

# **A Shot in the Dark**

## **A Report on Kangaroo Harvesting**

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On behalf of Animal Liberation NSW  
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## **Acknowledgements**

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## **I. EXECUTIVE SUMMARY**

The harvesting of kangaroos is being successfully promoted by the kangaroo industry as free-range farming producing a healthy meat alternative to traditional meats. Kangaroo harvesting has even been celebrated by some as having the potential to restore Australia's pastoral lands by reducing the numbers of damaging hard-hoofed livestock such as sheep and cattle on the land. This report demonstrates that the industry's claims are only partial truths or outright misinformation. This report exposes the realities of the kangaroo industry which include extensive and alarmingly unhygienic practices, unacceptable suffering of both young kangaroos and adults and the manufacture of false hope that kangaroo harvesting will alleviate environmental degradation in rural areas.

The chapter 'Hygiene and Kangaroo Game Meat' identifies the many pathogens that affect kangaroos and describes the kangaroo meat handling process. A concern is raised regarding the potential human health threat from an unidentified epidemic that periodically causes high levels of mortality in localised kangaroo populations. It shows that the management and regulation of hygienic practices in rural areas, where kangaroos are shot and eviscerated, is unacceptable, and in this self-regulated industry, is practically impossible to enforce. At the time of writing the Russian Federation has issued a ban on the import of kangaroo meat due to abnormal coliform accumulation. In the same vein, an independent investigation has identified unacceptable levels of bacterial accumulations in kangaroo carcasses in chillers (holding facilities for kangaroo carcasses) in Queensland. This is not the first time that kangaroo chillers have been found to be in appalling conditions, unsuitable for holding meats destined for human consumption. This report concludes that enforcement of hygiene standards at the three to six million points of kill and hundreds of remote chillers in rural areas is next to impossible.

The chapter 'Animal Welfare' highlights the severe welfare issues that result from the harvesting of kangaroos. Every year some 440,000 dependent young kangaroos are either clubbed to death or left to starve after their mothers have been killed. These practices have more severe welfare implications than the renowned annual slaughter of baby Harp Seals whose products have been banned in many countries including

Mexico, the United States, the Russian Federation and member countries of the European Union. At present the only difference in the ethics of these two industries is that young kangaroos are killed in the dark, in remote environments and away from the camera lens. Further, a startling number of adult kangaroos suffer an inhumane death due to inaccurate shooting. The kangaroo industry will contend that only one to six percent of adults are misshot (depending on the state); when considering the enormity of the harvesting industry this equates to too many breaches of ethical practice. An independent assessment of occurrences of misshot kangaroos suggests that the percentages are actually much higher, possibly up to 40 percent. Both this estimate and the industry's estimate do not account for misshot kangaroos that are left

***The realities of the kangaroo industry: extensive and alarmingly unhygienic practices, unacceptable suffering of young kangaroos and the manufacture of false hope that kangaroo harvesting will alleviate environmental degradation in rural areas.***

in the field because their carcasses will not be accepted by the meat processors.

The chapter 'Sustainability' examines the various conservation issues stemming from kangaroo harvesting. In some cases localised populations are overharvested because they are perceived as pests by pastoralists. This report argues that there is no scientific basis for labelling kangaroos as pests. This report also concludes that in

some cases, when harvesting quotas are set during drought conditions, the precautionary principle is not adhered to. This is despite the fact that in drought conditions, when kangaroo populations are typically at their lowest, harvesting continues unabated, occasionally reliant upon the emigration of kangaroos from adjacent management zones to replenish populations. A number of detrimental factors such as road-kill and disease may have such a severe impact upon kangaroo populations during drought that, if harvesting continues, these populations may not persist. Finally, this report clearly establishes that kangaroos do not compete with livestock for resources (with the arguable exception of drought periods). The aim of kangaroos replacing livestock has not materialized thus far, and there is every indication that it never will.

## **II. HYGIENE AND KANGAROO GAME MEAT**

### **KEY POINTS**

- **There is a concern of a human health threat from an unidentified epidemic that periodically causes high levels of mortality in localised kangaroo populations.**
- **Hygiene surrounding the production of kangaroo meat is so poor that the Russian Federation has banned the import of kangaroo meat.**
- **An independent investigation has identified unacceptable levels of bacterial accumulations in kangaroo carcasses in chillers (holding facilities for kangaroo carcasses) in Queensland.**
- **Regulation of hygienic practices at the three to six million annual points of kill where kangaroos are shot and eviscerated is impossible.**

## Introduction

It is estimated that 75% of pathogens are zoonotic, and overall, zoonotic pathogens are twice as likely to be associated with emerging diseases than non-zoonotic pathogens (Taylor et al. 2001). Kangaroos are harvested as game meat, with the product also sometimes termed 'wild-game meat'. It is well recognised that game meats frequently cause illness in consumers, especially when care has not been taken while eviscerating and handling the carcasses (Alwynelle 2006).

The European Union has recognised the potential dangers of game meats, with the European Council issuing a Directive on the killing of wild game and the placing of wild-game meat on the market. This Directive stipulates that wild-game meat imported from countries outside the European Union should be subject to the minimum requirements laid down by this Directive for trade between Member States (Office for Official Publications of the European Communities 1992).

This report shows that the hygiene standards surrounding the production of kangaroo meat do not presently meet the Australian nor the European standards. Further, the scale of the kangaroo industry and slaughter process used will most likely preclude the kangaroo industry from meeting these standards in the future. This report describes some of the known kangaroo meat-related pathogens and diseases and highlights the lack of hygiene regulation inherent in the processing of kangaroo meat for human consumption.

At the time of writing there was a six month ban on the import of kangaroo meat to the Russian Federation as a result of abnormal coliform bacteria accumulations (Bardon 2008). Abnormal coliform bacteria accumulations are a commonly-used indicator of poor sanitary quality in food and water (Spellman 2003). In independently assessed samples (Silliker 2008) obtained by Animal Liberation NSW from biopsies performed on carcasses located in remote kangaroo chillers in Queensland the levels of generic *Escherichia coli* were so high (Table 1) that they warranted Australian Quarantine and Inspection Service (AQIS) alerts known as "*E.coli* ALERTs" (Australian Quarantine and Inspection Service 2008a).

## Diseases in kangaroos

Dr David Obendorf is an Australian wildlife veterinary pathologist and a member of the Scientific Advisory Board to the

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International Animal Health Body, Paris (Office des Internationale Epizooties), with 20 years' experience in the parasites and diseases of Australian fauna. He has noted that “[k]angaroos ... can harbour a wide range of parasitic bacterial, fungal and viral diseases” (Obendorf 2001). Some of the diseases which have been documented affect only kangaroos and so reduce harvest capacity. Others can affect humans as well and so raise serious public health concerns. The following examples illustrate

the magnitude and extent of disease outbreaks among kangaroo populations.

### *Epidemics and viruses*

A number of epidemics have been reported in wild kangaroos. The most worrying in relation to human health-risk is an undiagnosed fatal epidemic. There have been several reported incidents of sporadic “die-offs” in large kangaroo populations in central and western Queensland and north western New South Wales dating back to the 1950's. The following common characteristics are reported in an internal report (Speare et al. 1991):

- 1) Epidemics appear to occur within the Winton - Longreach - Charleville area about every 2-10 years;
- 2) The epidemics are associated with heavy rain or flooding;
- 3) Deaths occur over a 1-2 week period;
- 4) Between 25-80% of the populations in affected areas are impacted;
- 5) Red Kangaroos and Eastern Wallaroos are mostly affected, although mortalities have also been reported in Eastern Grey Kangaroos;
- 6) Clinical signs are those of the central nervous system disease;

- 7) There is no obvious gross pathology;
- 8) Sheep are not affected.

There are few detailed accounts of this pathogen. In 1983 there was a dramatic population crash which affected Red Kangaroos, Eastern Grey Kangaroos and Common Wallaroos in the Boulia - Bedourie - Windorah area of western Queensland. Deaths were reported to begin in some areas before drought-breaking rains and several months later in other areas (Speare et al. 1989). In October 1988, a major epidemic of the unknown disease broke out among kangaroo populations in north-western New South Wales. The disease had a sudden onset, a short duration of about two weeks and a high death rate. Most of the animals infected with the disease died; those who survived had difficulty rising and a reduction in motor function. Mature kangaroos were affected more frequently than young individuals. The disease had drastic effects on the population in the five affected areas, with an average decline of 42% in Red Kangaroos (although one area recorded a decline of 72%) and a 46% decline in Grey Kangaroos (Curran 1999). Similar epidemics occurred in Queensland in 1990 (Speare et al. 1991) and 1999 (Curran 1999).

The 1990 epidemic followed heavy rain and flooding in the Thompson - Barcoo -Cooper river system in western Queensland (Clancy et al. 1990). There were significant mortalities of Red Kangaroos, Eastern Grey Kangaroos and Wallaroos, with mortality rates declining away from the river. Aerial surveys suggested a reduction in the Red

***“There is a need to conduct more detailed investigations into the sporadic die-offs in large kangaroo populations...”  
Queensland Parks and Wildlife Service report (Lundie-Jenkins 1999)***

Kangaroo population of more than 60% in an area of 10,000 km<sup>2</sup>. The mortalities coincided with outbreaks of sandflies, *Austrosimulium pestilens*, and necropsies on carcasses suggested arbovirus infection (Speare et al. 1990).

During the 1990 epidemic specimens of Wallaroos and Red Kangaroos were collected from two separate locations and autopsied to determine the nature of the pathogen. All the kangaroos had a mild to acute mononuclear meningoencephalitis and interstitial pneumonitis (Lundie-Jenkins 1999). The Queensland Parks and Wildlife Service report (Lundie-Jenkins 1999) goes on to state the obvious:

“There is a need to conduct more detailed investigations into the sporadic die-offs in large kangaroo populations specifically in relation to: the dynamics of populations of large kangaroos, the potential transmission of disease agents to livestock and humans and potential human health concerns associated with the harvesting and consumption of kangaroo meat.”

Alarmingly, this virus has yet to be identified. The drastic impact it has on dense kangaroo populations raises grave concerns for the possible impact on humans. The scale of the kangaroo industry and its potential impact on human health mandates a full understanding of the various pathogens that affect harvested kangaroos and their potential link to human health – not a wait and see approach.

There a number of other known epidemics. Apparent epidemics of ‘lumpy jaw’, a condition of jaw infection, have occurred in the Murchison area of Western Australia several times this century (Tomlinson and Gooding 1954). Localised epidemics of coccidiosis, single-celled protozoan parasites that are more complex than either bacteria or viruses, resulted in the deaths of many juvenile Eastern Grey Kangaroos trapped by rising flood waters (Barker et al. 1972). Malnutrition and high densities were thought to make younger animals particularly susceptible when exposed to large numbers of oocysts (egg cells). Another epidemic produced widespread blindness. This outbreak affected thousands of Western Grey Kangaroos between April and July 1994 and March and June 1995 in western New South Wales, South Australia, north-western Victoria and between December 1995 and April 1996 in Western Australia. Eastern Grey Kangaroos, Red Kangaroos and Wallaroos were also affected, but to a lesser extent (Hooper et al. 1999; Reddacliffe 1999). It is believed that the outbreaks were caused by a virus (possibly the Wallal virus) spread by insects, but the factors which lead to the epidemic are unknown (Hooper et al. 1999).

Further, a survey in coastal central Queensland found that 24 out of a sample of 70 Eastern Grey Kangaroos carried antibodies for Ross River Virus, and 36 had antibodies for Barmah Forest Virus (Frances et al. 2004). Antibodies to the Trubanam Virus were found in 21.1% of Western Grey Kangaroos sampled in Western Australia (Johansen et al. 2005).

### *Pathogenic bacteria*

Toxoplasmosis and salmonellosis are two bacterial infections that affect kangaroos and which also have significant public health implications. The infections can spread to

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humans through the handling, processing or consumption of infected kangaroo meat - and as many as one in two kangaroo carcasses may harbour the salmonella bacterium (Shultz et al. 1996). A recent food-borne outbreak of toxoplasmosis in Queensland caused acute clinical illnesses in 12 people and one case of congenital chorio-retinitis (inflammation of the eye tissue) in a

newborn baby. Contaminated kangaroo meat was the most likely cause of the outbreak (Obendorf 2004).

### *Parasites*

A single Western (*Macropus fuliginosus*) or Eastern (*M.giganteus*) Grey Kangaroo, for example, can be infected with up to 30,000 nematodes (parasitic worms) from up to 20 different nematode species (Speare et al. 1989). In southern Queensland *Pelecitus roemeri*, a large nematode worm, infects on average 18% of *M. giganteus*, 6% of *M. rufus* (Red Kangaroo) and 22% of *M. robustus* (Eastern Wallaroo). The following occurrences of pathogens in kangaroos were cited in an independent report prepared for the Kangaroo Management Advisory Panel (Olsen and Low 2006):

- 1) The cyst-forming tapeworm *Echinococcus granulosus* entered Australia on sheep and now infects kangaroos as intermediate hosts, in severe cases killing the host (Johnson et al. 1998), or rendering it more susceptible to predation by forming debilitating cysts in the lungs (Jenkins and Macpherson 2003);
- 2) Cutaneous leishmaniasis, a disease affecting both humans and wildlife mostly outside of Australia, was found in Red Kangaroos held in captivity near Darwin (Rose et al. 2004);

- 3) *Cryptosporidium* oocysts, a protozoan parasite that can cause diarrhoea in humans and other mammals, was found in the faeces of Eastern Grey Kangaroos (Davies et al. 2003; Power et al. 2004); and
- 4) a serious blood infection by the nematode *Pelecitus roemeri* was recorded in a captive Western Grey Kangaroo (Portas et al. 2005).

### **Point of kill**

For the kangaroo industry the challenges of disease control and hygiene regulation are exacerbated by the scale of the industry, the remote locations where harvesting takes place, and the conditions under which harvesting occurs.

In theory, kangaroo shooters operate under strict guidelines which exist to prevent the harvesting of unhealthy individuals. The Australian Standard for Hygienic Production of Game Meat for Human Consumption stipulates that kangaroo shooters must carry out pre-death inspections of target movement to determine whether there is any indication of sickness (CSIRO 2007). According to the Standard, no animal should be harvested if it can be seen that it:

- 1) has an abnormal gait;
- 2) is weak or lethargic;
- 3) lacks alertness;
- 4) sits in an unusual way;
- 5) holds its head at an unusual angle;
- 6) has any discharge from the nose or mouth;
- 7) has any skin abnormalities; and/or
- 8) is poorly fleshed, or is otherwise apparently injured or suffering from an abnormality that may render meat derived from it unwholesome.

However, in practice it is difficult to comply with the Standard. Inspections are impossible to carry out because the harvesting of kangaroos occurs at night and in remote locations. Further, the shooting of a kangaroo requires that it must first be transfixed (made to stand still) making any observation of target movement impossible by a spotlight (Sibraa 2004). The result is that such inspections by shooters are of little value in identifying diseased individuals.

Visual meat inspection procedures following harvesting and processing are also far from effective. Unless gross lesions are apparent in the meat or samples are taken for testing, some infections are difficult or impossible to detect (Sibraa 2004). If the animal is ill and the meat becomes fevered after death the dark colouring of kangaroo meat further reduces any chance of picking up on any visual indications of the condition (Obendorf 2001).

In a response to the ban by the Russian Federation on kangaroo meat imports AQIS has issued updated guidelines for microbiological testing of game carcasses. The guidelines require that one in every 600 carcasses be tested for *E. coli* (Australian Quarantine and Inspection Service 2008b). As the section on 'Remote chillers' will show, this frequency of testing is not nearly enough to ensure that contaminated carcasses are not processed and sold for human consumption.

### **Time delay**

As well as the problems associated with the shooting of unhealthy individuals, further risks of bacterial infection arise due to the sometimes excessive periods of time

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between an animal being shot and processed and the carcass being placed in cold storage. Shooters often travel long distances for their night's kill and in summer there are few hours of darkness. Kangaroos are gutted and bled in the field and then hung on an open air truck (DVD: Chapter 9) for the duration of the night (CSIRO 2007). The

resulting long delay between processing (in the field) and cold storing increases the likelihood of bacterial contamination.

There has been and continues to be minimal supervision to ensure that meat submitted after the arbitrary time limit of two hours of daylight is rejected (Administrative Appeals Tribunal 2008b; Obendorf 2001).

## Remote chillers

Remote chillers (Figure 1) are used to store kangaroo carcasses at field depots (unlike livestock, kangaroos are shot remotely and not killed at abattoirs). In theory, premises and equipment at the field depot should not be a source of contamination of wild game material; they should facilitate hygienic production, and should be effectively inspected and monitored (CSIRO 2007). However, evidence collected by Animal Liberation NSW (Appendix 1, Sibraa 2009) from various remote chillers in NSW and Queensland suggests that chillers are often unhygienic and use a range of practices which violate both the National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes (Department of the Environment Water Heritage and the Arts 2008) and the Australian Standard for the Hygienic Production of Game Meat for Human Consumption (CSIRO 2007). This evidence documented such practices as:

- 1) hanging carcasses touching the floor (DVD: Chapter 1);
- 2) fresh blood on the floor (DVD: Chapter 2);
- 3) old dried blood that had not been washed away on the floor (DVD: Chapter 3);
- 4) carcasses over-packed and touching one another (DVD: Chapter 4);
- 5) no sterile zone due to only one point of entry into the chillers (DVD: Chapter 5);
- 6) tags on carcasses showing that they are 12 and 13 days old (DVD: Chapter 6);  
and
- 7) implement used for bludgeoning joeys (young kangaroos) with caked blood on the end (DVD: Chapter 8).

(Note: copies of the video recordings documenting the above practices are available on DVD as an accompaniment to this report. If you have not received a copy of this DVD and wish to view this material, please contact Animal Liberation NSW.)

Microbial testing of meat samples (DVD: Chapter 10) obtained from these chillers following AQIS guidelines (Australian Quarantine and Inspection Service 2008a) found generic *E. coli* levels greater than 500 colony forming units per cm<sup>2</sup> (cfu/cm<sup>2</sup>) in five of ten carcasses obtained from two separate chillers in the vicinity of Charleville (7 December 2008) and Mitchell (8 December 2008) in Queensland (Table 1). The sampled chillers were located over 300 km apart, indicating that samples were

independent and that the problem is regional. An *E. coli* level of 500 cfu/cm<sup>2</sup> is deemed unacceptable and enough to initiate an AQIS "*E. coli* ALERT". If only one carcass is found with this level of *E. coli* then all the carcasses in the same batch (a batch is 15 carcasses as defined by AQIS) are to be dismissed (Australian Quarantine and Inspection Service 2008a). Thus a sampling rate of one in 600 carcasses, as specified by AQIS (Australian Quarantine and Inspection Service 2008b), can easily overlook many carcasses not fit for human consumption and import.

**Table 1.** Generic *E. coli* levels from samples of kangaroo carcasses in remote chillers in Queensland (Silliker 2008).

Location	Date	Sample number	Generic <i>E. coli</i> colonies
Charleville	7/12/08	450369671	~ 15 cfu/cm <sup>2</sup>
		450369672	~ 1000 cfu/cm <sup>2</sup>
		450369673	~ 1.2 cfu/cm <sup>2</sup>
		450369674	> 7500 cfu/cm <sup>2</sup>
		450369675	> 7500 cfu/cm <sup>2</sup>
Mitchell	8/12/08	450369649	> 7500 cfu/cm <sup>2</sup>
		450369650	~ 108 cfu/cm <sup>2</sup>
		450369651	~ 162 cfu/cm <sup>2</sup>
		450369652	> 7500 cfu/cm <sup>2</sup>
		450369653	~ 296 cfu/cm <sup>2</sup>

~ colony forming units of *E. coli* were reported per 25 cm<sup>2</sup> swab. The original value was divided by 25 to reflect the table value of *E. coli* per 1 cm<sup>2</sup>.

There is a history of chillers in unhygienic conditions and the phenomenon seems to be widespread. During a South Australian Kangaroo Management Program public meeting Eddie Anndriessen, an AQIS meat inspector, stated that in a follow-up inspection of 15 chillers throughout South Australia which took place two years after the initial inspection, he found:

"not a single chiller box (Macro Meats and other processors SA, sic) that is up to standard, with most being unclean or uncleanable; a big incidence of fly-struck meat is going down to Adelaide; airflow floors are not being cleaned thoroughly; there's still congealed blood and muck;

most of the dirty water is washed out from the front with the bones, instead of being plumbed to a drain; no connection to potable water, only one chiller box had chemicals for cleaning; and that there were still kangaroo feet in the surrounds from two years ago" (The South Australian Kangaroo Management Program 1998).



**Figure 1.** Kangaroo chillers at Marla, South Australia

Kangaroo chillers are numerous and scattered throughout remote areas. The hygiene issues exposed thus far are likely to be prevalent, as hygiene in remote areas is difficult to monitor and almost impossible to regulate.

## Summary

There is a concern raised regarding the potential human health threat from an unidentified epidemic that periodically causes high levels of mortality in localised kangaroo populations. The most obvious causes of contamination of any kind of meat product with common bacteria such as *Salmonella*, *E. coli*, and *Campylobacter* which can pose threats to human health (Sibraa 2004) are:

- 1) delays in gutting carcasses;
- 2) delays in refrigerating carcasses;
- 3) inappropriate sanitation and effluent management;
- 4) the inadequate long-term chilling of carcasses; and
- 5) failure to use potable water during or after gutting in the field.

Australia has rigid and extensive meat hygiene standards for the processing of game meat and domestic stock as well as demanding export standards. Under these

***Effectively, the conditions in which kangaroo harvesting and processing takes place create a double standard for the kangaroo industry which claims to adhere to Australian hygiene guidelines but which cannot possibly regulate all individual points of slaughter or remote chillers.***

standards, the point of slaughter for domestic meats is limited to processing plants which are tightly regulated. In contrast, there are millions of points of slaughter for kangaroos in the outback - as many as there are kangaroos killed. There are also hundreds of intermediate processing and holding field depots (remote chillers) throughout the kangaroo harvesting states (Queensland, New South Wales, South Australia and

Western Australia). Effectively, the conditions in which kangaroo harvesting and processing takes place create a double standard for the kangaroo industry which claims to adhere to Australian hygiene guidelines but which cannot possibly regulate all individual points of slaughter or remote chillers.

### **III. ANIMAL WELFARE**

#### **KEY POINTS**

- **The harvesting of kangaroos raises grave welfare issues.**
- **Every year some 440,000 dependent young kangaroos are either clubbed to death or left to starve after their mothers have been killed. The results are more severe than those seen in the annual slaughter of baby Harp Seals whose products have been banned in many countries including Mexico, the United States, the Russian Federation and member countries of the European Union.**
- **Despite the requirement that adults be harvested using a single shot to the head, many carcasses in remote chillers show evidence of neck shots as the cause of death.**
- **A significant number of adults receive body shots which enable them to escape only to suffer protracted and painful deaths.**

## Introduction

The starting point for animal welfare policy in the European Union is the recognition that animals are sentient beings and as such should be treated so that they do not suffer unnecessarily. The “Five Freedoms” are widely recognised as defining ideal states of animal welfare and form the basis of European Union policy (Health and Consumer Protection Director-Generale 2007). The “Five Freedoms” are as follows:

- 1) freedom from hunger and thirst – access to fresh water and a diet that will enable full health and vigour;
- 2) freedom from discomfort – an appropriate environment with shelter and comfortable rest areas;
- 3) freedom from pain, injury and disease – encompassing both prevention and/or rapid treatment of any such condition;
- 4) freedom to express normal behaviour – adequate space and facilities and company of the animal’s own kind; and
- 5) freedom from fear and distress – conditions and treatment which avoid causing mental suffering.

Nearly 90% of surveyed European Union consumers say that the same animal welfare standards should apply to imports as to goods produced within the EU (Health and Consumer Protection Director-Generale 2007).

In the European Union the kangaroo industry is a game meat industry and therefore it is subject to different welfare standards to domesticated meat products. However, the sheer volume of annual kangaroo harvesting (two to six million kangaroos) places this industry outside the normal parameters of most game meat industries. In a similar wildlife harvesting/culling industry nearly 300,000 baby Harp Seals (*Phocophilus groenlandica*) are clubbed to death annually in Canada (Fink 2007). Due to the cruelty of this practice, products derived from baby Harp Seals are banned in member countries of the European Union as well as the United States, the Russian Federation and Mexico (Fink 2007).

Like baby Harp Seals, young kangaroos are also clubbed to death or left to starve after their mothers are killed (see below). However, there are no such national bans on

kangaroo products, presumably because the impacts of kangaroo harvesting on the young are less well known, although consumer activism on kangaroo welfare issues has caused several United Kingdom supermarket chains to ban kangaroo products on this basis (Gallatley 2009). This report will expose the cruelty to adult and, in particular, young kangaroos which results from kangaroo harvesting in Australia.

### **Welfare standards**

When harvesting kangaroos, shooters are expected to adhere to the National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes (Department of the Environment Water Heritage and the Arts 2008), otherwise referred to as "the Code". However, in a government-summoned review of the Code of Practice, RSPCA Australia, one of the peak bodies for animal welfare in Australia, found the code to be severely flawed on a number of issues relating to "[f]reedom from pain ... [and] injury" (RSPCA Australia 2002).

#### *Pouch young and young at foot*

Under ideal conditions 50% of harvested female Red Kangaroos are likely to have young at foot. For Eastern and Western Grey females the likelihood is 60%. Therefore a conservative estimate for a harvested female kangaroo with young at foot is 25%, not including young still in pouch. These are young that are still dependent upon their mothers for survival (Witte 2005). During this time, lactation (milk-feeding) demand on the mother peaks at the time of permanent pouch exit, about seven to nine months. Lactation dependence continues after permanent pouch exit as the young at foot typically suckles every 1.5 to 2 hours throughout the day from that time until they are weaned (Russell 1989). During the period up until the Eastern Grey young reach 12 months of age, the mother teaches them vital survival skills including finding food, water and shelter (Croft 2004). Some 18 million females were killed between 1994-2004 (Witte 2005). Thus, a conservative estimate indicates that nearly 4,600,000 young at foot, not including pouch young, were left to suffer an inhumane death during that period (Witte 2005).

Through the Code the government recognizes that measures must be taken to prevent the inhumane death of young that cannot survive on their own (Department of the

Environment Water Heritage and the Arts 2008). Rather than leave the young of slaughtered maternal females to die slow, traumatic deaths, the Code specifies three “humane” methods for killing pouch young, dependent on their size:

- 1) Small hairless young should be killed by a single forceful blow to the base of the skull sufficient to destroy the functional capacity of the brain or by decapitation;
- 2) Larger furred pouch young should be killed by a single forceful blow to the base of the skull sufficient to destroy the functional capacity of the brain;
- 3) Young at foot should be killed by a single shot to the brain or heart where it can be delivered accurately and in safety.

RSPCA Australia has reviewed the appropriateness of these techniques for despatching pouch young and young at foot (RSPCA Australia 2002). In relation to pouch young, RSPCA Australia (2002) concluded that there is “some question over the appropriateness of the techniques (decapitation and head clubbing) recommended for killing pouch young” as these methods are likely to involve unacceptable amounts of pain and suffering to the pouch young.

In relation to large pouch young, the RSPCA Australia (2002) report recommended that to avoid potential cruelty to pouch young the “the Code of Practice and the appropriate

***... there is “some question over the appropriateness of the techniques (decapitation and head clubbing) recommended for killing pouch young” as these methods are likely to involve unacceptable amounts of pain and suffering to the pouch young.***

license should contain a condition that no female kangaroos carrying large pouch young should be shot”. This advice has not been included in the new Code of Practice and was not accepted by the decision of the Administrative Appeal Tribunal in the case of *Wildlife Protection Association of Australia Inc. v Minister for the Environment Heritage and the Arts* (Administrative Appeals

Tribunal 2008a). In an overview of commercial harvesting of kangaroos a government commissioned report states that most shooters found it difficult to kill larger young because of their size and the hazard of shooting them at close range (Pople and Grigg 1999). Further, it found that the main method of disposal of large pouch young was by releasing them into the bush (Pople and Grigg 1999).

In relation to young at foot, which without their mothers are likely to die of starvation, dehydration, or predation, the mandate of lethal shot to the head or heart is inadequate without regulation. Once a female mother is shot it would be all but impossible to ascertain which young at foot belonged to her. Moreover, kangaroos are so timid that it would be impossible for the shooter to catch a young at foot once its mother has been shot. Therefore whilst the Code provides guidelines for the disposal of young at foot, they are both impractical and unenforceable. The net outcome is that inhumane practices remain embedded in the kangaroo harvesting industry, and that large pouch young and young at foot are either clubbed to death or left to fend for themselves once their mothers have been shot.

#### *Adults*

The Code of Practice stipulates that adult kangaroos should be shot in the head by a single bullet (Department of the Environment Water Heritage and the Arts 2008). As shooting generally occurs at night and is carried out from distances of 50 m to 100 m using a single shot high power rifle, some animals are not accurately shot, suffering a hit to the neck or body which enables the kangaroo to flee - only to suffer a protracted and painful death. This issue was of great concern to RSPCA Australia (2002):

“In 1985, the national commercial harvest of kangaroos was 1,777,249. 86% of these kangaroos were head-shot, and 14% were body-shot. This indicates that in 1985 248,815 kangaroos presented to processors would not have been head-shot. The total harvest in 2000 was 2,745,798, or 154% of the 1985 harvest. Applying the same principle, it is estimated that 112,578 kangaroos presented to processors in 2000 would not have been head-shot. Although it is clear that there has been a significant reduction in the number of kangaroos that were body-shot by commercial shooters since 1985, given the size of the commercial kangaroo harvest, this is still a matter of considerable concern” (RSPCA Australia 2002).

The report goes on to state that:

"[there] are a number of important qualifications that must be applied to these results when viewing them in more general terms: 1) The results only represent the prevalence of head shots in kangaroos taken to processors. Given that many processors will only accept head-shot kangaroos, this sample must be regarded as a conservative estimate of the proportion of head-shot kangaroos in the total harvest. 2) The sample does not include kangaroos that had been shot and injured but were not retrieved by the shooter."

An independent assessment of compliance with the Code, carried out by Animal Liberation NSW between 2005 and 2008, has identified an average of 40% of kangaroos per chiller in 24 chillers throughout New South Wales and Queensland were

***... an average of 40% of kangaroos per chiller in 24 chillers throughout New South Wales and Queensland were neck shot... Neck shot kangaroos may suffer a painful death, which is a clear transgression of humane practices and the Code guidelines.***

neck shot (Appendix 1, Video: Chapter 7). Neck shot kangaroo were identified as those whose heads were severed below the atlantal–occipital joint, a location where the cut is much more difficult to make, and as a result of which the weight of the carcass (and with it the amount the shooter would get paid for it) would have been decreased (Sibraa 2009).

Neck shot kangaroos may suffer a painful death, which is a clear transgression of humane practices and the Code guidelines. Correctly followed, the Code would render the carcasses of neck shot kangaroo inadmissible for meat processing; however carcasses with heads severed below the atlantal–occipital joint are routinely processed for meat and skins.

### **Welfare regulation**

Regulation of kangaroo harvesting by wildlife authorities, even with a Code of Practice, is problematic as shooting takes place at night in remote areas and few resources are allocated to the policing of the Code. For example, in 2007 the New South Wales shooting quota was 940,757 kangaroos (Department of Environment and Climate

Change 2008) – yet the quota was policed by only three inspectors (Administrative Appeals Tribunal 2008b). Moreover, the inspectors used a regular travel route through the state, following a three week cyclical pattern (Administrative Appeals Tribunal 2008b), so presumably shooters could easily predict when inspectors would arrive.

Kangaroos are often thought of as farmed animals, yet the farming of kangaroos in a controlled environment is impossible. They are free ranging and do not show the herding characteristics of domestic animals such as sheep and cattle, with groups dispersing quickly if startled. They are very skittish in nature and in stressful situations (such as when being handled or when in captivity) they exhibit a powerful stress response that can result in muscle tension that prevents their meat from being edible after slaughter, or even death.

### **Summary**

- 1) The kangaroo industry and state sanctioned programs have failed to address key concerns raised by RSPCA Australia (2002);
- 2) free ranging kangaroos cannot be harvested in the millions without severe transgressions of basic welfare guidelines; and
- 3) the kangaroo industry does not meet the minimal animal welfare guidelines espoused by the European community and therefore kangaroo products should not be imported by the European Union.

## **IV. SUSTAINABILITY**

### **KEY POINTS**

- **Some localised kangaroo populations are overharvested because they are perceived as pests by pastoralists. In fact, there is no scientific basis for labelling kangaroos as pests.**
- **In some cases, when harvesting quotas are set during drought conditions, the precautionary principle is not adhered to. This is despite the fact that in drought conditions, when kangaroo populations are typically at their lowest, harvesting continues unabated. Any one of a number of factors in play during drought periods may have such a severe impact upon kangaroo populations during these times that if harvesting continues, these populations may not persist.**
- **Kangaroos do not generally compete with livestock for resources (with the arguable exception of drought periods) and there is no indication that they will ever replace livestock as a preferred farming animal.**

## Introduction

Australia's marsupial mammals are unique in many ways. Most notably, young develop in a pouch, many hop rather than run, and the development of embryos may be controlled in response to environmental conditions. Despite their unique characteristics, Australia's conservation track record when it comes to these animals is alarmingly poor. Since European settlement 210 years ago 18 species of Australian marsupial mammal have become extinct, which is nearly half the world's total loss of mammal species over the same period. Six of these species were macropods (kangaroos and wallabies). Forty five more species are currently threatened with extinction (Calaby and Grigg 1989). Four of these are species of macropod which are extinct on the mainland but still occur on islands; seven are macropods classed as endangered and ten are macropods classed as vulnerable (Calaby and Grigg 1989). Only nine species of macropods are considered abundant, and the harvest of six of these is permitted (Department of Environment Water Heritage and Climate Change 2009).

The Australian Society for Kangaroos recently published a report titled 'Decimation of an Icon' (Sutterby 2008) which compiled population and density statistics of harvested kangaroo species in the states of South Australia, New South Wales and Queensland. This report indicates that a number of localised populations of the four harvested kangaroo species (Eastern Grey Kangaroo, Western Grey Kangaroo, Red Kangaroo and Wallaroo) within those states are at risk (Sutterby 2008). Government studies, reports and population statistics referenced in the report indicate that harvested kangaroo populations have declined dramatically due to drought conditions in recent years (see 'The harvesting programs' below). Harvesting quotas, however, remain at the same, that is in same proportion to the populations as during good years.

This report, like the 'Decimation of an Icon' report, argues that the misguided cultural perception of kangaroos as pests, economic incentives to harvesting, and an erroneous belief that kangaroos can replace the livestock industry are the major forces placing some kangaroo populations in risk.

## Kangaroo harvesting framework

Kangaroo harvesting occurs in South Australia, New South Wales, Queensland and Western Australia. Harvest quotas are set as a proportion of the estimated total population size and are determined every year on a state by state basis. In some states the quotas are set individually for management zones and in others the quota is set on a state wide basis. The Federal Minister for the Environment bears responsibility for approving individual state kangaroo management programs.

For 2008 the commercial quota was 3.7 million kangaroos nationwide, representing the maximum allowable for that year. If shooters adhered to the full quota in their harvest of adults, the total annual toll would have been far in excess of this harvest quota. The quotas do not include pouch young killed by the shooter and young at foot orphaned and left to a likely death. They also do not account for kangaroos killed in the non-commercial harvest, kangaroos killed by local governments in national parks and state forests, kangaroos killed illegally, kangaroos killed on the road, nor does it account for the loss of habitat which can have a further negative impact.

The Murray Darling Report (Hacker et al. 2004) examined the sustainability of kangaroo harvesting from the perspectives of stakeholders including farmers, the

***Only nine species of macropods are considered abundant, and the harvest of six of these is permitted.***

kangaroo industry, and conservation groups. The report found that there were risks to populations of kangaroos where harvesting was allowed at population densities below five kangaroos per km<sup>2</sup>. Harvesting strategies that

lead to average population densities of less than five kangaroos per km<sup>2</sup> gave rise to the possibility of minimum densities of two kangaroos per km<sup>2</sup>, a minimum population density level below which Eastern and Western Grey Kangaroo and Red Kangaroo populations are considered at risk of extinction (Hacker et al. 2004).

An independent literature review prepared for the Federal Kangaroo Management Advisory Panel (Olsen and Low 2006) confirmed the findings of the Murray Darling Report (Hacker et al. 2004) in its executive summary. The review states the rather obvious: that commercial harvesting is not sustainable at densities that threaten any of the harvested species with extinction (Olsen and Low 2006). Yet, as is detailed later

in this report, many pastoralists and rural land managers still view kangaroos as pests that are in need of culling. Despite the above reports and population modelling designed to assess management options, disturbing statistics regarding the current management programs in three of the four kangaroo harvesting states were revealed in the Australian Society for Kangaroos' 'Decimation of an Icon' report.

### **The harvesting programs**

In preparing the 'Decimation of an Icon' report, Sutterby (2008) obtained unpublished kangaroo population survey data from South Australia's Department of Environment and Heritage (Thomsen 2008) and Queensland's Environment Protection Agency (Lundie-Jenkins 2008) for 2008 as well as any earlier years for which data was available. She also obtained equivalent published information from the New South Wales Department of Environment and Conservation (Payne 2007). This data is used as the basis of the next section of this report.

In reading this next section of the report, it is important to note that each of the three states referred to below has numerous kangaroo management zones within which there are independent or contiguous kangaroo populations.

#### *South Australia*

Across most of South Australia all three of the commercially harvested species (Red Kangaroos, Eastern and Western Grey Kangaroos) were quasi-extinct (existing in population densities of below five kangaroos per km<sup>2</sup>). Red Kangaroos were quasi-extinct across 92% of South Australia, and were at less than two kangaroos per km<sup>2</sup> across 50% of the state. Yet in 2008, the commercial hunting quota for Red Kangaroos was set at 192,000.

Western Grey Kangaroos are quasi-extinct across 80% of South Australia, and were at less than two kangaroos per km<sup>2</sup> across 60% of the state. A harvesting quota of 76,000 Western Grey Kangaroos was set for 2008 in South Australia. Wallaroos are quasi-extinct across most of South Australia and were at densities of less than two kangaroos per km<sup>2</sup> across 63% of the state. Despite these critical levels, the South

Australian Government has set a quota of 12% to 20% of the population to be harvested between 2008 and 2012.

Across half of South Australia typically 50% of harvested kangaroos are female (Thomsen 2008), which significantly increases the risk of each population declining dramatically (Hacker et al. 2004).

### *Queensland*

In Queensland, the commercial kangaroo industry has access to 94% of the state, leaving only six percent of the state as protected habitat for kangaroos. Red Kangaroos are quasi-extinct across 70% of Queensland, and at densities of less than 1.6 kangaroos per km<sup>2</sup> across 40% of the state. Despite these critically low levels the Queensland Government has set a harvesting quota of 15% to 20% (which is 608,408) of the remaining Red Kangaroos in 2008.

Eastern Grey Kangaroos are quasi-extinct across 36% of Queensland. Yet the harvesting quota for 2008 was set at 1,013,203 of the remaining Eastern Grey Kangaroos in the state.

Wallaroos were quasi-extinct across 86% of Queensland, and at densities of less than two kangaroos per km<sup>2</sup> across 52% of the state. As in South Australia, the average weight of kangaroos killed by the kangaroo industry is just 20 kg. Kangaroos of this weight would barely be of breeding age (Lundie-Jenkins 2008). Despite these figures, the harvesting quotas for Wallaroos were set at 328,060 for 2008.

### *New South Wales*

In New South Wales the commercial kangaroo management zone covers 93% of the state leaving just 7% of the state as protected habitat for kangaroos. Red Kangaroos are quasi-extinct at less than 3.3 kangaroos per km<sup>2</sup> across 68% of NSW, yet in 2008 the commercial harvesting quota was 17% (429,156) of the remaining population.

Eastern Grey Kangaroos were quasi-extinct across 36% of the state. Yet in 2008 the kangaroo industry was to harvest 15% (600,000) of these animals.

Walloos were quasi-extinct across the entire state of New South Wales. Despite this worrying population data, the NSW Kangaroo Management Program has set the harvesting quota for Eastern Wallaroos at 15% (which is 17,245) of the remaining population in 2008 (Payne 2007).

### **Debunking the myths used to justify high quotas**

Several poorly-founded justifications for the continued setting of such high kangaroo harvest quotas have been put forward by the kangaroo industry and population ecologists responsible for advising governments on kangaroo management plans. Below are some of the common justifications, referred to here as myths, and the arguments against them.

*Myth #1: Local extinctions are not important; total numbers are more significant (Administrative Appeals Tribunal 2008b).*

In 1996 the Australasian Wildlife Management Society (Grigg 2004) accepted the position that there are “regional situations where annual off-takes may be well above the maximum sustainable yield and where immigration is a very significant factor in kangaroo demography (Pople 1996)”. This statement reflects an accepted view that kangaroo population decline in individual management zones is not a great risk to overall population persistence because local immigrations from less affected zones will balance out population numbers eventually. This may no longer be the case as populations are at low levels throughout entire states (such as South Australia and Queensland) and broad scale wildlife movement between states is unlikely due to localised movements of kangaroos, the vast distances across states and the vermin proof fences between and within these states (Figure 2).



**Figure 2.** Major vermin-proof fences in Australia (Pople and Grigg 1999).

Movement between local populations should not be relied upon to replenish declining populations harvested in times of drought. A population model of the Red Kangaroo in Longreach, Queensland, a prime Red Kangaroo habitat, indicated that without immigration the likelihood of extinction increases sharply beyond a reduction in fecundity of greater than about 20% (Timmers pers.comm. in Grigg 1996). If the viability of kangaroo populations even in prime habitats becomes reliant on periodic immigration from surrounding areas, kangaroo populations may become at risk at high harvest rates (Australasian Wildlife Management Society 2009).

It should be noted that the term 'local', when used to describe kangaroo populations, can be misleading. In NSW, 'local' refers to management zones which range in size from 16,000 ha to 91,000 ha (Payne 2009). At this scale, landscapes will undoubtedly contain ecosystem processes which are localised, and it is widely recognised that species and ecosystem function are strongly linked. As kangaroos and sheep utilise different resources (Edwards et al. 1996), affected landscapes are likely to be impacted by the loss of herbivores at the top of the food chain. Common species can play key roles in conferring short-term resistance to reductions in ecosystem function

resulting from the loss of rare and uncommon species from the system (Smith and Knapp 2003). Thus, dominant or common species can impart short-term stability to ecosystems experiencing non-random patterns of species loss (Ramp and Roger 2007).

*Myth #2: Harvesting during drought has a minimal additive effect on kangaroo mortality; most kangaroos would die anyway as a result of the drought. In fact, when harvesting takes place during drought season there is actually some benefit to unharvested kangaroos as a result of decreased competition for limited resources (Administrative Appeals Tribunal 2008b).*

Harvesting removes the largest and therefore fittest kangaroos (whether male or female) from the population – the ones most likely to survive extreme climatic conditions and other detrimental unpredictable events (Robertson 1986). Although Red Kangaroos typically live for 15 to 20 years, growing throughout their lifetimes, the average age of Red Kangaroo males in north-western NSW is typically just two years old. This is a result of the industry's practice of targeting the largest animals (McLeoud 2001). Consequently, there is a dramatic difference between the mean body weights of unharvested and harvested kangaroo populations. For example, unharvested kangaroo populations can be expected to have a mean body weight of about 32 kg (South Australia) and 27 kg (Queensland), and harvested populations to have means of 19 kg (SA) and 16 kg (QLD) respectively (Pople pers. comm. in Grigg 2002). This suggests that the overall fitness of these populations, and presumably their ability to survive extreme events, is substantially reduced.

The destabilizing of social structures may be an indirect effect of kangaroo harvesting not taken into account in devising harvest quotas but which may further impact kangaroo mortality rates. Shooting a mother kangaroo may have consequences for the survivorship and fitness of more members of a social group (the mob) than the immediate loss of dependent offspring (Croft 2004). Social learning from a mother kangaroo confers survival advantages upon the young into adulthood (Higgingbottom and Croft 1999). Diet preferences and the ability to discern between plants are learnt from the mother (Provenza 2003). Mothers also train young about stimuli heralding predation risk (Higgingbottom and Croft 1999). Group structure and cohesiveness in Eastern Grey Kangaroos is dynamic and is maintained through matrilineal (female lineages) that constantly build and evolve with each new generation (Stuart-Dick

1987). Play-fights, which occur between mixed age/size groups, prepare the younger kangaroos for adult interactions and enable male mob members to assess potential competitors (Croft and Snaith 1991). Thus, in many ways females are crucial for preserving the integrity of the mob structure and presumably the long term persistence of populations.

The stress that tourism places on kangaroos has been considered for the eco-tourism industry (Croft 2004). However to date no scientific investigation has been undertaken of the stress that harvesting places on the social fabric of kangaroo groups, making it impossible to assess the effect of this factor on harvested populations.

Road-kills, a non-harvesting cause of mortality, increase during drought periods in the sheep rangelands. For example, along a 21.2 km sealed section of road in north-western New South Wales the rate of road-kill was almost ten times higher during drought (20.8 road-kills per month) than non-drought (2.6 road-kills per month) periods. All four harvested kangaroo species were affected in the increased rate (Lee et al. 2004).

Disease outbreaks in kangaroos and other native fauna can cause mass mortalities and so can significantly threaten wildlife populations, biodiversity and the industries that

***Harvesting removes the largest and therefore fittest kangaroos (whether male or female) from the population – the ones most likely to survive extreme climatic conditions and other detrimental unpredictable events.***

depend upon them. For example, a highly contagious facial cancer virus, known as the Devil Facial Tumour Disease, is presently decimating the Tasmanian Devil (*Sarcophilus harrisi*) population. The first known case of Devil Facial Tumour Disease occurred in 1996. The disease is extremely unusual as it is only one of three recorded cancers that

can spread like a contagious disease (Tasmanian Department of Primary Industries and Water 2009). As a result of the disease, Tasmanian Devil populations have declined dramatically, to the point where the species was listed as endangered in 2008 (Tasmanian Department of Primary Industries and Water 2009). It is conceivable that a similar disease could affect one of the harvested kangaroo species during a drought period.

More kangaroos are likely to be harvested during drought than non-drought years. Animals are more accessible and graziers are more active in having animals culled as kangaroos begin to move in on resources they need for their own stock. In addition, the kangaroo industry will have a relatively greater capacity to take animals as a result of previous higher population densities (Pople 2008). For example, in the drought of 1982–83, kangaroos declined by approximately 40% over 12 months in the sheep rangelands of eastern Australia (Caughley et al. 1985). However, most of this decline occurred over a shorter period of perhaps four months, possibly when the more vulnerable individuals died (Robertson 1986). This figure becomes particularly daunting when it is noted that had this period of decline been maintained, the total population decline over 12 months would have been 80% (Pople 2008).

The problem with shooters filling harvest quotas during periods of drought is that the potential for imprecision in population estimates and over-harvesting is greatest during drought periods when mortality rates naturally increase (Pople 2008). The mortality rates often rise so steeply and suddenly that by the time harvesting occurs actual kangaroo numbers can be much lower than they were at the time of the population surveys. For example, if the population halves (as it nearly did in 1982 - 83) or declines by 80% over 12 months, the actual harvest rate over the year becomes 21% or 34% respectively instead of the desired rate of 15% (Pople 2008).

The 'precautionary principle' is a moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public or to the environment, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate not taking the action. The pressures of harvesting at maximum rates and the increasing impact of other factors on mortality create a delicate survival balance for harvested kangaroo populations during times of drought. Sudden population drops can occur and result in a much greater loss to the population than intended by the harvest quota. Annual aerial surveys are costly and are unlikely to occur at greater frequency than they presently do (Pople 2008). Therefore, adherence to the 'precautionary principle' by the bodies responsible for kangaroo welfare and conservation, the Federal Minister of the Environment and the various state kangaroo management programmes, should result in a much less liberal approach to harvesting during drought.

*Myth #3: Frequent surveys provide a realistic assessment of population numbers and the assessments are conservative (Administrative Appeals Tribunal 2008b).*

Kangaroo population surveys do not provide real numbers but rather estimates that are derived, in part, by using correction factors (Pople 2004). Correction factors vary and are dependent on a number of survey conditions including habitat type, vegetation

***Kangaroo population surveys do not provide real numbers but rather estimates...***

density, canopy cover and kangaroo species (Pople and Grigg 1999). As a result of efforts to better estimate kangaroo populations, the factors have a history of changing upwards. For a long time all states utilised the same correction factor of 2.3 to 2.4, originally derived for Red Kangaroos (Caughley

et al. 1976), with the aim of maintaining comparable estimates and ensuring conservative management (Pople and Grigg 1999). However, the development of the kangaroo industry has created much variability in the factors in a generally upward direction, thus continuously increasing the population estimates.

Although information on correction factors is not all in the public domain, the following examples provide some indication of the variability. In 1998, South Australia and Queensland utilised factors of 4.6 to 4.8 for both species of Grey Kangaroo. At the same time, Western Australia utilised a correction factor of 5.75 to 6 for the same species (Bigwood 1998). After "careful consideration" the advisory group to the NSW Management Program suggested that the correction factors be revised to 3.5 for both species of Grey Kangaroo (Bigwood 1998) when surveyed from the air (because they are indistinguishable). On the ground factors of 4.8 and 3.5 were suggested for Western and Eastern Greys respectively (Korn 2001). Most importantly, this variability makes it impossible to compare changes in populations over time.

A gradual upwards shift in population factors resulting in artificially increasing population estimates casts a shadow on arguments by the kangaroo industry and its supporters that kangaroo populations are thriving. Red Kangaroo populations spiked after adjustments to the correction factor in 1992 (Pople and Grigg 1999). As noted by population biologists consulting for the kangaroo industry, the jump in the Red Kangaroo quota in 1992 from 450,000 to 600,000 represents the change in

methodology for determining the state-wide population size in Queensland (Pople and Grigg 1999). In 1995 the population of Western Grey Kangaroos in South Australia was calculated using a revised correction factor (increased by a factor of 2) for aerial survey estimates (Pople and Grigg 1999). The result was a continuation of a dramatic population increase from the previous year, only to be followed by a sharp decline the following year. Similarly, a case study of harvested kangaroo populations that focused on the New South Wales Management Program indicated substantial population spikes of Eastern and Western Grey Kangaroos in 1993. The population spikes had been influenced by an upwards shift in correction factors (Olsen and Low 2006).

Correction factors were revised upwards again in 2001 only to be followed by population spikes in 2002 (Olsen and Low 2006). Alarming, if historical data were reworked to accommodate upward variations in correction factors, populations may now be substantially lower than they were in the 1970s and 1980s.

*Myth #4: The quasi-extinction density of five kangaroos per km<sup>2</sup> and extinction threat density of two kangaroos per km<sup>2</sup> are simply modelling factors that should not be adhered to in practice (Administrative Appeals Tribunal 2008b).*

Perhaps the most worrying aspect of the state-sanctioned kangaroo harvesting industry is that the Federal Government has apparently been trying to ignore its own independent assessment of kangaroo management programs. The findings of the Government report, 'Kangaroo Management Options in the Murray-Darling Basin' (Hacker et al. 2004), have been independently supported by Olsen and Low (2006) and Croft (Administrative Appeals Tribunal 2008b). The modelling factors set out above were derived from modelling exercises conducted during the preparation of the report and geared to provide guidelines for sustainable kangaroo harvesting programs (Hacker et al. 2004) at a time when kangaroo densities were higher than in 2008 across entire states. Yet in subsequent years, when a severe drought occurred across much of the pastoral lands and kangaroo numbers declined dramatically, management programmes did not acknowledge the ensuing low kangaroo densities.

Ignoring the report's findings when the implications threaten the kangaroo harvesting industry compromises both the sustainability of the kangaroo industry and kangaroos populations.

## Forces driving the harvesting industry

### *Cultural bias*

"The origins of the present kangaroo industry trace to rural support for it as self-funding pest control" (Australian Wildlife Management Society – position statement as of Feb 2009). State managed kangaroo harvesting programs have grown out of certain beliefs held by farmers in relation to kangaroos. The most common of these beliefs is that kangaroos are a major pest to crops. Another is that kangaroos compete with sheep and cattle for resources, thereby decreasing productivity. These beliefs are augmented by the widely held view that kangaroos overpopulate production zones due to increased food resources and increased artificial water points (put in place to support livestock) in these zones. To alleviate the farmers' concerns and manage the

***... the Federal Government has apparently been trying to ignore its own independent assessment of kangaroo management programs.***

out of control self-funded kangaroo culling, state-managed kangaroo 'harvesting' (culling) programs were put into place.

Over the years, studies have, for the most part, dispelled these beliefs. A six year study found only slight evidence of competition between sheep and kangaroos in times of extreme drought (Edwards et al. 1995, 1996). Another study in north-western New South Wales concluded that a decrease in wool productivity due to competition with kangaroos occurred only at low pasture biomass and high kangaroo densities (McLeod 1996). That study also concluded that Red Kangaroos have little or no impact on either the body mass or reproductive output of sheep or the growth and survivorship of lambs.

In fact, it was found that Red Kangaroos "consistently avoid areas used by sheep" and that sheep have a negative impact on kangaroos. A recent assessment of the comparative contributions of sheep and kangaroos to total grazing pressure under more realistic values of dry sheep equivalents, comparative biomasses, and the lesser physical impact of kangaroos than sheep on soils and vegetation, concluded that "woolgrowers will not get the benefits they seek from a reduction in kangaroo numbers" (Grigg 2002).

A seminal study on the impact of Grey Kangaroos on crops established that more than 95% of crops in the wheat-belt are not visited by kangaroos, with most browsing occurring on crops located near the forest edge (Arnold 1990). While even this small amount of browsing is potentially problematic, it has been shown that when crops are around 400 m from the forest edge they are not affected at all by kangaroos, which rarely venture that distance away from the forest edge (Arnold et al. 1989).

A study of the impact of artificial water points on kangaroo densities and distribution identified high quality grazing and resting locations, not artificial water points, as the primary determinants of kangaroo distribution. The poor regeneration of vegetation around artificial watering points was attributed primarily to the impact of sheep grazing pressures 20 years after the removal of sheep (Montague-Drake and Croft 2004).

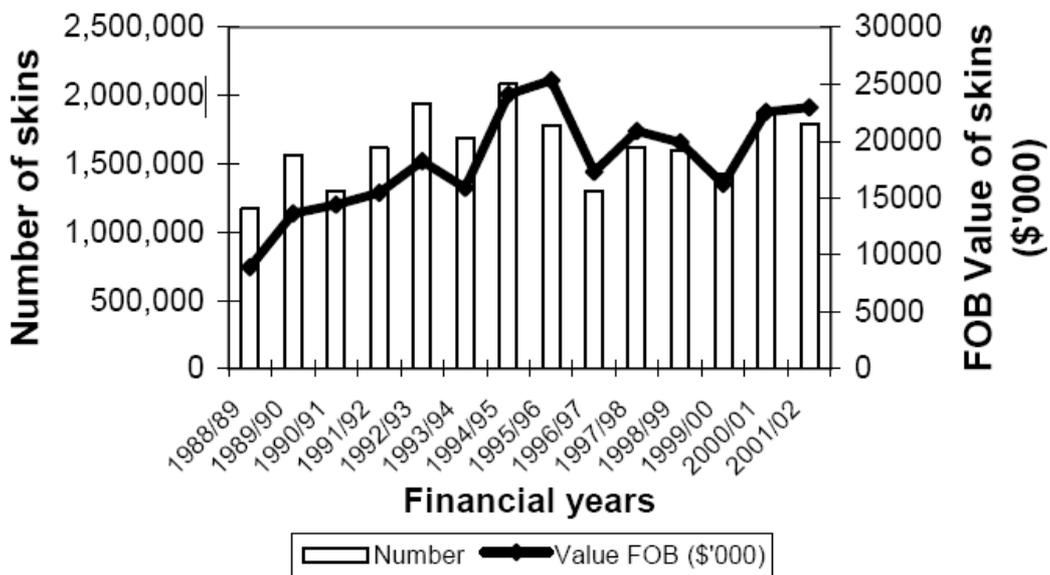
Further, despite the commonly held belief that kangaroos are pests that have experienced population explosions due to resource availability (Caughley et.al. 1983; Grigg 2002), there are well-supported claims to the contrary (Senate Rural and Regional Affairs and Transport Committee 1998). These counter-claims suggest that historical records and current stocking capacities show that kangaroos may have been more widespread throughout Australia and present in greater numbers than they are today (Auty 2005; Croft 2005). The reality is that no one knows what the stable pre-harvesting populations were (Baumber and Ampt 2006) and therefore there is no validity to the argument that the populations are overabundant and in need of culling.

To date only the New South Wales Kangaroo Management Programme has removed the aim of reducing kangaroos' impact on agricultural products and the land from the published aims of the programme (Department of Environment and Conservation NSW 2007). From this it would appear that the consensus of scientific evidence in relation to kangaroos' impact on agricultural products and the land has been slow to infiltrate state kangaroo management programmes. Alternatively, or in addition, there is the possibility that cultural beliefs are stronger than scientific evidence and the agricultural stakeholders who perpetuate them exert substantial influence on state kangaroo management programmes.

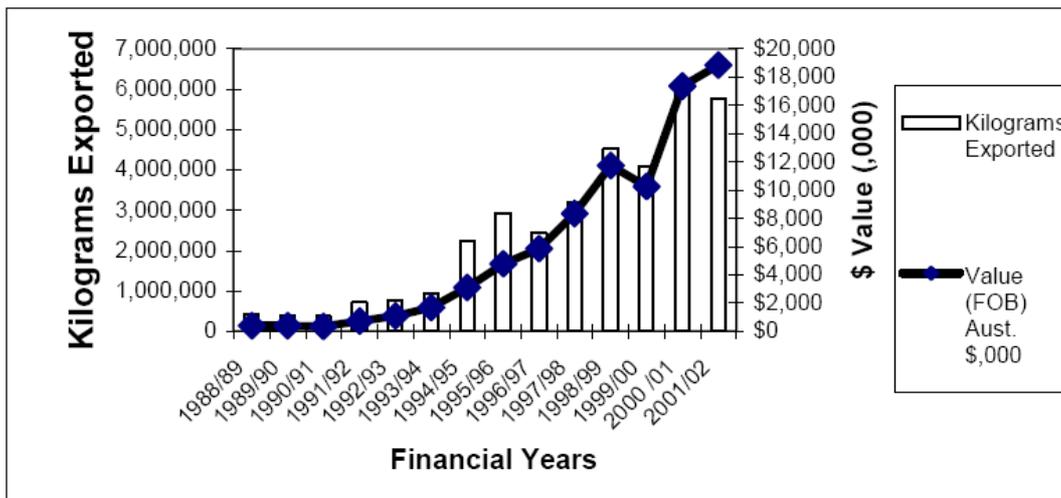
*The economic incentive*

In its 2005 strategic report the kangaroo industry presented a twenty year average trade growth rate of 7% per annum (Kelly 2005). The growth in both the production of skins (Figure 2) and exports of meat for pet food and human consumption (Figure 3) have been dramatic. With such market growth the kangaroo industry is currently worth approx \$270 million each year to the Australian economy (Kelly 2005). Kangaroo meat, skins and leather are exported to over 60 countries around the world (Kelly 2005). In addition, the kangaroo industry creates 4,000 full-time jobs for both shooters and meat processors in rural and remote regions (Kelly 2005).

The industry is directly supported by the Federal Government. The Rural Industries and Development Corporation (RIRDC) is a joint public and private research cooperative for the research and development of ways and means to expand the kangaroo industry (RIRDC 2009). It has supported projects such as new research for more effective harvesting, identifying new markets for kangaroo products, exploring strategies for increasing the value of kangaroo meat, and promoting positive public awareness of kangaroo harvesting and kangaroo products.



**Fig. 2.** Kangaroo skins exported and the value of skins in Australian dollars, 1988-89 to 2001-02 (Hercocock and Tonts 2004).



**Fig. 3.** Exports of kangaroo meat for human consumption and pet food 1988-89 to 2001-02 (Hercocock and Tonts 2004).

*The environmental imperative*

For over twenty years now it has been thought that kangaroo harvesting could be "the sheep replacement therapy for the rangelands" (Grigg 1987). The idea was that if pastoralists could derive significant income from kangaroos, while reducing sheep numbers in the marginal lands, further land degradation could be avoided (Grigg 2002). Many environment and conservation groups have voiced concerns about kangaroo harvesting.

In a submission objecting to a NSW Kangaroo Management Plan (NSW KMP) the Total Environment Centre, on behalf of the Australian Conservation Foundation, Humane Society International and others, expressed some of the following concerns (Angel 2001):

- 1) The new KMP is driven by the kangaroo industry;
- 2) The National Parks role should be to protect and care for native wildlife not facilitate its killing for commercial gain;
- 3) Effective monitoring and policing of kangaroo numbers is impossible;
- 4) The KMP cannot be ecologically sustainable.

Unfortunately, due to misinformation about the environmental benefit of kangaroo harvesting, this practice has gained public acceptance to the extent that some major environmental organizations such as Greenpeace now openly support it.

The two aims of managing kangaroos as pests and managing kangaroos as an economic sustainable resource are mutually exclusive. If the first aim is achieved then the potential of kangaroos to be a high enough value resource to warrant replacement

***The [kangaroo] industry is directly supported by the Federal Government.***

of sheep and thereby achieve conservation goals would be unlikely (Grigg 2002). Alternatively, if high pricing and conservation goals are achieved then kangaroo numbers should be allowed to fluctuate and go through their natural boom and bust population cycles. However, the management programmes of Queensland, South Australia and Western Australia still include both management aims. For example, Grigg (2002) stated that in South Australia:

"the 1999 proposal to the Commonwealth for harvest quotas in 2000 identified a range of target densities in each of the Soil Boards. If the low ends of the ranges were to be achieved, and it is clear that these are the real targets, it would result in a reduction of Red Kangaroos in South Australia from a long-term average of 1.49 million to 0.6 million, or a 60% decrease (Alexander et al. 1999). The target densities have been set ... to manage the populations in response to current landholder perceptions about appropriate numbers of kangaroos and their role in land degradation and in compromising the economic viability of the existing industry, namely introduced stock, and especially sheep".

These concerns were echoed by an organisation called Future of Australia's Threatened Ecosystems (FATE), which advocates kangaroo harvesting as a means of conservation through sustainable use (FATE 2009). FATE's premise is that kangaroo harvesting can create the economic incentive necessary to conserve native habitat by providing commercial returns to landholders. However, FATE researchers have recently concluded that after 30 years, managed kangaroo harvesting has not led to any deliberate actions by landholders to conserve either kangaroos or their habitat (Ampt

and Baumber 2006). Rather than re-evaluating its position FATE is continuing to promote harvesting.

FATE's findings are reflected by other, current trends which indicate that, at best, the kangaroo harvesting industry is continuing to develop as an additional meat and skins industry, not a replacement industry (Kelly 2005). Clearly the environmental potential or promise of kangaroo harvesting as 'sheep-therapy for arid lands' has not been fulfilled. Rather, the welfare and persistence of kangaroos, which are an integral part of the Australian environment, has been consistently compromised by harvesting.

### **Summary**

The aims of kangaroo management are in conflict. One aim is to manage kangaroos as a renewable resource and the other is to mitigate the damage they cause through harvesting. As pointed by Grigg (2002) this conflict has put the kangaroo industry at a crossroads, because following the latter objective not only puts the persistence of kangaroo populations at risk but also devalues their meat. Contemporary studies have established that kangaroos are not pests. In fact, kangaroo populations have a dynamic state of equilibrium which means that they naturally undergo boom and bust population cycles. This is thought to be a reproductive adaptation to the unpredictable Australian climate.

Even when management aims are only to manage kangaroos as a renewable resource, as in New South Wales, there is a concern of overharvesting during drought. In real numbers the number of harvested kangaroos decreases proportionally to population

***... the harvesting of kangaroos will not eventuate in livestock being replaced by kangaroos as the pastoralists' livestock of choice ...***

decline. However, drought conditions present additional challenges to already weakened kangaroo populations which do not seem to be accounted for under present management systems. The rapid die off rates during drought and inability to monitor population through out the year create a risky scenario. This report asserts that the precautionary principle must be adhered to, particularly during drought conditions.

Finally, the harvesting of kangaroos will not eventuate in livestock being replaced by kangaroos as the pastoralists' livestock of choice, thereby benefiting the environment. The information presented in this report clearly establishes that due to the largely non-competitive relationship between kangaroos and livestock and significantly greater income from livestock this has not happened since the idea has been introduced over 20 years ago and is unlikely to happen in the future.

## **APPENDIX 1: TESTIMONIAL OF DESMOND SIBRAA**

My name is Desmond Sibraa and my address is 123 Constitution Road West Ryde 2114. I have attached a copy of my qualifications and experience.

I acknowledge that I have read and agree to be bound by the Expert Witness Code of Conduct of the Supreme and District Courts of New South Wales.

On 9 January 2009, Mark Pearson showed me a series of photographs of kangaroo carcasses stored in chillers. I was advised the photographs were taken between 2005 and December 2008 in northern NSW and southern Queensland. The photographs showed about 420 carcasses and of the total I was able to assess the situation of the cut through the cervical vertebrae of about 204.

Of the total I estimated about 82 were not cut through the atlantal-occipital joint, i.e. about 40%.

The easiest and most convenient method of removing the head from the carcass is by a simple cut through the atlantal-occipital joint. That is between the skull and the first cervical vertebrae. If the cut is made further down the cervical vertebrae, the bone structure of the vertebrae make it difficult to make a clean cut because of the overlapping nature of the latter cervical vertebrae. There is no reason why a neck would be cut below the atlantal-occipital joint apart from removing evidence of failure to deliver a clean head shot because:

- 1) there would be loss of carcass weight with loss of income;
- 2) it is more difficult to cut through the spinal cord.

These necks were clearly indicated by short neck and a rough cut through cervical vertebrae giving the appearance of rough frayed tissues.

It is illegal to shoot kangaroos for human consumption other than by a head shot. See National Food Standards Code 1.6.2 (7) (2) (b) that requires any game meat to be in accordance with a governmentally approved quality assurance program designed to

ensure that the game meat is fit for human consumption. The Australian Standard for Game Meat for Human Consumption is the standard that must be complied with and requires kangaroos to be head shot.

### **Other Observations**

Many of the carcasses were stacked too close together so that the cool air is prevented from reaching all parts of the carcass that is in contact with other carcasses. It is most important that cool air is allowed to contact all parts of the hanging carcass. There were many carcasses that had their legs penetrating the gut cavities of other carcasses. In addition many carcasses had their necks and paws in contact with the unclean floor.

The Australian Standard for Game Meat for Human Consumption is the standard that must be complied with and part 7 .2 of that standard requires hanging kangaroos in chillers to be positioned and spaced for the purpose of achieving adequate chilling.

The general hygiene of the chillers was very unsatisfactory with evidence of old stale bloodstains beneath fresh blood stains on the walls and floors. In some cases there were carcasses in contact with the floor and walls. The Australian Standard for Game Meat for Human consumption requires chillers to be clean and sanitized before any carcasses are placed therein and carcasses must not be in contact with the floor. There were wild pigs with their skins covered with a deep cover of mud and blood stored in close proximity to kangaroo carcasses. This presented a great risk of cross contamination of the kangaroo carcasses hanging in close proximity to the pigs.

It is clear that the requirements of The Australian Standard for Game Meat for Human Consumption are not being properly enforced and there is an urgent need to make sure they are complied with.

## **APPENDIX 2: LETTER FROM MAX DULUMUNMUM HARRISON, ABORIGINAL ELDER FROM YUIN COUNTRY**

19 December, 2008

To Whom it May Concern

Dear Sir/Madam,

My name is Max Dulumunmum Harrison. I am an Aboriginal Elder from Yuin Country. I am writing to you because of my concern about the slaughter of an iconic totem of my people, the Malu, or, in other tongues, the Kangaroo.

I have a number of concerns of which you may not be aware. The first relates to the manner in which Kangaroos are harvested for consumption. Current practices are likely to be harmful to human health as, traditionally, when Kangaroos were hunted and killed, they were immediately thrown on a fire and cooked. This prevented both the build up of harmful bacteria in the meat and a deterioration in its quality. Immediate cooking also meant that the nutritional value of the meat was retained (Kangaroo meat contains one of the highest food sources of iron). Today, the Kangaroo is killed and then transported long distances to processing factories during which time the build [up] of harmful bacteria is likely to occur resulting in unhygienic meat which has lost most of its nutritional value.

My second concern is that very little kangaroo meat actually ends up on the dinner table. It is mostly used for producing pet food, which may be fine for this industry, but is of little value to humans. Moreover, using such an important and iconic totem for the pet food industry does not sit well with our beliefs and traditions and is seen by many as an insult to our culture.

Thirdly, not only is the Kangaroo an important totem in Aboriginal culture, the broader Australian community has adopted it as a national icon as well. The Kangaroo is part of the Australian Coat of Arms and there are many Australians who do not support their slaughter because of the cruel manner in which this is conducted.

Last but not least, the Malu plays a significant role in maintaining our Song Lines, i.e. the lines and centres of energy upon which our culture and all humanity is dependent for sustaining its balance and centredness. The Malu is part of the animal kingdom (together with other animals) which preserve the energy of the Song Lines through their travel over those Lines. In particular, their natural habit of thumping their tails is what keeps the energy of the Lines "activated" and "flowing" around Australia. Their slaughter and loss of habitat interferes with this process which can only be detrimental to the wellbeing of both Aboriginal and other cultures.

I thank you for taking the time to read this letter and my wish is that you will give these matters due consideration.

Yours faithfully,

Max Dulumunmum Harrison

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