

# *Kangaroo Industry Background*

John Kelly, B. Ru. Sci. (Hons), Kangaroo Industries Association of Australia. Mar 2016

## **Introduction**

Whilst the sustainability of pastoral activities in much of the Australian arid rangelands is under constant investigation, the fact remains that they are currently supporting a large population of kangaroos which, if uncontrolled, would seriously threaten the economic viability of the pastoral industry and the environmental sustainability of huge tracks of land (Caughley 1998). These are extremely fragile areas which can support a limited number of grazing animals. Allowing the grazing pressure from all animals to increase is one of the most serious environmental hazards in the rangelands. The kangaroo Management Plan is the only tool currently available to exercise control over the kangaroo contribution to grazing pressure.

Furthermore, the kangaroo population represents a resource. There is extensive ethical debate concerning the morality of utilising wildlife as a resource. This debate however, rarely examines the moral imperative for nations to utilise their resources to the best effect in supplying the world with the food and commodities it needs.

Over the past 60 years a significant industry has developed which utilises the kangaroo resource. Initially its focus was largely on pest control for the pastoral industries. However over the last decade there has been a growing realisation that the kangaroo industry has significant economic and environmental benefits and is an important industry in its own right.

The kangaroo industry is worth over \$200M/year to the Australian economy and employs over 2,000 people. The vast bulk of these jobs are in remote rural communities, many of which would not exist without the industry.

This industry has put in place tight controls over all aspects of its operations. It has become something of a model of sustainable, wise and humane resource utilization.

This document examines the scientific evidence indicating the kangaroo harvest is sustainable and the controls in place to protect the animals it utilizes and ensure it produces safe products.

## Contents

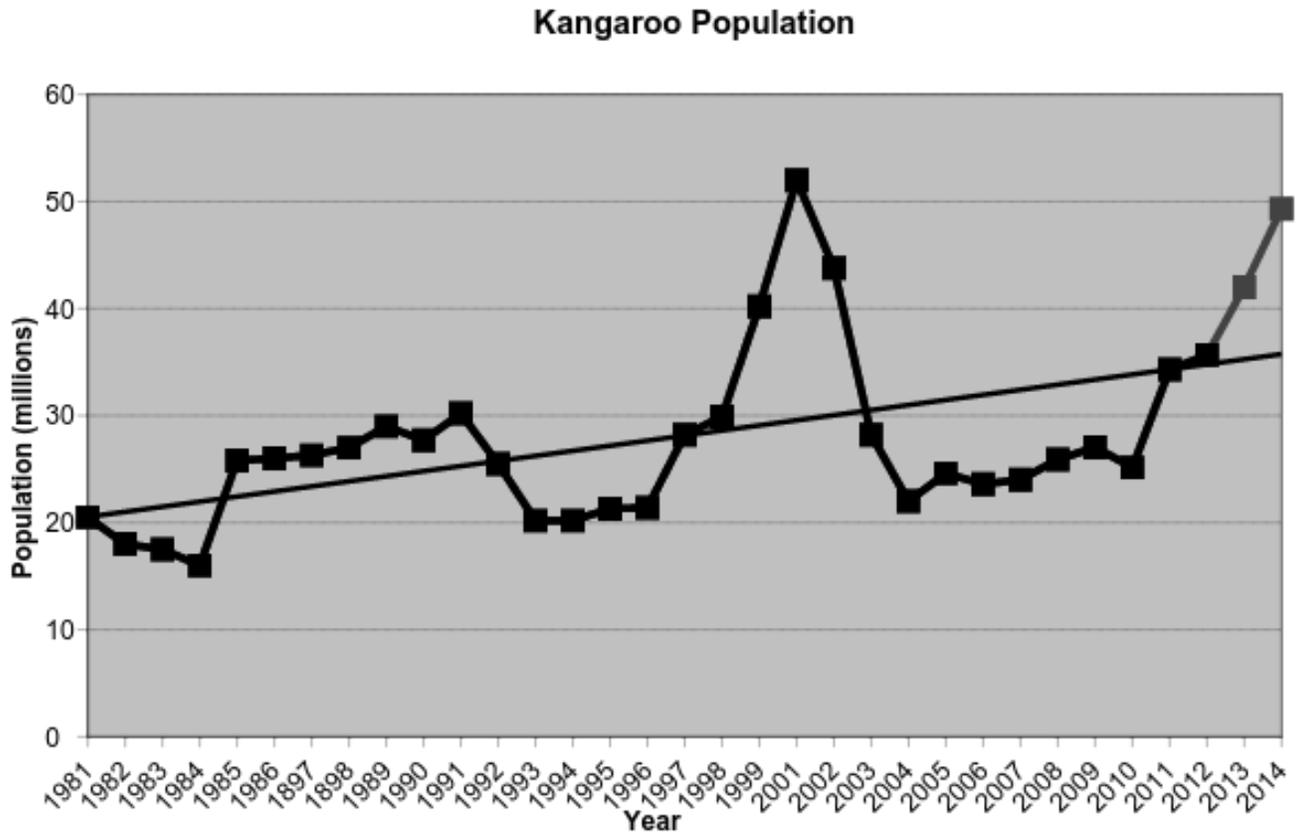
1. **Kangaroo populations**
2. **The harvest quota setting process**
3. **Licensing controls over kangaroo harvesters**
4. **Monitoring of the system**
5. **Environmental impacts of utilising kangaroo**
6. **Environmental impacts of NOT utilising kangaroos**
7. **Animal Welfare**
8. **Public support for a model of sustainable utilisation**
9. **Conclusion**

### 1. **Kangaroo Populations**

There are 48 species of macropods (kangaroos) in Australia. Of these only 4 can be commercially harvested. In addition 2 species of wallaby are harvested in Tasmania.

Over 99% of the commercial kangaroo harvest occurs in the arid grazing rangelands. The populations of kangaroos in these areas are estimated every year in each State by well developed aerial survey techniques. It must be understood that these areas are sparsely timbered, if at all, savannah type ecosystems. Hence it is possible to fly over them and count the large animals such as kangaroos seen below. Using either low flying fixed wing aircraft or helicopters, flying at heights of 2-300 meters the National Parks Authorities count the numbers of kangaroos seen over fixed transects. Forty years of such monitoring have allowed them to develop sophisticated and accurate techniques of extrapolating out to estimates of total population numbers (Grigg and Pople 2001). Kangaroos are one of only a very few species (including humans) who have an annual census of their populations.

The kangaroo population in 2014 was 49.3 million. This means there are nearly twice as many kangaroos in Australia as there are cattle,



**Fig 1: Kangaroos are one of the most numerous large wild land mammals on earth.**

(data source Australian government records)

It is widely accepted that within the rangelands kangaroos are now more common than ever. This situation has arisen due to the increased food and water supply generated by the activities of the sheep and cattle industry. Prior to European settlement these areas had very few places of surface water from which kangaroos could drink. Hence during droughts populations would have shrunk back to the few available waterholes. The pastoral industry has tapped into below ground water supplies to the point where now very few points in the rangelands are further than 3 km from a permanent water source and no point is further than 10 km (Landsburg 1999).

In fact the graph at fig 1 indicates that outside of seasonal fluctuations (the troughs during the mid '80's, 90's and 2000's are the result of droughts, the peaks the result of good seasons), the kangaroo population has been steadily increasing over the past 25 years. This in spite of the commercial harvest throughout that period.

## **2. The Harvest Quota Setting Process**

For any kangaroo species to be harvested the States National Parks Authority must have a detailed Management Plan approved by the Federal conservation Department. These Plans must detail the population monitoring and quota setting controls, the controls over the take and they must be renewed every 5 years.

Each year after the population estimate is obtained, each Management Plan will set a maximum allowable take (quota) of between 10-20% of total population. The populations fluctuate depending on seasonal conditions, during droughts they can decline, or they can increase dramatically during good seasons. The States Authority will then issue individually and sequentially numbered plastic lockable tags. These tags are designed to ensure that once properly applied any tampering with them will be perfectly obvious.

Each kangaroo taken by licensed harvesters must have such a tag fixed to it and the harvester and processor must report back to the Authorities on a monthly basis the details of the exact numbers off the tags they have used, where the tags were used and what species, sex and weight of animal they were attached to. The Authority monitors the release and use of tags to ensure the harvest in any one area does not exceed the quota.

The complexity and detail of the controls in the Management Plans can be indicated by a brief examination of the NSW Plan. It divides the State into 15 different zones, 14 in which commercial kangaroo harvesting is allowed and one comprising over one third of the State in which no harvesting can take place. The population is estimated in each individual zone and a harvest quota allocated to it. An appropriate number of tags are then issued to the conservation authority Managers in each zone and these can only be obtained by kangaroo harvesters on two days of each month. The harvester must use and submit reports for all of his tags issued before more can be obtained and the issue of tags by zone is closely monitored. As soon as the harvest in any one zone approaches the quota it is closed to commercial activity for the rest of the year (NPWS 2012). Full details of the NSW Kangaroo Management Plan are at

<http://www.environment.nsw.gov.au/wildlifemanagement/KangarooManagementProgram.htm>.

## **3. Licensing Controls over Kangaroo Harvesters**

In order to purchase the tags issued by the Authorities an individual must be licensed as a kangaroo harvester. To do so they must undergo training delivered by government accredited agencies and approved by the Australian TAFE (Tertiary and Further

Education) agency in the appropriate State. This training covers the regulatory controls and compliance requirements, the animal welfare controls and the hygiene controls each harvester must adhere to. They must then pass assessment in their knowledge and practices relating to these controls by two separate Government Departments. This will include assessment of their competency with their firearm. Then and only then will they be able to obtain the required licenses from the two Authorities concerned.

It is a condition of every kangaroo harvesters license that he adhere to the strict guidelines laid out in the Federal Government document ‘Code of Practice for the Humane Shooting of Kangaroos’. This specifies the minimum high caliber firearms which can be used, it requires that all animals be head shot and documents procedures for the humane dispatch of any pouch young. This document is at <http://www.environment.gov.au/system/files/resources/8ae26c87-fb7c-4ddc-b5df-02039cf1483e/files/code-conduct-commercial.pdf> . In NSW for example adherence to this Code represents condition number one of the licenses which are issued under the National Parks and Wildlife Act - section 123 (NPWS 2012).

Any kangaroo or kangaroo product accepted by processors, be it for meat or skins, must have an approved tag applied to it and be supplied by a licensed harvester. Each processor must report on a monthly basis to the State Authority the numbers of kangaroos purchased, who from and the relevant tags numbers.

#### 4. Monitoring of the System

The claim is sometimes made by anti kangaroo industry campaigners that the level of compliance with the controls is not monitored. Compare this with the number of inspection made by the NSW meat hygiene authority, Safe Food NSW. This authority controls compliance with the meat hygiene requirements and as documented in the NSW Kangaroo Management Plan, has a statutory requirement to monitor compliance with the requirements of the Management Plan (NPWS 2001). For example in 2010 Safe Food NSW made the following number of inspections of kangaroo industry facilities, the bulk of these are unannounced:

<b>Facility Type</b>	<b>Inspections</b>
Field Harvesting Vehicle	1056
Pet Food Harvesting Vehicle	16
Field Depot	299
Game Meat Processing Premises	13
<b>Total Inspections</b>	<b>1384</b>
(Safe Foods NSW 2010)	

That’s a very high level of monitoring!

## 5. Environmental Impacts of Utilising Kangaroos

The Kangaroo Management Plans have been operating under strict and intensive supervision for almost 40 years. Over this period the average harvest per year has been in excess of 2 million animals. In many respects we know the **actual** environmental impact of utilising kangaroos. Intensive use and scientific effort have answered the questions of potential impact and enabled industry to defend itself based on demonstrated science and experience.

### 5.1 Population sustainability

As already discussed, Figure 1 shows data collected over a 30 year period by the Department of Environment on the total kangaroo population. Despite harvests in excess of 2 million animals per year throughout this period the kangaroo population has consistently increased. Even immediately after the worse drought on record, numbers were still what could be considered historically typical levels. The current kangaroo population of over 45 million is significantly higher than the 25 year average of 26.7. This in itself is a very graphic representation of the sustainability of the harvest.

In terms of kangaroo population the harvest is sustainable on a national basis.

Extensive data indicates it is also sustainable on a regional basis and that the quota setting process allows for the effects of drought and other influences on the population. For example in NSW during the drought years of 1981-85 populations of red, eastern grey and western grey kangaroos fell by 57%, 72% and 54% respectively. During this period the quotas were reduced by similar levels. However following the good seasons of 1985-87 populations increased by 76%, 233% and 96% for the three respective species, more than making up the losses during the drought (Fletcher *et al* 1990).

On an even smaller regional basis harvest rates of up to 40% (much higher than the national average) have been shown to have no effect on red kangaroo populations on individual Queensland properties (Pople 1996).

A project conducted by NSW Dept Ag, which employed extensive field study and highly sophisticated computer modeling techniques, has provided considerable light on why kangaroo populations are so resilient to harvesting. The project examined harvester activity and modeled it in response to terrain and prices paid for kangaroos harvested. It demonstrated that in the areas investigated and at current prices, 20-40% of any one property will rarely be visited by a kangaroo harvester because the terrain is too rough or other limitations make it not economic for him to do so. These areas then become 'refugia', areas in which the resident kangaroo population is never harvested

and from which the population expands to re-populate areas which are harvested (NSW Dept. Ag. 2002).

The project further demonstrated that on the broader scale there are more extensive regions in which it is not economic for kangaroo harvesters to operate. In NSW for example it suggests that even at highly inflated prices for kangaroos, some 5% of the kangaroo population will be contained in large regional refugia which are never harvested. Add to this the kangaroos in national parks (in which no harvesting can take place) and even under highly inflated financial returns, 8% of the states kangaroo range will never be visited by harvesters (NSW Dept. Ag. 2002). These are in addition to the smaller property based refugia previously discussed and clearly shows a significant proportion of the population is always left behind to supplement normal breeding in the harvested areas.

Finally the computer modeling demonstrated that even at greatly inflated prices, kangaroo harvesting can never threaten the species. It has shown that relative to the effort required to harvest them, kangaroos are never likely to be valuable enough to harvest them down to levels which would threaten species viability. Quite simply once numbers drop below certain levels it is no longer economic to continue harvesting. These levels are well above threshold levels under which the species would be consider under threat. The authors conclude:

“Models presented here suggest that kangaroo populations may be more resilient to harvesting than we had previously thought” (McLeod *et al* 2001)

## **5.2 Effects on the species**

The argument is sometimes mooted that kangaroo harvesting selects the largest animals and will therefore affect the genetic fitness of the species. The scientific data strongly refutes this argument. Four separate reports have provided considerable evidence to show these claims are mere unfounded supposition.

- 1) An examination of the question submitted to the NSW National parks and Wildlife Service in 2001 concluded:

“Currently, there is no evidence of real or potential genetic ‘deterioration’ due to harvesting, nor any reason to suspect it. Indeed, indications are that kangaroo numbers would have to be reduced to extremely low levels for genetic impacts to become important and by then other impacts, such as demographic disruption, would be overridingly important” (Olsen and Braysher 2001)

- 2) A extensive report into factors affecting genetic makeup in kangaroos by the University of Queensland concluded that:

“The effects of the commercial harvest are therefore unlikely to produce genetic changes in the population. First, the heritability of the characters in question is low. Second, the selection differential is low because differences in fitness between younger and older adult males is small, older males do not appear to monopolise matings, only a small proportion of older males are selected against (so most animals are in the selected group), and only a small proportion of the population is harvested.” (Hale 2001)

- 3) A study of Queensland kangaroo populations harvested at rates of 0 to 30% has shown no differences in the genetic diversity of the various populations. That is, intensively harvested populations show no reductions in genetic diversity compared to unharvested ones (Pople 1996). This study also cites information showing virtual uniformity of genetic codes across widely dispersed kangaroo populations, suggesting the extensive harvesting to date has had no effect on the species.
  
- 4) A study conducted by the NSW Dept. of Ag. has applied extremely sophisticated computer modeling techniques to kangaroo population dynamics. It has demonstrated that even after several hundred years of intensive harvesting there would be no impact on the genetic makeup of the population. A large cause of this being that there are always areas of rugged terrain in which kangaroos are never harvested (refugia) and migration of animals and their genetic material out of these areas offsets any selection which may occur through harvesting (NSW Dept. Ag. 2002)

Quite clearly the balance of credible opinion and evidence suggests kangaroo harvesting has no significant impact on the genetic makeup of the population.

## **6. Environmental Impacts of NOT Utilising Kangaroos**

The rangeland environment of Australia, in which the vast bulk of the kangaroo population lives, also supports a wide range of other domestic, indigenous and feral grazing animals. It is a fragile region highly susceptible to overgrazing and resultant land degradation. In order to manage this environment the concept of total grazing pressure (TGP) has been developed. This sets for any one region the upper grazing pressure it can sustain and the mix of various animals which will generate that pressure. This management system requires that all animals contributing to the grazing pressure be controlled. Kangaroos typically represent 10-30% of TGP (Pople and Grigg 2001). If domestic stock numbers are set at estimated sustainable levels yet kangaroo numbers are uncontrolled the total grazing pressure will also increase and the environmental sustainability of the region will be placed at risk.

Thus the kangaroo industry actually plays a significant role in ensuring the environmental sustainability of these regions by providing a tool for managing a significant contribution to total grazing pressure. In its absence, the kangaroo

population would be at least 30% higher (Caughley *et al* 1987) and the risk of desertification and wide spread loss of biodiversity high. The kangaroo industry plays a positive role in protecting biodiversity in the rangelands.

Indeed several trials have clearly indicated that an uncontrolled total grazing pressure presents a major extinction threat to a huge range of biodiversity (Caughley *et al* 1987). This has clearly been demonstrated in work done at Hattah-Kulkyne National Park. Kangaroos can not be commercially harvested in National Parks, as a result their numbers often rise to staggering levels which sometimes require culling programs to be used. In biodiversity monitoring done following a cull at Hattah-Kulkyne, increased abundance of 20 rare or threatened plant species was recorded in culled areas compared with unculted areas (Sluiter *et al* 1997).

Recently well respected conservation NGO's such as the Wildlife Preservation Society of Queensland and Wildlife Preservation Society of Australia have also called for increased commercial harvest noting for example that expanding populations of euros are threatening remnant populations of smaller threatened wallaby species.

For these and other reasons many professional ecological groups actively support the kangaroo harvest. Some include:



## 7. Animal Welfare

Many people believe the kangaroo harvest represents the most human way we have of producing meat and leather. After-all these animals are left to roam free in their natural environment without any painful or stressful interference from man. They are not trucked and deprived of water, never mulsed nor caged and they are dispatched instantaneously without stress. The animal welfare regulations controlling the harvest are extensive and tightly monitored.

### 7.1 The regulatory controls over kangaroo harvesting

All kangaroos are harvested by professional shooters. Strict State and Federal Government controls ensure that no kangaroo can enter the commercial industry unless they have been taken by a licensed kangaroo harvester who has passed a TAFE accredited training course which includes training in the animal welfare aspects of kangaroo harvesting. In addition anyone wishing to harvest kangaroos for human consumption must undergo assessment of their accuracy with their firearm. The accreditation and competency assessment are controlled by State Government regulations in each State.

All kangaroos must be taken according to the strict guidelines laid out in the Federal Government document 'National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes'. This specifies the minimum high caliber firearms which can be used, it requires that all animals be head shot and documents procedures for the humane dispatch of any pouch young. This Code is available at

<http://www.environment.gov.au/system/files/resources/8ae26c87-fb7c-4ddc-b5df-02039cf1483e/files/code-conduct-commercial.pdf>.

All animals processed for meat must be inspected to ensure they have been taken according to this Code. The Federal Department of Agriculture lays out the inspection and reporting procedures in Meat Notice – Kangaroo Welfare Incidence Reporting, [http://www.daff.gov.au/\\_data/assets/pdf\\_file/0011/989390/mn09-01.pdf](http://www.daff.gov.au/_data/assets/pdf_file/0011/989390/mn09-01.pdf). This documents that all suspected incidents of animals being taken outside of the Code must be reported to the relevant State authority for potential prosecution.

In addition in each State the Regulatory authorities conduct regular random unannounced audits of kangaroo Harvesters. As noted at 4.0 over 1000 such audits/year are conducted in NSW alone. An important part of these audits is compliance with the Code.

### 7.2 The evidence concerning welfare outcomes

The kangaroo industry has been subject to considerable scrutiny over the years with regard to animal welfare. In fact it has encouraged this. In 1999 the Kangaroo Industry Association of Australia (KIAA) successfully lobbied the Federal Minister for Environment to fund a survey carried out by the Royal Society for the Prevention of Cruelty to Animals (RSPCA) which audited current welfare outcomes in the kangaroo harvest. This is discussed further below. A similar report conducted by the RSPCA in 1985 states:

"If achieved correctly, kangaroo culling is considered one of the most humane forms of animal slaughter. An animal killed instantly within its own environment is under less stress than domestic stock that have been herded, penned, transported etc." (RSPCA 1985)

The 1985 report however did consider that the methods used at the time could be improved and made a series of recommendations. At the time they found 85% of kangaroo were head shot. The vast bulk of the remained were heart shot. The RSPCA commented that a heart shot could be considered a humane outcome, but was clearly less desirable than a head shot.

With regard to the dispatch of pouch young the RSPCA concluded:

"The dispatch of pouch young by professional shooters was generally by a sharp blow to the head or by decapitation. There is no reason to consider this as a cruel act." (RSPCA 1985)

Since 1985 the industry has implemented most of the recommendations put forward by RSPCA to improve the harvest, as well as others which they didn't think of. The accreditation and assessment of harvesters and an absolute requirement for head shot animals for meat production have seen major improvements.

In 1999 the KIAA lobbied the Federal Government to fund a new audit to document the current outcomes. This was conducted during 2001 and the report released in July 2002. It concludes:

"These results demonstrate that there has clearly been an improvement in the humanness of the commercial killing of kangaroos compared with that recorded in the 1985 Report. In 1985 the overall proportion of head-shot kangaroos in Australia was estimated to be 86%. In 2000/2002, it was 95.9%". (RSPCA 2002).

However the overall head shot ratio needs a little clarification. The vast majority of non-head shots (reported by RSPCA as body shots) were high in the neck at the base of the skull and it appears the result of harvesters deliberately targeting this site. Of 5083 kangaroos surveyed by RSPCA, only 10 (0.2%) were actual body shots in neither the head nor neck. Industry can claim that at the time 99.8% of kangaroos were shot in the head region exactly where the harvester aims. At the time neck shots were allowed for in the Code, it has since been reviewed to require all animals be shot in the brain.

Throughout the report the RSPCA clearly recognise and endorse industries animal welfare approach. For example at 3.2 RSPCA state:

"It was clear from the responses given that, not only have the kangaroo management agencies adopted the criteria of head-shot only, but the industry also uses a similar standard."

This report again made a number of recommendations for further improvements in welfare outcomes. Most of which have also since been implemented. These included altering the Code to clearly specify all animals must be shot in the brain, therefore eliminating the neck shots recorded by this study. It also recommended a move away from targeting females. The industry has largely adopted this. The industry representative body has a policy to promote a male only harvest. Nationally the take is now consistently over 95% male.

More recently the kangaroo industry and Federal Government funded a study to monitor welfare outcomes for kangaroos under actual field conditions. This study conducted by the NSW Department of Primary Industry accompanied Harvesters on actual shooting trips and recorded actual welfare outcomes under normal operating conditions. It found that when monitored under actual operating conditions Kangaroo Harvesters brain shoot 99.6% of all kangaroos targeted delivering instantaneous death (McLeod and Sharp 2014). This demonstrates extraordinary high level of competence in the industry.

All kangaroos processed in export registered premises are inspected by Federal Government Veterinarians. They are required to monitor compliance with the Welfare standards and report any non-compliance. In 2014 1,026,960 kangaroos were inspected, 25 were reported as non-head shot (Dept Agriculture data).

## 8 Product Safety

Kangaroo meat is processed under rigorous controls to ensure it is safe and hygienic. All kangaroos are processed in premises licensed and regulated by either State Meat Hygiene Authorities or the Federal Dept of Agriculture.

All product processed for human consumption must be inspected by a licensed Meat Inspector to check for potential disease conditions. The rejection rates at these inspection are extremely low, typically only 1/3 of the rates seen in beef or lamb (Andrew 1988). In addition regular swabs are taken of finished product to test for microbial contamination. These must be tested by independent lab and the results over an extended period have shown compliance with the prescribed acceptable standards to equal or exceed results seen in any other meat industry.

All premises and facilities within the kangaroo industry are audited on a regular basis by the relevant authority. The Inspectors will check for compliance against acceptable standards and if need-be issue corrective action notices. In 2014 the level of

compliance within kangaroo establishments at such audits conducted by the NSW Food Authority was 98%. This was the highest of any food industry it regulates, the beef/lamb/pork industry for example had a compliance rate of only 88% (NSWFA 2015).

Kangaroo meat is tested for environmental contaminants under the National Residue Survey, kangaroo meat has a long term compliance rate of 99.82% with the government's acceptable limits (NRS 2015). In the ESAM program (which is the Government's meat microbial monitoring program and requires multiple samples from finished products on a daily basis from each premise) compliance with acceptable microbial limits is 99.4% (FSANZ 2013).

But the proof is in the eating. There has never been any confirmed case of food poisoning from kangaroo meat consumption anywhere in the world, ever.

## **9 Public Support for a Model of Sustainable Utilisation**

Numerous professional and credible environmental management organisations have published guidelines for the sustainable utilisation of wildlife resources including:

- \* CSIRO
- \* Australasian Wildlife Management Society
- \* International Union for the Conservation of Nature (IUCN)
- \* World Wide Fund for Nature.

In all cases the kangaroo harvest fits perfectly or very tightly to the criteria for sustainable utilisation. Indeed the first two organisations have openly endorsed the kangaroo industry as fitting their criteria. For example CSIRO (Australia's peak scientific research body) states:

"Kangaroo harvesting clearly meets most of the principals of sustainable use of wildlife" (CSIRO 1998).

The Australasian Wildlife Management Society, the peak representative body for professionals actively involved in wildlife management, state:

"AWMS supports the idea of achieving a conservation benefit from a government regulated, high value, sustainable kangaroo industry" (AWMS 1998).

Even many non government 'conservation' groups are vocal in supporting the utilisation of kangaroos. The South Australia Nature Conservation Society told a Senate Inquiry into Wildlife Utilisation that:

"We are in full agreement that regulated commercial utilisation e.g. Kangaroo harvesting, on private lands are a potent driving force for the retention of habitats." (SANCS 1997).

The Wildlife Preservation Society of Qld recently commented to the Qld government in public consultation of its 2015 Kangaroo quota submission that:

"Has the commercial harvest of macropods to date put these species at risk? Not in Wildlife Queensland's opinion. The commercial harvest of these species underpins a sustainable industry, it appears the natural range of these species in Queensland has not been compromised by kangaroo industry activities. Wildlife Queensland is confident that these species will be here for our children's children to enjoy." (WPSQ 2014).

A good many Australian NGO's dedicated purely to wildlife preservation support commercial kangaroo harvesting as delivering conservation benefits. The Australian Wild Life Preservation Society is actually the oldest conservation NGO in Australia, and regularly comments positively on the industry.

"There is no problem with harvesting native wildlife given adequate controls as well as no cruelty in the gathering." (WLPS 1998)

The level of support for the kangaroo harvest amongst professional Australian ecologists and conservationists sometimes astounds international commentators. Public groups vocal in supporting the industry or with position papers in support of kangaroo use include:

- The Australian Veterinary Association
- The Australasian Wildlife Management Society
- Australian Association of Veterinary Conservationists and Biologists
- Ecological Society of Australia
- Wildlife Preservation Society of Australia
- Wildlife Preservation Society of Queensland
- Conservation Council of South Australia
- Nature Conservation Society of South Australia

## **8.1 Public support for the kangaroo harvest**

Research has indicated that the majority of the Australian public also supports the sustainable utilisation of kangaroos. Market research published by RIRDC has shown that in response to the question "Do you think kangaroos are a valuable natural resource and we should make use of their meat and leather", **77% of Australians said yes, 16% had no opinion whilst only 4% said no** (RIRDC 1998). The study also demonstrated that over 50% of Australians have tried kangaroo meat.

The results of a range of public surveys on attitudes to the kangaroo industry are given below. Some of these are media generated response polls, these types of surveys need to be interpreted carefully. However they do suggest overwhelming public support for kangaroo harvesting in Australia.

<b>Public surveys on attitudes to the kangaroo industry</b>				
<u>date</u>	<u>source</u>	<u>question</u>	<u>number surveyed</u>	<u>result</u>
Mar 97	RIRDC	Kangaroos are a valuable natural resource and we should use their meat and leather?	503	77%
		yes		8%
		unsure		
July 00	publicdebate.com	Should we be eating kangaroo meat?	7540	75%
		yes		5%
		unsure		
Mar 02	60 Minutes	Is it barbaric to cull kangaroos?		81%
		no		
May 02	Herald Sun	Should state laws allow commercial use of slaughtered kangaroos?	1698	87%
		yes		
June 11	Canberra Times	What's your view on the commercial use of culled Roo carcasses?	730	85%
		yes		

More recently an extensive survey released in 2014 looked at community acceptance of a range of kangaroo management alternatives, including exclusion fencing and 'doing nothing'. Commercial Harvesting was consistently considered the most acceptable against a range of considerations including humaneness and likelihood of extinction. The authors concluded: *Our results indicate that the majority of the general public accepts commercial harvesting as an acceptable, humane and effective method of managing kangaroos* (McLeod and Sharp 2014).

## **8.2. Kangaroo utilisation and a new ecological model.**

Australia is a vastly different environment to the 'Old World'. The major influence on its weather patterns is the El Nino effect. This produces extremely variable and unpredictable seasonal conditions. The Northern Hemisphere in contrast, although subject to wide variations within a year has a very repeatable set of seasons between

years. The unpredictability of an El Nino climate has resulted in vastly different environmental systems than those of the Northern Hemisphere (Flannery 1996).

To date agricultural development in Australia has largely been based on modified European systems, using European animals. In recent decades this Eurocentric view has come under considerable academic question. A ground swell of opinion is developing that we should develop management systems adapted to our specific environmental conditions, not impose systems adapted to the Old World.

Under this philosophy utilisation of free ranging populations of native animals adapted to the environment makes enormous environmental wisdom.

## **10 And Finally there's methane**

Kangaroos emit very little methane. Cattle and sheep do by the tonne lot and methane is 21 times worse than carbon dioxide as a global warming gas. It's estimated that kangaroo meat has one third the carbon footprint of beef. (Wilson, 2008 Garnaut, 2008).

## **10. Conclusion**

Kangaroo harvesting can be a controversial topic and inspires considerable passion and debate both for and against. Those for, can demonstrate that it is both sustainable and a necessary tool in environmental management. They argue that in a protein starved world it is morally indefensible not to utilise animals that must be culled anyway to deliver balanced ecological management. Many are also now coming to the view that kangaroo production offers a more sustainable method of land use in the rangeland environment than grazing sheep or cattle, that it has the potential to offer greater conservation benefits past those which it currently delivers. It offers the opportunity to release Australia from the shackles of Eurocentric management systems.

The kangaroo industry believes it is a model of wise environmental management and this belief is supported by extensive scientific data and the support of a wide range of professional scientific bodies. Further the industry believes that it points the way forward for a bright new future in the environmental management of this land. It believes that producing our food from the animals and plants which belong here and are adapted to this country makes enormous environmental wisdom.

**Internet based information on the kangaroo industry**

The most comprehensive review of the science behind population monitoring is the Pople and Grigg review which forms the basis of all Kangaroo Management Plans, it is at

<http://www.environment.gov.au/resource/commercial-harvesting-kangaroos-australia>

The State Management Plans also compile much of the science, the current Qld and NSW Plans are respectively at

<https://www.qld.gov.au/environment/plants-animals/wildlife-permits/macropods/>

<http://www.environment.nsw.gov.au/wildlifemanagement/KangarooManagementProgram.htm>

Finally this document is a brief overview of kangaroo management recently compiled by one of the most experienced kangaroo Management Officers in the country.

<http://www.ehp.qld.gov.au/assets/documents/plants-animals/wildlife-permits/macropods-qld/overview-qld-macropod-industry.pdf>

## References

- ABARE (2002) Australian Livestock Numbers. Canberra.
- Andrew AE 1988. Kangaroo meat - public health aspects. Australian Zoologist, 23(3)
- AVA 1998. Submission to Senate Reference Enquiry: Commercial utilisation of native wildlife (Proof Hansard Report)
- AWMS 1998. Submission to Senate Reference Enquiry
- Caughley, G.J., Sheppard, N and Short, J. (1987). Kangaroos, their ecology and management in the rangelands of Australia. Cambridge Uni Press.
- CSIRO 1998. Submission to Senate Reference Enquiry
- FSANZ (2013): Assessment of the microbiological hazards associated with the minor and wild game meat species.
- Flannery, T. 1996. The Future Eaters, Reed Publishing.
- Fletcher, M., Southwell, c, Sheppard, N, Caughley, G, Grice, D, Grigg, G, and Beard, L. (1990) Kangaroo population trends in the Australian rangeland, 1980-87. Search vol 21 no1
- Garnuat, R. (2008) The Garnaut Climate Change Review. Cambridge University Press. Melb
- Grigg, G, Pople, A, Hale, P McCallum, H (1998) Reference committee submission.
- Landsburg, J (1999). The effects of artificial sources of water on rangeland biodiversity. CSIRO Div. Wildlife and Ecology, Biodiversity Technical Paper no 3.
- Hale, P. (2001) Kangaroo genetics, Impacts of Harvesting. Conservation Biology Program, The Ecology Center, University of Queensland, Brisbane

- Hopwood P and Martin P. 1991. Report to the NSW Meat Industry Authority on zoonosis of pigs and lambs and their implications for public health.
- McLeod, S.R, Hacker, R.B. and Druhan, J.P. (2001) Sustainable management of age-structured kangaroo populations
- McLeod, S.R and Sharpe, T (2014). Improving the Humaneness of Commercial Kangaroo Harvesting. RIRDC pub no 13/116.
- NRS (2015). Kangaroo Program Annual Report.
- NPWS (1997) Dubbo District Court transcripts 31 July 1997 NSW NP&WS v Eichner.
- NPWS (2012) Kangaroo Management Program. State Printers
- NRMCC (2008) National Code of practice for the humane shooting of kangaroos and wallabies for commercial purposes. Environment Australia.
- NSW Dept. Agriculture (2002). Evaluating Alternative Management Strategies for Kangaroos in the Murray Darling Basin. Cited with permission R.B. Hacker, NSW Dept Ag
- NSWFA (2015) Pers Com.
- Olsen, P. and Braysher, M (2001) Situation Analysis Report: Current state of scientific knowledge on kangaroos in the environment, including ecological and environmental impact and effect of culling. A report for NSW NPWS.
- Pople A (1996) Effects of harvesting upon the demography of red kangaroos in Western Queensland. University of Queensland Thesis.
- Pople, A.R and Grigg, G (2001) Commercial Harvesting of Kangaroo in Australia. Environment Australia. Canberra
- RIRDC (1998). Improving consumer perceptions of kangaroo products, Rural Industries Research & Development Corporation. Pub. no97/36.
- RSPCA (1985) Incidence of cruelty to kangaroos, RSPCA Australia.
- RSPCA (2002) Kangaroo Shooting Code Compliance. RSPCA Australia.
- Safe Foods NSW (2002). Annual Report.
- SANCS (1997) Submission to Senate Inquiry into Wildlife Utilisation.
- Sluiter, I., Allen, G., Morgan, D. and Walker, I. (1997) Vegetation responses to stratified kangaroo grazing at Hattah-Kulkyne National Park, 1992-96. Dept. Natural Resource, Melb
- Wild Life Protection Society 1998. Submission to Senate Reference Enquiry
- Wilson, G.R. & Edwards, M.J. 2008, 'Native wildlife on rangelands to minimize methane and produce lower-emission meat: kangaroos versus livestock', Conservation Letters 1(3): 119–28.
- WPSQ 2014. Submission on Queensland 2015 Kangaroo quota submission.