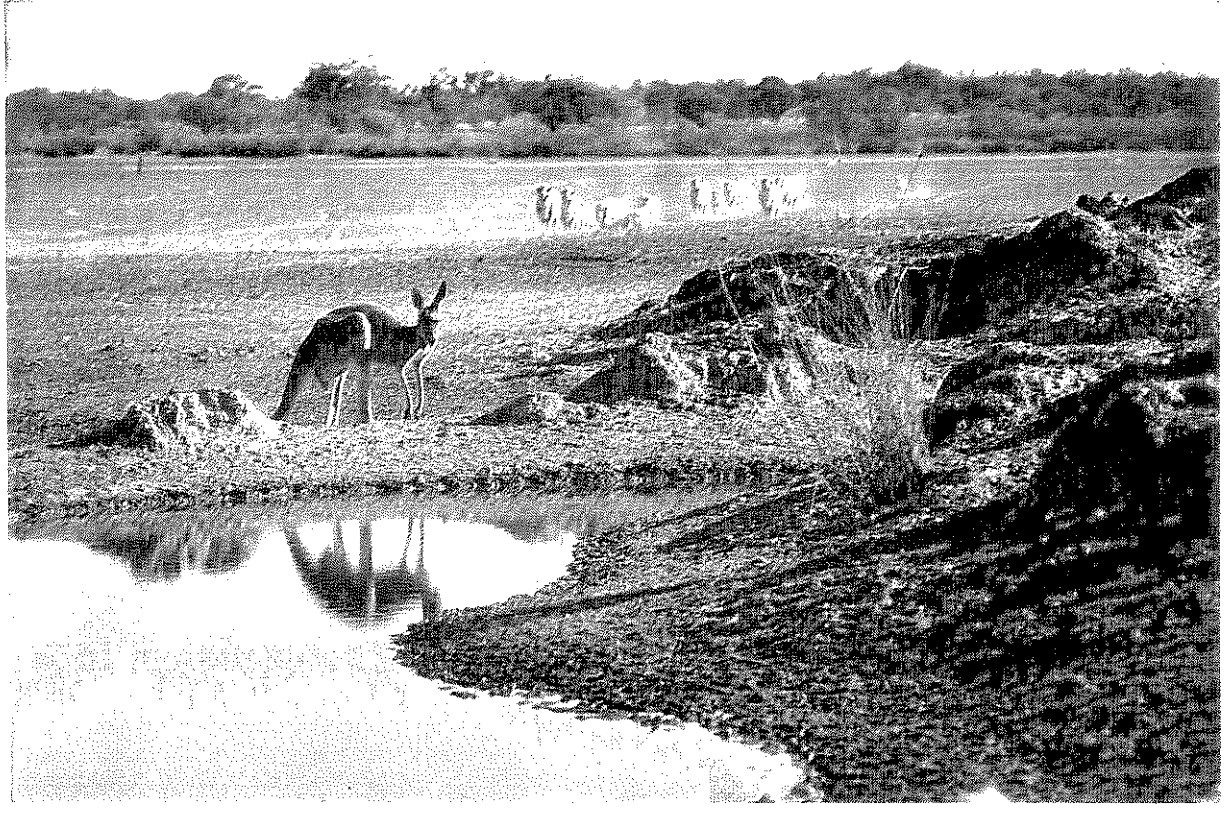
126. The Save the Kangaroo Committee of Queensland saw no reason why the kangaroo industry should not continue but believed that greater controls should be introduced. It believed that if kangaroos were left to breed uncontrolled they would eventually overpopulate their habitat and fall in numbers.



Male Red Kangaroo—most of the concern about commercial harvesting of kangaroos has centred around this species.

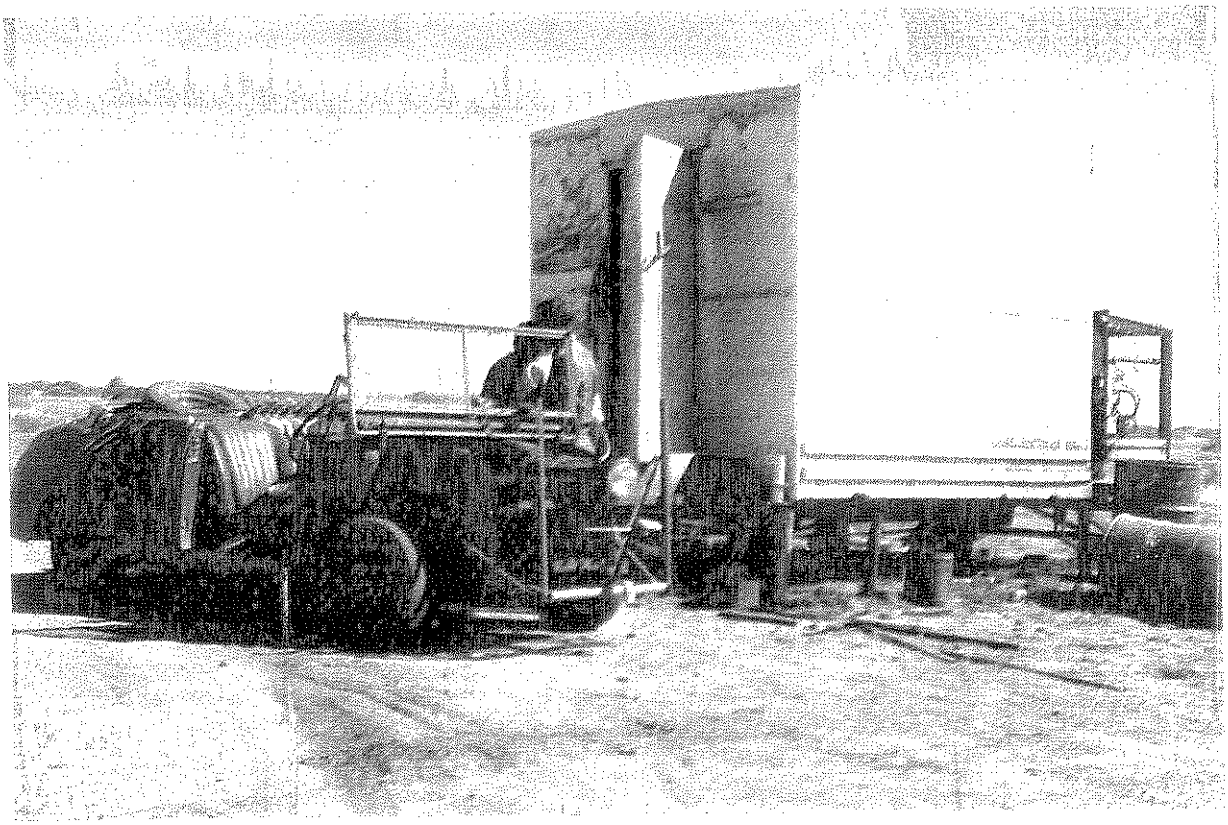
Eastern Grey Kangaroos in typical habitat.

Kangaroo and sheep grazing together. A body of opinion advocates complementary grazing of kangaroos and stock.



Weighing in Eastern Grey Kangaroo carcasses.

A mobile chiller box. Carcasses are stored in these boxes before being taken to processing works.



Skinned kangaroo carcasses ready for the boning out process.

127. The Queensland group also considers that reserves are needed, that the purchase of unprofitable properties may be of value, and that adequate regulation of harvesting and the setting aside of large areas as sanctuaries would meet the needs of the grazier, the kangaroo industry, the public and the tourist. The proposition, which has been put forward by wildlife scientists, that the larger species of macropod are more abundant now than ever before, was not accepted by this group of kangaroo conservationists.

128. The Kangaroo Protection Committee of New South Wales emphasised its belief that urgent research is needed into the ecology of the kangaroo so that a realistic approach to kangaroo conservation and an effective management plan, based on biological knowledge, can be developed.

129. It also believed that the shooting of kangaroos should be halted while work on populations is carried out to assess the impact of shooting. It did not support commercial harvesting and believed any necessary culling should be carried out by Government employed rangers.

130. It believed existing controls are not sufficient to prevent extinction of the kangaroo. The witnesses, in common with kangaroo conservation groups elsewhere, strongly supported the establishment of large reserves and emphasised the tourist value of places where kangaroos could easily be seen.

TOURIST INDUSTRY

131. The Australian Tourist Commission pointed out that Australian fauna, and especially the larger macropods such as the red and grey kangaroo, are of increasing significance to the international and domestic tourist industries. The latter are of growing importance to this country. The Commission stated that because of its uniqueness and because of the strong fascination that visiting experts and laymen alike have for it, Australia's wildlife has featured prominently in much of the tourist promotion of Australia.

132. A further point made by the Commission is the desire of tourists to see wildlife in its natural surroundings. It pointed out that visitors motivated by wildlife themes are not going to be satisfied to travel a considerable distance at high expense to see Australian fauna in Zoological Garden type conditions.

133. The Committee was advised by several witnesses that the monetary return to Australia from the export of kangaroo meat and skins is insignificant when compared with the tourist income that could be obtained through wise wildlife conservation. A related issue is that adverse publicity overseas concerning the exploitation of wildlife could discourage potential visitors.

134. The Committee believes that the development of reserves which attract tourists could play a real part in decentralisation and provide a valuable new source of income in rural areas.

KANGAROO INDUSTRY

General

135. The kangaroo industry is defined as including shooters, meat wholesalers, retailers and canners, tanners and fur processors, skin merchants and exporters, and manufacturers, wholesalers and retailers of skin products.

136. The following estimated figures of investment and employment in the kangaroo industry were submitted by the Kangaroo Industry Association in September 1970:

State	Employment	Annual wages bill	Investment in plant and equipment
		$	$
Victoria	350	850,000	540,000
New South Wales	2,350	5,875,000	1,500,000
Western Australia	450	1,600,000	1,350,000
South Australia	250	750,000	1,000,000
Queensland	1,950	3,100,000	2,700,000
Totals	5,350	12,175,000	7,190,000

137. The Kangaroo Industry Association, representing the diverse interests involved, stated that its first aim was the conservation of the kangaroo and that:

> . . . if commercial shooters DON'T conserve kangaroos, the kangaroo industry will die long before the last kangaroo is killed.

138. The Association advised the Committee that it supported State imposed controls on kangaroo harvesting but considers a minimum limit on the size of kangaroos taken of 25 lb should be established and that all kangaroos destroyed should be utilised. It also emphasised the service it performed for graziers in reducing kangaroos from pest proportions.

139. The Association stated that kangaroo industries have a total capital investment of about $14m, which includes $7m in plant and equipment. The industry employs about 5,400 people with a wages bill of $12.175m, and it earned some $1.9m in export income during 1969–70. It believes that overseas income could be increased if kangaroo meat were certified as fit for human consumption, as well as for pet food.

140. Mr A. W. Crompton, President of the Association, said that, whilst he believed that the payment of royalties to landholders for kangaroos taken on their properties would make the industry unprofitable, royalties could be paid if kangaroo meat could gain acceptability as a meat for human consumption.

141. Mr V. Bates, a council member of the Kangaroo Industry Association, stated that he had repeatedly asked the Commonwealth Department of Primary Industry to inspect and certify kangaroo meat so that it could gain export acceptability for human consumption. This request had not met with any success.

142. Mr G. R. Helton, Managing Director of General Wool and Skin Company, Brisbane, pointed out that the industry has demonstrated its belief in stable kangaroo populations by continuing investment. He told the Committee that his Company's meat is sent to Brisbane, Sydney and Melbourne for use as fresh or canned pet food.

143. The Committee was informed that meat for export was exported in 60 lb frozen carcasses marked 'kangaroo haunch meat' but that exports to the United Kingdom carried an additional marking 'not fit for human consumption'.

144. Mr M. E. Humfress, Director of M. E. Humfress & Co., skin exporters of Brisbane, informed the Committee that in his view the carcass industry was the reason for concern about kangaroos' continued survival. He said that previously when kangaroos were shot for skins only shooting was carried out almost entirely in the winter months when skins were in best condition, thus providing a de facto closed season.

145. Mr T. D. Thompson, President of the Retail Pet Foods Association, Sydney, an organisation of fresh pet meat sellers, stated that, in view of public controversy over kangaroos, it is impractical, for public relations reasons, for the Association's members to promote their product as fresh kangaroo meat.

146. The unsupported claim has been made to the Committee that most manufacturers of canned pet food use or have used kangaroo in their production, although some firms, as a sales promotion feature, advertise that they do not use kangaroo meat in their products.

147. There is no regulatory requirement for contents of canned pet foods to be identified on labels. Mr L. J. Prowse, Managing Director of Luv Pet Foods Pty Ltd of Sydney, stated:

> . . . we do not come under any Government regulations. What we do in our factory is really our own business.

The Committee recommends that the Commonwealth Government recommend to the State Governments that pet food manufacturers using kangaroo meat in their products be obliged by regulation to indicate this on their packages.

148. Mr T. Livanes, a pet food manufacturer, believed that the only danger the industry could pose to the kangaroo would be to populations in particular areas for short periods. He believed it was the responsibility of Governments to ensure that this was prevented. The witness added that kangaroos were a resource capable of continuous use without damaging populations. He believed kangaroo products could be marketed much more efficiently and could produce far more income than at present.

Commercial Farming of Kangaroos

149. There was a difference in the evidence in the definition of the phrase 'commercial farming of kangaroos'. Some witnesses believed that if, because of feeding and environmental factors, kangaroos and sheep were deliberately grazed together, the land could probably give a greater productivity of meat. Others advocated the raising of kangaroos as a primary objective, and proposed to do this in much the same way as domestic stock is raised.

150. Two specific proposals to farm kangaroos as the primary unit of production have been brought to the attention of the Committee. Neither is well advanced.

151. Mr C. A. Goldberg informed the Committee that he intended to establish commercial kangaroo farms throughout Australia, primarily to provide a constant supply of meat and skins; to develop overseas markets for these products; and to conserve the species.

152. Detailed consideration has not been given to establishment problems and to acquiring a breeding population, but the objective is to run kangaroos as domestic animals.

153. The Committee, during a visit to northern New South Wales in June 1971, inspected the property of the Kangawalla Pastoral Co. near Glen Innes. This is an enterprise which is being specifically developed to carry kangaroos as well as other stock. The intention is that kangaroos already on the property will be used as the breeding source. It is planned that cattle raising and tourism will coexist with kangaroo farming.

PASTORALISTS AND GRAZIERS

General

154. Pastoralists and graziers who the Committee have met, or who have given evidence, have without exception stated that they support the conservation of the kangaroo. However, they have different opinions as to what constitutes reasonable numbers. In general they believe that, as the Hon. D. N. Brookman, M.L.A., of South Australia, told the Committee, the grazier should be the one to decide whether or not kangaroos are a problem to him. Mr E. H. Lee-Steere of the Pastoralists and Graziers Association of Western Australia said:

> What the pastoralist wants is adequate protection of his livelihood in a way that does not threaten the existence of the red kangaroo.

155. Mr J. J. Doohan, representing the New South Wales Graziers Association, stated:

> I do not think there is any doubt that grazing the land has assisted the kangaroo and that its population has increased enormously in many . . . areas. The provision of water and the grazing of natural grasses has helped the kangaroo to breed and increase.

Graziers organisations admit that they do not know the precise degree of competition between kangaroos and sheep for feed, but Mr Doohan claimed that the major adverse effect of kangaroos is competition with stock for food.

156. The evidence suggested that graziers do not believe that for every kangaroo removed a sheep can be maintained, but in general they believe that under less than optimal seasonal conditions kangaroos on pastures can be a serious problem. Mr J. R. Gilmour of the Queensland United Graziers Association noted that:

> It has been our experience over a period of time with the reduction of the numbers of kangaroos, that whilst we did not run any more sheep on these properties . . . they seemed to survive better.

Mr F. S. Burt of the Pastoralists and Graziers Association of Western Australia pointed out that kangaroos can graze pastures shorter than sheep and compete with them for fresh new shoots.

157. One of the major criticisms made was that paddocks which are spelled from stock to allow pasture regeneration can be eaten out by kangaroos, thus defeating the purpose of spelling. In more closely settled areas, particularly in wheat-sheep zones, damage to crops by trampling is also a problem. Competition for water is regarded as a serious problem at particular times.

Attitude to tagging

158. As noted in paragraph 154, graziers believe that they themselves should determine whether or not kangaroos constitute a pest. It follows from this that many graziers feel that if tagging is used, the tags should be issued to them rather than to shooters or chiller operators who are not primarily concerned with the interests of a particular property holder.

159. Mr Lee-Steere suggested that pastoralists in Western Australia should be given tags without restriction by that State's Fisheries and Fauna Department. He further stated that some of the members of his Association were concerned that increasing interest in conservation may lead to a virtual abandonment of commercial exploitation.

160. Mr Doohan was critical of the New South Wales regulations which require graziers to approach the National Parks and Wildlife Service for a permit to reduce numbers. Mr A. C. M. Alden of the Queensland United Graziers Association stated that the grazier, as he is providing the facilities which allow commercial exploitation to take place, should participate in some way in the profits of that enterprise.

Problem of reserves

161. Mr Doohan pointed out that graziers are concerned with the possible effects of kangaroos on reserves. He feels that unless these areas have marsupial proof fences, they will become protective areas for kangaroos which will then move out onto the surrounding lands to graze. His Association opposes reserves of this type because they could become areas which allow the proliferation of noxious animals and plants; they could also constitute fire hazards and lead to erosion problems, and the withdrawal of land from agricultural production for such reserves will lead to the imposition of a greater burden of rates on remaining productive areas.

Damage to fences and fouling of water and feed

162. Representatives of grazier organisations believed that kangaroos damaged fences: it was generally accepted that kangaroos attempt to go through fences rather than over them. Mr Gilmour stated that the holing of dingo proof fences by kangaroos could be particularly damaging to graziers.

163. Graziers met by the Committee agreed that kangaroos were responsible to some extent for the fouling of water holes and of pastures. Mr Gilmour stated that:

> They are always a problem with regard to troughing. They upset the float level and let all the water out . . . In drought times when water holes are low they do foul the water to some extent . . . They tend to feed at night in water courses on the greener pick and of course sheep and cattle do not go into those areas. They can smell them.

Attitude to royalties

164. The question of graziers bearing the cost of carrying kangaroos by providing feed and water and thus being entitled to some financial return for kangaroos shot on their land, was raised in evidence a number of times.

165. Grazier opinion was divided on this issue. Mr H. G. P. Daly, of Errabiddy Station, Western Australia, stated:

> The commercialisation of vermin by a landholder or a participation by a landholder in the proceeds of such commercialisation, would have a tendency to cause neglect to the legitimate production of that landholder's property . . .

166. Mr Doohan said that under present circumstances he did not feel there was a strong case for the grazier to receive any compensation, but he believed that if the pet meat trade is to be further encouraged, then as the landowner and ratepayer he is entitled to some return.

167. The Queensland United Graziers Association believed that landowners should receive some direct financial benefit from commercial exploitation.

The Committee recommends that the Commonwealth Government approach the State Governments recommending that permits be issued to graziers to allow the culling of excess kangaroo populations and that they be permitted to sell the meat and skins. Where these are sold it is recommended that royalties be paid.

WILDLIFE SCIENTISTS

Views on the status of the commercially exploited kangaroos

168. The submission by the CSIRO stated:

> It is believed that none of the larger species of kangaroo is in immediate danger of extinction, although it is accepted that their populations have been depleted in many places.

169. Professor A. R. Main of the University of Western Australia, believed that kangaroos, as a result of commercial harvesting, were at the point where regulation was necessary[1], but that numbers were not dangerously low. It was his impression that kangaroos are very much more abundant than they were before stock watering points were established.

170. Mr R. I. T. Prince of the Department of Fisheries and Fauna, Western Australia, stated that there were no indications that in Western Australia kangaroos were threatened with extinction, although local populations could be threatened in certain areas.

171. Dr A. E. Newsome made the point that:

> The fauna of Australia as a whole wilts under the pressure of agriculture and pastoral production but there are a handful of species which benefit. The red kangaroo is one, the euro another. The grey kangaroo is another possibility.

172. Professor Sharman, in presenting a submission on behalf of staff members of the School of Biological Sciences, Macquarie University, said:

> Those species of kangaroos which have been most exploited for meat and fur trades are today the most abundant of all kangaroos.

He added further that:

> We, as a School, do not believe that the larger species of kangaroo are in any danger of extinction.

[1] Since this evidence was given, regulations have been introduced in Western Australia. However, following representations by pastoralists and graziers who claim that the permitted harvest is too low, an Expert Committee of the Western Australian Parliament has been set up to further review the situation.

Attitudes towards harvesting

173. The CSIRO submission stated that there is no biological reason why some animals cannot be harvested. This is based on the knowledge that a portion of any population will die off each year and this portion can be taken without detriment. In order to calculate the surplus a thorough knowledge of the biology of the species is required.

174. Dr H. J. Frith of CSIRO Division of Wildlife Research, stated:

> There is no need at the present time to halt the kangaroo hunting,

and that as far as New South Wales and Victoria were concerned existing controls are adequate. He believed that in Queensland, Western Australia and South Australia additional controls might have to be introduced[1].

175. Dr Frith added that if an animal is killed for any reason he saw no harm in fully utilising it, and that not to do so is wasteful.

176. Dr F. H. Talbot of the Australian Museum, referring to kangaroos, stated:

> It is not inconsistent with sound conservation to have an animal exploited,

and that providing the industry doing the exploiting is properly controlled it can aid the species' preservation rather than threaten its survival.

177. Dr Newsome pointed out that large numbers of kangaroos have to be shot to manage the population in the interests of the grazier and he saw no reason why their carcasses should not be utilised.

Need for research

178. The Committee concurs with the view of all scientists involved that further intensive research into the kangaroo ecology is necessary.

179. The main priorities for this research are firstly the need to develop a quick and efficient method of estimating kangaroo numbers in a given area or of estimating changes in these numbers; and, secondly, that since some evidence indicates kangaroos and stock are not in direct competition for food, there is a need for detailed long-term large-scale grazing studies, involving sheep, cattle and kangaroos.

The Committee recommends that the Commonwealth Government offer financial assistance to the States for research into the biology and ecology of kangaroo species.

Competition of kangaroos and stock for food

180. CSIRO referred to a number of its studies showing that the diet of sheep and kangaroos do not overlap completely. Dr Frith pointed out this means only that sheep and kangaroos are not in 100 per cent competition all of the time. The CSIRO submission referred to work on the quantity of food eaten by a sheep and by a kangaroo. This showed that pound for pound on body-weight it takes much the same amount of forage to maintain a pound body-weight on either animal.

181. One of the problems associated with this work is that one may not necessarily see kangaroos in their natural situation since controlled grazing conditions may restrict their mobility. Further, since kangaroos and sheep are selective feeders the

[1] New regulations have since been introduced in South Australia.

results obtained depend very much on pasture and climatic conditions. Competition between kangaroos and sheep becomes much greater and more direct in drought periods but the kangaroo has the mobility to vacate drought areas and to move to more favourable localities.

182. Dr Frith regards the lack of information about the food/grazing interaction between kangaroos and sheep as the most serious gap in the knowledge of kangaroo ecology.

183. Mr A. J. Oliver of the Western Australia Agriculture Protection Board has carried out studies of competition between kangaroos and sheep and he advised the Committee that the most likely conditions under which kangaroos affect station management occurred in times of severe drought. There was competition for limited feed and a concentration of kangaroos in paddocks being spelled.

184. He considered the degree of competition as resulting from a combination of the following:

(a) the relative abundance of kangaroos on the various types of country under different climatic conditions;

(b) the amount of feed present in relation to regimens of all the animals feeding on it;

(c) the mobility of the kangaroo in response to poor conditions;

(d) the quantity of each plant type available and the proportion of each plant which they eat; and

(e) the extent to which diets are common.

185. The degree of dietary overlap in the studies ranged from 18 to 75 per cent. Under most conditions sheep selected a diet richer in protein than kangaroos. Mr Oliver believed that a figure of about 50 per cent described the gross overlap in red kangaroo and sheep diet.

186. He also made the point that under serious drought conditions kangaroos usually move to other areas whereas sheep may be forced to degrade the country by eating plants to ground level.

187. Dr Newsome believed that during the crucial period of drought the degree of competition is just not known. He considered it unlikely that for each kangaroo removed a sheep can be run or vice versa, but thought that it is quite likely that a greater bulk of protein can be raised on a property when both species are run and managed. He stated that kangaroos tend to graze shorter than stock.

188. Professor Sharman advised the Committee that in his view kangaroos and sheep do compete, that both are grass eating animals and their range of diets overlap considerably. There are things which the kangaroo eats and the sheep will not, and vice versa, but in drought times he believed both would eat virtually the same things.

Views on commercial farming

189. The economics of running kangaroos on an intensive farming basis are by no means clear. Professor Sharman considered that it would be uneconomic to attempt

to farm kangaroos only, because of their slow rate of weight increase. He saw much greater possibilities in running them together with sheep, noting that it

> . . . would be a better economic proposition than trying to farm sheep to the exclusion of kangaroos or kangaroos to the exclusion of sheep. You exploit more of your productivity because the two animals have a range of diets which overlap in the middle but diverge at the ends.

190. Apart from the problem of the growth rate of kangaroos, he also noted that kangaroo meat could be used for only a limited range of products. The productivity of kangaroos compared with sheep or cattle would be very low considering that much the same management techniques would have to be used, and, in addition, much more expensive fencing would be required.

191. In speaking against the farming of kangaroos alone he stated that one of the reasons for the kangaroo's success is his mobility and ability to ignore fence lines to get the best feed.

192. Dr Frith's view was that if sheep and kangaroos could be grazed together the land could give a greater productivity of meat. He added that the continued grazing with sheep at the present level was not in the national interest because it degrades areas until they are useless. He saw as a better long range proposition a reduction in sheep numbers. Some of the lost income from sheep production could be offset by utilisation of the kangaroos that are raised on the same land.

193. Dr T. H. Kirkpatrick, of the Queensland Department of Primary Industries, did not see kangaroo farming in enclosed areas as being practicable since kangaroos do best under natural conditions.

Need for special reserves

194. Professor J. S. Turner of the University of Melbourne felt that consideration should be given to establishing parks on the model of African game parks to protect the kangaroo.

195. The University of Townsville in its submission made the point that scientific and tourist interest in wildlife justified the establishment of very large reserves to enable people to view and study the more spectacular wildlife species such as kangaroos. It also believed that there should be places where people could be guaranteed of seeing kangaroos in their natural environment.

196. Dr Talbot advocated reserves for kangaroos and other animals. He drew attention to the work of Professor Main which indicated that areas of 50,000 acres upwards would be required for this purpose.

197. Professor Main pointed out that there is no theoretical knowledge anywhere in the world specifying how a reserve is to be selected for adequacy of size. However, his studies of islands off the Western Australia coast indicated that islands of greater than 50,000 acres supported all macropod species found on the adjacent mainland.

198. Dr Newsome advocated that arid zone National Parks should be established in western New South Wales as refuges for red kangaroos. Kangaroos in these areas would need to be managed.

The Committee recommends that the Commonwealth Government offer financial assistance to the States for the acquisition of land for the creation of national parks and wildlife reserves for kangaroos and other native fauna.

Harvesting rates

199. Mr J. W. Winter, a zoologist who appeared before the Committee as a representative of the Wildlife Preservation Society of Queensland, has, on the basis of published works by others, calculated that a safe shooting rate is 1 in 6.5. This means that for every kangaroo shot in the course of a year five or six should be left alive if the population is to maintain itself.

200. Mr Prince, on the basis of work carried out in Western Australia in average conditions, considered a safe harvesting rate of about 1:14 would be more realistic. Dr Newsome emphasised that a safe shooting level must be related to seasonal conditions and during prolonged drought should be reduced to nil.

INTERNATIONAL ATTITUDES

201. Although no direct submissions were received from overseas conservation groups protesting about the commercial harvesting of kangaroos, similar groups or individual witnesses in Australia drew the Committee's attention to adverse public reaction in Europe and America. Generally the reaction has been directed against spotlight shooting and the extent of the harvest. This has led to the belief by many overseas people that kangaroos are threatened with extinction.

202. However, two important international scientific bodies concerned in wildlife conservation and the preservation of endangered species throughout the world do not list the larger kangaroos as endangered species although both include many Australian animals and birds in their lists.

203. The Survival Service Commission of the International Union for the Conservation of Nature and Natural Resources, Geneva, Switzerland, monitors threatened species in all continents, and lists these in its publication, the Red Data Book. The book does not include the larger species of kangaroo in any of its four categories of rare and threatened species, which cover several hundred birds and animals throughout the world.

204. Likewise the Endangered Species Legislation of the United States Congress does not list the larger kangaroos in its schedules, although some forty-five Australian animals and birds are included. Both the Red Data Book and the US Endangered Species Legislation lists include species of the smaller kangaroos and wallabies which are under threat of extinction for reasons other than commercial harvesting[1].

[1] The two lists contain the following twelve species of small kangaroos and wallabies:

Species	*Red Data Book*	*US Act*
Brush-tailed Rat-Kangaroo (*Bettongia pencillata*)	X	X
Lesueur's Rat-Kangaroo (*Bettongia lesueuri*)	X	X
Desert or Plain Rat-Kangaroo (*Caloprymaus campestrio*)	X	X
Long-nosed Rat-Kangaroo (*Potorous tridactylus tridactylus*)	X	
Musky Rat-Kangaroo (*Hypsiprymnodon maschatus*)	X	
Queensland Rat-Kangaroo (*Bettongia tropica*)		X
Western Hare-Wallaby (*Lagorchestes hirsutus*)	X	X
Banded Hare-Wallaby (*Lagostrophus fasciatus*)	X	X
Ring-Tailed Rock Wallaby (*Petrogale xanthopus xanthopus*)	X	
Bridled Nail-Tailed Wallaby (*Onychogalea fraenata*)	X	X
Crecent Nail-Tailed Wallaby (*Onychogalea lunata*)	X	X
White Throated or Parma Wallaby (*Macropus Parma*)	X	X

205. The Australian authority responsible for recommending the inclusion of Australian animal species in both of these references, has stated that under present circumstances the inclusion of the larger macropods is not warranted.

206. In 1971 the State of California, which has its own endangered species legislation, included kangaroos among nine additional species proclaimed under the legislation. Under the Californian law no products made from proclaimed fauna species can be made or sold in that State. In Canada and Sweden conservationists have endeavoured to gain support for boycotts of products made from kangaroo skins.

H. Conclusions

The Committee, after careful consideration of all the evidence concerning kangaroos, finds:

1. That none of the large species of macropod is at present under threat of extinction, whether from destruction of habitat, drought or commercial harvesting, or from any combination of these factors. An exception is the Forester Kangaroo, a Tasmanian sub-species of the eastern grey, which is threatened due to habitat loss. However, the Committee accepts the view of CSIRO Division of Wildlife Research that the position needs to be continually monitored, and that continuous research with regard to larger kangaroo species is necessary.
2. That the interests of the kangaroo industry should be subservient to both the needs of conservation and the needs of the primary producer, and should be controlled in such a way by the relevant fauna authorities as to meet these needs rather than to guarantee a regular supply to the industry.
3. That a nationwide census of kangaroo numbers at any one time is impossible, from both a practical and an economic point of view. A number of methods of estimating kangaroo numbers exists but each method is confined to a specific set of circumstances. The margins of error for each can be very large and no accurate method of census-taking exists.
4. That because of conflicting evidence concerning safe levels of harvesting of kangaroos, the Committee considers that until further research has been undertaken, estimates made by biologists are more likely to safeguard the larger macropod species.
5. That knowledge of methods of managing and controlling kangaroo populations is far from adequate. Research is urgently needed to establish optimum management procedures and control measures.
6. That in view of its acceptance of the scientific opinion that no large species of kangaroo is at present under threat of extinction the Committee sees no immediate need for a nationwide closed season on kangaroo harvesting.
7. That the imposition of a Commonwealth ban on the export of kangaroo products would not of itself ensure the conservation of kangaroos. Reduction of numbers would still be necessary. If not carried out by the industry this would need to be done by property owners, or by State wildlife authorities at public expense.
8. That the responsibility for the control of kangaroo populations should remain with the States. There would appear to be great advantage, however, in more uniform State policies, even though evidence showed that the management needs of the kangaroo population varied greatly from State to State.
9. That in any State, Commonwealth or joint State-Commonwealth policy on kangaroos, the question of conservation or preservation should be determined in favour of conservation.
10. That the basic justification for the kangaroo industry's continued existence is that kangaroos are, at certain times and in some places, sufficiently numerous to be regarded as pests and that it is justifiable to permit reduction of their numbers. This being the case, the greatest possible use should be made of those destroyed.

11. That due to habitat change, the spread of settlement and the operation of commercial harvesting, the kangaroo has in many areas become visually extinct.

12. That the clearing of land, the provision of watering points and the introduction of stock, has led to an overall increase in the numbers of the larger macropods. However, the Committee is of the opinion that rural development has led to the extinction of some small species of macropods and the near extinction of others. The Committee believes that too little interest is shown in these species.

13. That although repugnant to some sections of the community, spotlight shooting with rifles equipped with telescopic sights is the most effective and humane method of killing kangaroos.

14. That the claim by the kangaroo industry that its harvesting activities are self-regulatory and ensure the continued existence of the kangaroo does not stand up to scrutiny; particularly in areas where part-time shooters predominate.

15. That areas where overharvesting appears to be occurring should be zoned and spelled until trends in the local kanagroo population can be assessed.

16. That much confusion exists about the degree of competition between kangaroos and domestic stock for feed. Wildlife scientists made it clear that in good conditions kangaroos and sheep can co-exist as their diets overlap to the extent of only about 40 per cent. Unfortunately many conservationists have extended this finding to all conditions. The Committee accepts that complaints by pastoralists and graziers of the effect of kangaroos on pastures have some justification. In adverse conditions competition increases for scarce fodder resources. It is most serious when kangaroos eat out pastures being spelled for stock.

17. That evidence concerning damage to fences and fouling of water sources covered a wide range of opinion. Pastoralists and graziers were not unanimous in claiming that damage to fences was a serious problem. Kangaroos pass through wire strand fences without causing much damage, but they can cause considerable damage to netting fences by attempting to force through them. Damage to watering points can be serious where kangaroos damage troughs or foul ground water.

18. That more information on the movement of kangaroos is necessary as few investigations have been made of kangaroo mobility. Witnesses stated that during drought kangaroos tended to concentrate on available water and fodder resources, but that after rain they dispersed. The Committee was unable to obtain firm evidence of how far the animals travel and to what areas.

19. That Commonwealth and State authorities cannot certify kangaroo meat as fit for human consumption, as the relevant regulations provide that all such meat must be from animals killed under supervision in approved abattoirs and processed at the point of killing. Criticism of the Commonwealth Department of Primary Industry concerning its supposed unwillingness to certify kangaroo meat for export for human consumption is unjust, because the Department must certify exports in terms of the regulations of importing countries. The present method of killing and processing cannot meet these requirements.

20. That the growth of the pet food industry has resulted in a higher level of kangaroo harvesting. However, suggestions that the present growth rate of the industry will result in the extinction of the kangaroo are open to question.

21. That whether or not there is commercial harvesting, kangaroo numbers will need to be controlled. There is thus a need to determine the best way of culling any surplus populations.
22. That despite the conflicting evidence concerning the feasibility of kangaroo farming, the Committee sees value in further studies being carried out in this field. The Committee believes ventures of this type provide opportunities for biological study of the kangaroo, and for determining the correct balance for economic co-existence of kangaroos and domestic stock on properties.
23. That the kangaroo is basically a nocturnal animal. The claim by tourist agencies and members of the public that the difficulty of sighting kangaroos in their natural habitat is solely a result of overharvesting is an oversimplification.
24. That large areas of land should be set aside as national parks and reserves for kangaroos and other native fauna. While evidence was given to the Committee suggesting that some land, at present uneconomic in terms of agricultural production, could be so utilised, the Committee believes that additional criteria should be used in assessing the suitability of any land to be set aside for this purpose.
25. That the tourist potential of reserves for kangaroos is of great importance. Projections by the Australian Tourist Commission indicate that earnings from tourism could approach $300m a year in 1975. An important attraction to tourists from overseas is Australia's unique native fauna, particularly the kangaroo. Adverse publicity overseas concerning the commercial exploitation of native fauna, could have an effect on potential tourist development.
26. That unnecessary obstacles are imposed on the export of live kangaroos and other native fauna to approved overseas zoos. Alteration of the provsion requiring that approval for export shall only be given to A class Australian zoos which have zoo-bred fauna surplus to their needs, should be considered.
27. That, due to overseas demand and the present structure of the industry, local manufacturers of kangaroo products appear to be uncertain of the future availability of the type and quantity of skins they require. The Committee believes that local needs should have priority.

E. M. C. FOX
Chairman

November 1971

Appendix I

ECOLOGY OF THE KANGAROO

Species

1. The species with which the Committee is primarily concerned in this Report are:

   (a) The Eastern Grey Kangaroo (*Macropus giganteus*) which occupies suitable habitat in all of Queensland except the most northerly part of Cape York peninsula, the Gulf country, and the western border country; almost all of New South Wales and Victoria, and small areas of north-eastern Tasmania. It is a forest and woodland species.

   (b) The Western Grey Kangaroo (*Macropus fuliginosus*) is found in similar country from south Western Australia, through southern South Australia, to western Victoria and New South Wales where it overlaps the range of the Eastern species.

   (c) The Euro or Wallaroo (*Macropus robustus*) is found in the greater part of mainland Australia, except Victoria and the forested south west. Its habitat consists of stony hills and tableland, and rocky country generally. The Euro is also found on Barrow Island off Western Australia.

   (d) The Red Kangaroo (*Megaleia rufa*). The total range of the red kangaroo is roughly the two million square miles of lightly timbered open plain and grasslands inland of the 10 to 15 in rainfall zone in southern Australia and the 20 in zone in northern Australia.

Population Factors

Numbers

2. One of the issues facing the Committee was whether an accurate means of assessing kangaroo populations was necessary before conservation measures could be recommended. Dr H. J. Frith and Mr J. H. Calaby indicated wildlife scientists' opinion on this issue:

> We do not know and do not think it possible to answer the question, nor do we think the answer would be of more than passing interest. What is important, though, is what changes occur in the density of kangaroos in different places from time to time and under different systems of management or control, and the speed with which local populations can decline in times of stress and their ability to recover.[1]

3. In accepting this opinion the Committee sought a reasonably accurate means of estimating changes in numbers. Several methods are presently in use but they vary in accuracy.

4. One method involves the setting up of transect lines, then moving along these at night with a spotlight-equipped vehicle recording numbers within spotlight range. This method has obvious limitations but has been used to assess changes in density.

5. Another method, used particularly for red kangaroos, is that of counting from the air at a standard altitude. Kangaroos are relatively easy to see on the plain from low altitude:

> The distance flown is known and the width of the strip is also known, so the area in which the animals have been counted can be calculated and the number of kangaroos seen per unit area computed.[2]

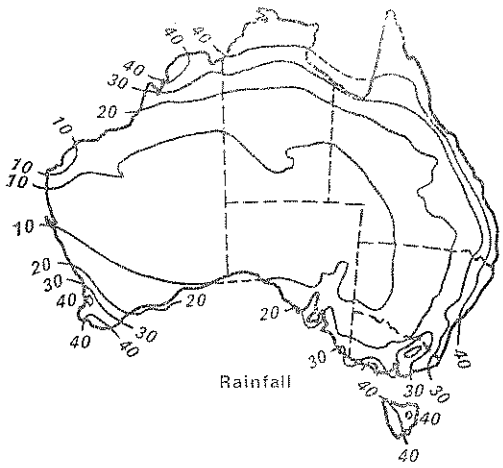
This method, while successful in open country, is of little use in areas with extensive ground shelter for the animals.

6. The Committee was also advised of methods developed to assess changes in the population structure of exploited species. These methods enable wildlife authorities to determine whether the age of animals being taken is declining and thus whether harvesting in a particular area is running at too high a level and should be restricted.

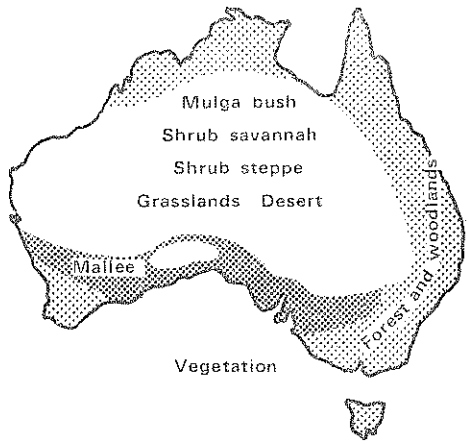
---

[1] Frith, H. J., and Calaby, J. H. *Kangaroos*, Melbourne, Cheshire, 1969, p. 51.
[2] Frith, H. J., and Calaby, J. H., *op. cit.*, p. 53.

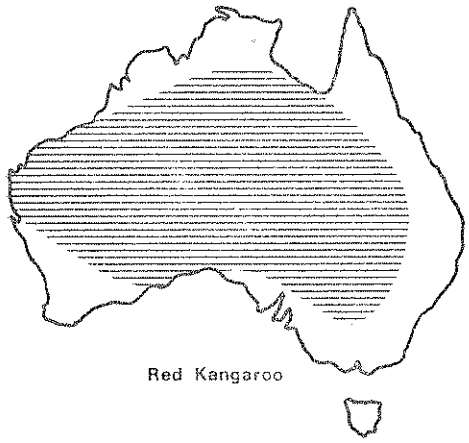
DISTRIBUTION OF LARGER KANGAROO SPECIES

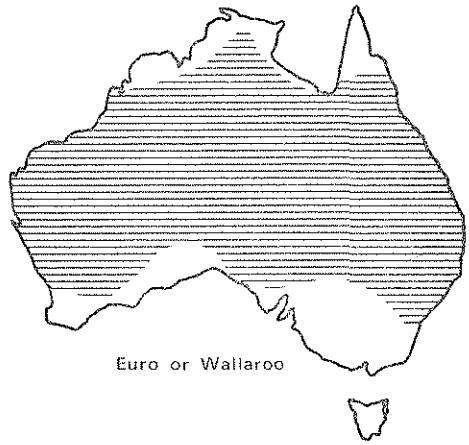


Rainfall



Vegetation


Red Kangaroo


Euro or Wallaroo


Western Grey


Eastern Grey

Adapted from H.J.Frith and J.H.Calaby, Kangaroos, Melbourne Cheshire 1969,p 39

7. Mr Roff explained that in Queensland the Department of Primary Industries monitors changes in population composition by the analysis of skulls of kangaroos harvested. The method, developed by Dr T. H. Kirkpatrick of the Department, utilises a random sample of between 1 and 2 per cent of the harvest, i.e. a sample comprising 10,000—20,000 animals. The skulls in the sample are assessed for age, which enables the structure of the population to be determined, and action can be taken, if necessary, to protect the breeding stock. Dr Kirkpatrick, in a public statement during September 1971, said that since the method was developed in 1965, continuing research by departmental zoologists has shown that the larger macropods are in no danger of extinction in Queensland.

8. Another, but less accurate, method is the practice of requiring shooters and chiller box operators to submit returns of the number and size of kangaroos taken. The most useful indication from this method is the average weight of the animals being harvested. If the average weight is declining it would appear that younger animals are being taken in greater numbers and that the population structure is changing.

9. Yet another method which has been used is an assessment of local numbers based on droppings counts. This method has been used in heavily wooded areas where other methods are not practicable.

Minimum levels for survival

10. Professor Main submitted evidence to the Committee resulting from his work on macropods on islands off the Western Australian coast. This work indicated that the smallest viable population, relative to food supplies, 'in the sense of persistence for many hundreds of generations', is about 200 animals. This means that, given the concept of a kangaroo population confined to a particular geographic region, and taking into account biological and other factors, a minimum population of 200 animals is required to ensure the group's long term survival.

Densities

11. Professor Main cited studies by Dr Newsome which showed densities of red kangaroos ranging from 1 per 60 acres to 1 per 220 acres, and work by Dr E. H. M. Ealey of Monash University which showed a density of 1 per 26 acres for euros. Dr Ealey and Dr Frith have shown that in many places kangaroos are more abundant than sheep, but that there are less in unsettled areas than in pastoral areas.

12. The Committee found it invalid to draw general conclusions from studies of particular areas. Professor Sharman pointed out that although he had studied kangaroos at Wilcannia during a two-year drought, he would not know what had happened even 50 miles away during the same period.

Reproduction

13. It is generally true of marsupials that the gestation period is shorter than the length of one oestrus cycle. As long as the mother is neither lactating or in some environmentally determined non-breeding phase, the gestation period is about 33 days in the red kangaroo and 35 days plus in the eastern grey kangaroo.

14. The newborn kangaroo suckles in the mother's pouch while it completes embryonic development. In the case of the red kangaroo pouch life lasts about eight months, and for the grey kangaroo it is ten months. After leaving the pouch the young continue suckling for several months, followed by a non-suckling period during which there may be close association with the mother.

15. Females may become sexually mature when 16–18 months old. Birth after the first pregnancy completes one major reproductive cycle, female kangaroos being potentially capable of producing their first replacement 18–20 months after their own conception.

16. Oestrus, ovulation and fertilisation occur just after a doe has given birth, in most kangaroos. In the case of the eastern grey, however, fertilisation usually takes place during pouch suckling 4–8 months after birth of the previous joey. The derived embryo enters a period of dormancy called embryonic diapause, while the earlier young is suckled in the pouch.

17. Breeding may then be continuous—as each young leaves the pouch it is replaced by a young derived from the hitherto stored embryo so that suckling of the just emerged young is accompanied by suckling of a new young in the pouch. In the case of the red kangaroo the period of lactation is limited to the breeding rate, because in general two young do not occupy the pouch together even though breeding is continuous.

18. The female, through her productive period, can thus produce young at the rate of one each eight months or three in two years.

19. However, drought affects the breeding cycle at stages other than pregnancy. An early result of drought is the death of advanced pouch young. A study carried out by Professor Sharman showed that, after two years of drought, only 30 per cent of females carried pouch young. Virtually no young at foot were present. Many females which lost pouch young gave birth to another derived from the dormant embryo, but these young also died. Some females failed to exhibit post partum oestrus and ovulation, remaining in anoestrus following loss of their young.

20. The study further showed that

> young females failed to begin breeding at the expected time and did not reach breeding condition during the drought . . . the number of females capable of breeding fell from 90 per cent at the beginning of the study to less than 30 per cent after two years of drought.[1]

The result was that in the area of study no red kangaroos less than two years old existed in the population. This would indicate that although commercial shooting has commonly been put forward as the reason for declining numbers, climatic conditions are obviously of great importance. In the study area at Wilcannia in western New South Wales, water was available, so that availability of suitable feed seems to have been crucial.

Other Factors

Rate of weight gain

21. A 1963 study found that over half the body weight of red and grey kangaroos is carcass muscle. More than 50 per cent is usable as edible protein which compares with 27 per cent for sheep and 32 per cent for cattle

22. However, to make these figures meaningful, relative growth rates have to be considered. A red kangaroo takes at least 6 years to reach full size and at that stage yields an equivalent amount of muscle to a sheep less than 2 years old. In other words, the kangaroo's growth rate is much slower than that of a sheep. The growth rate of kangaroos has a bearing on proposals to farm kangaroos as discussed in paragraphs 149–153.

Feeding

23. There has been little research carried out on the feeding habits of kangaroos, although most of the criticism of kangaroos by pastoralists and graziers has been on the grounds that they compete with stock for feed and water. The opinion of wildlife scientists is that kangaroos have a preference for green 'pick' and that they are not always in direct competition with stock for food.

24. Dr Newsome noted G. M. Chippendale's work in central Australia in 1962 which showed that cattle ate a much wider range of plants than kangaroos.[2] A later study in 1968

[1] Sharman, G. B., 'Management of Kangaroos', *The Australian Zoologist*, Vol. XVI, Part 1, 1971, p. 75.

[2] Newsome, A. E., 'The Ecology of Red Kangaroos', *The Australian Zoologist*, Vol. XVI, Part 1, p. 40.

covering a variety of seasons resulted in the general conclusion that green grass was predominant in kangaroo diet and that shrubs and trees were rarely eaten. After good rains perennial plants became abundant and were eaten.

25. Of particular importance to the red kangaroos in the area under study during drought was *Eragrostis setifolia* which dominates in gil-gais and other depressions on the plains. Water runs into these hollows after rain and green feed lasts longer there than elsewhere.

26. Red kangaroos are selective feeders, preferring high protein plants. As a result they might at times reduce the quality of food available to stock. Competition between stock and kangaroos is most likely in times of food shortage when the more mobile kangaroos select the choicest food—the green shoots and bases of grasses and the leaves of dicotyledons.

27. Dr Newsome also cited work by M. Griffiths and R. Barker who examined diets of red and eastern grey kangaroos and sheep running together on a property near Cunnamulla in Queensland, under average seasonal conditions.[1] Analysis of stomach contents showed that red kangaroos ate the same proportion of grass and dicotyledons as sheep but showed different preferences for actual species. The study also demonstrated that kangaroos do not eat more than sheep.

28. Other studies in 1968 in north west Western Australia indicated that the red kangaroo and sheep had largely overlapping diets in times of abundance; as conditions worsened sheep tended to move more and more on to top feed.

29. There seems no doubt that kangaroos prefer a diet of green grass. A study of kangaroos living on dry grass in drought showed them to be reasonable healthy but to have stopped breeding.

30. Indications are that diets change during drought, kangaroos concentrating more on grass and stock turning to top feed. Stock may be forced to change their diet because kangaroos graze the remaining grasses too short for them to reach.

The impact of the pastoral industry on the kangaroo

31. The effect of the introduction of pastoral activity on the grey kangaroo's population is not well known. In relation to the reds and euros it has been marked. The provision of a multitude of artificial watering points on the dry inland plains largely remove any problem of water shortage. More importantly, stock have the effect of grazing down the long dry grass that the red kangaroos prefer not to eat, causing soft green shoots to sprout from the crown—extensive areas of satisfactory grazing have thus been created.

32. Research carried out by Dr Newsome in central Australia showed that land which was ungrazed by cattle and carrying tall dry grass was of little interest to kangaroos. Within the study area, during drought, 80 per cent of kangaroos estimated to be in the area remained close to the grassy plains between 1 and 5 miles out from water. Close to the watering points most of the pastures had been destroyed by cattle; further out they had hardly been touched. Cattle had created a 'marsupial lawn' on the intervening land by their grazing, thus providing for the kangaroo much more drought fodder than would have been there otherwise.

33. Stock have improved the kangaroo environment in certain areas by altering the composition of the pasture and chewing down the long grass. The once dominant saltbush on the plains of south western New South Wales and inland South Australia has been eaten out over large areas and has been replaced by more palatable grasses. These changes have greatly increased drought refuges for red kangaroos whose numbers are claimed to have increased substantially throughout inland Australia since stocking with sheep and cattle began.

34. Work carried out by CSIRO in Pilbara, Western Australia, indicates that a very great increase in euro numbers which occurred there was largely a result of sheep grazing. The pastures originally were made up of soft nutritious grasses, along the plains, the creeks and the lower lying country. Spinifex grew on the rocky outcrops inhabited by the euros. However,

[1] Newsome, A. E., *op. cit.*, p. 40.

the sheep ate out the better grasses and spinifex spread out on to the plains. This gave the euros a large amount of fodder, and provided shelter from the heat. Sheep farming also provided more watering points.

Predation

35. Natural predation by eagles and dingoes is unlikely to have ever been great. Aboriginals may have killed large numbers for food, but only since European settlement has predation by man become of real significance.

Movement

36. Studies so far carried out on kangaroo movements are not conclusive. Some indicate that kangaroos are relatively sedentary while others show that they range quite widely. Seasonal conditions appear to be a major factor in movement. In severe drought, movements of up to 136 miles have been recorded, and there is much evidence to show that kangaroos move quickly to areas benefiting from rainstorms.

Heat and water intake

37. Professor Main's evidence to the Committee was that both dry food and water intake for kangaroos are considerably less than for eutherians[1] of the same size.

> The ability of an animal to survive under arid environmental conditions where water is short, is . . . largely related to the animal's ability to tolerate or avoid heat load, and/or concentrate urine and so conserve water.

38. Professor Main also stated that the provision of watering points has meant that kangaroos have been able to use water to keep body temperature down, and have been less dependent on shelter to keep cool.

Nocturnal nature of kangaroos

39. Kangaroos are not nocturnal in the sense that they can never be seen in the day time. However, partly in order to conserve body moisture, they do tend to remain under available cover during the heat of the day, feeding at dawn, in the late afternoon and at night. Mr Prince expressed the view that if kangaroos can be seen commonly in daylight they are overabundant and represent excessive population pressure on existing food supplies and shelter.

[1] Mammals are divided into three groups: the prototheria or egg laying mammals of which the platypus and echidna are the only living examples; the metatheria or marsupials; and the eutherians, comprising all other mammals, characterised by the facts that they have a placenta and that they carry their young until full development before birth.

Appendix II

A. EXPORTS OF KANGAROO MEAT AND SKINS AUSTRALIA 1954–55 TO 1970–71

Year ending 30 June	Meat		Kangaroo and wallaby skins undressed	
	Quantity	Value	Quantity	Value
	lb	$'000	No.	$'000
1954–55	n.a.	n.a.	(*a*)765,742	562
1955–56	n.a.	n.a.	(*a*)795,840	569
1956–57	n.a.	n.a.	(*a*)739,340	558
1957–58	n.a.	n.a.	(*a*)1,080,517	701
1958–59	n.a.	n.a.	(*a*)718,540	375
1959–60	n.a.	n.a.	(*a*)1,106,973	308
1960–61	5,707,593	796	(*a*)1,212,695	824
1961–62	2,617,787	318	(*a*)1,139,112	764
1962–63	2,098,556	239	771,302	855
1963–64	5,362,885	683	1,117,131	1,511
1964–65	10,831,862	1,392	1,485,157	1,611
1965–66	10,863,052	1,429	1,275,590	1,266
1966–67	8,532,937	1,331	1,078,830	1,426
1967–68	4,044,769	590	860,933	1,180
1968–69	2,225,735	343	817,655	1,209
1969–70	1,710,498	236	835,279	1,568
1970–71(*b*)	513,458	77	847,896	1,847

n.a. Not available.

(*a*) The quantity of undressed kangaroo and wallaby skins was recorded in pounds until 1962–63.
(*b*) Preliminary.

Source: Commonwealth Bureau of Census and Statistics.

B. KANGAROO MEAT EXPORTED FROM AUSTRALIA 1965–66 TO 1969–70 EXPRESSED AS A PERCENTAGE OF TOTAL MEAT EXPORTS[1]

Year	All meats (excluding kangaroo meat)	Kangaroo meat	Kangaroo meat as percentage of total meat
	lb	lb	
1965–66	897,839,040	10,863,052	1.21
1966–67	815,709,440	8,532,937	1.05
1967–68	875,452,480	4,044,769	0.46
1968–69	890,713,600	2,225,735	0.25
1969–70	1,222,558,400	1,710,498	0.14

Sources: (*a*) All meats—Australian Meat Board Annual Report for year 1969–70.
(*b*) Kangaroo meat—Commonwealth Bureau of Census and Statistics.

[1] Total meat exports comprise exports of beef, veal, mutton, lamb, pigmeat and edible offal.

Appendix III

NUMBERS OF MARSUPIALS HARVESTED IN QUEENSLAND—1954 TO 1970

Year	Total number harvested	Number and percentage by species						
		Grey Kangaroo	Red Kangaroo	Wallaroo	Whiptail Wallaby	Brush Wallaby	Swamp Wallaby	Sandy Wallaby
1954 . . .	218,459	127,753	68,683	3,295	6,429	7,907	1,678	2,714
		58.47%	31.43%	1.50%	3.61%	2.94%	0.76%	1.24%
1955 . . .	305,616	155,956	93,616	11,155	11,580	15,561	12,848	4,900
		51.03%	30.63%	3.65%	3.80%	5.09%	4.20%	1.60%
1956 . . .	361,462	183,663	111,034	21,642	13,800	13,923	12,167	5,233
		50.81%	30.71%	5.98%	3.81%	3.85%	3.36%	1.44%
1957 . . .	631,034	283,137	276,125	29,897	13,781	14,756	6,959	6,379
		44.86%	43.75%	4.73%	2.18%	2.33%	1.10%	1.01%
1958 . . .	295,820	172,437	89,248	12,212	11,164	7,063	3,168	528
		58.29%	30.16%	4.12%	3.77%	2.38%	1.07%	0.17%
1959 . . .	1,006,919	319,829	588,807	55,031	9,173	25,141	6,784	2,154
		31.76%	58.47%	5.46%	0.91%	2.49%	0.67%	0.21%
1960 . . .	769,948	488,118	250,059	10,319	5,478	8,059	6,642	1,273
		63.39%	32.47%	1.34%	0.71%	1.04%	0.86%	0.16%
1961 . . .	471,640	293,365	161,063	3,374	11,038	2,208	592	Nil
		62.20%	34.14%	0.71%	2.34%	0.46%	0.12%	
1962 . . .	548,771	369,631	163,712	8,377	4,945	1,227	879	Nil
		67.35%	29.83%	1.52%	0.90%	0.22%	0.16%	
1963 . . .	642,063	444,607	175,284	6,727	11,026	3,462	846	111
		69.24%	27.30%	1.04%	1.71%	0.53%	0.13%	0.01%
1964 . . .	1,118,813	596,775	496,439	13,328	7,800	3,299	1,172	Nil
		53.34%	44.37%	1.19%	0.69%	0.29%	0.10%	
1965 . . .	1,168,887	787,955	353,223	13,365	8,662	4,139	1,455	88
		67.41%	30.21%	1.14%	0.74%	0.35%	0.12%	0.007%
1966 . . .	924,629	640,985	269,377	4,703	8,082	1,210	272	Nil
		69.33%	29.14%	0.51%	0.87%	0.13%	0.02%	
1967 . . .	871,390	662,319	198,294	3,691	3,323	1,350	2,413	Nil
		75.97%	22.74%	0.42%	0.38%	0.15%	0.28%	
1968 . . .	862,981	612,323	235,123	5,524	6,214	1,467	2,330	Nil
		70.95%	27.25%	0.64%	0.72%	0.17%	0.27%	
1969 . . .	1,116,065	774,881	322,727	5,817	9,732	1,678	1,230	Nil
		69.43%	28.92%	0.52%	0.87%	0.15%	0.11%	
1970 . . .	900,202	604,932	232,017	42,372	13,850	5,856	1,088	87
		67.20%	25.77%	4.71%	1.54%	0.65%	0.12%	0.01%

Appendix IV

LIST OF WITNESSES

This list comprises all witnesses who have appeared before the Committee to date, including those witnesses giving evidence on matters outside the direct scope of the present report.

ALDEN, Mr A. C. M., Industrial Officer, United Graziers' Association of Queensland.
ALLEN, Mr A. C., Assistant Secretary for Lands, Victoria.
ATKINSON, Mr B. G., General Manager, Australian Tourist Commission.

BAFFSKY, Mr H., Managing Director, Booma Products Ltd, Five Dock, New South Wales.
BAINES, Mr C. C., President, Save the Kangaroo Committee, Queensland, and Vice-President, Fraser Island Defence Organisation, Queensland.
BATES, Mr V. W., Council Member, Kangaroo Industries Association of Australia, Victoria.
BENTLEY, Mr A. R., Vice-President, Australian Deerhunters' Association.
BIRLEY, Dr E. J. W., President, Save the Kangaroo Committee, Victoria.
BLACKWELL, Mrs M. I., Committee Member, Wildflower Society of Western Australia.
BONYTHON Mr C. W., President, Nature Conservation Society of South Australia.
BOWEN, Mr B. K., Director of Fisheries and Fauna, Western Australia.
BREEDEN, Mr R. A., Member, Vasse Conservation Society, and President, Busselton Wildlife Club, Western Australia.
BRISSENDEN, Mr R. F., President, The South Coast Committee, New South Wales.
BROOKMAN, The Hon. D. N., Member of the Legislative Assembly, South Australia.
BROWN, Mr R. F., Hon. Secretary, South Australian Ornithological Association.
BRYDEN, Dr W., Director, Tasmanian Museum.
BURBIDGE, Dr A. A., Senior Research Officer, Department of Fisheries and Fauna, Western Australia.
BURBIDGE, Dr N. T., Past-President, National Parks Association, Australian Capital Territory.
BURT, Mr F. S., Grazier, Carnarvon, Western Australia.
BUTCHER, Mr A. D., Director, Fisheries and Wildlife Department, Victoria.
BUTLER, Mr W. H., Naturalist, Wanneroo Wild Flower Nursery, Western Australia.

CARMODY, Mr R. J., Assistant Comptroller-General, Department of Customs and Excise, Canberra.
CLARK, Mr G. S., Secretary, Canberra Ornithologists' Group.
CLARK, Mr S. S., Plant Ecologist, The Australian Museum, Sydney.
COLLARD, Mr C. N., Leonora, Western Australia.
CORRELL, Mr R. L., Senior Demonstrator in Botany, James Cook University, Queensland.
COSTIN, Dr A. B., Assistant Chief, Division of Plant Industry, CSIRO.
CROMPTON, Mr A. W., President, Kangaroo Industries Association of Australia, Victoria.
CULLEN, Mr A. F., Assistant Secretary for Mines, Victoria.

DAHL, Professor E., Professor of Botany, Agricultural College of Norway, and Visiting Fellow, Department of Biogeography and Geomorphology, Research School of Pacific Studies, Australian National University.
DAVIS, Mr C. H. C., Assistant Secretary, Lands Administration Branch, Lands Division, Department of the Interior, Canberra.
DAY, Dr M. F. C., Executive Member, CSIRO.
DELL, Mr J., Secretary, Western Australian Naturalists' Club.
DIXON, Mr D. McS., Kangaroo Island, South Australia.
DOOHAN, Mr J. J., Treasurer, Graziers' Association of New South Wales.
DORWARD, Dr D. F., Secretary, Australian National Section, International Council for Bird Preservation.
DOWNES, Mr R. G., Chairman, Land Utilisation Advisory Council, Victoria.
DUNK, Mr W. P., Chief Irrigation Officer, State Rivers and Water Supply Commission, Victoria.
DUNPHY, Mr M., Hon. Secretary, The Colong Committee, New South Wales.

EALEY, Dr E. H. M., Senior Lecturer in Zoology, Monash University, Victoria.
EDGERLEY, Mr M. W., Director of Forests, Lands Division, Department of the Interior, Canberra.
ELDRIDGE, Mr S. F., President, Tasmanian Conservation Trust, and Vice-President, Science Teachers' Federation of Tasmania.
ELLIOTT, Mr M., Biologist, Lands Division, Department of the Interior, Canberra.
ELLYARD, Dr P. W., Committee Member, Society for Social Responsibility in Science, Australian Capital Territory.
EPPLE, Mr L. V., Brisbane.

FERGUSON, Mr B. M., Director, S. & J. Ferguson Pty Ltd, Sydney.
FESL, Mrs E., Hon. Secretary, Save the Kangaroo Committee, Victoria.
FRANKEL, Sir Otto, Member, Society for Social Responsibility in Science, Australian Capital Territory.
FREDINE, Mr C. G., Chief, Division of International Affairs, National Parks Service, United States Department of the Interior.
FRITH, Dr H. J., Chief, Division of Wildlife Research, CSIRO.
FULLOON, Mr S. R., Conservation Officer, Sporting Shooters' Association of Australia, Townsville.

GARTRELL, Mr G., Representative, Cave Exploration Group, South Australia.
GASKING, Mr W. R., *Curator, Cleland National Park, South Australia.*
GILBERT, Dr J. M., Silviculturist, Tasmanian Forests Commission.
GILMOUR, Mr J. R., Former President, Roma Branch, United Graziers' Association of Queensland.
GOLDBERG, Mr C. A., Highett, Victoria.
GOODE, Mr D. W., Vice-Chairman, Landscape Planning Commission, International Union for Conservation of Nature and Natural Resources.
GOODING, Mr C. D., Officer-in-Charge, Vermin Control, Agriculture Protection Board, Western Australia.
GOTHE, Mr J. M., First Assistant Secretary, Department of Trade and Industry, Canberra.
GREGORY, Dr G. C., Kangaroo Island, South Australia.
GRIFFITHS, Ald. O. K., Chairman, Town Common Advisory Committee, Townsville City Council.
GUILER, Dr E. R., Department of Zoology, University of Tasmania.

HAMMERSLEY, Mrs M. J., Past President, Wildflower Society of Western Australia.
HART, Dr B., Director of Animal Industry and Agriculture, and Statutory Chief Inspector of Wildlife, Northern Territory Administration.
HART, Mr S. B., Director of Planning, South Australia.
HEAN, Mrs B. M., Member, Lake Pedder Action Committee, Tasmania.
HEINSOHN, Dr G. E., Lecturer in Zoology, James Cook University, Queensland.
HELTON, Mr G., Managing Director, General Wool and Skin Company Pty Ltd, Brisbane.
HEMSLEY, Mr J. H., Curator of Wildlife, Animal and Birds Protection Board, Tasmania.
HENDERSON, Mr A. G., Managing Director, Australian Koala Bear Manufacturing Co., Sydney.
HENRY, Miss J. H., President, National Parks Association, Australian Capital Territory.
HOGG, Mr D. McC., Council Member, Federation of Victorian Walking Clubs.
HOWARD, Mr F. J. A., Managing Director, H. Morella Pty Ltd, St Peters, New South Wales.
HUMFRESS, Mr M. E., Director, M. E. Humfress and Co., Queensland.
HUMPHREYS, Mrs E. M., Minute Secretary, Wildflower Society of Western Australia.

INGLIS, Dr W. G., Director, South Australian Museum, and Protector of Relics (under the Aboriginal Relics Protection Act).

JACKSON, Professor W. D., Professor of Botany, University of Tasmania.
JAMES, Dr C. T., Representative, The Field Naturalists' Society of South Australia.
JENKINS, Mr C. F. H., Acting President, National Parks Board, Western Australia.
JOHNSON, Professor B., Professor of Zoology, University of Tasmania.
JONES, Mrs F. M., Member, Kangaroo Protection Committee, New South Wales.
JONES, Dr R., Member, Lake Pedder Action Committee, Tasmania.

KENNEDY, Mrs B. E. B., Hon. Secretary, Townsville and District Natural History and Wildlife Preservation Society.
KENNEDY, Mr D. K., President, Townsville and District Natural History and Wildlife Preservation Society.
KINCADE, Mr K. F., President, Australian Deerhunters' Association.
KNIGHT, Dr J. O., Councillor, Western Australian Naturalists' Club.
KNOWLES, Miss V. M., Hon. Secretary, The National Trust of Western Australia.
KOZICKY, Dr D. L., Director of Conservation, Winchester-Western Division, Olin Corporation, Illinios, USA.

LEE-STEERE, Mr E. H., President, Pastoralists' and Graziers' Association of Western Australia.
LINDBERG, Mr B. C., President, Western Australian Naturalists' Club.
LITTLEJOHN, Dr M. J., Reader in Ecology, Department of Zoology, University of Melbourne.
LIVANES, Mr T., Miranda, New South Wales.
LONG, Mr J. L., Research Technician, Agriculture Protection Board, Western Australia.
LOTHIAN, Mr J. A., Unley, South Australia.
LUCKMAN, Mrs J. S., Representative, The Hobart Walking Club.
LYONS, Mr R. G., Director, National Parks Commission, South Australia.

McBRYDE, Mr R. J., Glen Osmond, South Australia.
MACFARLANE, Mr J. D., First Assistant Secretary, Export Inspection Division, Department of Primary Industry, Canberra.
McKINNEY, Mrs J. A. W., President, The Wildlife Preservation Society of Queensland.
McMICHAEL, Dr D. F., Director, The New South Wales National Parks and Wildlife Service.
MACRAE, Mr E. G., Chairman, Animal and Birds Protection Board, Tasmania.
MAIN, Professor A. R., Professor of Zoology, University of Western Australia, and Member, Western Australian Wildlife Authority.
MANWELL, Professor C., Professor of Zoology, University of Adelaide.
MARTIN, Professor P. G., Professor of Botany, University of Adelaide.
MATHEW, Mr J. A., Assistant Town Planner, Townsville City Council.
MATTHEWS, Mr G. R., Conservation Officer, Sporting Shooters' Association of Australia (Queensland).
MILES, Mr R. E., Publicity Officer, The South Coast Committee, New South Wales.
MILLS, Mrs M., Member, The Colong Committee, New South Wales.
MILTON, Mrs A. M., Conondale, Queensland.
MOLLISON, Mr B. C., Biologist, South Hobart.
MOSLEY, Dr J. G., Assistant Director, Australian Conservation Foundation.
MOULDS, Dr F. R., Director, Forests Commission of Victoria.
MULVIHILL, Senator J. A.

NEWLAND, Mr B. C., Chairman, Roadside Vegetation Sub-Committee of the Fisheries and Fauna Advisory Committee, South Australia.
NEWSOME, Dr A. E., Canberra.

O'BRIEN, Mr E. J., Chief Chemist, Department of Agriculture, Victoria.
O'FARRELL, Mr R., Agricultural Adviser, Department of Agriculture, Carnarvon, Western Australia.
O'GRADY, Mr W. S., Gordonvale, Queensland.
OLIVER, Mr A. J., Research Officer-in-Charge of Mammals and Birds, Agriculture Protection Board, Western Australia.
OLSEN, Mr A. M., Director of Fisheries and Fauna Conservation, South Australia.
ORRELL, Mr J., Honorary Wildlife Protector of Smithfield, Queensland.

PAWLOWSKI, Mr R. R., Oxford Park, Queensland.
PETERS, Mr D. E., Committee Member, Canberra Ornithologists' Group.
PIESSE, Mr R. D., Director, Australian Conservation Foundation.
POOLE, Mr A. O., Information Officer, Department of Lands, Surveys and Immigration, Western Australia.
POPHAM, Mr L. R., President, Sporting Shooters' Association of Australia (Townsville).
PRINCE, Mr R. I. T., Research Officer, Marsupials, Department of Fisheries and Fauna, Western Australia.
PROUDLOCK, Mr B. W., Member, Lake Pedder Action Committee, Tasmania.
PROWSE, Mr L. J., Managing Director, Luv Pet Foods Pty. Ltd., Rozelle, New South Wales.

QUINLAN, Mr E., Hon. Secretary, Federation of Victorian Walking Clubs.

RECHER, Dr H. F., Head, Department of Environmental Studies, The Australian Museum, Sydney.
RIDE, Dr W. D. L., Director, Western Australian Museum.
RIGGETT, Mr T. L., Senior Research Officer, Department of Fisheries and Fauna, Western Australia.
RITCHIE, Mr J. A., Officer-in-Charge, Noxious Weed Control, Agriculture Protection Board, Western Australia.
ROBERTSON Mr D. R.. Toowong, Queensland.
ROFF, Mr C. R. R., Chief Fauna Officer, Department of Primary Industries, Queensland.

SCOTT, Mr K., Brisbane.
SCOWCROFT, Dr W. R., Member, Society for Social Responsibility in Science, Australian Capital Territory.
SERVENTY, Mr V. N., President, The Wildlife Preservation Society of Australia.
SHARMAN, Professor G. B., Professor and Head of the School of Biological Sciences, Macquarie University, New South Wales.
SHOOBRIDGE, Mr D. W., Director of Parks and Gardens, Lands Division, Department of the Interior, Canberra.
SLATYER, Professor R. O., President, Ecological Society of Australia.

SLOAN, Dr W. M., District Health Inspector, Department of Health, Victoria.
SMITH, Dr L. H., Director of National Parks, Victoria.
SMYTH, Dr M., Vice-President, Nature Conservation Society of South Australia.
SPRIGG, Mr R. C., Chairman of Directors, Arkaroola Pty Ltd, South Australia.
SPRINGETT, Dr B. P., Member, Landscape and Conservation Committee, National Trust of Western Australia.
STEANE, Mr R. W., Hon. Secretary, Phillip Island Promotion Association, Victoria.
STEEL, Mr W. S., Assistant Director, The New South Wales National Parks and Wildlife Service.
STEELE, Mr R. P., Secretary, Sporting Shooters' Association of Australia.
STEWART, Mr D. W. R., Deputy Conservator of Forests, Western Australia.
STEWART, Mr G. A., Chief, Division of Land Research, CSIRO.
STRAHAN, Mr R., Director, Taronga Zoological Park Trust, New South Wales.
STROM, Mr A. A., President, David G. Stead Memorial Wildlife Research Foundation of Australia.

TALBOT, Dr F. H., Director, The Australian Museum, Sydney.
TAYLOR, Mrs G., President, Victorian National Parks Association.
TAYLOR, Mr P. G., Committee Member, Australian Deerhunters' Association.
TEEDE, Mr B., Kangaroo Chiller Box Operator, Carnarvon, Western Australia.
THOMAS, Mr G. R., Director, J. Harris Pty Ltd, Eastlakes, New South Wales.
THOMAS, Mr I. M., Member, Council, and Member, Native Preservation Committee, National Trust of South Australia.
THOMAS, Mr J., Parks Superintendent, Townsville City Council.
THOMPSON, Mr T. D., President, Retail Pet Foods Association, New South Wales.
TOMLINSON, Mr A. R., Chief Executive Officer, Agriculture Protection Board, Western Australia.
TURNER, Professor J. S., Professor of Botany and Plant Physiology, University of Melbourne.
TYLER, Dr P. A., Botanist, Department of Botany, University of Tasmania.

VANDERMARK, Mr E., Hon. Secretary, The South Coast Committee, New South Wales.

WAINWRIGHT, Mr J., Professional Kangaroo Shooter, Carnarvon, Western Australia.
WALL, Mr L. E., Representative, Tasmanian Field Naturalists' Club.
WALTER, Mr D. A., General Manager, Arkaroola Pty Ltd, South Australia.
WANLISS, Dr M., Secretary, Native Fauna Conservation Society.
WASHINGTON, Mr G. W., Tourist Development Manager, Australian Tourist Commission.
WATSON, Mr J. E., Secretary/Treasurer, Vasse Conservation Society, Western Australia.
WEATHERLEY, Mr W. L., Representative, Monash University Conservation Society, Victoria.
WEBB, Professor M. J., Member, Council, and Member, Landscape and Conservation Committee, National Trust of Western Australia.
WHEELER, Mr R., Hon. Secretary, The Bird Observers' Club, Victoria.
WILLAN, Mr L., Vice-Chairman, Nature Conservation Council of New South Wales.
WILSON, Miss M. F., Hon. Treasurer, Kangaroo Protection Committee.
WINTER, Mr J. W., Executive Member, The Wildlife Preservation Society of Queensland.
WITTWER, Mr E., Vice-President, Wildflower Society of Western Australia.