CHAPTER 3

KANGAROO DAMAGE

Introduction

3.1 On 30 May 1985, the Council of Nature Conservation Ministers approved the 'National Plan of Management for Kangaroos'. This replaced the earlier 'National Kangaroo Management Plan'. The aims of the Plan are:

A. - to maintain populations of kangaroos over their natural range; and

B. - to contain the deleterious effects of kangaroos on other land management practices.

3.2 Four States have kangaroo management programmes approved by the Federal Government. There was one approved for Tasmania up to and including 1986 but not in 1987. The kangaroo management programme of Western Australia has aims identical to those of CONCOM while the programmes of the other three States have similar aims. As will be discussed later in this report, a kangaroo management programme is only required if kangaroo products are to be exported. Products derived from kangaroos killed in Victoria, Tasmania or the two Territories may not be exported because none of them has an approved kangaroo management programme.

3.3 Kangaroos are protected animals in all States and Territories except where permission has been obtained from the relevant fauna authority to kill a number of a specified species 'to contain the deleterious effects ... on other land management practices', mainly pasture, crops, fences and water.

3.4 Some animal welfare organisations have argued that, although kangaroos do cause some damage to rural properties, there has been little documentation or quantification of those deleterious effects. They are sceptical that the amount of damage done by kangaroos justifies the killing of millions of kangaroos each year.

3.5 It should be said at the outset that, until recently, there has been little attempt by government authorities to document the deleterious effects of kangaroos on other land management practices. In 1984 and 1985, three literature reviews were done by government bodies primarily for this Committee. In addition, the BAE prepared a paper on kangaroo damage based on data collected ten years previously. The ANPWS commissioned the CSIRO to do a study, based on farmer perceptions of kangaroo damage, the results of which were published recently. Given the uncertainty of the evidence of damage done by kangaroos, it is understandable that people concerned about the killing of kangaroos have some scepticism about the justification for a kill of such proportions.

3.6 In this chapter, the Committee outlines the information available to it on the nature and extent of the deleterious effects of kangaroos on other land management practices.

Perceptions of Kangaroo Damage

3.7 Before the Committee examines the evidence on the damage done by kangaroos to properties and other land management practices, it is desirable to note the distinction between 'perceptions' and 'reality'.

3.8 Greenpeace argued that although the issue of damage to agriculture as a justification for kangaroo culling was of

'critical' importance, the alleged damage could not be quantified:

> It seems that a lot of farmers cannot really quantify the damage being done. A lot do not know although they think they do know. I believe they are telling the truth, that they think they know how many kangaroos are on their property; they are not lying. But it is not a true assessment.[1]

3.9 Dr N. Shepherd of the NSW NPWS, in a paper on the impact of kangaroos on agriculture, wrote:

> The perception of agricultural managers is important; they perceive kangaroos as pests - not only because of dietary intake and crop damage, but also because of competition for water, damage to fences, and as a common cause of motor vehicle accidents. A recent survey in the Western Division of New South Wales found that 68% of graziers regarded kangaroos as their major problem after variability in weather... Because of this, agricultural managers will kill kangaroos whether they are authorised to do so by the wildlife agency or not.[2]

3.10 Sixty-seven per cent of landholders who were surveyed in Victoria claimed they did not want kangaroos on their property.[2A]

3.11 Dr Giles of the NSW NPWS told the Committee:

> I read a very succinct statement by some people from the US Fish and Wildlife Service recently that said that if the rationale of culling animals is that they compete with domestic stock, it does not matter whether the competition occurs or does not so long as the landholders perceive that it does.[3]

3.12 Sometimes damage is attributed to kangaroos but the real perpetrator is another animal or even insects. In addition, one species of kangaroo may be blamed for damage which is actually done by another species.

3.13 In the Kinchega area of New South Wales, the NSW NPWS first thought that damage to vegetation during the 1982-83 drought was caused by kangaroos, but further investigation indicated that pasture insects were responsible.[4] The Queensland NPWS has also drawn attention to the role of native insects, particularly termites, in pasture losses.[5] Other animals such as pigs, mice, rabbits, hares, donkeys, goats, wombats and emus may also be responsible for damage to pasture. The damage caused by other animals is variable. It is also often difficult to attribute any particular damage to a specific animal. For example, the Victorian Fisheries and Wildlife Service commented that in national parks other than within the Mournpoul block:

> we cannot be certain what proportion of the grazing effect is due to rabbits, what proportion is due to kangaroos and what proportion may be due to some other grazing animal.[6]

3.14 In 1986, the CSIRO told the Committee that research had been in progress for three or four years to try to separate the effects of rabbits and kangaroos on pasture.[7]

3.15 It is not always easy to decide which species of kangaroo is responsible for pasture damage. In the 1950s and early 1960s in north-western Western Australia, graziers observed grey kangaroos during the day and presumed that they were responsible for damage to pasture. In reality, at night a large number of euros came down from the hills to feed on those pastures.[8]

Competition between Kangaroos and Livestock for Food

3.16 As mentioned above, the Committee received three reviews of the scientific literature on the effects of kangaroos on properties and discussion of the subject.

3.17 The Australian Bureau of Animal Health submitted a short paper to the Committee in July 1984.[9] The Bureau drew upon a number of research studies and argued that there was minimal competition between kangaroos and livestock except during droughts. Both the NSW NPWS[10] and the ANPWS[11] criticised the Bureau's review for not reflecting more fully the results of research done in this area which, in their view, pointed to greater competition than that which the Bureau had mentioned.

3.18 Dr Shepherd of the NSW NPWS commented in a discussion paper [12] that herbivores that have co-evolved in a particular environment have learnt to co-exist without direct competition. However, herbivores which have not co-evolved , such as kangaroos and domestic livestock, are likely to compete for available resources. This competition is tempered by some degree of temporal and spatial separation.

3.19 Spatial separation may arise from the need to be close to a watering point by one species and not by another. A requirement to keep near to cover may deter one herbivore from grazing beyond a certain distance from cover.

> Species show temporal separation by eating the same plant species at different times or at different vegetative stages. Sequential use will be directly competitive only if one herbivore affects the ability of the other to make full use of the total resource (either by modification or removal).[13]

3.20 Dr Shepherd went on to discuss plant selection:

> Herbivores show dietary specialisation by selecting particular species of plants and/or portions of individual plants. As a general rule specialisation is most apparent when vegetation is abundant and decreases as this resource declines. However, in some plant communities species that are usually left ungrazed may be eaten by a particular

> herbivore as pastoral conditions decline. When this occurs there will be an apparent decrease in competition between herbivores, but this needs to be examined in relation to the effects of each herbivore on reserves of preferred plant groups.
>
> Overlap in diet preferences is only one aspect of competition between herbivores - only if the resource is limiting can a qualitative overlap in diet lead to competition.
>
> Another aspect is duration of direct competition. In the context of domestic livestock and kangaroos it is usually irrelevant that competition may be of short duration: decisions by the landholder will be made in response to observed competition or in anticipation of it. An example is the attitude of rangeland graziers to spelling of paddocks to store feed. Many view this as a waste of time because of the ability of kangaroos to move freely between paddocks and thus utilise the "stored" resource.[14]

3.21 The ANPWS submitted a paper entitled 'The Impact of Kangaroos on Agricultural, Pastoral and Forestry Activities'.[15] It supported the views expressed in Dr Shepherd's discussion paper and went on to say:

> .... it is considered that there is adequate evidence that the impact of kangaroos on agricultural and pastoral production is real, though variable in time and space.[16]

3.22 Apart from the research referred to in the earlier reviews, the ANPWS also drew attention to other relevant papers and commented that the findings contained in these papers did not alter the conclusions of the ANPWS.[17]

3.23 The ANPWS also drew attention to a number of studies which showed that some of the smaller macropods caused damage to crops and pasture.[18]

3.24 The Committee received evidence in Western Australia that kangaroos have a detrimental effect on rangelands because they slow the rate of recovery of degraded rangeland and may even lead to the continued decline of rangeland plant species.[19] It was pointed out that rangeland recovery required the removal of livestock and control of kangaroos as uninhibited grazing by kangaroos would not allow adequate regeneration of desirable plant species to occur.[20]

3.25 The adverse impact of the kangaroos on the environment may have been exacerbated by the provision of artificial water supplies. One witness stated that in an area of Western Australia, which now contains 1000 watering points, there were originally only 26 permanent natural watering points.[21] The increased provision of water has enabled a higher density of kangaroos to inhabit such areas. Dr G. Arnold of the CSIRO in Western Australia stated that the evidence gathered from the rangelands of Western Australia tends to support the argument that the provision of water particularly assists the red kangaroos in the low rainfall regions.[22]

3.26 With regard to New South Wales, Dr Shepherd commented:

> The extension of watering points into the far west of New South Wales and into the arid zone has probably seen a fairly substantial increase in the kangaroo populations on rangelands. If that is the case, then those kangaroos may in fact be having a detrimental effect of their own on the rangelands. They eat the flora and they probably interfere to some extent with the remaining native fauna. It would be desirable under those circumstances to bring those populations back to a level which was more compatible with the rangeland environment. And that is irrespective of whether we have sheep on those rangelands or not.[23]

3.27 Dr Robertson of the University of Melbourne, who did a

study of the dietary habits of eastern grey kangaroos, noted that a 'major failing' of available research on macropod grazing was the lack of differentiation between the effects of different species of macropod. He recommended that future studies:

> ... should be more clearly designed to more clearly evaluate the effects of different species of macropods on specific plant communities.[24]

3.28 Dr Caughley acknowledged that different species had different diets but upon close examination 'the thing that impresses you is the similarity rather than the difference'.[25]

3.29 Dr Robertson found that diet preferences varied among macropod species but the diet of the eastern grey kangaroo, for example, consisted almost exclusively of grasses and 'it has been shown to preferentially graze grasses even when potentially nutritious herbs are available.' They also prefer certain low fibre species of grasses and select new green leaves in preference to old material.[26] Dr Robertson's research revealed that eastern grey kangaroos did not eat trees and shrub seedlings.

3.30 Similar findings were obtained by R.J Taylor[27] who concluded that clovers and other similar herbs were not readily eaten by eastern grey kangaroos and euros.

3.31 Dr Robertson hypothesised that kangaroos may be deterred from eating clovers and other legumes because of the possibility of the absorption of toxic chemicals from these dicots. He argued that kangaroos rely heavily upon the breakdown of the cell walls of grasses by the symbiotic bacteria in their forestomach and were particularly sensitive to the toxins from dicots which inhibit these bacteria. He added that black wallabies prefer dicots and avoid grasses because of a totally different nutritional mechanism.[28]

3.32 Dr Shepherd noted that no available study had run the full gamut from good season to drought and that this may explain why there has been difficulty in assessing when competition occurs and its magnitude.[29]

3.33 The NSW NPWS argued further that although there was sufficient evidence already available to indicate the existence of a broad dietary overlap, competition is determined by a number of factors of which dietary overlap is only one, such as season, population and amount of food available. It argued that the complexity of the relationship would necessitate several lengthy research projects and would make extrapolation hazardous.

3.34 Mr Poole of the CSIRO commented that a wide range of research projects have been undertaken but because they have been limited to specific species and habitats, cross-comparisons have been difficult to make. In addition, little attempt has been made to examine the economics of competition.[30]

3.35 The Australian Agricultural Health and Quarantine Service (AAHQS) took the view that properly conducted experiments could provide the data to establish a basis for extrapolation.[31] Dr P. Rawlinson of the Australian and New Zealand Federation of Animal Societies (ANZFAS) argued that State fauna authorities should have done research on competition between kangaroos and livestock long ago. He went on to say that if the States were unwilling to do this research, it should be done by the Commonwealth.[32]

3.36 ANPWS commented that:

> Shepherd's conclusion that meaningful research in this area is difficult and expensive also is supported but this does not mean that further research should not be undertaken.[33]

3.37 The Agriculture Protection Board of Western Australia submitted that:

> Currently used techniques of diet estimation in herbivores are best regarded as being qualitative or only approximately quantitative. Although it may be possible, in some circumstances, to establish a quantitative procedure, a considerable expenditure of time and resources will be necessary to do so.[34]

Crop Damage

3.38 Steele Rudd sketched an early perception of kangaroo damage:

> We took it in turns to watch the barley. ... It was terrible going out, half awake, to tramp round that paddock from fire to fire, from hour to hour, shouting and yelling. And how we used to long for daybreak! Whenever we sat down quietly together for a few minutes we would hear the dull thud! thud! thud! - the kangaroo's footstep.
>
> At last we each carried a kerosene tin, slung like a kettledrum, and belted it with a waddy - Dad's idea. He himself manipulated an old bell that he had found on a bullock's grave, and made a splendid noise with it. It was a hard struggle, but we succeeded in saving the bulk of the barley ...[35]

3.39 In areas of intensive cropping where most of the woodland has been cleared, there are few kangaroos and, consequently, little damage to crops. However, on the edge of the wheat belt, kangaroo damage can be serious, particularly in areas where the expanding wheat belt has extended into woodland and paddocks are surrounded by scrub.[36] Kangaroos cause damage to crops not only by eating them but also by trampling.

3.40 The fact that crops in some areas suffer from the depradations of kangaroos is not in question - even the animal welfare organisations accept that such damage occurs. The extent of the damage and the means used to protect those crops are, however, subject to disputation.

3.41 The AAHQS told the Committee that there is little quantitative information available on the extent of damage.[37] Further, perceptions of kangaroo damage to crops can be influenced by ignorance of other causes of damage. Such things as weather damage to crops can distort assessment of kangaroo damage. Sometimes, the results of a minor hailstorm on a crop can be very similar in appearance to that of kangaroo damage.

3.42 The AAQHS, NSW NPWS and ANPWS all agreed that kangaroos were perimeter feeders because of their preference for remaining close to cover.[38] The impact of perimeter grazing is dependent upon the shape of the crop paddock. Large square paddocks with little available cover usually suffer less damage than long, narrow paddocks adjacent to scrub.[39]

3.43 Another consideration is the availability of other feed. It is significant that many crops have their early growing phase during winter when there is little pasture growth.[40] A winter wheat crop provides attractive and nutritive food for kangaroos.[41] Damage to the crop during its early growing stage leads to a retardation of growth of that part of the crop, which is then still green when the rest is ripe. When the crop is harvested, the grain is either rejected or discounted at the grain terminal, depending upon the extent of the damage.

3.44 Most species of macropod are capable of inflicting damage upon crops. There is evidence that grain and lucerne crops are eaten by not only eastern grey and western grey kangaroos but also by the red-necked, whiptail, black-striped and swamp wallabies and the wallaroo. The rufous rat kangaroo can make a

significant impact on the tubers of a potato crop and even the uncommon Lumholtz's tree kangaroo of north-eastern Australia causes damage to maize crops.[42] The range of the red kangaroo is too far west to have much impact on crops, except where they have been grown in marginal rainfall areas.

3.45 Representatives of the National Farmers Federation (NFF) stated that kangaroos do spoil and trample crops, especially grazing oats.[43] However, Dr Arnold commented that kangaroos have 'very regular' habits, as kangaroos usually make only one or two entry points to the crop and once having made a path they will stick to that path. He considered that the amount of damage done by trampling is 'usually quite small'.[44] Dr Robertson found that although kangaroos follow fixed pathways he concluded that in a wheat or annual crop paddock they may be responsible for considerable trampling damage.[45]

Impact on Livestock Watering Points

3.46 A number of witnesses stated that kangaroos competed with livestock for water. A representative of the Agriculture Protection Board of Western Australia said that in the pastoral areas of Western Australia, kangaroos compete for artesian water supplies.[46] AAHQS observed that there was 'little doubt that large numbers of kangaroos can reduce reserves of valuable water'.[47] The Director of AAHQS told the Committee that little scientific information had been assembled and added that further research was required.[48]

3.47 The NSW NPWS pointed out that evaporation from dams far exceeds consumption by kangaroos. Research indicates that red kangaroos drink less frequently than sheep, once every five days as compared to twice a day, and a smaller volume of water, 39.5 ml/kg/day as compared to 173.4 ml/kg/day.[49] Under normal circumstances, there is enough water for livestock and kangaroos.

However, when water reserves are low, competition does occur. The NFF stressed the cost of pumping and transporting water in droughts and the extra costs imposed on landholders when some of that water is drunk by kangaroos.[50]

3.48 Respondents to a survey of 122 pastoral members of the United Farmers and Stockowners of South Australia Incorporated found it difficult to estimate costs associated with the impact of kangaroos on watering points. Some responses indicated that landholders were forced to use motor-driven pumps rather than windmills more often during calm periods because of the presence of the large numbers of kangaroos. Pumping water for livestock which was drunk by kangaroos cost 'hundreds of dollars' in diesel fuel during summer months. However, 44 respondents (36 per cent) said that kangaroos were not a problem around watering points.[51]

3.49 Some witnesses suggested that the fouling of water supplies by kangaroos was sometimes a problem.[52]

Damage to Fences

3.50 Several witnesses stated that kangaroos caused damage to fences but there was a lack of quantitative information.[53] Dr Caughley confirmed that kangaroos damaged fences but the extent of that damage was subject to the perceptions of landholders.[54]

3.51 Representatives of farmer organisations stated that if one categorised the types of damage done by kangaroos, kangaroo damage to fences ranked second to grazing damage to pasture.[55] The material and labour costs for repairing fences were extra costs borne by farmers. In addition, valuable livestock, such as fat lambs, could be lost through holes in fences[56] or, conversely, straying livestock, with serious parasitic infestations such as sheep lice or infections such as footrot,

could gain entry through holes in fences and so contaminate other livestock.

3.52 Kangaroos appear to cause minimal damage to conventional, stockproof, wire-strand fences and the fences are no obstacle to their progress. Occasionally, in a state of excitement, they knock over, or otherwise damage, old or defective fence posts.[57] Plain wire fences, which are largely located in the pastoral areas, are also exposed to damage when large kangaroos attempt to jump over them. If their legs fail to clear the top wires, the resulting entanglement could damage the fence and fatally entrap the kangaroo.

3.53 Kangaroos force holes in rabbit netting. Netting fences need to be constantly maintained and even small macropods such as pademelons are able to tear holes in wire netting. Once an entry hole is made, repairs are demolished or bypassed as soon as they are completed.[58]

3.54 Kangaroos also use holes that other animals, such as wombats and emus, make in fences.

Damage to Forestry

3.55 The Director of the ANPWS stated that one aim of the kangaroo management was to prevent the deleterious effects of kangaroos or wallabies on forestry production.[59] In particular, the Tasmanian NPWS listed as a specific aim of its wallaby management programme the containment of the deleterious effects of wallabies on forestry.[60] It has become apparent to the Committee that the exact nature of macropod damage to forestry is again related to the impact of different species of kangaroo. Dr Arnold of the CSIRO studied western grey kangaroos in pine plantations and reported that there was no damage to the plantation, or at least far less damage than that inflicted by

sheep and cattle.[61] The ANPWS reported that there was a paucity of information on kangaroo damage to forestry for mainland Australia.[62] However, in a review of the literature, it was clearly established that, at least in Tasmania, wallabies heavily browsed native and exotic seedlings and at times the damage was extensive and severe.[63]

3.56 A survey by the NSW Forestry Commission reported damage by both kangaroos and wallabies in the browsing of seedlings and saplings of both native and exotic trees and the trampling of saplings and damage to rabbit proof fences. The species responsible for the damage were identified as red and grey kangaroos, swamp wallabies, red-necked wallabies, black-striped wallabies and red-necked pademelons. It concluded that although there was wide damage throughout the State it varied much in frequency, extent and season. It further concluded that kangaroos and wallabies were capable of doing serious damage to forests.[64]

Road Accidents and Motor Vehicle Damage

3.57 The NSW NPWS submitted that kangaroos are a common cause of motor accidents.[65] These accidents can result in fatalities and serious injuries.[66] However, it is difficult to determine the extent of this damage, as all of the available information is anecdotal. There are no statistics kept of the number or cost of accidents caused by kangaroos.

Economic Estimates of Damage

3.58 Until the commencement of the Committee's inquiry, few studies had been done quantifying the damage caused by kangaroos. Those done were all limited in scope. Since then, both the BAE and the CSIRO have published the results of surveys of the costs attributed to kangaroo damage. Before examining the BAE and CSIRO

surveys, it is worthwhile examining the earlier estimates of kangaroo damage.

3.59 Ms S. Arnold, Co-ordinator of Australians for Animals, was aware of two very limited studies of damage, one in Victoria on marginal and semi-marginal lands which gave an annual maximum damage per property of $4500 and another, compiled in the Darling Downs, which gave an annual total of $2000 to $3000.[67] The Tasmanian Department of Agriculture calculated that on Flinders Island wallabies grazing newly sown pasture intended for sheep were consuming feed that would earn the landholders $140 per hectare per year. A similar study was done for dairy pastures grazed by wallabies and concluded that the pasture feed that was consumed deprived landholders of income of approximately $400 per hectare per year.[68]

3.60 In the survey conducted by the United Farmers and Stockholders of South Australia, 81 of the 122 operators surveyed responded that kangaroos had affected their stocking rates from five to 50 per cent, with the majority estimating a 20 per cent livestock reduction factor. This meant that if the average pastoral lease carried 6000 sheep, the landholder could, on average, have gained an extra $12 000 in income per annum if kangaroos were removed. In addition the operators reported an amount of $403 860 for total damage to fencing or $3310 per property, which included both material and labour costs.[69]

3.61 Mr M. Lloyd of the Primary Industry Association of Western Australia told the Committee that he had an annual crop loss of between one and two per cent. Another four to five per cent of his crop was partially damaged. This amounted to a $5000 loss per year to his property.[70] A survey of approximately 1000 grain farmers in 1979 in the South West Downs of Queensland indicated an average crop loss of $10 000 over a period of two months. Damage to coastal sugar cane crops in Queensland in 1982 was estimated at $128 400 for the industry.[71]

3.62 In 1985 the BAE analysed data which were obtained in a supplementary questionnaire to the 1973-74 BAE Grazing Industry survey.[72] This questionnaire asked landholders to estimate agricultural and pastoral damage caused by kangaroos. Approximately 500 landholders responded to the questionnaire and the financial data were indexed to 1983-84 values using BAE indices.

3.63 The BAE estimated the total cost of kangaroo damage to the agricultural sector in 1983-84 as $148 million although it acknowledged that the amount of $148 million may be inaccurate by as much as 50 per cent either way. The largest component of the cost was that attributed to lost livestock carrying capacity (51 per cent), followed by crop losses (27 per cent) and fences and materials (10 per cent). The average agricultural cost per kangaroo was estimated to be $3.72 with an average cost per property of $1364. Table 3.1 shows the carrying capacity forgone per kangaroo and Table 3.2 shows the average costs to agriculture caused by kangaroos.

Table 3.1 Average Costs to Agriculture Caused by Kangaroos, by Zone (1973-74 Indexed to 1983-1984 dollars)

Zone	Average cost per property of kangaroos	Average cost per kangaroo
	$	$
Wheat-Sheep	1 441	11.26
High Rainfall	1 124	2.87
Pastoral	2 073	1.47
All zones	1 364	3.72

Source: BAE, 'An Economic Perspective on the Population Management of Commercially Harvested Kangaroos'.

Table 3.2 Carrying Capacity Forgone per Kangaroo

Zone	Physical carrying capacity forgone per kangaroo (1973-74)	Value of carrying capacity forgone per kangaroo (Indexed to 1983-84)
	sheep equivalent	$
Wheat-Sheep	0.90	4.68
High Rainfall	0.31	1.81
Pastoral	0.20	0.41
All zones	0.36	1.76

Source: BAE, 'An Economic Perspective on the Population Management of Commercially Harvested Kangaroos'.

3.64 Although there was a normal season in 1973-74, there was an export ban on kangaroo products from 1973 to 1975. The fall in demand for kangaroo products may have led to an increase in the population of kangaroos because of reduced shooting by the industry. In addition, Mr Rawlinson of ANZFAS commented that, as the export industry had just been abolished by the Federal Government, 'many people were in fact intent on trying to show that kangaroos were causing them immense problems'.[73] The BAE itself acknowledged the subjective nature of the landholders data.[74] It also acknowledged that the reliability of farmers' perceptions was not known but it was reasonable to assume that a bias operated because of vested interests.[75]

3.65 The ANPWS engaged the CSIRO as a consultant to undertake research into the economic effects of kangaroos on pastoral and agricultural production. Ms L. Gibson and Mr M. Young of CSIRO obtained data for a computer model by means of a questionnaire sent to:

> 906 landholders in five pastoral regions, two marginal cropping regions and three established cropping regions.... The response rate in each of these regions ranged from 56% to 81% with an average response rate of 66%. No non-response bias was detected.[76]

3.66 The ten regions were all situated in the commercial shooting areas of the four mainland States which have approved kangaroo management programmes.

3.67 The CSIRO team concluded:

> Landholders perceptions and estimates of the damage and losses incurred from kangaroos were used to produce a first estimate of losses to agriculture from kangaroos under the current Kangaroo Management Program. The estimate of losses which could be quantified for the commercial shooting areas of mainland Australia totalled $113 million for the

1984/85, financial year. The gross value of agricultural production for the area was $3,533 million in 1984/85, the estimate of net losses therefore represents 3% of the gross value for that year. Unquantified losses include those due to foregone management opportunities and changes in management practices induced by the presence of kangaroos. The estimate of losses, derived using landholders perceptions of the damage and losses caused by kangaroos was larger in the areas of the wheat/sheep zone ($85 million) where commercial kangaroo shooting takes place, than in the pastoral areas ($27 million) of Australia, reflecting the greater productivity of the wheat/sheep zone compared with the pastoral zone.

The opportunity cost of fodder consumed by kangaroos accounts for 51% of the estimated losses due to kangaroos, lost crop production for 27%; the opportunity cost of water consumed by kangaroos accounts for 8% of the losses whilst the cost of fence repairs represents 14%.[77]

3.68 Animal welfare organisations and the NSW NPWS[78] (Correspondence, April 1985) have drawn attention to the limitations of estimates of economic loss attributed to kangaroos which have been derived largely from landholder perceptions rather than from empirical information. Notwithstanding these limitations, it is obvious from the CSIRO study that significant damage has been caused by kangaroos.

Conclusions

3.69 The fact that kangaroos cause damage to properties is irrefutable. The extent of that damage is subject to serious disagreement among the various parties to the debate. There is no scientific study or other information which, with any sufficient degree of reliability, establishes the extent or cost of kangaroo damage.

3.70 Kangaroo damage appears to be, from the evidence given the Committee, not inconsiderable. The nature and extent of that damage varies considerably in both time and space. There are many factors which contribute to the extent of the damage and the cost of it to landholders.

3.71 The evidence points to a need for landholders to protect crops in some areas and pastures in others. The total damage, even without reliable estimates, seems to be enough for government to operate a management programme for kangaroos, which could include compensation. Management programmes are discussed later in this report.