



**Australian Government**

**Rural Industries Research and  
Development Corporation**

# **People and the Kangaroo Harvest in the South Australian Rangelands**

**Social and institutional  
considerations for  
kangaroo management  
and the kangaroo industry**

**A report for the Rural Industries Research  
and Development Corporation**

by Dana Thomsen and Jocelyn Davies

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# Foreword

The commercial harvest of kangaroos is important to the sustainability of Australia's rangeland landscapes. It assists in the reduction of total grazing pressure in the rangelands, has potential to deliver supplementary income to pastoralists and makes important contributions to the social and economic sustainability of rangeland communities.

The purpose of this research was to develop understanding of the social, institutional and cultural factors that influence the use of commercial kangaroo harvesting as a strategy for promoting sustainable rangeland landscapes. In-depth information gathered through interviews with industry stakeholders in South Australia has highlighted issues which are important to designing effective institutions for management of commercial harvest which are not revealed in any other research on kangaroo management or industry development.

This project was funded from RIRDC Core Funds which are provided by the Australian Government.

This report, an addition to RIRDC's diverse range of over 1600 research publications, forms part of our Rangeland and Wildlife Systems R&D program, which aims to facilitate a more diverse rural sector, enhanced biodiversity and innovative industries based on non-traditional uses of the rangelands and their wildlife.

Most of our publications are available for viewing, downloading or purchasing online through our website:

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A large number of people participated in this research. Most importantly, we thank the people involved in the kangaroo industry and Aboriginal people who provided their perspectives on kangaroo management and the industry. Without these research participants this report would not have been possible.

SA DEH provided harvest data that required considerable work from staff of the kangaroo management program. SA DEH staff were also helpful by providing additional information as required. Indeed, a number of people from other state government regulatory bodies also provided data and information.

Field work was assisted by Luke Diddams, Kado Muir and Joseph Lennon. The maps presented in this report were prepared by Bernhard Haseloff from CartoTech Servies, Adelaide. We received assistance with statistical analysis from David Rutley, University of Adelaide. Lisa Strehlein from AIATSIS provided assistance with understanding the legal framework of Aboriginal rights and interests in kangaroos. John Hatch and Ian Cooper, both from The University of Adelaide, provided advice on economic issues covered in this report. Other people from The University of Adelaide that were helpful and supportive in the production of this report were Louise Moylan, Gavin Riggs and Ian Nuberg.

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# Abbreviations

|          |   |
|----------|---|
| AG DAFF  | Australian Government Department of Agriculture, Fisheries and Forestry |
| AIATSIS  | Australian Institute of Aboriginal and Torres Strait Islander Studies   |
| APY      | Anangu Pitjantjatjara Yankunytjatjara                                   |
| FATE     | Future of Australia's Threatened Ecosystems                             |
| ILUA     | Indigenous Land Use Agreement   |
| IPA      | Indigenous Protected Area   |
| KIAA     | Kangaroo Industry Association of Australia                              |
| KIRG     | Kangaroo Industry Reference Group                                       |
| KMP      | kangaroo management program   |
| LM       | Land management (quota allocation)                                      |
| MBI      | Market-based instrument   |
| NPW Act  | <i>National Parks and Wildlife Act 1972</i> [SA]                        |
| NRM      | Natural resource management   |
| PIRSA    | Primary Industries and Resources, South Australia                       |
| PLMC Act | <i>Pastoral Land Management and Conservation Act 1989</i> [SA]          |
| RIRDC    | Rural Industries Research and Development Corporation                   |
| SA DEH   | South Australian Department for Environment and Heritage                |
| SA NPWS  | South Australian National Parks and Wildlife Service                    |
| SCB      | Soil Conservation Board   |
| SCBD     | Soil Conservation Board District  |
| SU       | Sustainable use (quota allocation)                                      |
| TAFE     | Technical and further education   |
| TGP      | Total grazing pressure  |

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# Executive Summary

## What the report is about

This study has addressed a need for better understanding of social and institutional issues that impact on kangaroo management and the kangaroo industry in South Australia. These issues constrain industry development and efficient management of kangaroo populations. The study focuses on the interactions between producers (landholders and commercial kangaroo harvesters) and wholesalers (meat processors) in the kangaroo supply chain, their interface with the kangaroo management system administered by the South Australian Government, and perspectives of Aboriginal people on the industry.

## Background

Kangaroos are harvested commercially for human consumption and pet food markets and the skins are used for leather of exceptionally high quality. State government agencies administer kangaroo management programs that include commercial harvest in New South Wales, Queensland, South Australia, Western Australia and Tasmania. Their kangaroo management plans aim primarily to conserve kangaroo populations across their range and emphasise sustainability of harvest. Harvest quotas are set annually based on population monitoring. Harvesters are licensed and must meet accreditation standards for shooting accuracy and hygienic handling of harvested animals.

Commercial harvest of kangaroos is important to the sustainability of Australia's rangeland landscapes. Kangaroo populations have benefited from pastoral land use. Water points for livestock grazing together with dingo control have led to increased kangaroo populations. Kangaroos make a significant contribution to total grazing pressure in the rangelands. Kangaroo harvesting helps manage total grazing pressure, makes important contributions to the social and economic sustainability of rangeland communities and is a prospective strategy for diversification of land use and economy in pastoral regions. Commercial harvest of kangaroos has also long been advocated as an opportunity for landholders in Australian rangelands to realise value from wildlife.

The kangaroo industry contributed an estimated \$200m to the national economy in 2005. The South Australian quota for commercial harvest, which averaged 645,000 kangaroos per annum from 1997 to 2004, is much smaller than that of New South Wales or Queensland. South Australia reformed its kangaroo management plan in 1996, introducing a tradeable harvest quota allocation to landholders of properties within the commercial harvest zone. It was envisaged that tradeable quotas would allow landholders to realise financial value from kangaroos by trading surplus quota and/or by harvesting kangaroos on their property. However landholders did not take up the opportunity to trade quota. In 2002 the option to trade was discontinued because it was determined to be inconsistent with legislation governing commercial harvest.

Aboriginal involvement in commercial use of wildlife has been widely advocated as a pathway for employment and economic development. However no previous research has examined Aboriginal rights, interests and aspirations in relation to commercial kangaroo harvest and its management. Opportunities for the kangaroo industry to address social dimensions of sustainability such as through negotiated agreements with Aboriginal traditional owners may support development of differentiated 'fair traded' products for growing niche markets.

## Objectives

This project has developed a stronger understanding of social and institutional factors that influence use of commercial kangaroo harvest as a strategy for promoting sustainable rangeland landscapes in South Australia. The objectives of the research have been to:

- analyse institutional settings and interfaces between people involved in the kangaroo industry
- examine social, cultural and economic parameters that affect harvest decisions
- provide Aboriginal people with an opportunity to bring forward issues that the commercial harvest of kangaroos raises for them
- develop recommendations for policy improvement that address issues raised by harvesters, landholders, meat processors and Aboriginal people.

## Methods

In-depth interviews were conducted with landholders, kangaroo harvesters and kangaroo meat processors who operate in three regions of South Australia: the northern Flinders Ranges, the far north of South Australia (Marla/Oodnadatta) and west of Port Augusta. These regions were selected to sample a range of harvest conditions such as different topographies, species harvested and proximity to a major regional centre. Interviews explored information and communication networks, decision-making processes, economic issues and impacts of the regulatory environment. Records of harvest rates and harvester numbers made available by South Australia's Department for Environment and Heritage (SA DEH) were also analysed to explore issues raised by research participants.

We also talked about commercial harvest with Aboriginal people from two cultural regions: the Flinders Ranges (Adnyamathana traditional country) and the central north of South Australia from Coober Pedy to Marla and Oodnadatta (where Yankunytjatjara and Antakarinya people are the traditional owners).

The study has limitations for generalisability because sample sizes are relatively small. The rich data from this study nonetheless shows the range of views of industry stakeholders and identifies some key issues for future kangaroo management and industry development in South Australia.

## Results

Landholders, harvesters and meat processors consider that the kangaroo industry provides a range of benefits to South Australia and its rangeland landscapes in relation to human and social capital, regional economic impact and management of total grazing pressure. Regulations that govern commercial harvest are important to people in the industry because they engender public and consumer confidence that the industry is hygienic and the harvest is ecologically sustainable.

Regulations and standards for commercial kangaroo harvest are becoming more consistent between various states. However the South Australian system has some key differences to other states. In other states harvest quotas are allocated to regions. In South Australia quota is set on a regional basis but regulations require that each unit of quota/tag must be assigned to one species, one property, one harvester and one meat processor prior to harvest. In South Australia quota is allocated to individual properties at the start of each year and landholders may request additional quota allocation if they harvest all their original quota. In all states harvested kangaroos must be tagged with a numbered tag which provides proof of legal harvest. The sale price of tags incorporates a royalty. In most states it is harvesters who purchase these tags from the government management authority. In South Australia tags are purchased from the government management authority (SA DEH) by meat processors and are then passed on to harvesters.

Harvesters and landholders say that the South Australian system is less flexible in managing kangaroo populations because populations fluctuate locally due to kangaroo mobility, especially after rain. Harvesters and landholders follow their own informal rules about where harvest should be undertaken:

harvesters must harvest kangaroos where and when abundance is greatest or else jeopardise good relationships with landholders, access to land and quota. This informal rule reflects the self interest of landholders and of harvesters. Landholders need to reduce kangaroo grazing pressure as part of their management of total grazing pressure. Harvest is most efficient where populations are high. However this informal rule can be in conflict with regulations governing kangaroo harvest.

Most harvesters work on several properties. If they run out of tags from the allocation to the property where they are shooting they use tags for the same species that they hold as part of the allocation to other properties where they shoot. This practice, known as 'tag swapping', is illegal. However harvesters face a low risk of sanctions because there has little capacity to enforce regulations closely. Tag swapping is not ever likely to pose a threat to the viability of kangaroo populations or the sustainability of harvest because it targets areas of high kangaroo density and because the number of kangaroos harvested across the whole state is well within the total state quota. However tag swapping does mean that the records that harvesters return showing how many kangaroos they harvested on each property are inaccurate. We noted that tag swapping occurs both within and between the regions that are the basis for quota allocation and that the extent of inaccuracy within regions varies. It is an opportunistic practice and the methods for this study did not allow us to quantify the extent to which it occurs.

South Australia harvested 43% of quota on average each year from 1997 to 2004, the lowest of any state and significantly lower than was harvested from 1991 to 1996 before the introduction of property level quota. The number of kangaroos harvested also shows a steady decline from 1997 to 2004 which is not fully accounted for by declining quotas during this period. However demand from meat processors for kangaroo carcasses is strong. They imported an annual average of 211,000 carcasses into South Australia from New South Wales and Queensland from 2002 to 2005, equivalent to more than 30% of the South Australian quota.

The harvesters, landholders and meat processors we interviewed identified two main reasons for low harvest rates in South Australia. Landholders said the main reason was geographical, a result of isolation because rangeland South Australia has few towns and lacks transport and other infrastructure. Isolation and lack of infrastructure mean harvesters incur high social costs. They travel long distances and stay in bush camps for weeks while harvesting which puts pressure on families and social life. Harvesters and meat processors said the main reason for low harvest rate is institutional: a few harvesters hold exclusive harvest rights (and quota) for too many properties. Harvesters incur no financial cost for holding the right to harvest many more kangaroos than they can harvest in a year. Harvesters who control a lot of quota minimise their risk of not being able to harvest efficiently. The harvest rates of other harvesters are limited because they cannot access enough quota. This situation is an outcome of the South Australian system of property level quota allocation promoting the nomination of one harvester per property.

The South Australian property level quota limits competition which has a number of flow on effects. South Australia has very few harvesters compared to other states and numbers appear to be declining fast. Prices paid to harvesters by meat processors are 20% less than in other states.

Harvest costs account for half the sale price of each carcass. The annual gross profit of a sample of harvesters with an average annual harvest 6,430 kangaroos per annum is about \$50,000. It would be close to \$80,000 at sale prices equivalent to those in other states. On average South Australian harvesters have a much lower harvest rate than this, at approximately 2,100 kangaroos per annum. This is nevertheless considerably higher than harvesters in other states due to a higher proportion of South Australian harvesters being 'full timers'. Other than access to quota and kangaroo population density, harvesters identified that the main factors that influence their own rate of harvest are weather, terrain, distance to chiller and their own skills and knowledge.

Landholders view kangaroos as a resource, not a pest, although they say they can be a problem when populations are high. This challenges popular notions of landholder views and may indicate changing

attitudes amongst landholders. Landholders would like to get a financial return from this resource but recognise the cost would be passed on to harvesters who cannot afford to pay. Some smaller meat processors now pay landholders a fee, typically \$1 per head, for each kangaroo harvested from their property. They tend to reduce the sale price paid to harvesters to cover this cost.

The strongest relationships and communication networks in the South Australian industry are between landholders and harvesters. Both have little communication with government. Meat processors strongest relationships and communication networks are with SA DEH and with harvesters. Landholders and harvesters are critical of methods that they used to determine kangaroo populations and feel better information would result if they talked to them more.

Kangaroos hold cultural, social and economic significance for Aboriginal people. Western Desert Aboriginal people who participated in this study have strict cultural protocols about how red kangaroo should be harvested and butchered. These conflict with the practices of the commercial industry and preclude these people's involvement in commercial harvest. In contrast some Adnyamathanha people expressed an interest in developing enterprises based on kangaroo harvest. People from both groups said it is important for them to be involved in decisions about kangaroo management.

Landholders, harvesters and Aboriginal people all volunteered strong objections to culling kangaroos, or shooting to waste, as happens in Flinders Ranges National Park and on some private land when high population density is impacting on conservation of other species and landscapes.

## **Implications**

The very strong reliance on a top-down 'command and control' approach to kangaroo management in South Australia is misplaced. The requirement to tag every harvested kangaroo with a tag that is specific to property, harvester and meat processor is a particular problem. It limits flexibility in kangaroo management because it is not responsive to the localised temporal and spatial variability in kangaroo numbers that results from kangaroo mobility. It makes it difficult for harvesters to change the meat processor they sell to, or for landholders to change the harvester they engage. This limits competition. These factors have negative flow on effects for harvest rate, sale price of carcasses and harvester gross profits.

It is ironic that the current inflexible system of property level quota evolved from efforts in the mid 1990s to make a flexible, competitive system based on landholders trading quota. This experience emphasises the importance of good design for effective implementation of market-based instruments.

Tag swapping has been evolved by harvesters as a mechanism to bring some flexibility into the current property level allocation system. However because tag swapping is illegal and renders SA DEH harvest data unreliable except at whole of state level, it makes the kangaroo management program and the industry vulnerable to criticism.

Competition and cooperation are both important to the effective operation of kangaroo management and the kangaroo industry. Cooperation is important to minimizing the cost of achieving compliance with regulations and to establishing strong supply chains. Competition is important to fostering innovation and to achieving efficiencies in production.

The strongest cooperative relationships at present are between landholders and harvesters. They communicate most closely and rely on each other to achieve their own goals - landholders in relation to reducing kangaroo numbers at times of high local populations as part of their management of total grazing pressure, and harvesters in relation to being able to access locally high populations for efficient harvest. Following the strict rules involved in the property level quota allocation is not compatible with achieving these reciprocated outcomes.

We have not identified any reasons to support the retention of property level quota in its current form. Redesigning it as a tradeable quota system could introduce the necessary flexibility and competition but we expect the investment in design and implementation would outstrip the benefit because of the small size of the South Australian quota and harvest and the low financial value of kangaroos.

Changing to a regional quota allocation, as exists in other states, is the alternative option. This would engage the management system at a scale more appropriate to the characteristics of the kangaroo resource. It would introduce competition because it would be much easier for landholders to authorise more than one harvester and for harvesters to change meat processors. Harvesters would need to be responsible for the purchase of tags and this would give them financial incentives to match the number of tags they hold to their estimated harvest.

Targeted incentives could be valuable as a way of encouraging individual harvesters to put more effort into harvesting. These might involve rebates on part of the royalty or permit fee to harvesters who achieve a threshold level of annual harvest. This would encourage licensed harvesters who now need to supplement their income from other sources to put more effort into harvesting. Incentives could be planned as cost-neutral as there would be increased revenue to the self-funded kangaroo management program through the higher levels of harvest that would result.

The trend of declining harvester numbers in South Australia is likely to continue given that many harvesters are approaching retirement age. Potential incentives to attract new industry entrants include apprenticeship schemes such as are in place in Queensland. Support for prospective industry entrants to plan their businesses and secure loans for start up costs would also help to make harvesting a more attractive option.

Landholders with abundant kangaroos, good habitat and easy access for harvesting will be those most able to realise a financial return from kangaroos. Under a regional quota allocation any fee charged would be for access to the property rather than payment for a kangaroo.

However there are uncertainties about whether landholders of pastoral leases have a legal right under their lease to charge an access fee. Some of these uncertainties relate to native title. South Australia is using the statewide Indigenous Land Use Agreement process, an effective and established structure, to resolve such uncertainties in a way that builds relationships and addresses issues for government, industry and Aboriginal traditional owners. The relationships and negotiated local scale agreements generated through pastoral leaseholders and industry peak bodies being involved in this process provide the best prospects to initiate development of kangaroo products with appeal to the growing 'fair trade' market.

The diversity of views held by Aboriginal people make it clear that a 'one size fits all' approach to Aboriginal involvement in decisions about kangaroo management is not appropriate or workable. There is scope for the industry to generate support from Aboriginal people by listening to and respecting the perspectives and priorities of different language groups. However it will not be easy to accommodate all these perspectives given the cultural values of kangaroos.

Kangaroo management needs to be adaptive because people and kangaroos are part of a dynamic social-ecological system. Informed dialogue involving resource users, scientists, officials and other interested people is critical to robust governance. Feedback is a critical factor in facilitating learning and adaptation to changing social and ecological conditions. However even though the South Australian kangaroo management generates a lot of data, this is hard to access and very little of it is fed back to people involved in the industry.

People who live and work in the rangelands know a lot about kangaroo density, movements and habits, particularly at local and regional scales. Some Aboriginal people also have detailed knowledge of aspects of kangaroo behaviour. Local people's knowledge is important for adaptive governance of a dynamic resource such as kangaroos. It will be accessed best through local and regional scale forums.

Such forums are likely to evolve most effectively through SA DEH working in collaboration with other agencies which have a strong field presence on properties and in Aboriginal communities in the kangaroo harvest zone. A collaborative approach will increase informed dialogue with harvesters, landholders and Aboriginal people about kangaroo management in a more cost-effective way than could be achieved by the kangaroo management program of SA DEH working alone.

## **Recommendations**

Suggested improvements to kangaroo management in South Australia will enable the kangaroo industry to contribute more effectively to sustainable rangeland landscapes. They could be implemented by SA DEH in conjunction with the Kangaroo Industry Reference Group and other people in the industry:

- establish competition in interactions between harvesters, landholders and meat processors by removing the regulatory requirement for pre-allocation of one tag to one property, one harvester and one meat processor
- develop targeted incentives to encourage existing licensed harvesters to put more effort into harvest
- develop a program to encourage and support new people to enter the industry as harvesters
- seek to include issues associated with kangaroo management on the agenda for discussions and negotiations in the South Australian statewide Indigenous Land Use Agreement negotiation process
- recognise and respect that knowledge of harvesters, landholders and Aboriginal people can make important contributions to kangaroo management
- recognise the need for a diversity of institutions for robust adaptive governance, rather than being overly reliant on regulation
- feedback data collected, such as on harvest rates and locations, to people involved with the industry and kangaroo management to facilitating learning, adaptation and institutional change.

# 1 Introduction

Kangaroos and people are linked in a social and economic system in the rangelands of South Australia. This project addresses a need for better understanding of the social and institutional factors affecting industry development and effective management of kangaroo populations in South Australia.

Commercial harvest of kangaroos is important to the sustainability of Australia's rangeland landscapes. It helps manage total grazing pressure, makes important contributions to the social and economic sustainability of rangeland communities and is a prospective strategy for diversification of land use. Most research about commercially harvested kangaroo species has focused on biology, ecological interactions with livestock and kangaroo population ecology. Social, institutional and economic issues that are pertinent to the development of the commercial kangaroo industry have had far less research attention.

This research is primarily qualitative. It has sought to establish the views of people involved in the South Australian kangaroo industry as landholders, commercial kangaroo harvesters ('field processors') and meat processors about issues that impact on the development of the industry. It has also sought to understand the views of Aboriginal people about kangaroo management and the kangaroo industry. Data from harvest records and comparison of institutional arrangements in other states are used in this report to analyse the issues identified from field research.

One stimulus for this research was the apparent puzzle of why harvesters in South Australia continue to harvest less than half of the kangaroo harvest quota annually even though kangaroo meat processors have been reporting strong and growing demand for their product. Another was the realisation that, at a time when the attention of community, government and some industries such as mining and fishing has been directed at more effective involvement of indigenous people in natural resource management decisions, the views of Aboriginal people of South Australia about commercial use of kangaroos had not ever been sought. The project's aims and methods were developed to address these questions.

## 1.1 Objectives

The aim of this project has been to develop a stronger understanding of social and institutional factors that influence use of commercial kangaroo harvesting as a strategy for promoting sustainable rangeland landscapes in South Australia. This has been addressed by:

- analysing institutional settings and interfaces between people involved in the kangaroo industry
- examining social, cultural and economic variables that affect harvest decisions
- providing Aboriginal people with an opportunity to bring forward issues that the commercial harvest of kangaroos raises for them
- developing recommendations for policy improvement that address issues raised by harvesters, landholders, meat processors and Aboriginal people.

## **1.2 Structure of the report**

The next section of this report presents background to the project's objectives and reviews relevant literature. The project's methods are then described for each of the two components of the project: people in the kangaroo industry, and issues for Aboriginal people about kangaroo management and the industry.

Research results are presented in a separate section for each of these components. First we present results from the industry component of the research project. This section is structured around the issues raised by harvesters, landholders and meat processors who participated in the study. At the start of the section we outline the different roles that people have in the kangaroo industry and management system and the institutions governing kangaroo harvest. Comparisons are drawn between South Australia's kangaroo management system and that of other states where commercial harvest occurs. We then address factors that contribute to low harvest rates in South Australia and to the low prospect of financial returns to landholders from commercial harvest including consideration of financial and institutional factors impacting on harvester livelihoods. In the following section we present issues brought forward by Aboriginal research participants about the industry and about the involvement of Aboriginal people in kangaroo management and in the industry.

The report concludes by discussing our findings and their implications for future development of kangaroo management strategies and the kangaroo industry in South Australia.

## 2 Background

Kangaroos are harvested commercially for human consumption and pet food markets and the skins are used for leather of exceptionally high quality. The harvest attracts periodic publicity, by no means all positive. Most of the harvest occurs in sparsely populated arid and savanna rangelands where extensive livestock grazing is the main land use. In these regions kangaroo populations have benefited from water points established for livestock, and dingo control measures (Calaby & Grigg 1989; Shepherd & Caughley 1987).

State government agencies administer kangaroo management programs which include commercial harvest in New South Wales, Queensland, South Australia, Western Australia and Tasmania. Their Kangaroo management plans aim primarily to conserve kangaroo populations across their range and emphasise the sustainability of harvest. Secondary objectives may include minimising the deleterious effects of kangaroo grazing on production and conservation values.

Kangaroo management by state governments has a well-established track record that demonstrates that the goals of commercial harvest are consistent with conservation of the harvested species (O'Brien 1990). Harvested populations are monitored by annual aerial survey. The accuracy and validity of the survey methodology has been carefully scrutinised over the 30 years of its operation (see for example, Tracey et al. 2005; Pople et al. 1998; Bayliss & Yeomans 1989; Bayliss & Giles 1985; Short & Hone 1985; Short & Bayliss 1985; Caughley & Grigg 1981). Survey data shows that kangaroo populations fluctuate with rainfall (Cairns & Grigg 1993) and that the regulated harvest of kangaroos is sustainable in the long term (Grigg 2002).

### 2.1 Origins of the industry

An industry based on the harvest of kangaroos for skins had developed by the early 20<sup>th</sup> century. Kangaroo meat trade gained momentum after the dramatic reduction of rabbit numbers due to myxomatosis in the late 1950s. The rabbit industry had supplied meat for decades and its decline meant that there were a large number of unused chiller boxes in southern inland Australia. Some rabbit industry operators adapted these chiller boxes for the previously unused meat of kangaroos, a strategy that 'proved highly successful in commercial terms' (Kirkpatrick & Amos 1985, p. 85). This innovation spread and the commercial kangaroo industry developed rapidly, selling pet meat. In the 1960s nearly two-thirds of the kangaroo harvest was used to produce both leather and pet food (Kirkpatrick & Amos 1985).

Public interest in the kangaroo industry emerged in the 1960s with concerns for the welfare and conservation of harvested kangaroo species. Public scrutiny led to a parliamentary inquiry into the harvest of kangaroos in 1971. It reported that populations were relatively stable and the kangaroo industry provided an important control on grazing pressure in the rangelands (Parliament of Australia 1971). However it recommended the industry introduce harvest limits and keep records of harvest.

Further pressure from animal rights activists and conservationists caused the Australian Government to ban export of kangaroo products in 1973. As a result the industry lost access to about 70% of its market and was left in disarray. Affected rural communities lobbied for the ban to be lifted or for governments to reintroduce vermin control legislation for kangaroos. The Australian Government responded by requesting that all states set an annual quota for kangaroo harvest and control harvest by requiring that special tags be attached to all harvested kangaroos. In 1975 the Australian Government determined that risks to kangaroo populations from the previously unregulated industry were now under control and lifted the export ban (Kirkpatrick & Amos 1985).

The kangaroo industry continued to struggle for some time. Export markets were reopened but Australian consumer acceptance of kangaroo meat for human consumption remained low. Pet food dominated in domestic markets. This started to change after the introduction of the *Australian standard for hygienic production of game meat for human consumption* in 1997. International animal

liberation or vegetarian organisations have continued to lobby against the industry. These groups have had some success in persuading supermarkets in Britain not to sell kangaroo meat, but have had little impact elsewhere (Kelly 2002).

## 2.2 The contemporary industry

The commercial kangaroo industry is established in all Australian states except Victoria, the Northern Territory and the Australian Capital Territory. Five macropod species (four kangaroos and one wallaby) are harvested on mainland Australia and two species of wallaby are harvested in Tasmania. Table 1 shows commercially harvested species and the states where harvest occurs. The kangaroo industry in South Australia is smaller than that in the eastern states. Table 1 shows average annual quotas for New South Wales, Queensland, Western Australia and South Australia between 1997 and 2004. Average annual quotas in New South Wales over these years were 1.6 million and Queensland had an average annual quota of 2.7 million. In contrast, Western Australia and South Australia have smaller average quotas of 372,000 and 645,000 respectively.

**Table 1: Average quotas and harvests NSW, Qld, WA and SA, 1997 to 2004**

|  | NSW   |         | Qld   |         | WA    |         | SA    |         |
|--|-------|---------|-------|---------|-------|---------|-------|---------|
|  | Quota | Harvest | Quota | Harvest | Quota | Harvest | Quota | Harvest |
| Mean quota and harvest 1997-2004 (,000s) | 1,616 | 1,019   | 2,738 | 1,461   | 372   | 243     | 645   | 272     |
| Stdev (,000s)                            | 378   | 195     | 677   | 370     | 81    | 74      | 168   | 53      |
| Median (,000s)                           | 1,551 | 939     | 2,805 | 1,487   | 369   | 2182    | 659   | 85      |

The kangaroo industry directly employs about 4,000 people nationally. It is economically valuable to rangelands communities and makes some contribution to the national economy. Over the past 20 years the kangaroo industry has experienced 7% average annual growth in productivity (Kelly 2005). Exports have been rising steadily since the late 1980s and are a major contributor to this growth (Hercock & Tonts 2004). Kangaroo products are now exported to over 60 countries. Meat exports to European markets generated over \$20m in 2004. The annual value of the industry to the Australian economy was estimated at \$200m in 2005 (Commonwealth of Australia 2005; Kelly 2005).

At the national level kangaroo products are gradually becoming more widely accepted. RIRDC research has established that South Australia has the highest level of consumer acceptance of kangaroo meat for human consumption compared to other states (Purtell & Associates 1997). This is due to the use of kangaroo meat for human consumption being legalised in South Australia in 1980, much earlier than other states. Other states followed in 1993 (Pople & Grigg 1999). All kangaroos in South Australia are harvested in accordance with hygiene standards established for human consumption. This is also the case in other states with the exception of Queensland where it is possible for harvesters to harvest for human consumption, skin-only or both markets.

The kangaroo supply chain is critical to maintaining and growing domestic and international markets. The industry experiences variability in supply that creates some instability in the supply chain. Supply of kangaroo carcasses varies according to fluctuations in weather conditions which impact on kangaroo abundance and the ability of harvesters to access kangaroo populations. This is problematic given the increasing expectation of consumers in a global market place that supply will meet their demands rapidly and accurately (Webster 2002).

**Table 2: Commercially harvested kangaroo and wallaby species**

| Kangaroo and wallaby species harvested for commercial markets | NSW | Qld | WA | SA | Tas |
|---|-----|-----|----|----|-----|
| Red kangaroo ( <i>Macropus rufus</i> )                        | ✓   | ✓   | ✓  | ✓  | A   |
| Eastern grey kangaroo ( <i>M. giganteus</i> )                 | ✓   | ✓   | A  | ×  | ×   |
| Western grey kangaroo ( <i>M. fuliginosus</i> )               | ✓   | ×   | ✓  | ✓  | A   |
| Euro or wallaroo ( <i>M. robustus</i> )                       | ✓   | ✓   | ×  | ✓  | A   |
| Whiptail wallaby ( <i>M. parryi</i> )                         | ×   | ✓   | A  | A  | A   |
| Bennett's wallaby ( <i>M. rufogriseus</i> )                   | ×   | ×   | A  | ×  | ✓   |
| Rufous wallaby ( <i>Thylogale billardierii</i> )              | A   | A   | A  | A  | ✓   |

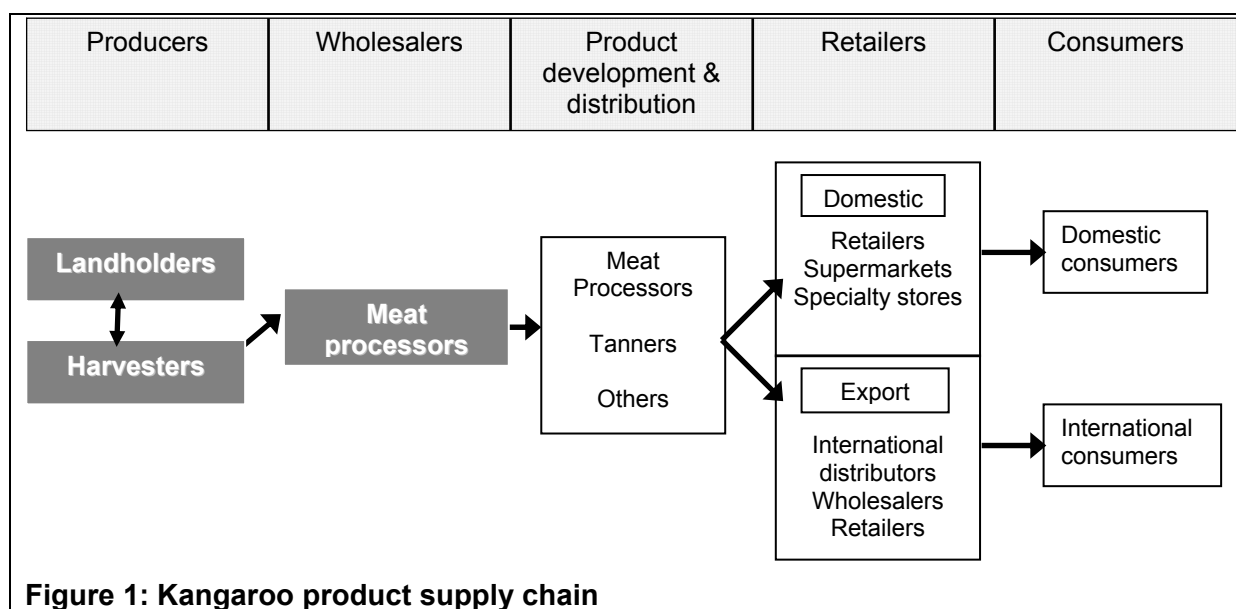
Key:

- ✓ Species is commercially harvested
- ×
- A Species is present, but no commercial harvest
- Species is absent

Source: Macarthur Consulting 1997; Pople & Grigg 1999; AG DEH 2005

Figure 1 shows the kangaroo product supply chain from producers to wholesalers, distributors, retailers and consumers. This research is focused on the producers and wholesalers in the supply chain.

Table 3 outlines the roles these people and companies have in the industry, and as indicated, staff of state and Australian Government agencies are also involved in the industry in monitoring kangaroo populations and administering regulations that govern commercial harvest and meat processing.



**Figure 1: Kangaroo product supply chain**

**Table 3: People's roles in the kangaroo industry**

| Who?                                     | Role in the kangaroo industry  |
|--|--|
| Landholders                              | Provide habitat that maintains high kangaroo populations   |
| Harvesters (field processors)            | Shoot and dress kangaroo carcasses in the field with permission of landholders   |
| Meat processors                          | Process carcasses supplied by harvesters. Distribute meat to wholesalers. Supply skins to tanneries. Market and distribute meat products to wholesalers, retailers and consumers |
| Skin tanners                             | Process, supply and market skins to leather and leather products   |
| State and Australian Government agencies | Monitor kangaroo populations; regulate and administer commercial harvest and meat processing; fund/support research and development  |

### 2.3 Kangaroos and total grazing pressure

Most kangaroo harvest happens on pastoral rangelands - the 58% of Australian rangelands where livestock grazing is the main extensive land use (AG DAFF 2005). Land degradation has been assessed as affecting over half of these rangelands (Heathcote 1994; Norbury & Norbury 1993). It involves a reduction in palatable vegetation and soil condition (Norbury & Norbury 1993). Ludwig and Tongway (1995) have estimated that about 26% of Australia's rangelands are suffering severe degradation and 16% are in a very severe state of degradation. Pastoral production is considered to be the principal cause of this degradation (Noble et al. 1984; Musgrave 1983).

Management of total grazing pressure is the main tool available to address land degradation on pastoral lands. Total grazing pressure (TGP) refers to the combined impacts of herbivorous mammals on vegetation (Choquenot et al. 1998). Two components of TGP are recognised: domestic livestock and wild stock, both feral and native. Managing the livestock component of TGP is achieved through conservative stocking rates, spatial distribution of water points and the movement of livestock between paddocks. Managing the wild stock component presents a challenge that is usually addressed by reducing populations through culling or commercial harvest (Fisher et al. 2004).

Management of TGP is important to maintaining resilience of rangeland ecosystems which is what provides the ecosystem and the social system it is linked to with capacity to withstand stresses and shocks (Gunderson 2003; Stafford Smith & Reynolds 2002; Scheffer et al. 2001). The unpredictability of rainfall – its timing and magnitude – is a substantial source of ecological shock in South Australian rangelands. The irregular cycle of drought and flood that results leads to these rangelands being characterised as 'boom and bust' environments. While this cycle is inherently unpredictable, continual attention to TGP allows managers to guard against 'slower' changes in soil structure and vegetation. Attending to these 'slow' variables supports the capacity of the ecosystem to persist in drought, to 'boom' after heavy rain, and to maintain its overall productivity through these cycles.

Kangaroos make a significant contribution to total grazing pressure in arid rangelands (McLeod 2004; Freudenberger 1995). When kangaroo populations are overabundant they can have severe deleterious effects on native vegetation (Fisher et al. 2005). Shepherd and Caughley (1987) argue that kangaroo abundance has increased over the past 120 years to a level that may be affecting the composition and biomass of native vegetation.

A number of studies have examined the impact of kangaroo grazing on native vegetation regeneration in arid and semi-arid rangelands (see for example, Norbury & Norbury 1993; Norbury et al. 1993; Gardiner 1986). Results show that sites protected from livestock and kangaroo grazing pressure contain greater species diversity and vegetative biomass than sites where livestock is excluded but where kangaroo grazing occurs. Page and Beeton's (2000) grazing trials in the mulga lands of south-west Queensland confirmed previous findings by showing that kangaroo grazing pressure limits regeneration of native grasses in areas excluded from livestock grazing.

The effect of competition between livestock and kangaroos on pastoral production values has also been studied reasonably extensively. There is broad consensus that there is a degree of dietary overlap between kangaroos and domestic livestock that is most prominent during drought conditions (see for example, Dawson & Ellis 1996; Edwards et al. 1996; Wilson 1991b). There is also general agreement that kangaroo grazing is often concentrated in paddocks that are being rested from use by livestock (Edwards et al. 1996; Wilson 1991a; Andrew & Lange 1986). Wilson (1991a) concluded that kangaroo grazing has deleterious impacts on wool production in sheep grazing country. Edwards et al. (1996) found no detectable effect on wool production but noted that sheep in competition with kangaroos recorded lower live weights than those in paddocks excluded from kangaroo grazing pressure. Overall, the contribution of kangaroo grazing to total grazing pressure in Australia's rangelands provides a strong case for intervention that manages kangaroo abundance.

## **2.4 Wildlife conservation through sustainable use**

Conservation of wildlife through sustainable use is a concept based on creating economic incentive for landholders to retain and protect native habitats and species (Parliament of Australia 1998; Webb 1997; Ramsay 1994). The aim is to generate conservation benefits by increasing the economic productivity of native habitats and encouraging landholders to rehabilitate degraded habitats (Jenkins 1995). It is now widely accepted that ecologically sustainable land management is not achieved through narrowly-focused singular production modes. Rather there is a need for a range of management modes, minimising dependence on any individual person, species or ecosystem function (see for example, Coop & Brunckhorst 1999; Cock 1992; Berkes et al. 1991).

Several southern African states have been encouraging sustainable commercial use of wildlife for some 40 years. Landholders in Zimbabwe, South Africa, Namibia and Botswana have rights to use wildlife on their land for the production of wild game meats, safari hunting and other tourism activities (Muir-Leresche & Nelson 2001). Once private land in South Africa is fenced with game-proof fencing the animals within the fence become the private property of the landholder. This requires 10 foot high fences made of 12 strands of high-tensile wire (Anderson 2004).

African experience is that when wildlife began to be privatised its economic value to landholders became clear. Benefits for wildlife conservation followed with increases in diversity and abundance of wildlife on private lands (see for example, Abbot et al. 2000; Barrow et al. 2000). Cattle ranching, an economically marginal activity in the southern African rangelands, has also benefited from the increased profitability in ranches that have established mixed cattle-wildlife enterprises (Muir-Leresche & Nelson 2001).

### **2.4.1 Realising value for landholders from kangaroos**

Commercial harvest of kangaroos has long been proposed as an opportunity for landholders in Australian rangelands to realise value from wildlife. Gordon Grigg of the University of Queensland has been the most prominent advocate. Grigg (1987) argued that overgrazing by domestic stock has proved detrimental to the long-term ecological health of the rangelands. He encouraged landholders to value and commercially exploit the kangaroo as 'sheep replacement therapy for rangelands'. He has argued that significant financial returns for landholders from commercial harvest of kangaroos will lead to landholders putting more emphasis on providing suitable habitat for kangaroos, reducing sheep stocking rates and generating benefits for land condition (Grigg 2002).

Grigg (2002) argues that the low retail price of kangaroo meat is the greatest hurdle to the implementation of his proposal. Young and Wilson (1995) predicted that landholders will be able to realise financial returns from kangaroos when kangaroo meat is comparable in price to other red meats. Australian retail prices for prime cuts of kangaroo are often now quite comparable to those for good cuts of beef or lamb. Nevertheless up to 70 per cent of kangaroo meat is used for pet food (Kelly 2005; Grigg 2002) and kangaroo is yet to gain widespread consumer acceptance as a healthy and tasty product. The Kangaroo Industry Association of Australia (KIAA) argues that a shift to majority human consumption is needed to rectify the overall low market value of kangaroo (Kelly 2003). Momentum is gaining with media attention in recent years to the health benefits of eating kangaroo meat highlighting its high levels of protein, iron, zinc and healthy fats when compared with other red meats (CSIRO 2004; Domico 2000). A further impetus is the growing interest in Australia in native or bush foods. Niche markets in Australia for kangaroo are growing. However kangaroo products remain underpriced on global markets in comparison with beef and lamb (Hercock & Tonts 2004).

Grigg (1995) has also given some consideration to the issue of property rights in kangaroos. He acknowledged that some conservation groups are opposed to ownership of wildlife being transferred to individuals and that landholders are reluctant to base a significant portion of their earning capacity on a wild animal that they do not own (see also Chapman 2003). Grigg (1995; 1991) proposed that the government requirement that all commercially harvested kangaroos are marked with designated numbered tags could address both concerns. These tags are markers that establish that kangaroos are legally harvested. Grigg proposed that harvest quotas and tags be allocated to individual landholders based on the localised population density on their properties. Landholders could then either employ kangaroo harvesters, sell their tags to harvesters, or enter into contractual arrangements with harvesters or meat processors. Through their control of the tags landholders would realise a right to financial return from selling kangaroos off their property but only up to the predetermined quota limit.

South Australia revamped its kangaroo management program in the mid 1990s. From 1996 it began to allocate the quota to property level along the lines that Grigg (1995; 1991) advocated. Other measures were also introduced in South Australia in the same period to expand opportunities for sustainable commercial use of wildlife, notably regulations to provide for emu farming. This was part of the growing interest in wildlife conservation through sustainable use that has led some other states to explore small scale opportunities for commercial harvest of other species, such as crocodile and reptiles (Commonwealth of Australia 1998; Grigg et al. 1995). Notwithstanding this emerging national interest in sustainable commercial use of wildlife, South Australia has been the only jurisdiction to embrace the idea that landholders could realise value from kangaroos through the allocation of harvest quota to individual properties.

#### **2.4.2 The South Australian kangaroo management program**

The reforms introduced in 1996 (Alexander 1997) through the South Australian kangaroo management plan aimed to promote an enhanced role for landholders and regional institutions in the management of kangaroos (SA DEH 1999). They introduced the notion of trading harvest rights with the aim of developing an improved basis for landowners to implement their own property scale decisions about kangaroo management. The management program incorporated two quotas, a Sustainable Use Quota (SU) and a Land Management Quota (LM). The SU quota was offered annually to landholders to be used commercially. The LM quota was released by South Australian Department for Environment and Heritage (SA DEH) on application by landholders and following advice and recommendation by the District Soil Conservation Board (SCB). The partial devolution of management control to regional level through SCB involvement aimed to support integration of kangaroo management into regional development directions (Alexander et al. 2000; SA DEH 1999). It recognised the link between kangaroo populations and total grazing pressure and allowed landholders to harvest kangaroos over and above the commercial harvest (SU) quota where warranted by land management objectives.

The reforms aimed to provide landholders with a way of realising the economic value of kangaroos by granting landholders “trading rights to a harvestable portion of kangaroos occurring on their properties” (Alexander 1997, p. 26). It was anticipated that landholders would sell their SU quota to harvesters or meat processors. More significantly it was envisaged that landholders would trade in SU quota allocations (and tags) with other landholders. Trade of SU quota/tags would be allowed amongst landholders in the same Soil Conservation Board District (SCBD). It was envisaged that this trade would allow landholders with very high populations of kangaroos at any particular time, due to kangaroo mobility or seasonal conditions, to buy quota from other landholders who had excess quota due to low local kangaroo populations, or for any other reason, such as because they do not want to participate in commercial harvest. The expectation was that landholders would realise financial return from kangaroos through trading quota and through harvest on their property (Alexander 1997).

Under these reforms, the quotas on total harvest within each SCBD and at state level would continue to guard against the risk that harvesting might impact on sustainability of kangaroo populations. However it was expected that landholders would have greater flexibility to direct the level of harvest on their own property to meet their land management and other goals. Introduction of this scheme came at a time of increasing interest amongst governments about how market-based instruments (MBIs) – instruments that use market signals to influence people’s behaviour – could achieve environmental outcomes more efficiently than standard regulatory approaches (Whitten et al. 2004). The scheme introduced in South Australia in 1996 has closest parallels with the well established use of tradable harvest quotas in fisheries management. It can be considered to be one of a class of ‘rights based’, or ‘quantity based’ MBIs designed to lever environmental change by introducing new private property rights and/or obligations.

## **2.5 Aboriginal people and commercial use of wildlife**

Aboriginal commercial use of native animal species is best established in Arnhem Land Aboriginal communities where it is a strategy for economic development that supports ‘caring for country’. Bawinanga Aboriginal Corporation has the most diverse and innovative suite of activities including crocodile egg harvesting, turtle hatchlings, goanna and native fish with active involvement of scientists and local people in addressing sustainable use (Cochrane 2005; Altman & Whitehead 2003). Trophy hunting for crocodiles has also been proposed in this region but failed to achieve Australian Government approval in 2006.

Few Aboriginal people are involved in the commercial kangaroo industry. In South Australia seven pastoral leases in the commercial harvest zone are owned by Aboriginal family-based corporations and may engage in commercial harvest in the same way as other pastoral leaseholders (see page 68). Only one Aboriginal person has held a permit for commercial kangaroo harvesting in recent years. Other states have similarly low levels of Aboriginal involvement in the kangaroo industry.

Involvement in commercial wildlife industries has been advocated as a pathway for Aboriginal economic development and sustainable resource use (Davies et al. 1999; ATSIC & DPIE 1997; Altman et al. 1996; Bomford & Caughley 1996; Williams et al. 1995; Coombs et al. 1990; Wilson et al. 1990). However most indigenous enterprises based on commercial use of wild animals have struggled to achieve viability as a result of short term and discontinuous support for capacity building, poorly developed supply chains and markets, and remoteness of many harvesting activities from processing facilities. The Australian Government’s Aboriginal Rural Resources Initiative (ARRI) program, which operated from 1992 to 1995 and had antecedents in the Aboriginal Contract Employment Scheme established in 1988, supported projects for indigenous people to generate employment and income through the use of wild animal resources such as kangaroos and various feral species. There was high demand from Aboriginal people for support from the ARRI program (Williams et al. 1995). There has been no specific government support for indigenous wildlife enterprise development since 1996.

Two ARRI projects supported Aboriginal people to develop enterprises based on harvesting kangaroos – in the Charleville region of Queensland and in Esperance Western Australia. In both cases the Aboriginal people involved had previous experience as kangaroo harvesters. In 1995 the Esperance project was operating as a commercially viable business and the status of the Charleville project was uncertain (Williams et al. 1995).

Strong demand experienced by the ARRI program from Aboriginal people interested in establishing enterprises based on feral animals reflects Aboriginal people's view that feral species have economic value. This view comes from Aboriginal people's own use of some species for food, notably rabbits and buffalo, and their observation of, and periodic participation in, commercial harvesting of goats, camels, rabbits and buffalo (see for example Bowman & Robinson 2002; IAD 1994; Palmer & Brady 1991; Altman 1982). This economic value is one reason for widely documented disquiet from indigenous people about culling any animals without use of the meat. Cultural significance of animals, including some feral animals (CLC 2005; Rose 1995; Nugent 1988), also leads Aboriginal people to object to 'shooting to waste', rather than using animals.

Because of these Aboriginal values, culling of animals is a particular trigger for periodic conflict between Aboriginal people and others about management of wildlife, both native and feral species. Such conflicts are difficult to resolve unless Aboriginal people have been part of the decision-making process. Where Aboriginal people have observed and considered the land degradation resulting from high populations of grazing animals they tend to be more willing to control wild populations by culling, especially where there are opportunities for them to earn income by participating in control programs. For example in Nantawarrina Indigenous Protected Area (IPA) in the Flinders Ranges, Adnyamathanha people used to periodically muster and sell feral goats prior to their decision to manage the area for conservation in 1998. Implementation of this decision, supported by resources through the Natural Heritage Trust IPA program, has led them to focus on culling rather than harvesting feral animals and is assisting in vegetation recovery (Chester & Last 2002).

There has been very limited Aboriginal involvement in government decisions about management of wildlife or their commercial use (Altman & Cochrane 2003; Davies et al. 1999). Queensland was the first state to give attention to considering Aboriginal perspectives in kangaroo management. An Aboriginal community representative was involved in the statutory Macropod Management Advisory Committee in the 1990s (Fourmile 1996). SA DEH began to address Aboriginal interests in kangaroo management in 2002 for the first time. It invited the SA Aboriginal Legal Rights Movement Inc, as the representative body for native title holders and claimant groups under the *Native Title Act 1993* [Cwth], to participate in the review task group for its kangaroo management plan.

National expenditure on projects and policy development to more effectively involve indigenous people in Australian natural resource management has markedly increased since the 1990s when the important role that indigenous people and their knowledge can play in understanding ecosystems was first formally recognised in Australian policy (see Commonwealth of Australia 1996). Involvement of Aboriginal people and attention to their interests in natural resource management continues to be spatially patchy as judged by expenditure from National Heritage Trust on projects involving Aboriginal people or addressing their interests, and some have argued it is inequitable (Lane & Corbett 2005; Williams 2005; Worth 2005). The inclusion in 2005 of a new objective of promoting indigenous community participation amongst the seven high level national objectives for regional natural resource management investment (NRM Outcomes Checklist 2005) indicates a commitment by Australian governments to continue to address this issue (and see Commonwealth of Australia 2004).

The 2002 kangaroo management plan (SA DEH 2002a) includes an objective of promoting and encouraging the involvement of Aboriginal people in the management of kangaroos. Corresponding actions are:

- targeted promotion of the plan to promote informed decision-making by Aboriginal landholders about harvest decisions on their properties

- identifying opportunities for Aboriginal involvement in the industry as part of Aboriginal economic development
- contributing to building stronger relationships between Aboriginal people, the SA Farmers Federation and Pastoral Board
- developing improved understanding of the potential impacts of commercial harvest on Aboriginal rights, interests and aspirations for kangaroos.

SA DEH interest and support for this research developed in the context of this new attention to Aboriginal issues.

## 2.6 Origins of this project

This project originated from discussions of property level quota in 1997 between Jocelyn Davies and Peter Alexander, who was then responsible for the South Australian kangaroo management program within SA DEH. Davies pointed out that although this reform and others aimed to address important goals of improved management of total grazing pressure and diversification in rangeland production systems, they had not considered impacts on native title rights and interests. The *Native Title Act* 1993 [Cwth] had been promulgated to recognise and register indigenous common law rights in land and natural resources that were recognised by the High Court's Mabo decision of 1992 and to manage the interface between these and other property rights. The introduction of tradable quotas in kangaroos appeared on face value to be invalid because it had introduced a new property right, albeit limited, without undergoing the procedures set out in the *Native Title Act* for 'future acts'.

At a broader level the intent of kangaroo management systems to demonstrate sustainability is questionable while they do not account for the rights and interests of Aboriginal people (Davies et al. 1999). This is because social, economic and cultural considerations are fundamental to sustainable development (Pepperdine 2000) and sustainable wildlife use (Webb 1997). In particular, the sustainable use of wildlife may be demonstrated in ecological terms, but it will not be contributing to sustainable development unless social, economic and cultural factors are considered.

There are potential opportunities for the kangaroo industry in engaging with outstanding issues of Aboriginal rights and interests in kangaroos because of rising interest from consumers in products that can demonstrate they are 'traded fairly' (Hargroves & Smith 2005; WRI 2002). Consumers are increasingly interested in 'the world behind the product they buy...how, where and by whom the product has been produced' (Topfer, UNEP in Hargroves & Smith 2005, p. 123). In their review of business opportunities and innovation for the 21<sup>st</sup> century, Hargroves and Smith (2005) conclude that there is a strong business case for the move by innovative companies to certify their products and services using ecological and fair trade labeling schemes.

Aboriginal people and other parties have been negotiating all kinds of agreements for mutual benefit, particularly since the High Court Mabo decision (see ATNS Data Base). Why not consider the prospect for agreements that provide for kangaroo products to be endorsed by Aboriginal traditional owners of the land where kangaroos are harvested? Perhaps this could provide market appeal that would help balance periodic vocal opposition to kangaroo harvest from animal liberation and vegetarian lobbyists.

Questions such as this are hard to approach without understanding the social, institutional and economic issues that kangaroo management presents for people in the industry and that the commercial harvest of kangaroos presents for Aboriginal people. This project was conceived to advance those understandings.

We started working on this project in 2002. By that time the *Native Title Act* had been amended such that any impediments that it may have originally provided to landholders trading kangaroo quota were no longer present. However by that stage we had also learned from our engagements with landholders about the project that they were not actually trading their quota. There was no accessible 'market

place' and landholders were not aware of the option to trade. In addition Jenny Lee of the South Australian Crown Solicitor's Office told industry stakeholders at the South Australian Kangaroo Management Seminar in Port Augusta late in 2002 that the *National Parks and Wildlife Act 1972* [SA] did not actually allow kangaroo quota to be legally traded.

Property level quota allocation has continued in South Australia during the period of this project although the dual SU and LM quota provisions were discontinued in 2003. Further reforms to the kangaroo management system are now in development which will change the scale for quota allocation from property level to regions (Lisa Farroway, SA DEH pers comm. 2006). The impact of South Australia's experiment with property level quota is evident in many of the research results presented in this project. They illustrate the perverse outcomes that can arise from a poorly designed market-based instrument.

## 3 Methods

This research mainly used qualitative methods. It has involved in-depth interviews with people involved in the kangaroo industry in three regions of rangeland South Australia and interviews and discussions with Aboriginal people from two cultural regions of South Australia. In exploring the issues identified by these people we have also analysed quantitative data from South Australian harvest records and those of other states.

In early stages of the project we:

- described current institutional arrangements in various states from legislation, kangaroo management plans and telephone interview with regulatory agency representatives
- compared recent institutional changes with recommendations in *A review of the impact of government policies on kangaroo industry commercial practices* (Macarthur Consulting 1997), RIRDC commissioned research. This involved a phone questionnaire with regulatory agency representatives in Queensland, New South Wales, Western Australia and South Australia. Findings are in Appendix 2
- reviewed other literature on kangaroos and their management and on commercial use of wildlife.

Field research was conducted in two parts:

- interviews with landholders, harvesters and meat processors involved in the South Australian kangaroo industry
- interviews and meetings with Aboriginal people in relation to the South Australian kangaroo industry and kangaroo management system.

This section of the report sets out methods for each of these two field components.

The interview and data management protocol was reviewed and approved by The University of Adelaide Human Research Ethics Committee. Dana Thomsen collected and analysed field and other data under Jocelyn Davies' supervision.

### 3.1 People in the kangaroo industry

This component of the research focuses on three key questions in relation to the South Australian kangaroo industry:

- what social, institutional and economic factors are important in explaining kangaroo harvest levels and the spatial distribution of harvest?
- what factors contribute to harvest levels being less than 50% of quota?
- what issues influence the social, economic and environmental benefits provided to rural communities by the kangaroo industry?

#### 3.1.1 Field methods

We used in-depth, semi-structured interviews to understand social, institutional and economic issues for people involved in the kangaroo industry as landholders, harvesters or meat processors.

We based the study on geographic regions because we anticipated that social interactions and geography influence kangaroo harvest rates. This allowed comparison of regional differences in kangaroo harvest dynamics and highlighted factors that influence harvest between and within various parts of South Australia.

#### **Study regions**

In selecting regions to be the focus of the research effort, we considered two macro-influences that we anticipated impact on commercial kangaroo harvest dynamics:

- the location of land in relation to the Dog Fence
- proximity to the major centres of Port Augusta and Adelaide.

Dingo predation reduces kangaroo density (Newsome et al. 2001; Freudenberger 1995; Norbury et al. 1993). The Dog Fence (see Figure 2) keeps dingoes from entering sheep production country south of, or 'inside', the Dog Fence. Only cattle are grazed north, or 'outside', the Dog Fence. Proximity to major regional centres impacts on kangaroo harvest rates because of the cost of transporting harvested kangaroos to processing plants which are in major regional centres. We also expected that property size and terrain would influence kangaroo harvest.



**Figure 2: The South Australian Dog Fence near Coober Pedy**

We identified three regions, two inside and one outside the Dog Fence, where we could gather data about harvest on contiguous properties with a range of sizes and terrains.

Within these regions we introduced the research to, and requested participation from landholders, kangaroo harvesters who conduct harvest activities on these landholders' properties and the meat processors who buy kangaroo carcasses from these harvesters.

One landholder declined to be involved in the research. Everyone else we approached agreed to participate. The harvesters that we approached first established our credibility. After this they seemed pleased that we were seeking to learn about issues of concern to them and would be presenting these in publications and forums. They provided detailed information on harvest activities, business decision-making, financial and social issues relevant to their livelihoods.

The people interviewed comprise:

- 21 landholders (approx 10% of the 215 pastoral properties in South Australia)
- 14 harvesters (approx 18% of the 79 harvesters holding South Australian permits in 2006)
- four meat processors (80% of a total of five kangaroo meat processors in South Australia).

The three regions where the participating landholders' properties are located are shown on Map 1 (page 14) and described below.

### *Port Augusta region*

This study region is inside the Dog Fence and sheep grazing is the major land use. The eleven properties in this study region are within 200 km of Port Augusta, the major service town for the South Australian rangelands. Average property size is 770 km<sup>2</sup> with a range of 337 km<sup>2</sup> to 2304 km<sup>2</sup>. Between 1997 and 2001 average kangaroo harvest quotas for these properties ranged from 1,100 to 7,000 with a mean of approximately 3,000.

### *Northern Flinders Ranges region*

This study region is inside the Dog Fence and sheep grazing is the predominant activity with some cattle grazing (mixed grazing). Most properties in the region are between 200 and 500 km from the major regional centre of Port Augusta. The twelve contiguous properties in this study region vary in

size and terrain. The average property size is 1091 km<sup>2</sup> and properties range from 178 km<sup>2</sup> to 4144 km<sup>2</sup>. Properties vary in their proximity to the relatively large conservation reserve, Flinders Ranges National Park. We expected that the existence and management of this protected area may impact on local kangaroo abundance and landholder attitudes to kangaroos and commercial harvest. Between 1997 and 2001 average kangaroo harvest quotas for these properties ranged from 700 to 8,000 with a mean of approximately 3,000.

### *Marla/Oodnadatta region*

This study region is outside the Dog Fence and cattle grazing is the major land use activity. The nine properties in this region are each about 800 km north of Port Augusta. All are large properties, averaging 4112 km<sup>2</sup>, with a range of 2349 km<sup>2</sup> to 7169 km<sup>2</sup>. There is little variation in terrain in this region. Between 1997 and 2001 average kangaroo harvest quotas for these properties ranged from 3,500 to 14,000 with a mean of 7,500.

### **Interview format**

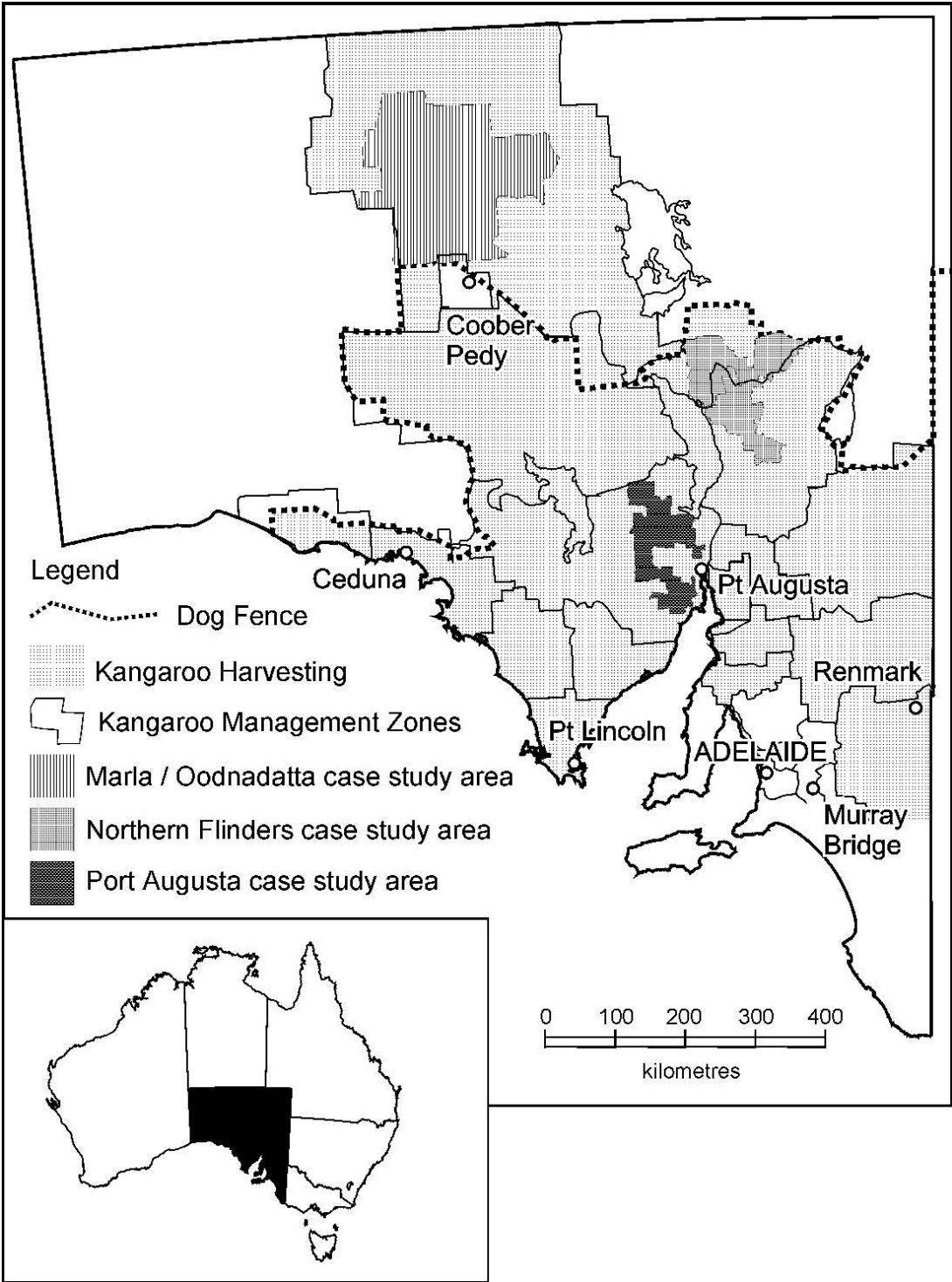
Open-ended interview questions covered the following topics:

- general questions about involvement in the industry
- information and communication networks
- decision-making: how the people interviewed make decisions about harvesting
- regulations and policy: legal or policy issues that impact on people implementing their decisions about harvesting
- rights and interests: ownership of kangaroos and the distribution of benefits of commercial harvest
- costs and financial returns associated with harvesting.

The content of each interview varied according to the issues that individual research participants brought forward. Interviews varied from relatively short discussions of 45 minutes to long and detailed interviews of up to six hours duration. All interviews were tape recorded except for one interview with a landholder and one interview with a harvester. Hand written notes were taken during these two interviews. During interviews we also provided research participants with information about regulations that impact on harvesting activities as necessary to develop their understanding of the regulatory environment within which the industry operates.

It was very important to establish and maintain good working relationships with research participants particularly because some people in the industry do not welcome research on social issues. One clear reason for this is that the industry has had repeated adverse publicity due to the claims of vocal animal liberation groups. We conducted several field visits between September 2002 and August 2005 in order to generate trust, provide information to research participants, and give feedback about preliminary findings from the research.

Map 1: Location of study regions



## 3.2 Aboriginal people and the kangaroo industry

This component specifically considers Aboriginal perspectives on the commercial harvest of kangaroos. In this component we focused on:

- developing an understanding of Aboriginal perspectives regarding the commercial harvest of kangaroos
- establishing an ethical and culturally appropriate process for considering these perspectives in the research and in the management of kangaroos
- building capacity for Aboriginal engagement through improved understanding of the industry and the kangaroo management system.

### 3.2.1 Field methods

This component of the research was conducted in two regions of South Australia:

- the central northern region, extending from Coober Pedy to Marla and Oodnadatta. In this region there are two language groups, Yankunytjatjara and Antakarinya, who speak closely related dialects and form part of the broader Western Desert language group (see Tindale 1974 and Horton 1994).
- the northern Flinders Ranges where Adnyamathanha people are the traditional owners of the land.

These two regions were selected as most appropriate because they are within the commercial harvest zone and the Aboriginal cultural groups of these regions have a high proportion of members living on or close to their traditional country. They also overlap with two of the three study regions for our research with landholders and commercial harvesters.

We discussed commercial kangaroo harvest and kangaroo management with Aboriginal people who have cultural ties and responsibilities within these regions. Topics included access to kangaroos, ownership, native title and views on the commercial kangaroo industry. Other issues were raised by the research participants. In total over sixty Aboriginal people participated in the research by contributing their perspectives through meetings and interviews.

Field work in each region was conducted in three phases:

#### ***Scoping phase***

During the scoping phase we assessed the level of interest in the research topic, extended our networks with prospective Aboriginal research participants and accepted advice about how to proceed. The scoping phase was integral to the development of culturally appropriate research methods. In both regions we followed directions from senior Aboriginal people in deciding who to talk to and how to proceed with the research.

#### ***Primary data collection***

Field work for primary data collection involved two community meetings in each region. We also interviewed people who had previously told us they want to participate but who were unable to attend the community meetings.

#### ***Verification***

Research findings were verified with research participants in each region by presenting our findings to them and soliciting feedback. This involved small group meetings and one-on-one discussions.

#### ***Coober Pedy/Oodnadatta - Western Desert cultural region***

During the scoping phase we established that research methods for the Western Desert cultural region had to be responsive to the existence of knowledge and customary law about maḷu (red kangaroo) that is restricted to initiated men. In this region maḷu is strictly ‘men’s business’.

The scoping phase was assisted by Aboriginal Legal Rights Movement, the representative body for native title holders in South Australia appointed under the *Native Title Act 1993* [Cwth]. Discussions of the prospective research at a meeting of native title claimants in Coober Pedy directed Thomsen to culturally authoritative people. They agreed to the research provided that it would only involve senior men and directed us to relevant men in Coober Pedy and Oodnadatta. The research also involved discussions with men at a meeting at Amata in the Anangu Pitjantjatjara Yankunytjatjara Lands which we undertook at the request of these Coober Pedy/Oodnadatta research participants.

Because the core researchers on the project (Davies and Thomsen) are female we engaged appropriate male research expertise with support through a grant from the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS). Kado Muir was engaged because of his status as an initiated Western Desert man (from the Ngalia people in the south-west of the Western Desert region) and his experience as a researcher.

Kado Muir managed the consultation process during the primary data collection phase. During the verification phase he ensured that the research findings reflected the messages conveyed by research participants. He applied his own judgement about what information was appropriate to present publicly and ensured informed consent from research participants for this provision of information. Kado was supported in these roles by two respected local Aboriginal men with experience in research, Yami Lester and Joseph Lennon.

### ***Northern Flinders Ranges – Adnyamathanha region***

In this region research methods did not need to take account of restricted or gendered cultural knowledge about kangaroos. During the scoping phase Adnyamathanha people advised that they would be happy to talk to a female, non-indigenous researcher about kangaroos and kangaroo management. There were also no cultural restrictions on which Adnyamathanha people could be involved as research participants. We met with and interviewed a range of Adnyamathanha people including elders, women and young people as well as men.

## **3.3 Analysis of interview data**

Field work resulted in rich and detailed data. Robust analysis was assisted by use of NVivo software. This simplifies the complex task of data management by providing a range of tools for storing and browsing data records, for coding of data to categories, and for accessing data records accurately and quickly (Richards 1999). The process of data analysis involved:

- transcribing tapes or notes from interviews and meetings into electronic documents
- importing the documents into the NVivo system
- reviewing the text on screen and noting common themes emerging
- coding phrases and passages containing common themes under a specific title or key word
- analysing coded text closely to identify preliminary findings
- testing the validity and accuracy of preliminary findings in one-on-one consultations with key research participants and also with other people who research participants had identified as rangeland experts (Appendix 1)
- liaison with SA DEH staff, and staff of other state government regulatory bodies, about access to further data to test findings. These staff also provided helpful insights into the findings that were emerging from our analysis
- developing the main themes emerging from the findings, as presented in this report.

The objectivity of the analysis was established by close consideration of the motivations for and context of the views expressed by each participant. Data from interviews with participants in the kangaroo industry were also compared with available data on quota trends, actual harvest rates, kangaroo harvester numbers and imports from interstate, as described in this report.

## **3.4 Limitations**

This research has some limitations that are important to acknowledge.

### **3.4.1 Data from South Australian Department for Environment and Heritage**

It proved difficult to compare interview data with quantitative data collected about kangaroo harvest by SA DEH because of difficulties in access to some of the data. After considerable effort from SA DEH staff and on our part we were able to access data on quota and recorded harvest for the properties in our study regions (1997-2001) and on imports of carcasses to South Australia but not time series data on the number of kangaroo harvesters holding permits. Because such data are generated by statutory requirements we expected them to be relatively simple to access but this was not the case. However SA DEH has since upgraded its data base capability. Since 2005 SA DEH has sent reports on property-level quota and harvest to all pastoral leaseholders and intends to continue to do so every six months.

A large time investment by SA DEH staff and us resulted in a small but relatively consistent data set of quota allocated and recorded harvest for 1997 to 2001. However from the project's interviews we learnt about the practice of 'tag swapping' (see page 31) which impacts on the accuracy of property level harvest data. Harvesters in the Port Augusta and Flinders Ranges case study areas use tag swapping to concentrate harvest effort on properties where density is highest. In the Marla/Oodnadatta study region we found that harvesters are less likely to swap tags between different properties because there are high quotas and few harvesters in this region. We concluded that SA DEH property level harvest data was unreliable except in the Marla/Oodnadatta study region. Therefore this is the only case study area for which we found it valid to include analysis of quota and harvest data at the property level in this report (see page 44).

### **3.4.2 Sampling strategy and generalisation**

Qualitative research typically deals with quite small numbers of research participants and is therefore not amenable to generalisation (Patton 1990). Rather it uses 'inquiry approaches' to achieve in-depth examination of social phenomena (Patton 1990, p. 183) and to understand underlying factors that explain phenomena. For this reason the views of the people we interviewed cannot be considered representative of the groups to which they belong and we have avoided drawing broad generalisations in our results.

To make generalised statements about kangaroo harvesters, their practices and views, would have required about 80 participants (of the 126 harvesters holding permits in 2002) to give 95% confidence in generalised statements about the population (based on Patton 1990). We could have feasibly sought larger samples of harvesters and landholders by using a questionnaire survey instead of in-depth, semi-structured interviews. However a questionnaire would not have provided the same insight and understanding of interrelated causal factors that has been possible from the in-depth interviews.

During the research design phase we did consider alternatives to sampling based on study regions. In particular we considered selecting a number of kangaroo harvesters and then using a 'snowball' sampling strategy to locate and interview landholders and other industry actors that they communicate with. This would have allowed us to map and analyse the social networks of individual harvesters and how they influence harvest decisions. It would have facilitated analysis of how the amount of quota controlled by individual harvesters impacts on overall harvest rates in South Australia. This alternative was not pursued because it would have given less attention to issues for landholders and to regional differences than was possible with sampling design we used.

### **3.4.3 Confidentiality**

We are not able to present the evidence base for some of our conclusions in detail because of ethical considerations. A particular ethical risk arises from our finding that the rules-in-use by people

involved in harvesting sometimes do not comply with legislation (see page 31). To minimise risk of harm to people's livelihoods and relationships in a small industry we do not provide the names of individual research participants or properties.

In interviews we asked meat processors and kangaroo harvesters for detailed financial information about their businesses. Of course, individuals had the option to provide this information or to decline and no pressure was applied in seeking this information. All meat processors participating in this study declined to give financial information and also gave no detailed information about the number of carcasses that are processed for human consumption compared to those processed for pet food. In contrast, all kangaroo harvesters provided financial information and many opened their books to show their earnings and expenditure. Some also provided us with photocopies of these documents. We have used this information to generate simple models of gross profit from kangaroo harvesting (see page 50).

#### **3.4.4 Aboriginal harvest rates**

The study design did not allow us to quantify harvest effort or the rate of harvest by Aboriginal people for domestic use or factors that may impact on this including commercial harvest (but see page 69). A longitudinal study replicated in several regions, involving methods such as harvest diaries maintained by Aboriginal harvesters, would likely be necessary to generate reliable data.

## 4 People in the kangaroo industry

This section of the report considers the social, institutional and economic factors that influence the use of commercial kangaroo harvesting as a strategy for promoting sustainable rangeland landscapes. The question of why South Australia harvests only 40 to 50 per cent of the available kangaroo quota in most years is a focus. This question is pertinent because demand in South Australia far exceeds local supply. Kangaroo meat processors import kangaroo carcasses from interstate to meet demand, suggesting there is potential for more kangaroos to be harvested within South Australia. Higher local harvest rates could lead to increased contributions from the kangaroo industry to the economic, social and environmental well-being of South Australian rural and remote communities.

People are involved in the kangaroo industry in many different ways. The people who participated in this research are producers (landholders and harvesters) and wholesalers (meat processors). These people, who are introduced below, hold significant knowledge of kangaroos and their management. The results in this section of the report are structured around issues these people identified.

### 4.1 Beneficiaries of the kangaroo industry

This research has focused on the benefits of the kangaroo industry for landholders and harvesters. However research participants consider that the kangaroo industry benefits a very diverse range of people. Their views on this are summarised in Table 4.

**Table 4: Beneficiaries of commercial harvest, as identified by research participants**

| <b>Beneficiary</b>   | <b>Benefit</b>   |
|--|--|
| Landholder   | Assistance in the management of total grazing pressure   |
| Kangaroo harvester   | An income from microenterprise   |
| Meat processor   | Profits from the processing and sale of kangaroo products  |
| Skin tanneries and leather exporters                           | Profits from the processing and sale of kangaroo skins and leather   |
| Meat distributors (human and pet), retailers and export agents | Profits from the distribution and sale of kangaroo products  |
| Road users   | Reduction in overall kangaroo numbers results in fewer road accidents involving kangaroos  |
| Small business operators in rural/remote Australia             | Kangaroo harvest brings harvesters and transport companies to regions of low population where they support local businesses  |
| Rural communities  | Kangaroo harvesters often live in rural and remote towns and, together with their families, they contribute to the available labour pool and social fabric of these communities  |
| Consumers of kangaroo products                                 | Kangaroo meat is lean and contains high levels of protein, iron and zinc. Kangaroo leather is renowned as a leather of exceptional quality, has high-tensile strength but is also light-weight.  |
| General public   | <ol style="list-style-type: none"> <li>1. Species conservation: Commercially harvested kangaroo species are closely managed to ensure sustainable harvests and conservation.</li> <li>2. Conservation of rangeland environments: reduction in total grazing pressure may contribute to regeneration of native plants and improve conditions for the survival of other species</li> </ol> |
| National economy   | The kangaroo industry contributes to the national economy through the local sale and export of kangaroo products   |

## **4.2 Landholders**

Landholders are arguably the most important people in the kangaroo industry because they are at the very base of the industry supply chain. The activities of landholders maintain the habitat that supports high kangaroo populations across much of the rangelands. However from other points of view it is harvesters rather than landholders who are the starting point for kangaroo products to flow to market (see for example Kelly 2005).

We found that landholders of large properties (with annual quota allocations of several thousand kangaroos) were more interested in being involved in the industry, and in getting a financial return from kangaroos, than landholders of small properties (with annual quota allocations of only a few hundred kangaroos). Of 21 landholders interviewed, 13 were interested in financial returns from kangaroos and 11 of these were landholders of large properties. There were six landholders who were not interested in financial return, four of them from small properties. Two landholders were not sure about whether they would be interested in financial return from kangaroos.

## **4.3 Harvesters**

Harvesters shoot kangaroos under permit from government and according to industry requirements. They generally work hard, often alone and in harsh conditions, to make a living. The work is physically demanding requiring long hours of toil through the night. A harvester's day begins in the afternoon, loading bullets, checking and maintaining the vehicle, and packing the vehicle for the night's work. Unless the harvester is staying at a bush camp they travel up to 200 kilometres to the property where they intend to harvest. They usually arrive at dusk and begin work straight away.

Harvesters kill kangaroos by a single shot to the head from a high-powered rifle. They hang the harvested kangaroos on the side of the vehicle and bleed them promptly. After shooting up to ten animals the harvester dresses the carcasses. Standard field dressing involves removal of the internal organs other than the heart, lungs, liver and kidneys. Hind legs are removed at the tarsal joints, front legs at the carpal joint, the head and often the tail are also removed.

At the end of the night's shooting the harvester transports the carcasses to a chiller. All carcasses must be in the chiller within an hour of sunrise. Then the harvester immediately cleans the vehicle and utensils, which may take up to an hour, before travelling back to their home or camp and settling in for a sleep.

A harvester's fully loaded vehicle will typically transport 52 carcasses. 52 carcasses weigh about a tonne. Each carcass is lifted four times: from the ground to side of vehicle for bleeding and dressing; from the side of the vehicle to the rack on the vehicle's trayback; from rack to weigh point; and then from weigh point to the chiller. This equates to lifting four tonnes in a night. Kangaroo harvesters have mighty handshakes!

## **4.4 Meat processors**

Meat processors have a role in the industry that goes beyond simply processing kangaroo meat. They are also active in product development, distribution and opening new markets. Some meat processors have been very active in developing the industry, working closely with government agencies to deliver high standards in hygienic production, product quality and humane harvest. Meat processors are usually also active in the promotion of kangaroo products, helping to grow consumer acceptance of kangaroo meat for human consumption.

## **4.5 Contribution to sustainable rangelands**

Research participants discussed how the kangaroo industry contributes to the viability and sustainability of rangeland communities and environments. Their perspectives are summarised below.

### **4.5.1 Human and social capital**

Some landholders and harvesters that we interviewed pointed out that skilled labour is a scarce resource in the rangelands. Harvesters often contribute to property operations by checking water supplies and fences.

I'll do their water runs, I'll start their pumps, I'll check their tanks. It saves them a bit of time. (Harvester)

When the shooters are here they check troughs and fences and help with the bores. Having extra people around is good. They're really helpful. (Landholder)

Harvesters are often also skilled in other trades, as electricians, welders, plumbers or station hands. They make significant contribution to the human capital available in rural and regional communities.

With the other property we had, the [harvester] there was very good at welding, and that can give you a hand if you need it. And this [harvester] here the other day gave us a hand on the motor bike to move some sheep when I had to go away to Adelaide before shearing. So, yeah, it works out pretty well. (Landholder)

Some harvesters raise their families in the rural area where they harvest and the presence of these families can help the community in many ways. For example, boosting pupil numbers at the local school may ensure a rural school remains open.

The industry does put extra people into the bush that wouldn't be there if there was no kangaroo industry. The most valuable resource on pastoral properties is manpower. And it can bring women and children out here too. (Harvester)

### **4.5.2 Economic impacts**

The kangaroo industry contributes to the economic capital of rural areas through the local purchase of fuel, food and other consumables by harvesters and transport companies. The revenue injected into rural communities by the kangaroo industry can have a significant impact on small business operators who rely on local trade to keep their business afloat (Gerlach 2003). Some small towns in western Queensland and western New South Wales attribute their continued social and economic viability to the commercial kangaroo industry (Wilkie 2003).

Our informal contact with small business operators during field work suggests that the kangaroo industry is similarly important to South Australian rural towns. Research participants also commented about this.

One of the most important benefits [for rural towns] is the economy. The economy consists of ammunition, fuel, groceries, tyres, you name it. So, the economy gets something out of the industry. Every business can get something out of it. (Meat processor)

Take the roo shooters out of Lyndhurst and that would have a big impact on the community. The kangaroo industry is significant for Lyndhurst and other rural towns in South Australia, like Port Augusta. (Landholder)

It's another person making money off a pastoral lease. Not only one pastoral lease, but a number of pastoral leases...That's a family making a living and what's wrong with that? (Landholder)

### **4.5.3 Ecological importance**

Research participants said that the kangaroo industry has environmental benefits, contributing to good land condition. This view is supported by ecological research (see page 5).

Research participants gave two examples that illustrate the ecological importance of the kangaroo industry to rangeland environments. Firstly, when localised rain results in new plant growth, or ‘green pick’, typically attracting kangaroos to the area, a kangaroo harvester is often able to respond to that situation promptly. The harvester greatly reduces the impact of the short-term localised overabundance of kangaroos.

After a thunderstorm, roos can be a big problem. If the shooter doesn’t come in straight away then they’ll just eat the area out and leave no feed for stock. (Landholder)

Secondly, commercial kangaroo harvest is a mechanism that acts to reduce boom and bust fluctuations in kangaroo populations (Hacker et al. 2004). Research participants said that in harvested populations there will be fewer kangaroos dying during dry years and in good seasons kangaroos will be less likely to become superabundant.

My personal attitude is that I would never like to see [kangaroos] disappear but I would like to see them in conservative numbers so the species is protected and is healthy. But the boom bust situation is not good. (Landholder)

#### 4.5.4 Landholder goals

We asked landholders why they choose to participate in the commercial kangaroo industry. Table 5 shows the primary and secondary reasons they identified. Management of total grazing pressure is the primary reason for nearly all of the landholders interviewed. Secondary reasons include conservation of water and provision of an income to a kangaroo harvester.

**Table 5: Landholders’ reasons for engaging in commercial kangaroo harvest**

| Primary reason                                       |    | Secondary reason  |   |
|--|----|---|---|
| Manage total grazing pressure                        | 18 | To provide a source of income to kangaroo harvesters                            | 4 |
| To provide a source of income to kangaroo harvesters | 1  | Social norms: neighbours engage in commercial harvest and expect others to also | 1 |
| Do not engage in commercial harvest                  | 2  | To manage/conservate water  | 5 |

Note: 21 landholders interviewed all nominated a primary reason. 10 landholders also nominated a secondary reason.

One reason that management of total grazing pressure is an important consideration for landholders who participated in this study is because they hold their properties as pastoral lease tenure under the *Pastoral Land Management and Conservation Act* 1989 [SA]. This Act and the pastoral lease require landholders to maintain the grazing resource in good condition. The landholder relies on the kangaroo harvester to manage the contribution of kangaroos to total grazing pressure.

However, landholders’ goals are different to those of harvesters. Although harvesters do respond quickly to high local populations of kangaroos and thereby assist to reduce kangaroo grazing pressure (see page 30), their overall goal is to maintain kangaroo populations on the properties where they harvest. This is because it is more cost-efficient for them to harvest on properties with higher kangaroo densities.

Our research suggests that some landholders are quite aware of the difference between their goals and those of harvesters. Landholders nevertheless choose to participate in the industry rather than use other strategies to manage kangaroo numbers. One alternative available to them is to cull kangaroos under ‘shoot and lie’ permits, without using the carcass. Another option would be for landholders themselves, or their employees, to harvest for the commercial market, subject to first meeting accreditation and permit requirements (see also page 58). The fact that landholders choose to engage independent harvesters indicates that the social and economic benefits that result, as outlined above, are important to them.

#### 4.5.5 Impact of no harvest

Landholders discussed what may happen if commercial harvest of kangaroos was discontinued for some reason. Table 6 shows that most landholders believe that kangaroo populations would increase to the point of having detrimental effects on land, vegetation and water resources and possibly on kangaroo populations also.

**Table 6: Landholder predictions of the impacts of no harvest**

| Predicted impact   | Number of landholders<br>(n=21) |
|--|---------------------------------|
| Population increase leading to excessive grazing pressure and land degradation       | 11                              |
| Population increase leading to resource depletion and major population crash         | 1                               |
| Population increase leading to lack of feed and water for stock                      | 3                               |
| Loss of an important rural industry  | 1                               |
| Unprofessional and inhumane shooting of kangaroos by landholders or amateur shooters | 4                               |
| Poisoning of large numbers of kangaroos at water points                              | 4                               |
| Pastoral business would not survive  | 3                               |
| Waste of a good product  | 4                               |
| Negative impact on other native species  | 2                               |
| Don't know   | 5                               |

Note: Some landholders identified more than one impact.

Landholders said:

Number one you'd lose an industry and number two you would be overrun with roos. The country would not be able to sustain it. (Landholder)

The numbers would increase rapidly and there would be a big impact in the cropping country. There would also be an impact on pastoral land through land degradation like soil drift and damage to water points. Other native species could also be badly affected, like the Yellow-footed Rock Wallaby. There would also be an increased danger for tourists and other motorists who would have a much higher chance of hitting a kangaroo on the road. (Landholder)

The roos will knock the country around and build up in numbers and then when it's dry they just end up starving and dying by the thousands. (Landholder)

Landholders and also rangeland experts (see for example, Hercock & Tonts 2004; Chapman 2003; Cunningham 1981) recognise that commercial harvest of kangaroos, conducted by professional, licensed specialist harvesters, is the most effective and humane means of managing kangaroo grazing impact. Some commentators have argued if there was no kangaroo industry, landholders would choose cheap but effective methods for reducing local kangaroo populations and that these would not necessarily be humane or sustainable (see for example, Gibson & Young 1987; Cunningham 1981). Our research supports this argument. The landholders we interviewed stated that if there were no regulated commercial harvest, they would use other methods to manage the grazing impact of kangaroos. Some mentioned specific methods such as poisoning and unprofessional shooting (see Table 6).

## 4.6 Institutions

Institutions encompass the range of ways that people establish and enforce expected behaviour patterns in different situations.

They are:

the prescriptions that humans use to organise all forms of repetitive and structured interactions including those within families, neighbourhoods, markets, firms, sports leagues, churches, private associations and governments at all levels (Ostrom 2005, p. 3).

Kangaroos are a common pool resource - that is a resource for which exclusion of unauthorised users is potentially difficult and where use subtracts from the resource base (Ostrom & Ostrom 1977).

Institutions for common pool resources have to tackle two fundamental problems (Dietz et al. 2002; Ostrom 2000; Schlager et al. 1999):

- the exclusion problem: restricting access to the resource to authorised users
- the subtractability problem: ensuring use of the resource is sustainable.

Management systems established by government for the commercial kangaroo industry are institutions that address these two problems. The kangaroo industry is closely regulated by governments (Parliament of Australia 1998). Many research participants said that regulations are important to the industry. In particular, many people said that meat hygiene and humane shooting regulations demonstrate the professionalism of the kangaroo industry and are critical to increasing consumer acceptance of kangaroo products. A small number of landholders and harvesters, those with the best developed understanding of the management system, also said that the process of monitoring kangaroo populations and setting quotas allows the industry to show that the harvest of kangaroos is regulated and sustainable.

In addition to these management systems established by governments - the 'formal rules' - the people who work in the industry have developed their own institutions to govern kangaroo harvest. Some of these conflict with the government management systems. To explain this situation and its impact we first explain the formal rules that govern the commercial harvest in South Australia. We then compare some of these formal rules with less formal institutions identified from our interviews with research participants.

### 4.6.1 Legislation and policy governing harvest

Kangaroo harvest is regulated by governments using a 'top-down' or 'command and control' approach. This approach involves decision-making from a centralised body that aims to control human behaviour through laws or incentives (Holling & Meffe 1996). Table 7 (page 26) gives an overview of the Australian and South Australian legislation and other instruments governing commercial harvest of kangaroos. The role of the Australian Government is to coordinate a national approach to the export of kangaroo products and as Table 7 shows, this is the focus of national legislation. The Australian Government sets standards that state governments must meet if their kangaroo products are to be exported internationally. State governments have primary legislative and regulatory responsibility for sound management of natural resources, including kangaroos. It is the responsibility of state governments to develop and implement kangaroo management plans. The management of kangaroos varies to some extent from state to state as discussed further below. However all state kangaroo management plans emphasise conservation values and sustainable harvest rates and all states enforce the *Code of practice for the humane shooting of kangaroos* which was endorsed by the council of relevant state and Commonwealth ministers in May 1985 (Pople & Grigg 1999).

The South Australian kangaroo management system operates using a top-down approach through which the government regulates resource use and monitors compliance in order to:

- ensure the sustainability of the harvest (for rules that are the responsibility of SA DEH)

- protect public health and safety in relation to product quality (for rules that are the responsibility of PIRSA).

Industry stakeholders have input to kangaroo management in South Australia through the Kangaroo Industry Reference Group (KIRG). Formed in 1998, KIRG provides a forum for stakeholder groups to participate in policy development, the direction of research effort and decision-making for the kangaroo industry. KIRG includes people from SA DEH, PIRSA, landholder groups, the Kangaroo Industries Association of Australia (KIAA), meat processors and representatives for kangaroo harvesters (SA DEH 2002a). Up until 2002 SA DEH also held an annual kangaroo management public meeting in Port Augusta.

Box 1 (page 25) outlines the permit requirements applicable to harvesters (or ‘kangaroo field processors’) in South Australia under the *National Parks and Wildlife Act (SA) 1972* and the *Kangaroo Harvesting Regulations 2003*. A key requirement of the formal rules is that harvesters must affix a ‘sealed tag’ to every kangaroo they harvest. Management authorities introduced this system as a way of distinguishing kangaroos that have been legally harvested and collecting royalty. These numbered tags come in different colours for different species of kangaroo. Every kangaroo shot on a property must carry a tag that has been allocated to that property and species. It must be shot and processed by the licensed<sup>1</sup> harvester and meat processor nominated in relation to use of that tag.

#### **Box 1: Permit requirements for harvesters**

The permit is granted under section 60J of the *National Parks and Wildlife Act 1972 [SA]*. Additional rules are established by the *National Parks and Wildlife (Kangaroo Harvesting) Regulations 2003* and PIRSA (2002):

- the permit applicant must hold a current firearms licence
- the permit applicant must have successfully completed approved firearms accuracy accreditation
- the permit applicant must have successfully completed a meat hygiene course
- a permit holder may only harvest kangaroos on properties where they have landholder’s permission
- a permit holder must harvest kangaroos in accordance with the *Code of Practice for the Humane Shooting of Kangaroos 1985* (Council of Nature Conservation Ministers) and the *Australian Standards for the Hygienic Production of Game Meat for Human Consumption (AS4464:1997)*
- the permit holder must affix a sealed tag to each carcass. The sealed tag must be the correct tag for the species of kangaroo and the property from which the animal was harvested
- the permit holder must provide returns to SA DEH in the prescribed format.

Source: *National Parks and Wildlife Act (SA) 1972*; *National Parks and Wildlife (Kangaroo Harvesting) Regulations 2003 [SA]*; PIRSA (2002); SA DEH (2002).

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<sup>1</sup> As a matter of style in this report, we refer to duly authorised harvesters and meat processors as ‘licensed’. However technically they are holders of ‘permits’ (rather than ‘licences’) under the *National Parks and Wildlife Act 1972 [SA]*.

**Table 7: Legislation and policy for commercial kangaroo harvest**

| Government department or authority   | Act, Regulations, Code of Practice or Guidelines  | Scope   |  |   |
|--|---|---|--|---|
|  |   | Environment   | Kangaroo harvest   | Kangaroo processing, sale and export  |
| South Australian Department for Environment and Heritage                                       | <i>National Parks and Wildlife Act</i> 1972 [SA]  | Kangaroos (and other native fauna) in South Australia are protected under this Act. | Controlled harvest of three common kangaroo species: red kangaroo ( <i>Macropus rufus</i> ), western grey kangaroo ( <i>M. fuliginosus</i> ) and euro ( <i>M. robustus</i> ) |   |
|  | The Macropod Conservation and Management Plan for South Australia   | Conservation and management of common kangaroos in South Australia                  | Approved wildlife trade management plan under the <i>Environment Protection and Biodiversity Conservation Act</i> 1999 [Cwth]  |   |
|  | <i>National Parks and Wildlife (Kangaroo Harvesting) Regulations</i> 2003 [SA]  |   | Defines sealed tag regulations and commercial harvest permit requirements  |   |
| Primary Industries and Resources, South Australia  | <i>Meat Hygiene Act</i> 1994 [SA] and <i>Meat Hygiene Regulations</i> 1994  |   |  | Hygienic processing of meat for human consumption including sale and marking of meat  |
|  | <i>Food Act</i> 2001 [SA] and Food Standards Code   |   |  | Food composition standards; food labelling; food hygiene  |
|  | South Australian Field Processor's Handbook 2002  |   | Guidelines to assist harvesters comply with industry standards   | Guidelines for field processing kangaroos for human consumption   |
| The Pastoral Board and the Dept of Water, Land and Biodiversity Conservation (South Australia) | <i>Pastoral Land Management and Conservation Act</i> 1989 [SA]  | Management, utilisation and conservation of pastoral land in SA                     |  |   |
|  | <i>Natural Resources Management Act</i> 2004 [SA]   | Provides for the care, control, management and conservation of natural resources    |  |   |
| Department of the Environment and Heritage (Commonwealth)                                      | <i>Environment Protection and Biodiversity Conservation Act</i> 1999 [Cwth]   | Environmental protection including wildlife and habitat conservation                | Declares state kangaroo management plans as approved wildlife trade management plans and approves state quota proposals  | The export of kangaroo products from Australia requires Commonwealth government approval  |
|  | Code of Practice for the Humane Shooting of Kangaroos 1990  |   | Sets animal welfare standards, that is, one shot to the head delivering instantaneous loss of consciousness and rapid death  |   |
| Australian Quarantine and Inspection Service (Commonwealth)                                    | <i>Export Control Act</i> 1982 [Cwth]   |   |  | Regulates export of Australian products.  |
|  | Australian Standard for the Hygienic Production and Transport of Meat and Meat Products for Human Consumption (AS 4696) |   |  | Standard for the hygienic production and transport of meat products for human consumption   |
|  | Australian Standard for the Hygienic Production of Game Meat for Human Consumption (AS 4464)                            |   |  | Standard for the production, processing, handling and transportation of game meats, including kangaroo, to ensure safe and wholesome products |

The SA DEH kangaroo management program prepares the kangaroo management plan, conducts kangaroo population surveys, sets harvest quotas and allocates quotas to landholders. As is the case in all states except Western Australia, this program is entirely self funding including for staff costs. Revenue sources are harvester and meat processor permit fees and sale of ‘sealed tags’. Table 8 shows that South Australian harvesters pay much higher permit fees than their interstate counterparts. The cost of sealed tags is also higher. The higher costs reflect the small size of the harvest in South Australia compared to other states (see page 2).

**Table 8: Permit and tag fees by state**

| State | Harvester permit (annual) | Sealed tags (each) | Self-funded program? |
|-------|---------------------------|--------------------|----------------------|
| NSW   | \$200.00                  | \$0.80             | Yes                  |
| Qld   | \$106.20                  | \$0.73             | Yes                  |
| SA    | \$769.00                  | \$1.20             | Yes                  |
| WA    | \$60.00                   | \$0.30             | No                   |

#### 4.6.2 Differences between South Australia and other states

We reviewed previous RIRDC research on the impact of government policies on the kangaroo industry (Macarthur 1997) and found that there is increasing consistency in approaches to kangaroo management amongst the states (see Appendix 2). In particular the Macarthur report recommended ‘uniform health standards that meet domestic and export market requirements’. All states have now legislated the application of Australian Standard 4464 (1997) on *Hygienic production of game meat for human consumption* which applies to both domestic and export products.

Nevertheless the South Australian kangaroo management system has some key differences to that in other states as highlighted in Box 2 (page 28).

The main differences between South Australia and other states are discussed below.

##### ***Quota allocation to properties***

Quota is allocated to properties in South Australia<sup>2</sup>, and to regions in other states. As explained above (page 6), property level quota allocation was introduced in South Australia in 1996 to promote value to landholders from kangaroos and their harvest.

##### ***Number of harvesters per property***

Landholders in South Australia engage only one harvester. In other states they may give permission to several harvesters<sup>3</sup>. South Australian regulations do not preclude landholders from nominating more than one harvester for their property but the format for the nomination does not make this option obvious. Landholders we interviewed engage a single harvester. We understand that this is almost always the case in South Australia. However regardless of how many harvesters are nominated the *Kangaroo Harvesting Regulations* require that the person who purchases sealed tags (either the landholder or the meat processor) must advise SA DEH which harvester will use each tag at least five days before the tag is used.

<sup>2</sup> In the past, 100% of quota was allocated to properties and this was followed rigidly. This has changed during the time we have been conducting this research. Currently between 50 to 70% of quota is allocated to properties and the remainder is issued on request to properties that use all of the initial quota allocation.

<sup>3</sup> We heard of some landholders in other states giving 15 or more harvesters permission to harvest on their property. In Queensland landholders are required to tell the regulatory authority the names of harvesters who have permission to harvest on their properties. It is not clear why this is required – it seems an unnecessary level of regulation. We do not know whether NSW and WA have a similar requirement.

## Box 2: Comparing South Australia with other states' kangaroo management systems

|        | South Australia   | Other states   |
|--------|---|--|
| Step 1 | SA DEH conducts an aerial survey to determine kangaroo abundance across harvest zones and submits a population estimate and harvest quota for harvest zones to the Australian Government Department of the Environment and Heritage for approval.   | The state government regulatory body conducts an aerial survey to determine kangaroo abundance across the harvest zones and submits a population estimate and harvest quota for harvest zones to the Australian Government Department of the Environment and Heritage for approval.  |
| Step 2 | <b>Quota is set for regions and allocated to landholders</b> within each region by SA DEH according to the size of the property and an assessment of its habitat value for various species of kangaroo. The landholder can accept all, part, or none of this quota allocation. If the landholder accepts quota, they then <b>nominate a meat processor</b> and advise SA DEH. They may also <b>nominate a harvester</b> . Otherwise the nominated meat processor nominates a harvester. | <b>Quota is allocated to regions</b> by the state government regulatory body. In WA the region used is the commercial harvest zone as a whole.   |
| Step 3 | The landholder or nominated meat processor may purchase tags from SA DEH. In practice <b>meat processors purchase tags</b> . The tags are property and species specific.  | <b>Harvesters purchase tags</b> for the region where they intend to conduct harvest activities. In NSW tags are specific to a region and to a particular property. In Qld tags are not specific to a region, species or property. In WA tags are species specific only.  |
| Step 4 | The meat processor gives the tags to the harvester nominated for that property. When the harvester receives the tags they may begin to harvest kangaroos from the property. Usually <b>one harvester</b> conducts harvest on <b>each property</b> .   | Harvesters harvest kangaroos on properties where they have permission from the landholder. <b>Several harvesters</b> may have permission to harvest on <b>a property</b> .   |
| Step 5 | The harvester harvests kangaroos by night and transports <b>carcasses to a chiller by sunrise</b> . The chiller is usually owned by the meat processor and may be located in a town or on a property. Chillers are usually emptied once a week by a truck driver employed by the meat processor.  | The harvester harvests kangaroos by night and transports <b>carcasses to a chiller depot located in a town at daybreak</b> . A number of meat processors have chillers at this location. Each chiller is owned by a meat processor and staffed by a chiller operator who tells harvesters the price per kilogram being paid by that meat processor. The <b>harvester chooses which meat processor to sell to</b> . |
| Step 6 | Carcasses are transported to the meat processing works.   | Carcasses are transported to the meat processing works.  |

### **Harvester choice of meat processor**

In South Australia nomination of a meat processor by landholders is linked to their nomination of a harvester. The landholder follows the harvester's directions about which meat processor to nominate or a meat processor's directions about which harvester to nominate. Harvesters are obliged to supply to the nominated meat processor. In other states harvesters have much more flexibility to choose who to sell to.

The existence of chiller depots in other states, where three or four different meat processors may have chillers, means that there is competition for the purchase of carcasses. Hence harvesters can get the best possible price on the day. In South Australia meat processors purchase tags and supply them to

the harvester. This acts to lock harvesters into an arrangement with a particular nominated meat processor. If the harvester wants to change meat processors, relevant landholders must also agree to the change. Notification must be forwarded to SA DEH to enact the change. The time and other costs involved discourage South Australian harvesters from changing meat processors and act to limit competition. This is almost certainly significant in explaining why the price typically paid by meat processors to harvesters in South Australia (80c per kg) is lower than that typically paid interstate (\$1.00 per kg) (see page 49).

### 4.6.3 Rules, norms and shared strategies

While some institutions are established by legislation, others are crafted by groups of people with collective interests. The ‘rules-in-use’, or informal rules, that people develop are not always consistent with the formal rules from legislation. The South Australian kangaroo industry provides some examples.

It is useful to use a common format when comparing rules-in-use with formal rules established by legislation. When both kinds of rules are put in the same format it is easier to see when they support each other and when they are in conflict.

In Table 9 (page 30) we use the ‘grammar’ of rules developed by Crawford and Ostrom (2005) to compare some of the formal and informal institutions associated with kangaroo harvest in South Australia. This categorises rules based on five components:

- **Attributes** who the rule applies to
- **Deontic** obliges (‘must’) or forbids (‘must not’) or establishes permission (‘may’)
- **AI**m describes the action or outcome that the rule is directed at
- **Conditions** defines when and where an action is permissible, obligatory or forbidden
- **Or Else** sets out the consequence for not complying.

Crawford and Ostrom (2005) use this ‘ADICO’ syntax to classify generic rules into three categories:

- ‘Rules’ are prescriptive statements that contain all of the above elements
- ‘Norms’ contain only four of the ADICO elements (ADIC). They lack the ‘or else’ component. That is, there is no clear sanction for not complying
- ‘Shared strategies’ contain only three elements of the syntax (AIC). They are not prescriptive.

Both formal and informal institutions can have the force of ‘rules’, with powerful sanctions for non-compliance. We discuss some of the informal rules that operate in the South Australian kangaroo industry below, comparing them with the rules from legislation.

**Table 9: Formal and informal institutions affecting harvesters**

| <b>Institution</b>                          | <b><u>A</u>tribute</b> | <b><u>D</u>eontic</b> | <b><u>A</u>im</b>             | <b><u>C</u>onditions</b>                                      | <b><u>O</u>r else</b>   |
|---|------------------------|-----------------------|-------------------------------|---|---|
| Rule (formal, from legislation)             | Harvesters             | must                  | attach appropriate sealed tag | every carcass   | or else face financial penalty and risk loss of permit                            |
| Rule (informal: crafted by harvesters)      | Harvesters             | must                  | harvest kangaroos             | where and when abundance is greatest                          | or else jeopardise good relationships with landholders, access to land and quota. |
| Rule (informal: crafted by meat processors) | Harvesters             | must not              | harvest kangaroos             | that weigh <14 kg dressed weight                              | or else meat processors will not purchase the carcass                             |
| Norm  | Harvesters             | must not              | discharge firearms            | close to the homes of landholders                             | -   |
| Shared strategy                             | Harvesters             | -                     | do not harvest                | female kangaroos with detectable pouch young or young at foot | -   |

Note: format follows Crawford & Ostrom (2005).

#### 4.6.4 Managing a mobile resource

Kangaroo harvesters direct their harvest effort to properties where kangaroo populations are highest. We characterise this as a ‘rule’ (see Table 9) because it carries sanctions. If harvesters do not direct harvest effort to properties where populations are high, they risk jeopardising good relationships with landholders and their own livelihoods since these depend on landholders granting them access to land and quota.

The rule of harvesting where populations are highest has developed in response to kangaroo mobility.

As soon as the first bit of rain is about they are the first animal onto the green shoot. Because they are native to the country, and they know that they have to move around and be quick.  
(Landholder)

McKean (2000) has stressed the importance of flexibility in common pool resource management regimes and this is particularly the case in relation to mobile resources (Schlager et al. 1999). Although red and grey kangaroos generally have a relatively stable home range of not more than 20 km<sup>2</sup>, they do move across the landscape according to environmental conditions. During drought they have been found to travel over 300 km (see McCullough & McCollough 2000). Because kangaroos can be very mobile the management system needs flexibility to deal with localised population variations. When we asked research participants to comment on the formal rules for kangaroo management (see Table 10), about half said that the South Australian quota allocation system lacks the flexibility to manage mobile and dynamic kangaroo populations.

**Table 10: Research participant views on the formal rules for kangaroo management**

| Issue   | Harvester<br>(n=14) | Landholder<br>(n=21) | Meat<br>processor<br>(n=4) |
|---|---------------------|----------------------|----------------------------|
| Property level quota allocation does not deliver the flexibility required   | 6                   | 12                   | 2                          |
| Shoot and lie permits should not be issued  | 5                   | 3                    | 0                          |
| The industry should not need to be fully self-funding   | 5                   | 2                    | 0                          |
| Accreditation and shooting standards should be the same for anyone who harvests or culls kangaroos (eg harvesters, SA DEH staff or landholders) | 4                   | 0                    | 0                          |

Note: Some research participants identified more than one issue regarding formal rules. Only the main issues identified are presented here.

The only formal mechanism in the South Australian kangaroo management system to address kangaroo mobility is for a landholder to apply for additional quota allocations when kangaroo populations become particularly high on their properties, such as in response to recent rain (SA DEH 2002a). Additional quota allocations will only be granted where the previous allocation for that species has been fully (or nearly fully) harvested and there is quota for that harvest zone still available. SA DEH staff process the landholder's application and send the required tags to the meat processor authorised to process the kangaroos from that property. The meat processor then passes the tags on to the harvester. Landholders and harvesters report that this process often takes a number of weeks. They maintain that there is a genuine need to respond much more quickly to localised population fluctuations.

Harvesters engage in 'tag swapping' when they need to respond to localised high populations on a particular property and do not have tags for that property. This means that harvesters tag the kangaroos they shoot with tags that have been officially allocated to another property.

You will find that the roos will be shot where the roos are. Common sense tells you that that is what's going to happen and if I was a roo shooter then I would do that too. (Landholder)

Tag swapping is possible because harvesters typically have agreements from a number of landholders to harvest on their properties. When they have used all the tags allocated to the particular property where they are shooting, they use tags they hold for other properties. They do this to maximise harvest efficiency and their own economic returns and to respond to landholders' expectations to quickly reduce high kangaroo populations.

You tend to take the tags where they're needed, simply because [SA DEH] tag allocations are only general allocations. It's only a formula but it's not correct, it's just a formula. (Harvester)

Harvesters tend to see the allocation of tags as 'general allocations', as indicated in the quote above. However the rule governing use of appropriate tags is actually a requirement of the regulations and carries a penalty for non-compliance (a fine of up to \$1,000). In tag swapping between properties harvesters take the reasonable risk that their non-compliance will go undetected. In contrast tag swapping does not occur between species. Because the tags for each species are a different colour there is a high risk that tag swapping between species will be detected. The most immediate risk is that animals that carry the wrong colour tag for their species will be rejected by meat processors since they are also liable to penalty for handling incorrectly tagged carcasses.

For kangaroo harvesters, tag swapping between properties is not only important to efficiency of harvest, it also ensures that good relationships with landholders are maintained.

When one station got rain and no one else did, there's a problem if you don't have tags for that station. By the time you approach Parks [SA DEH] and go through their process to access more tags all the feed's gone. Kangaroos are gone. So the shooter takes it on himself, at his own risk, to rectify the problem. Then you end up breaking the law to assist the property holder and to operate your business professionally. (Harvester)

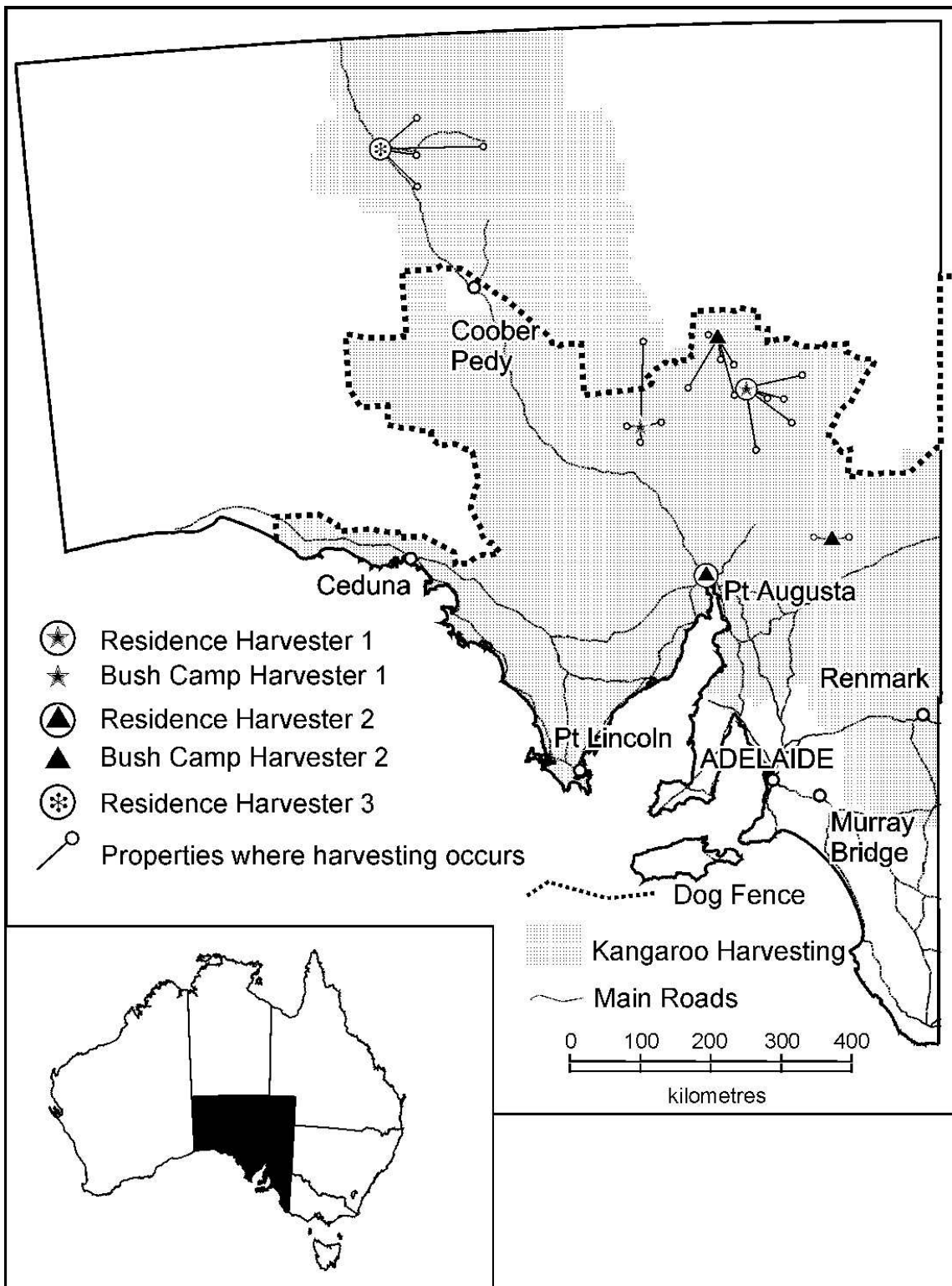
In South Australia harvesters can only comply with their informal rule of harvesting where populations are highest by tag swapping between properties. Compliance with this rule has a much greater pay-off for the harvester than compliance with the formal rule of property specific tag allocations since the risk of penalty from government regulators for non-compliance with this formal rule is slight.

Tag swapping is the most common way that harvesters introduce the flexibility required to manage a mobile resource into the South Australian kangaroo management system. Although it is very effective, this method of responding to kangaroo overabundance is illegal.

The practice of tag swapping means that SA DEH records about the spatial distribution of harvest, which are based on information provided by harvesters, have considerable errors and uncertainties. This is because harvester returns to SA DEH show that a kangaroo was shot on the property to which the tag attached to that kangaroo was allocated. In fact the kangaroo may have been shot on a different property. This may be quite some distance away because the various properties where an individual harvester works are sometimes widely separated.

Tag swapping means that harvest data collected by SA DEH is not completely accurate for many kangaroo harvest zones although it is accurate at the whole of state level. The inaccuracies for harvest zone data arise because many harvesters harvest on properties in more than one harvest zone and may swap tags between these properties. Map 2 (page 33) indicates this spatial dimension to harvest effort by showing the location of properties where three of the harvesters we interviewed work. One of these individuals harvests on properties near two bush camps 400 km distance from each other. Another harvests on some properties close to home and on some near a bush camp 200 km away from home. In both cases the properties where these individuals harvest are in different kangaroo harvest zones. Harvester 3 harvests on several properties close to their home base in the Marla/Oodnadatta study region and all of these properties are in the same kangaroo harvest zone. Other data from harvesters shows that all the harvesters who live and work in the Marla-Oodnadatta study region harvest only within one kangaroo management zone. However harvesters who live in Port Augusta and other regional areas often harvest in more than one kangaroo harvest zone. Tag swapping introduces inaccuracies into data on the level of harvest in these zones.

**Map 2: Harvest locations of a sample of harvesters**



#### **4.6.5 Addressing ‘first capture’ strategies**

When resource units are mobile and cannot be stored, resource users may use ‘first capture’ strategies. This means that resource users harvest the resource immediately, even if the resource units are small, immature, or in low quantity. They reason that if they don’t harvest the resource themselves while they have the chance, someone else will (Schlager et al. 1999). In the kangaroo industry examples of first capture strategies could include the harvest of adolescent animals or female animals with young in pouch or dependent young at foot.

There are no formal rules in the South Australian kangaroo management system that specifically protect against first capture strategies. However harvesters and meat processors have devised their own rules which address the risk of ‘first capture’ strategies being used in kangaroo harvest.

Firstly meat processors have crafted a rule that dressed carcasses must weigh at least 14 kg. Meat processors say that they specify this because it is not cost effective to process small kangaroos. Their rule also acts to ensure that small (young) animals are not harvested and contributes in part to addressing the common pool resource problem of ‘first capture’ strategies.

Secondly harvesters pursue a shared strategy of not harvesting female kangaroos with visible young in the pouch or at foot. We have observed how accurately kangaroo harvesters can determine whether a doe (female kangaroo) has a joey (young) in the pouch of significant size – that is a joey with fur, or developing fur, and weight of 1 kg or more. When looking at a kangaroo through the scope of the firearm they make a series of judgements about the animal. They assess the species, sex, age, dressed weight and health of the animal in a matter of microseconds. From this assessment they decide whether or not to shoot the animal.

The typical reasons that harvesters discussed with us for not shooting an animal are its young age, the presence of offspring and potential breeding capabilities. Harvesters describe this strategy as ‘looking after my stock of the future’.

In my opinion I am farming them. I won’t take next years stock when I can leave it and let it grow up. The farmers don’t see it but I do. But I just turn around and say to them, ‘Well, would you sell all of your lambs in one year?’ (Harvester).

But why would a harvester conserve ‘stock of the future’ when that stock is quite likely to move off the property where the harvester works? The reason is that each kangaroo harvester reasonably expects that other harvesters are acting in a similar manner. Their shared strategy works to benefit each of them.

#### **4.6.6 Monitoring compliance with formal rules**

The PIRSA Meat Hygiene Unit carries out annual hygiene and safety checks on all kangaroo harvesters, inspecting vehicles and utensils. This unannounced on-the-spot check may be conducted in the field or at a bush camp. Harvesters state that this system is beneficial to the kangaroo industry by ensuring hygiene standards remain high.

In contrast, research participants stated that in their experience SA DEH does not regularly police the operations of kangaroo harvesters in relation to its responsibilities for ensuring use of appropriate tags and accurate record keeping. Most harvesters said that it has been over ten years since they had an on-the-spot check by SA DEH.

Some harvesters who operate in Flinders Ranges and Port Augusta regions of this study said that more policing by SA DEH is required. They reported ‘poaching’ as a prominent issue for them - that is harvest of kangaroos on a property where the harvester does not have the permission of the landholder. However poaching was not an issue for kangaroo harvesters in the Marla-Oodnadatta region of this

study. One important reason why poaching is more prevalent in the two southern regions is their proximity to Port Augusta where most harvesters live (see page 43).

## 4.7 Understanding low harvest rates

From 1997 to 2004 South Australian harvesters harvested 43.1% of the quota on average across all species. During these years other states harvested at a higher rate, averaging between 54% and 67% of harvest quotas for all species. Harvest of a greater percentage of the quota in South Australia could lead to:

- greater contributions to the management of total grazing pressure on pastoral properties
- an increase in the economic contribution of the kangaroo industry to rural communities
- more people living and working in rural communities.

Hence it is important to understand the reasons for low harvest rates in South Australia.

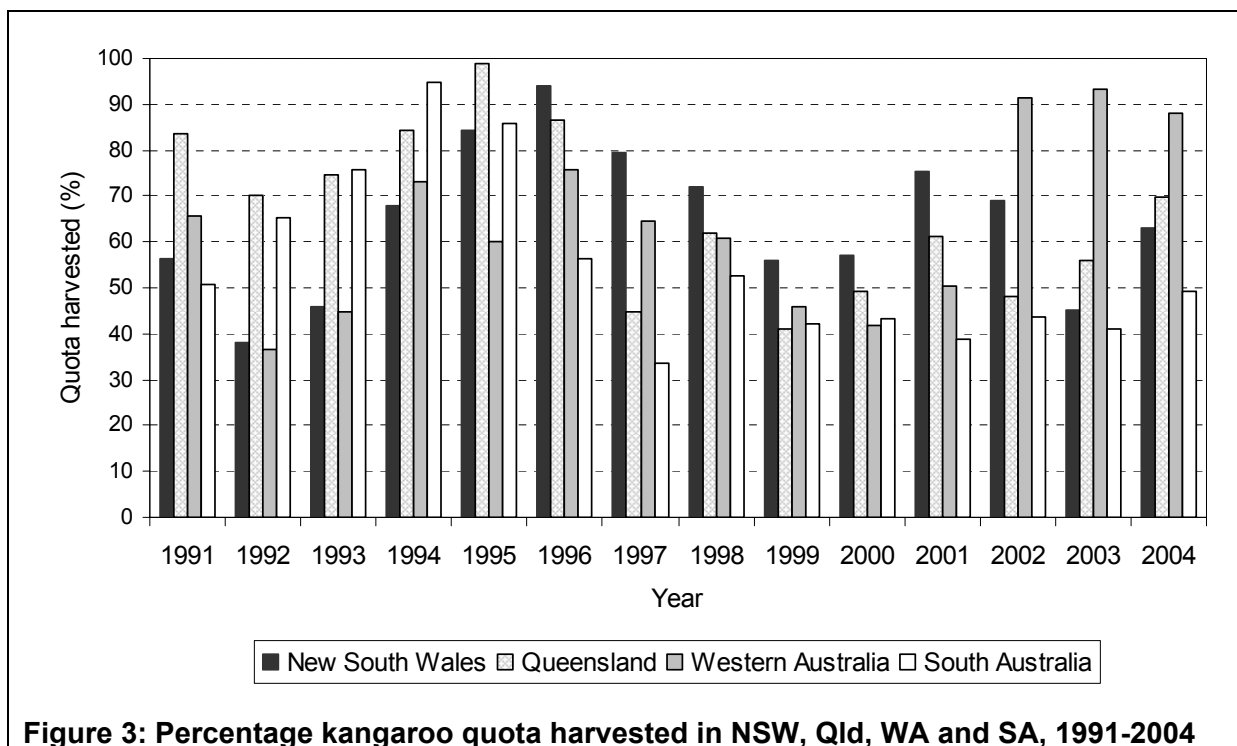
The problem of the quota not being taken is an issue, which can indicate that an inappropriate level of grazing is still occurring and whilst that is more an economic problem it is still an issue for land management. (Landholder)

### 4.7.1 South Australian harvest rate

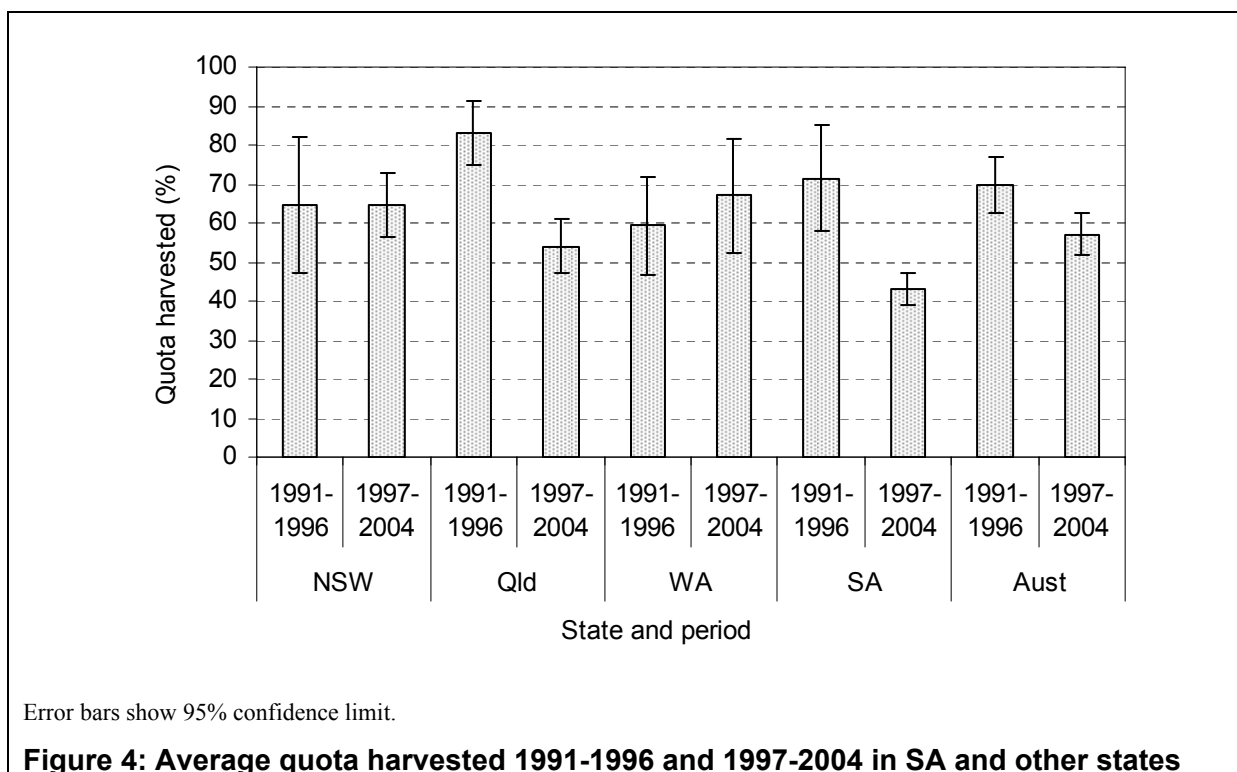
South Australian harvest rates (% quota harvested for all species) are compared with those of New South Wales, Queensland, and Western Australia in Figure 3. The South Australian harvest rate was the lowest of all states in every year since 1996. Before 1996 South Australia's harvest rate was typically amongst the highest of all states.

Average harvest rates for each state and Australia as a whole are compared for two periods, 1991-1996 and 1997-2004 in Error bars show 95% confidence limit.

Figure 4. The South Australian harvest rate is significantly lower in the more recent period ( $p < 0.05$ ). This drop in harvest rates coincides with the introduction of property level quota in South Australia in 1996 (see page 5). We note that Queensland harvest rate also dropped considerably between the two periods.



**Figure 3: Percentage kangaroo quota harvested in NSW, Qld, WA and SA, 1991-2004**



Error bars show 95% confidence limit.

**Figure 4: Average quota harvested 1991-1996 and 1997-2004 in SA and other states**

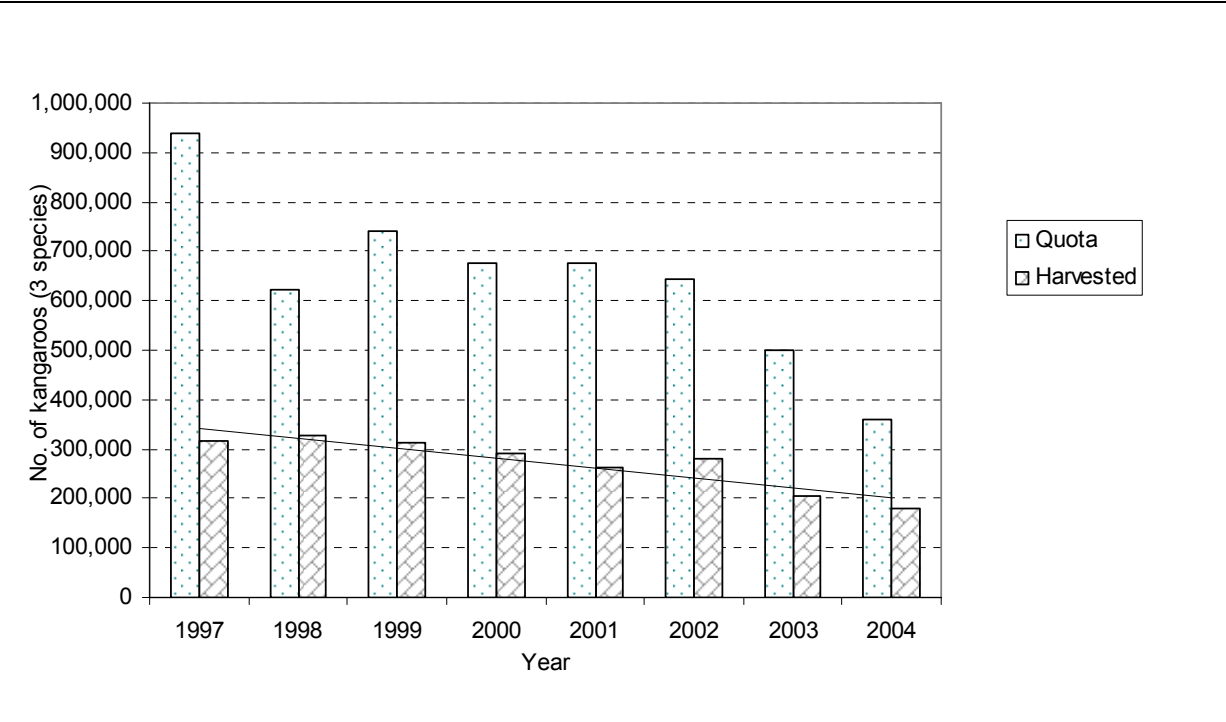
Table 11 and Figure 5 to Figure 8 show the South Australian quota and harvest for each harvested species for each year from 1997 to 2004. Trendlines on Figure 5 to Figure 8 show the harvest is decreasing each year. However quota has also tended to decrease during this period. Coefficient of determination ( $R^2$ ) analysis of harvest against quota indicates that variation in quota accounts for 67% of the variation in harvest (49% in reds, 84% in western greys and 63% in euros). The residual variation in harvest may be considered to be indicative of a declining rate of harvest.

One factor that is relevant to explaining this declining harvest is that lower quota levels are an indication that kangaroo populations are lower. Harvesters have emphasised that they harvest most efficiently when populations are high, so harvest may be less efficient when quota (and populations) are relatively low. Harvest effort is a further factor that needs to be considered. When quotas (and populations) are relatively low, harvesters may switch to other ways of earning a living. Other factors that impact on harvest effort are demand and the number of harvesters. These issues and a range of related issues raised by research participants are examined below.

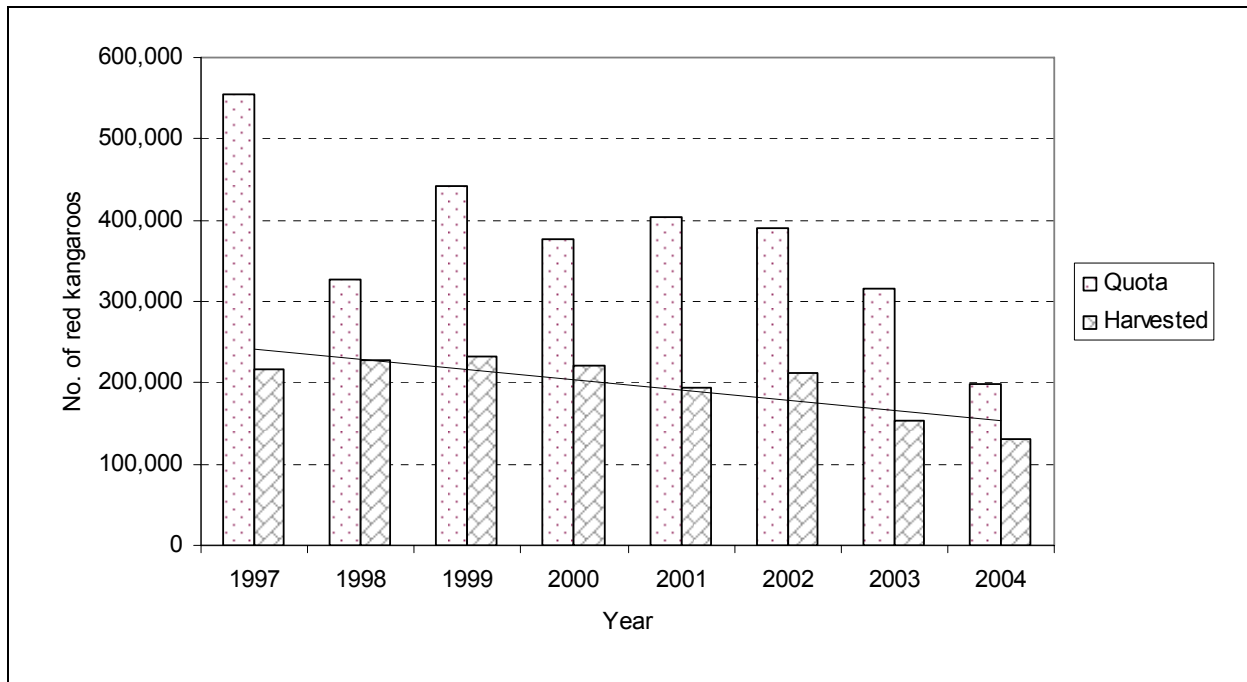
**Table 11: Quota and harvest for kangaroo species harvested in South Australia**

| Year | Annual Quota |              |         |                | Annual Harvest |              |        |                | % quota harvested |
|------|--------------|--------------|---------|----------------|----------------|--------------|--------|----------------|-------------------|
|      | Red kangaroo | Western grey | Euro    | Total          | Red kangaroo   | Western grey | Euro   | Total          |                   |
| 1997 | 555,000      | 280,000      | 130,000 | <b>938,000</b> | 216,079        | 75,794       | 24,067 | <b>315,940</b> | 33.7              |
| 1998 | 327,000      | 206,000      | 88,000  | <b>621,000</b> | 227,904        | 73,704       | 24,981 | <b>326,589</b> | 52.6              |
| 1999 | 441,500      | 212,000      | 88,000  | <b>741,500</b> | 231,327        | 63,672       | 18,988 | <b>313,987</b> | 42.3              |
| 2000 | 375,760      | 213,180      | 87,000  | <b>675,940</b> | 220,452        | 55,134       | 15,891 | <b>291,477</b> | 43.1              |
| 2001 | 403,260      | 187,660      | 87,000  | <b>677,920</b> | 193,400        | 55,589       | 15,279 | <b>264,268</b> | 39.0              |
| 2002 | 390,500      | 165,220      | 88,220  | <b>643,940</b> | 211,316        | 49,785       | 19,305 | <b>280,406</b> | 43.5              |
| 2003 | 315,200      | 124,700      | 60,800  | <b>500,700</b> | 153,615        | 41,867       | 10,241 | <b>205,723</b> | 41.0              |
| 2004 | 198,800      | 102,200      | 60,300  | <b>361,300</b> | 129,951        | 36,144       | 12,031 | <b>178,126</b> | 49.3              |
| Av.  | 375,878      | 186,370      | 86,165  | <b>645,038</b> | 198,006        | 56,461       | 17,598 | <b>272,065</b> | <b>43.1</b>       |
| SDev | 91,154       | 49,288       | 18,991  | 148,730        | 32,719         | 12,454       | 4,650  | 47,595         | 5.8               |

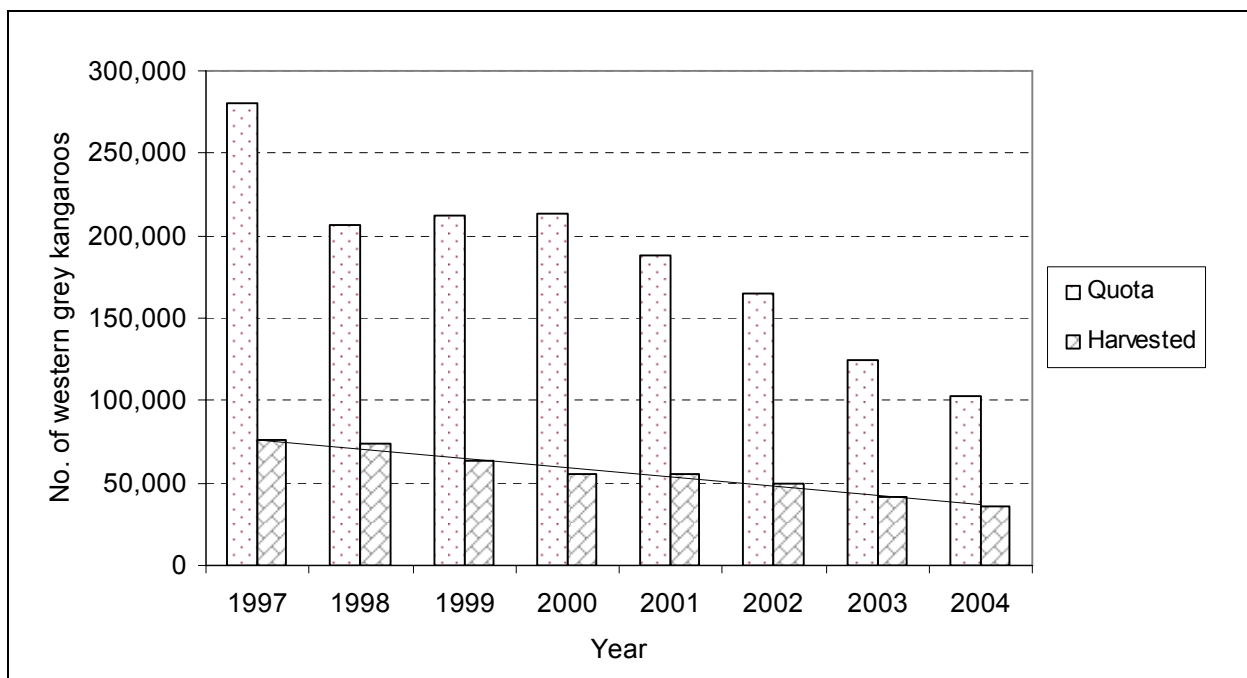
Source: <http://www.deh.gov.au/biodiversity/trade-use/wild-harvest/kangaroo/stats.html>



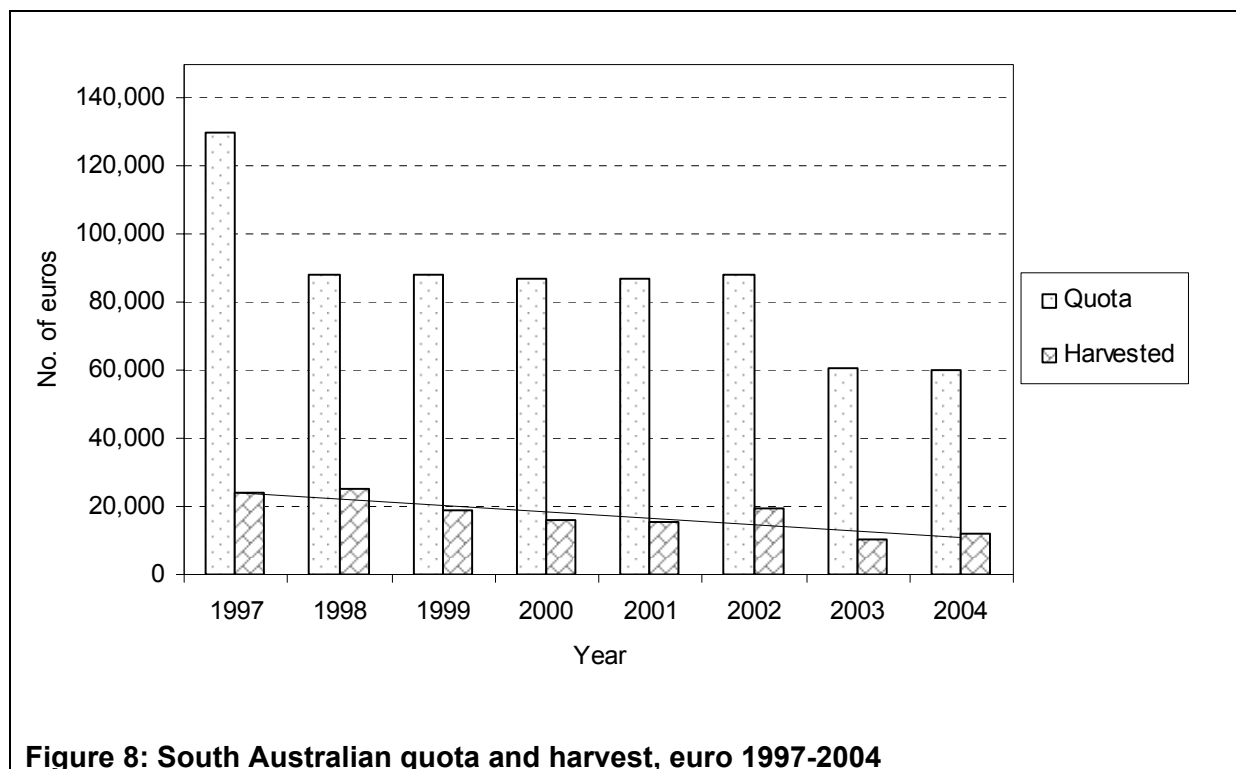
**Figure 5: South Australian quota and harvest, all species 1997-2004**



**Figure 6: South Australian quota and harvest, red kangaroo 1997-2004**



**Figure 7: South Australian quota and harvest, western grey kangaroo 1997-2004**



**Figure 8: South Australian quota and harvest, euro 1997-2004**

#### 4.7.2 Demand

Low kangaroo harvest rates are not explained by low demand. We conclude that kangaroo carcasses are actually in high demand by South Australian meat processors because they routinely import kangaroo carcasses from interstate. Table 12 shows that on average over the four year period from 2002 to 2005 more than 200,000 carcasses were imported annually to South Australia from New South Wales and Queensland by South Australian meat processors. From 2002 to 2004 the South Australian harvest fell short of the available quota by an average of 280,000 kangaroos each year (based on Table 11). Because demand from South Australian meat processors is being met by imports, meat processors do not need to promote higher harvest in South Australia, such as they might do by increasing the price they pay to South Australian harvesters (see page 48).

**Table 12: Kangaroo carcasses imported to South Australia from NSW and Qld, 2002-2005**

| Year    | Number of carcasses imported from NSW | Number of carcasses imported from Qld | Total   |
|---------|---------------------------------------|---------------------------------------|---------|
| 2002    | 235,478                               | 17,651                                | 253,129 |
| 2003    | 131,751                               | 16,488                                | 148,239 |
| 2004    | 165,052                               | 24,587                                | 189,639 |
| 2005    | 201,656                               | 53,394                                | 255,050 |
| Average | 183,484                               | 28,030                                | 211,514 |

Source: SA DEH

In this situation imports limit the benefits from the kangaroo industry for South Australian rural communities. 200,000 imported carcasses represent \$3.2m per annum in unrealised income for harvesters in South Australia, based on the typical 2006 price of 80c per kg paid to South Australian harvesters and a 20 kg average carcass weight, or \$4m based on the higher price of \$1 per kg paid typically paid to harvesters interstate. There is also unrealised revenue to SA DEH of \$240,000

annually from sale of sealed tags which could be adding to resources to fund the kangaroo management program.

### **4.7.3 Factors affecting a harvester's rate of harvest**

Kangaroo harvesters say that the main factors that influence the rate at which they can harvest kangaroos are weather, terrain, distance to chiller and their own skills and knowledge.

Harvesters usually do not go out shooting in poor weather conditions. They say that wind makes the kangaroos 'skittish' and may compromise shooting accuracy, while rain can make many places totally inaccessible.

Terrain influences the harvester's capacity to access areas of a property, visibility for shooting and retrieval of carcasses. Before going into rough terrain the kangaroo harvester must also consider whether the vehicle will make it out again once loaded. Topography, like distance to chiller, also impacts on travel time.

Distance and travel time from the harvester's home or bush camp to the harvest location and to the chiller post-harvest determines the number of hours that the harvester can spend harvesting kangaroos as well as impacting on the cost of harvesting (see also Hacker et al. 2004).

Experienced harvesters have considerable knowledge about the habits and movements of kangaroos. They know the country where they harvest extremely well and know where to find kangaroos under particular conditions. As a result their harvesting is more efficient than that of less experienced harvesters.

### **4.7.4 Research participants' explanations of harvest rate**

The factors outlined above influence individual harvesters' rate of harvest. To help understand explanations that impact at a broader scale we asked research participants why South Australia only harvests less than half the quota annually. Table 13 shows the explanations given by research participants and groups them into kangaroo harvester issues, geographic, economic and meat processor issues. Table 14 provides a summary of the most commonly identified explanations, ranked for each group of research participants.

Overall, the ranking process highlights two main issues:

- few kangaroo harvesters hold exclusive rights to too many properties
- isolation, few towns and lack of infrastructure.

As Table 14 shows, there are different views held by the different participant groups. Harvesters and meat processors see the former issue as most important. Landholders see the latter as more important. The most prominent issues raised by research participants, as summarised in Table 14, are reviewed below.

**Table 13: Research participants' explanations of low harvest rates**

| Factors identified as constraining number of kangaroos harvested in South Australia | Participants identifying this factor |                    |                       | Total     | % of total number of issues identified (n=64) |
|---|--------------------------------------|--------------------|-----------------------|-----------|---|
|   | Kangaroo harvesters (n=14)           | Landholders (n=21) | Meat Processors (n=4) |           |   |
| Kangaroo harvester issues   |                                      |                    |                       |           |   |
| • Few harvesters hold exclusive harvest rights to too many properties               | 8                                    | 2                  | 3                     | 12        | 34%   |
| • One harvester per property  | 0                                    | 3                  | 0                     | 3         |   |
| • Low number of harvesters  | 1                                    | 4                  | 1                     | 6         |   |
| <b>No. participants identifying factor</b>  | <b>9</b>                             | <b>9</b>           | <b>4</b>              | <b>22</b> |   |
| Geography   |                                      |                    |                       |           |   |
| • Isolation – few towns   | 1                                    | 6                  | 2                     | 9         | 28%   |
| • Rough terrain hinders access  | 1                                    | 5                  | 0                     | 6         |   |
| • Large properties  | 0                                    | 2                  | 1                     | 3         |   |
| <b>No. participants identifying factor</b>  | <b>2</b>                             | <b>13</b>          | <b>3</b>              | <b>18</b> |   |
| Economics   |                                      |                    |                       |           |   |
| • Low prices paid to harvesters   | 3                                    | 2                  | 0                     | 5         | 19%   |
| • High cost to access remote and rough country                                      | 3                                    | 2                  | 0                     | 5         |   |
| • High cost of harvest operations in general  | 1                                    | 1                  | 0                     | 2         |   |
| <b>No. participants identifying factor</b>  | <b>7</b>                             | <b>5</b>           | <b>0</b>              | <b>12</b> |   |
| Meat processor issues   |                                      |                    |                       |           |   |
| • Meat processors only want to process larger kangaroos                             | 4                                    | 4                  | 0                     | 8         | 19%   |
| • Meat processors have too much control/power                                       | 3                                    | 1                  | 0                     | 3         |   |
| <b>No. participants identifying factor</b>  | <b>7</b>                             | <b>5</b>           | <b>0</b>              | <b>12</b> |   |

**Table 14: Research participants' main explanations for low harvest rates**

| Research participant group | Main issue   | Secondary issues   |
|----------------------------|--|--|
| Harvesters                 | Access to quota: few harvesters hold exclusive harvest rights to too many properties | Meat processors only want to process large kangaroos<br>Low prices paid to harvesters<br>High cost to access remote and rough country  |
| Landholders                | Isolation – few towns and lack of infrastructure                                     | Meat processors only want to process large kangaroos<br>Rough terrain hinders access to kangaroos<br>Low number of kangaroo harvesters |
| Meat processors            | Access to quota: few harvesters hold exclusive harvest rights to too many properties | Isolation – few towns and lack of infrastructure<br>Low number of kangaroo harvesters<br>Large properties                              |

#### 4.7.5 Access to quota

Many harvesters and meat processors we interviewed said that individual harvesters hold exclusive harvest rights to more properties and quota than they can possibly harvest in one year. They said that this has a significant impact on the number of kangaroos harvested in South Australia.

You've got good shooters out there that hold a lot of country but they don't shoot their quota out either. (Harvester)

Some shooters can have 25 to 35 thousand tags tied up. They can't shoot that many roos in a year. (Harvester)

There are no restrictions on the number of properties for which one harvester can hold exclusive harvest rights and quota. The more properties that a harvester holds the more flexibility the harvester has to decide where to harvest, taking weather conditions and localised fluctuations in kangaroo populations into account. There is currently no financial cost to harvesters for holding more quota than they are able to harvest although there are costs in maintaining social capital.

I'm one of those that hold a lot of country... I hold more country than what I should. I've got too much but it's not enough. And if you're in there for the long haul like we are, well you need more country, in fact you crave more country than what you need. If I get swamped under with kangaroos I might have to drop some stations, I might, might not too. I might just hold them to my chest and go, 'Well, let them breed'. (Harvester)

Individuals are taking more properties and they are not able to cover their areas, but then I think that you have to have that many properties to make a living out of it. (Landholder)

Some harvesters state that they could harvest many more kangaroos each year. However it is hard for them to gain access to additional properties because the quota for such properties is already held by other harvesters. This is even true for the Marla-Oodnadatta case study region although there were only four harvesters operating there during our fieldwork period. These harvesters between them had secured access to all the properties in that study region to which SA DEH had offered quota <sup>4</sup>.

Some field processors [harvesters] do not have access to much property and a field processor's ability to harvest kangaroos really depends on the property that field processor has... There are some field processors that have too much country tied up and are unable to shoot the quota for that country, but it is hard to estimate the extent of this problem. (Meat processor)

There is usually high trust and loyalty between landholders and harvesters (see also pages 30 and 60). The outcome is that landholders will usually nominate the same harvester each year. This trust might be misplaced given that it is hard for landholders to know how many kangaroos are actually harvested from their properties. We found that landholders generally think that the harvester is shooting the full quota for their property. However SA DEH records show that the harvest is often considerably lower on the properties in our study regions. Tag swapping (page 31) means that it is not possible to get a reliable picture of actual harvest for these properties except in the Marla-Oodnadatta study region (for which see Map 3, page 45). It is conceivable that harvesters are actually shooting the full quota on properties in our other study regions but we think it extremely unlikely given that only 43% of the statewide quota has been harvested on average since 1997 (see Figure 5, page 37).

Harvesters who have been doing the job for a long time, have built a reputation as trustworthy operators, and understand the importance of maintaining good relationships with landholders are likely to retain the right to harvest on a property even though they might harvest only a low proportion of the property level quota allocation. And even when a landholder is not particularly happy with the quality

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<sup>4</sup> A number of properties in the far north of South Australia, including one in our Marla-Oodnadatta study region were not offered quota for commercial kangaroo harvest by SA DEH. Some landholders in the region had requested allocations from SA DEH. Recently the harvest zone in this region has been extended.

of work conducted by a harvester, loyalty to that harvester may mean that the landholder retains their services. Such issues of trust and loyalty are clearly important to determining whether a harvester can extend the number of properties where he has landholder's permission to harvest.

A harvester who does not have enough access to properties may actively seek other properties but faces strong opposition from other harvesters. He risks 'making enemies' or earning a reputation for 'stealing country'.

Somebody has got to die before you can get in. Because at the end of the day there's not enough country...Some people have a hell of a lot of land tied up where there could actually be somebody else shooting it. (Harvester)

One harvester we interviewed considers that if landholders had more information about harvesters they would make better decisions about who to engage.

A few shooters have too much country and they can't control it. [SA DEH] should be able to give out information to every property that is getting a permit, about their shooter, telling them how many properties they shoot on and how many tags they get. Then let that land owner decide whether he's going to be the shooter for me. How much time will this guy spend on my place? (Harvester)

Some harvesters suggested SA DEH should set an upper limit on the amount of quota that can be controlled by an individual harvester. However the design of this study has not allowed us to examine the merit of this suggestion as it would require analysis of the total amount of each South Australian harvester's quota and their level of harvest and our data relates only to harvesters operating in our study regions.

#### **4.7.6 Isolation and lack of infrastructure**

Geographically it's difficult because there's a lot more isolation and there's not many larger towns where shooters can work from. That is a big factor. (Meat processor)

Landholders and meat processors said that isolation - few towns and lack of infrastructure - are important issues impacting on low harvest rates. The cost of harvest increases with distance from a harvester's home base because of increased fuel and vehicle maintenance costs. Increased travel time also reduces time available for harvesting. Physical access to properties and transport of carcasses are also affected by the density and quality of the regional road network. These factors reduce the capacity of kangaroo harvesters to harvest more remote areas. Isolation also contributes to the social costs of kangaroo harvesting as a livelihood that are discussed below (page 54).

Port Augusta is an important centre for South Australian kangaroo harvesters. In 2001 more than 40% of all 126 licensed harvesters lived in or near Port Augusta. Only four harvesters were based in our Marla-Oodnadatta study region, more than 750 km north of Port Augusta, at that time. In 2006 there were only 79 licensed harvesters in South Australia. 33 of them (42%) were based within 100 km of Port Augusta. 17 were living outside the rangelands in the mid-north agricultural regions of South Australia and 1 in the agricultural region in the south east of the state. 28 were living in the rangelands including four based within 100 km of Lyndhurst or Marree in proximity to our northern Flinders Ranges study region and two based at Marla and Cadney Park in our Marla-Oodnadatta study region.

A comparison of harvest rates between our three study regions (Table 15) indicates the extent to which proximity to Port August impacts on harvest rate. The average quota taken in the Port Augusta region from 1997 to 2001 is 44.3% which is comparable with the state average of 43%. However, harvest rates in our other two study regions are well below the state average.

**Table 15: Average quota harvested in study regions 1997 to 2001**

| Study region             | Average quota harvested |
|--------------------------|-------------------------|
| Port Augusta             | 44.33%                  |
| Northern Flinders Ranges | 25.1%                   |
| Marla / Oodnadatta       | 29.25%                  |

Map 3 (page 45) shows property level harvest rate for our Marla/Oodnadatta study region for 1997 to 2001. During this period two harvesters were based at the small regional centre of Marla and another two at the roadhouse at Cadney Park. The map shows that harvest rate declines sharply with distance from these home bases. We did not conduct a similar analysis for our other two study regions because we judged that the extent of ‘tag-swapping’ in these other regions means SA DEH property level harvest data may be inaccurate (see also pages 17 and 32).

The impact of lack of towns and infrastructure on harvest rates is supported by comparison with New South Wales and Queensland where harvest rates are higher than in South Australia (see Figure 3, page 36). Outback South Australia has fewer towns and smaller human populations than these other states. However rangeland Western Australia’s sparse town and road network would appear to be comparable to South Australia and yet Western Australia also has a higher harvest rate. Compared to South Australia, Western Australia does have considerably lower licence and tag fees (see Table 8, page 27) and more harvesters (see Table 17, page 47) which may help to balance the impact of poor infrastructure.

#### **4.7.7 Terrain**

Some landholders say that low harvest rates in South Australia are caused by rough terrain and physical difficulties for access.

[Harvesters] probably only work 10% of this place ... they are not going to go up into the rough hills. So there’s huge areas that will never see a shooter. (Landholder)

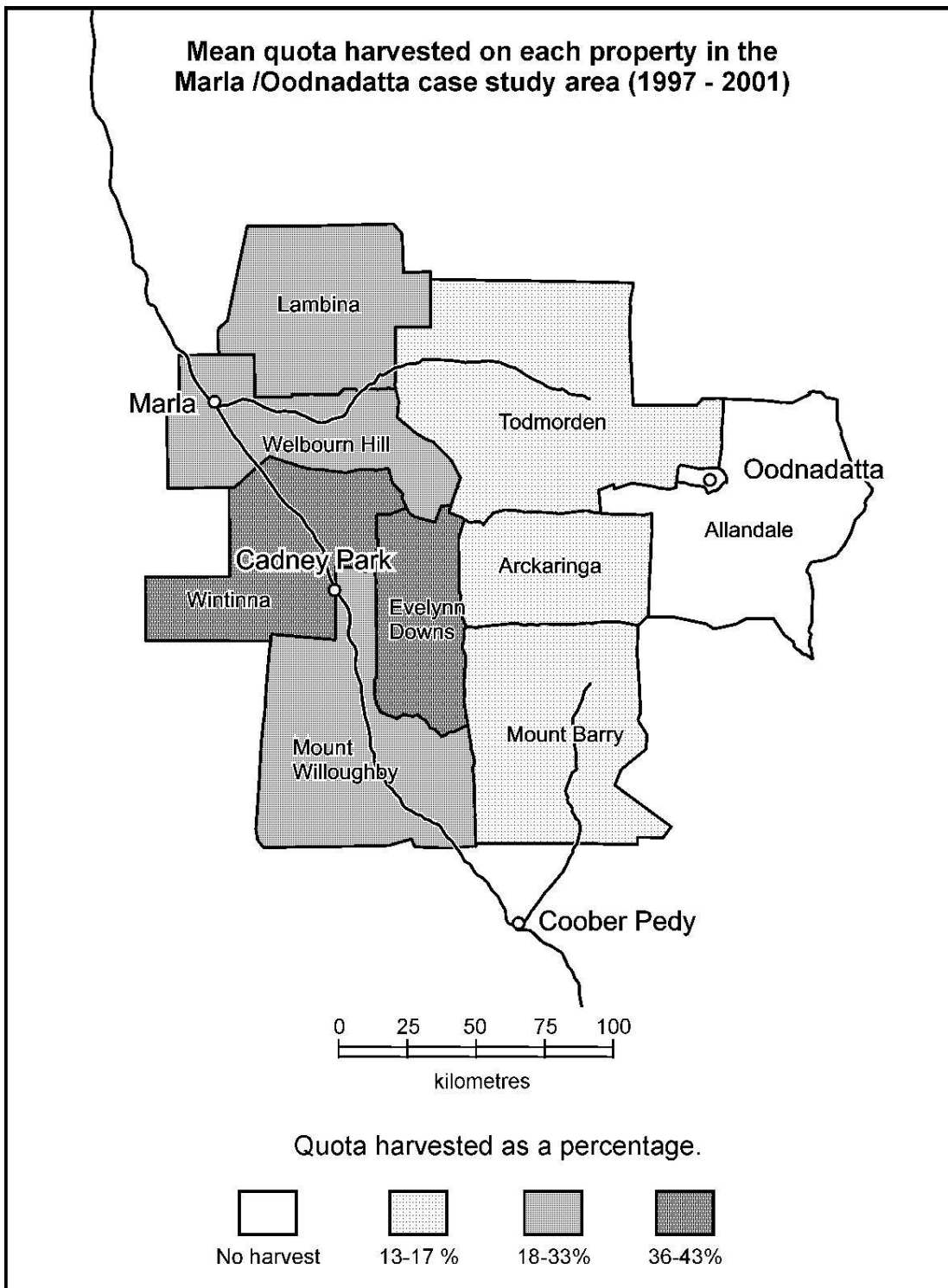
The harvesters who said terrain is an issue usually linked it to increased costs of harvesting (see Table 14, page 41). Issues include vehicle wear and tear, time to access rough country, and operational risks such as vehicle roll over.

There’s a lot of land that you can’t shoot. There’d be two-thirds of some stations that you can’t get to. It’s as rough as guts on most stations around here. You will not get in to some areas unless you want to bash your car to pieces and then you’re not making anything. (Harvester)

As well as rough terrain, vegetation and the distribution and condition of station tracks influence how much of a property is accessible to harvesters. We had selected study regions to include a range of terrain types (see page 11). Landholders’ and harvesters’ estimates of the proportion of these properties that are accessible for harvest range from 10% to 85%.

Rough terrain can be expected to have a greater impact on harvest of euros than other species, since euros prefer hilly and rocky environments. Some South Australian harvesters say that difficulty in accessing euros is a reason for low harvest rates. This clearly has some impact since euros comprise 13.5% of the total South Australian quota from 1997-2004 but 18.4% of the unharvested quota. If euros had been harvested at the same average rate as the other two harvested species, South Australia would have taken 46.7% of the quota on average in this period rather than 43.1%.

Map 3: Mean quota harvested at property level in Marla-Oodnadatta study region



In some regions the difficulties in harvesting euros could contribute more substantially to low harvest rates. Euros typically make up a larger proportion of harvested kangaroo populations in our Flinders Ranges study region and adjoining areas than in other parts of South Australia. For example in the Flinders Ranges Soil Conservation Board District euros comprised 21.4% of the 2003 quota allocation compared to 12.2% of the whole state quota allocation. This may well contribute to low harvest rates in that region. However we have not analysed this due to the unreliability of property scale and regional scale harvest data (see page 44).

We also examined the species balance of quota and harvest for New South Wales, Queensland, Western Australia and South Australia for the years 1997 to 2004. As indicated in Table 16, euros comprise a similar proportion of the total quota in Queensland and South Australia but South Australia harvested a much lower proportion of euro quota from 1997 to 2004. This indicates that difficulties in harvesting euros can be overcome.

**Table 16: Euro harvest 1997 to 2004**

|     | Euro quota as %<br>quota all species* | Euro - % quota<br>harvested - * | All spp except<br>euro -% quota<br>harvested |
|-----|---------------------------------------|---------------------------------|--|
| NSW | 2.06%                                 | 35.49%                          | 65.28%                                       |
| Qld | 12.91%                                | 62.07%                          | 53.10%                                       |
| WA  | *2.96%                                | 51.66%                          | 67.23%                                       |
| SA  | 13.52%                                | 20.37%                          | 46.67%                                       |

\*WA data is from 1997 to 2002 as no euro quota was allocated in 2003 or 2004

We conclude that although difficulties in harvesting euros do contribute to explaining the low South Australian harvest rate they are not of major importance.

#### **4.7.8 Meat processors prefer larger kangaroos**

The meat processors are putting the pressure on for the bigger animals and they can't fill the numbers with the larger animals. (Landholder)

Some harvesters and landholders state that meat processor preference for larger kangaroos impacts on harvest rates in South Australia. Some South Australian meat processors place a minimum weight limit of 14 kg on dressed carcasses. They refuse to pay harvesters for carcasses that weigh less than 14 kg on arrival at the processing plant. Meat processors say that it costs them the same amount of money in terms of wages and equipment to process a kangaroo whatever the size. Processing the extra meat and skin from larger kangaroos incurs virtually no marginal cost. Hence they prefer to process larger animals.

We have not been able to analyse the impact of this minimum size requirement on the availability of harvestable kangaroos due to lack of data on demography and the size distribution of South Australian kangaroo populations. However, we do discuss some other factors raised by harvesters that impact on their capacity to provide kangaroos of the minimum size specified by meat processors.

Approximately one-third of the live weight is lost to the dressing process. A dressed carcass weighing 14 kg had a live weight of approximately 21 kg. Harvesters say that a carcass weighing 14 kilograms when placed in the chiller on the morning after harvest will generally weigh less when it arrives at the processing plant due to 'drying out' during cold storage and transport. Harvesters explain that they must actually ensure that each carcass weighs at least 16 kg when placed in the chiller in order to be certain that they will be paid for the carcass.

An additional factor that impacts on the weight of carcasses is the removal of the tail. Meat processors often request harvesters remove the tail when tails are not in demand.

Kangaroos use their tail as a fat store, so we're chucking away the best bit of the kangaroo which gives us a deficit on our weight, which brings us to an underweight, which makes shooting roos unviable. Whereas, if the tail was on them there'd be quite a percentage there, now that might be another 15%. Which means I could shoot another 15% of the kangaroos that are here. But because there's no tail, they don't weigh enough and so they're out there hopping around still. (Harvester)

Some kangaroo harvesters and landholders pointed out that demanding larger kangaroos may not necessarily be in the best interests of meat processors in the long term. For example, kangaroo cuts from younger animals may be more attractive to consumers seeking tender meat.

If I was a consumer, I'd like to think that I was eating a younger kangaroo rather than an old one. Because of the weight limit the shooters are looking for the bigger ones...But, our younger yearling beef is worth much more than the bull beef. (Landholder)

Currently there is no differentiation amongst kangaroo products in terms of age, size or species. While this is the case market preferences cannot influence meat processors preference for larger kangaroos. It is possible that if meat processors did begin to differentiate their product and there was a positive customer response they may become more willing to process smaller kangaroos.

#### 4.7.9 Low number of harvesters

Meat processors and landholders said that low number of harvesters is a main reason for low harvest rates in South Australia. In 2006 there were 79 licensed harvesters in South Australia, a drop from 129 in 2002. Other states have many more licensed harvesters than South Australia and the numbers have been increasing as indicated by Table 17. South Australia has smaller kangaroo populations than Queensland and New South Wales and smaller harvest quota (see page 2) so it is not surprising that harvester numbers are much lower in South Australia. However kangaroo quotas are similar between South Australia and Western Australia yet the number of harvesters is much lower in South Australia.

**Table 17: Number of licensed harvesters 1998 to 2006**

| Year  | NSW             | Qld  | SA      | WA  |
|-------|-----------------|------|---------|-----|
| 1998  | 669             | 1011 | No data | 227 |
| 2002  | 842             | 1286 | 126     | 275 |
| 2006* | 1000<br>approx. | 1616 | 79      | 320 |

\*As at May 2006.

One would expect that the more harvesters there are the greater the number of kangaroos harvested. Nevertheless, if each of South Australia's current figure of 79 harvesters had harvested 6,000 kangaroos per year from 1997 to 2004 – a comparable level to the average annual harvest of the sample of harvesters who participated in this study (see Table 19, page 51) - then South Australia would have harvested an average of 474,000 kangaroos, or 77% of the quota annually in this period. This is significantly higher than the 43.1% of quota that was actually harvested. Hence the rate at which harvesters harvest needs to also be taken into account in understanding why such a low percentage of quota is harvested in South Australia.

Table 18 shows the average annual harvest per licensed harvester for South Australia and other states in the period 1997 to 2004. South Australian harvesters currently harvest at a significantly higher annual rate than harvesters in other states. This supports South Australian harvesters' comments that South Australia has a lower proportion of part time harvesters than other states. Based on this

comparison it would seem that increasing the number of harvesters is very important to increasing the overall harvest rate in South Australia.

**Table 18: Average annual harvest per harvester in NSW, Qld, WA and SA, 1997-2004**

|                                       | NSW       | Qld       | WA      | SA      |
|---------------------------------------|-----------|-----------|---------|---------|
| Average no. of kangaroos harvested pa | 1,019,719 | 1,461,954 | 243,159 | 272,065 |
| Average no. of licensed harvesters pa | 731       | 1,195     | 254     | 126*    |
| Average harvest per harvester pa      | 1,395     | 1,223     | 957     | 2,159   |

\*For SA only 2002 figures are available

Source: <http://www.deh.gov.au/biodiversity/trade-use/wild-harvest/kangaroo/stats.html>

#### 4.7.10 Low prices paid to harvesters

There's less shooters because there's not enough money in it. (Landholder)

Some harvesters and some landholders said the low price paid to South Australian harvesters for kangaroo carcasses is a factor explaining low harvest rates. Young and Delforce (1986, p. 44) noted in their study of commercial kangaroo harvesters that harvesters were not making 'excessive amounts of money' from kangaroos. 20 years later this is still the case. Harvesters we interviewed complain of low product prices paid by meat processors and high running costs. We heard of some that live 'week to week' and are unable to save any money. Many kangaroo harvesters are concerned that while the cost of establishing and running their business is substantial, they have no secure 'stake' in the industry which they can later 'sell-on'. They suggest that a restricted licensing system for harvesters (similar to licensing systems in the fishing industry) that holds some value for future sale is required to provide them with a secure future and to make the industry more attractive to prospective entrants to the trade.

Prices paid to harvesters in South Australia in 2006 range from 80 to 85c per kg, with 80c per kg being the typical price. The same price is paid for all species and carcass weights. However price does vary slightly between meat processors. Some pay an 'access fee' to landholders typically about \$1 per kangaroo (see also page 58). These meat processors will usually pay a little less per kg to harvesters. Some meat processors lower the price paid to harvesters due to poor quality. For example, a meat processor may 'dock' a harvester if the kangaroos supplied have not been dressed cleanly and according to their requirements (see page 20).

Kangaroo harvesters explained that some meat processors offer them price incentives. They offer a higher price per kg over a certain tonnage in a defined period of time with the aim of encouraging higher harvest levels at times of low supply. Such incentives are usually offered during winter months and the price drops in summer when kangaroos are congregating around water points and are harvested with less effort.

The typical price paid to harvesters has risen in recent years from 55c per kg in 2003 to 70c per kg in 2005 and 80c per kg in 2006. This is in response to rising fuel prices and the impact of drought conditions on quotas and harvest. Harvesters we interviewed said that they need to be paid a higher

price per kg to earn a reasonable living. In 2003, when they were being paid between 50c and 60c per kg, they said they need to earn at least \$1 per kg.

Harvesters working interstate receive higher prices than those in South Australia. In 2006 Queensland meat processors were paying over \$1 per kg. Harvesters in New South Wales and Western Australia could expect to earn about \$1 per kg based on information provided to us by harvesters and regulatory agency representatives in other states. Harvesters in these other states do have higher costs as they purchase the mandatory tags, unlike the situation in South Australia where tags are purchased by meat processors (see Box 2, page 28). Nevertheless, a harvester in New South Wales would be paid \$13.20 net of the 80c tag cost for a 14 kg kangaroo carcass, whereas a South Australian harvester would be paid only \$11.20. As previously discussed (page 29) the higher level of competition in the carcass market in these other states seems to be important in accounting for these higher prices.

### **Financial costs and gross profits**

The financial costs of harvesting are high and gross profits of harvesters are very variable. Box 3 describes the factors that account for this variation. Price per kg is one important factor influencing gross profit. Others are the number of nights spent harvesting and the number of kangaroos harvested each night.

#### **Box 3: Factors affecting harvester financial costs and returns**

##### **Set-up cost**

Set-up cost ranges from \$20,000 to \$80,000 depending on whether equipment is second hand or new. The greatest expense is the purchase of a 4WD vehicle (c \$50,000 new). The vehicle must be fitted with a tray and rack made of impervious material suitable for the transport of carcasses for human consumption. A stainless steel tray and rack is most commonly used at a cost of around \$5,000. Other items required range in price up to \$2,000. They include spotlights, firearms, accreditation fees, knives and steels, cleaning equipment and navigational equipment such as a GPS.

##### **Running costs**

Running costs include annual permits and licences, fuel, tyres, ammunition, cleaning gear, clothing, repair and maintenance costs and wages for an offsider if one is employed. Many costs vary depending on distances travelled and terrain.

##### **Return from sales**

The average price paid to South Australian harvesters is between \$14 and \$17 per kangaroo.

Return from sales depends on:

- the price paid per kilogram (80-85c in 2006, typically 80c)
- the size of kangaroo harvested (average dressed carcass weight is 20 kg)
- the number of kangaroos shot and processed which is affected by many variables including weather conditions, kangaroo abundance/density and the amount of quota held by a harvester. The number shot and processed in a year is a function of the number of nights worked and the number of kangaroos taken in a night. The former is influenced by whether the harvester is pursuing this livelihood part time or full time. The latter is influenced by the upper limit on the number of kangaroos that can be transported on a vehicle at any time due to ventilation requirements under meat hygiene standards. This limit ranges from 48 to 56 carcasses, depending on the vehicle, and is typically 52. Unless harvesters are working very close to their chiller location, they cannot harvest more than one load in a night.

Source: Based on interviews with harvesters and meat processors in 2003, updated to reflect inflation, escalating fuel prices and 2006 price per kg paid by South Australian meat processors.

There is a big variation between harvesters in the number of nights each year they spend harvesting. Harvesters draw a distinction between ‘part timers’ and ‘full timers’. Harvesters that classed themselves as full time generally worked an average of four days a week. Some work two weeks on and one week off. Harvesters explained that work nights can be lost to poor harvesting conditions caused by factors such as rain or wind, and that they are sometimes unable to conduct harvest simply because their chiller is full and awaiting collection by the transport company.

There is also high variation in the number of kangaroos that are harvested in a night’s work. A harvester may harvest a relatively small number one night and then harvest a full truck load the next. The factors that impact on the number harvested in a night include the harvester’s level of experience, the terrain and condition of access roads on the property, kangaroo abundance and fatigue. Of course, the more kangaroos that are harvested in a night’s work, the greater the return from that night’s work.

Table 19 and Figure 9 present data on annual harvest rate from a sample of 10 harvesters. It shows that the average number of nights spent harvesting in a year is 152 but the range is wide, from 78 to 220. Harvester A was the only one of this group who described himself as a ‘part timer’. His primary income is from a full time job other than kangaroo harvesting. However several of the other harvesters sampled here (A,D,E,G,J) also have other sources of income (see also Table 21, page 55) most often casual station work. These harvesters find that it is important to supplement their income from kangaroo harvest with other work due to the variable nature of the industry. Their harvest rate is particularly influenced by the price per kg for kangaroo carcasses. A higher price would give more incentive for them to spend more nights harvesting.

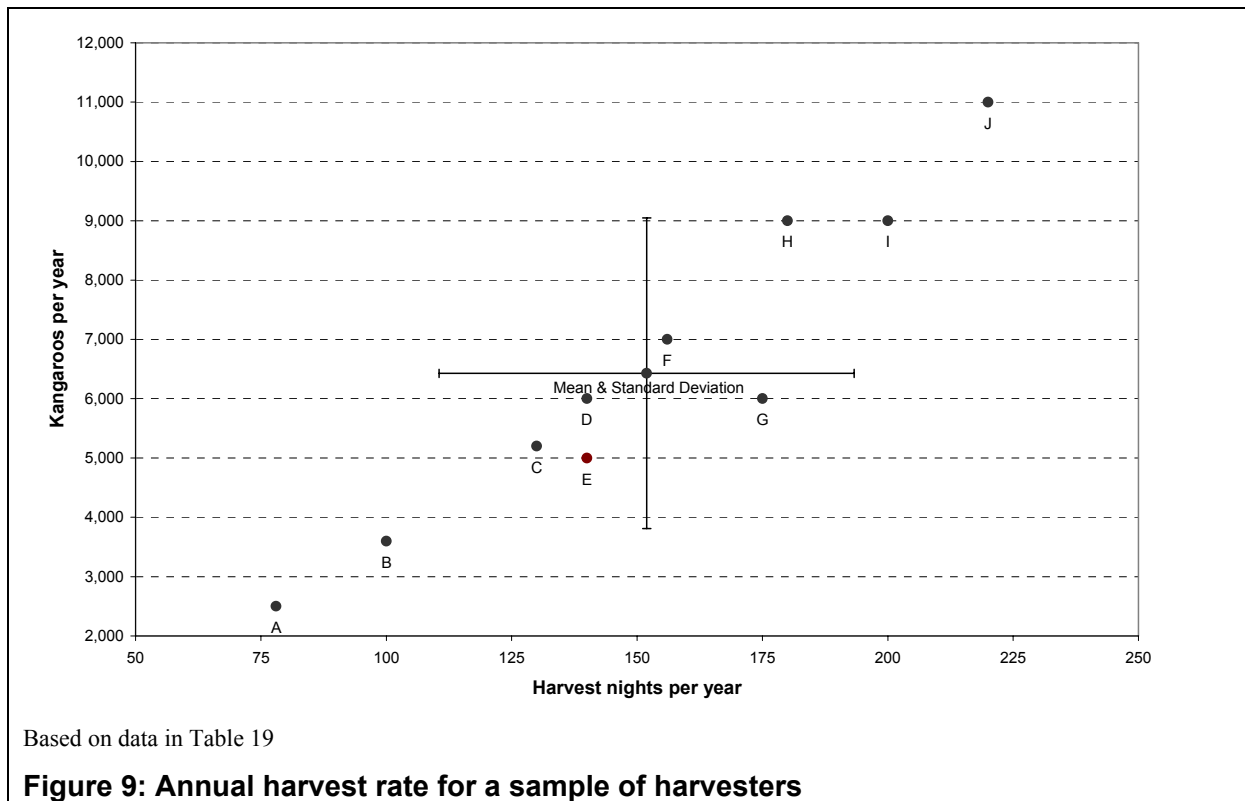
Based on data in Table 19, the average number of kangaroos this sample of harvesters harvest in a night is 41 with a range from 32 to 50. However during interviews some harvesters said that they tend to consistently take a full load on their truck every night, that is 52 kangaroos (see Box 3, page 49).

The sample of harvesters in Table 19 estimate that each kangaroo they harvest costs them between \$8 and \$9, averaging \$8.22. Typically these harvesters said that half of their returns from sales are needed to cover harvest costs. For such harvesters we have calculated the cost to be half the sale price of a 20 kg kangaroo carcass sold at 80c per kg. Three harvesters (B,D,H) provided more specific estimates of the cost to harvest each kangaroo. Financial data from three harvesters (H,I,J), each with between 180 and 220 harvest nights per year, has also been used to itemise the major cost items for harvesting (see Table 20, page 52)

Figure 10 shows the harvest nights and annual gross profit for this sample of harvesters, based on data in Table 19. We have also used the data provided by harvesters to model gross profit for harvest activities in two different ways. Figure 11 uses the average cost per kangaroo from Table 19 to model how annual gross profit changes with changes in the harvest nights per year and the number of kangaroos harvested in a night. Figure 12 uses a different cost model, based on data about specific cost items from harvesters’ financial records as presented in Table 20.

**Table 19: Harvest rate and costs of a sample of harvesters**

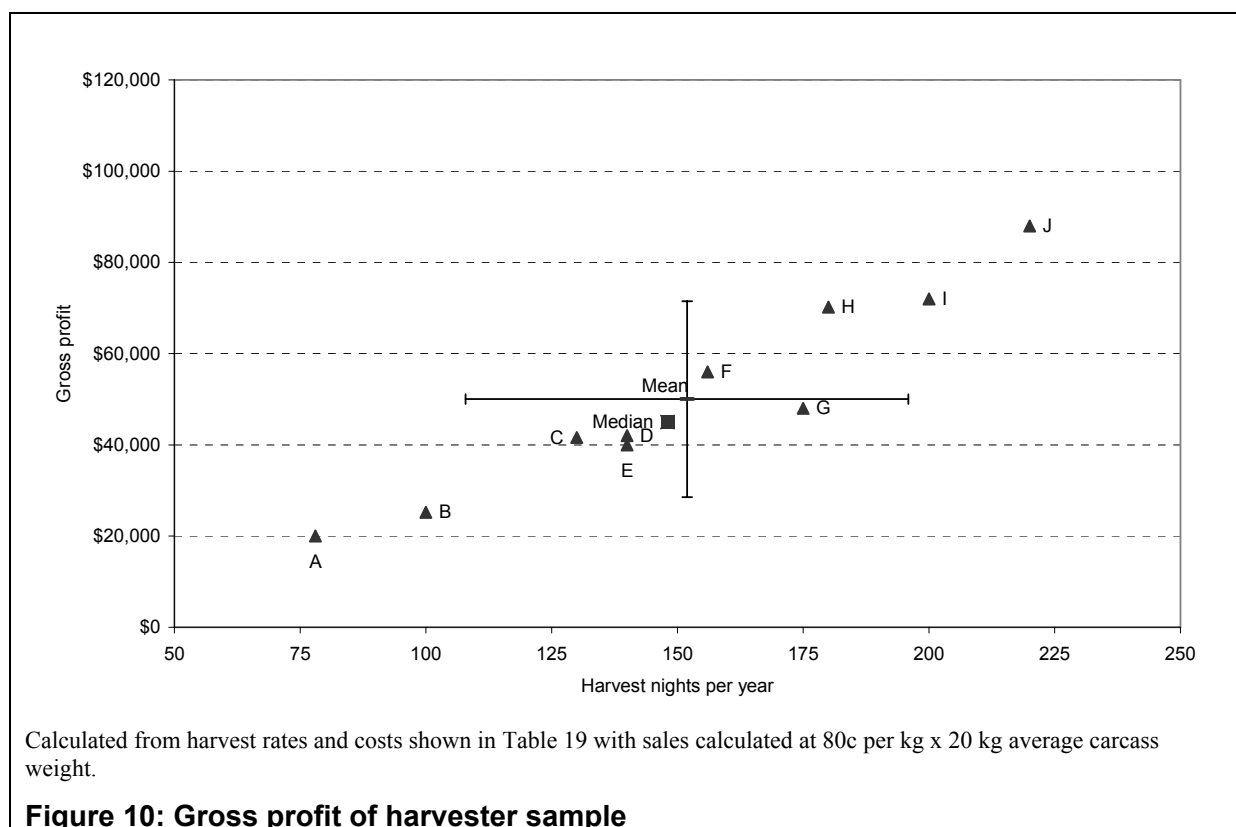
| Harvester   | No. harvest nights pa | No. kangaroos harvested pa | Cost per kangaroo \$ |
|-------------|-----------------------|----------------------------|----------------------|
| A           | 78                    | 2,500                      | 8.00                 |
| B           | 100                   | 3,600                      | 9.00                 |
| C           | 130                   | 5,200                      | 8.00                 |
| D           | 140                   | 6,000                      | 9.00                 |
| E           | 140                   | 5,000                      | 8.00                 |
| F           | 156                   | 7,000                      | 8.00                 |
| G           | 175                   | 6,000                      | 8.00                 |
| H           | 180                   | 9,000                      | 8.20                 |
| I           | 200                   | 9,000                      | 8.00                 |
| J           | 220                   | 11,000                     | 8.00                 |
| <b>Mean</b> | <b>152</b>            | <b>6,430</b>               | <b>8.22</b>          |
| St Dev      | 44                    | 2,486                      | 0.42                 |
| Median      | 148                   | 6,000                      | 8.00                 |



**Table 20: Harvest cost items**

| <b>Capital Costs, 10 year life</b>    |                 | <b>Running costs</b>                 |  | <b>Per year</b> |
|---------------------------------------|-----------------|--------------------------------------|--|-----------------|
| Vehicle                               | \$50,000        | Vehicle maintenance                  |  | \$4,200         |
| Stainless steel tray                  | \$5,000         | Fuel                                 |  | \$18,000        |
| Firearm loading gear set-up           | \$1,000         | Bullets                              |  | \$10,400        |
| Extra spare tyre                      | \$300           | Cleaning items                       |  | \$600           |
| UHF radio and aerial                  | \$500           | Fuel to run the chiller              |  | \$3,000         |
| GPS                                   | \$700           | Tyre repairs/new tyres               |  | \$2,000         |
| Training and accreditation            | \$450           | Clothing and boots                   |  | \$3,600         |
| <b>Total capital cost over 10 yrs</b> | <b>\$57,500</b> | Torch                                |  | \$120           |
|                                       |                 | Spot lights & tray lights            |  | \$900           |
|                                       |                 | Firearms                             |  | \$3000          |
|                                       |                 | Scope for firearm                    |  | \$1000          |
|                                       |                 | Knives and steels                    |  | \$300           |
|                                       |                 | <b>Total running costs pa</b>        |  | <b>\$47,120</b> |
|                                       |                 | Offsider costs per night if employed |  | \$100           |
| <b>Fixed costs, annual</b>            |                 |                                      |  |                 |
| Harvester permit                      | \$700           |                                      |  |                 |
| Vehicle registration                  | \$500           |                                      |  |                 |
| Vehicle Insurance                     | \$800           |                                      |  |                 |
| Public liability insurance            | \$2,000         |                                      |  |                 |
| <b>Total fixed annual costs</b>       | <b>\$4,000</b>  |                                      |  |                 |

Source: Based on 2003-4 financial records of three harvesters each averaging 180 to 200 harvest nights per year. Costs adjusted to 2006.



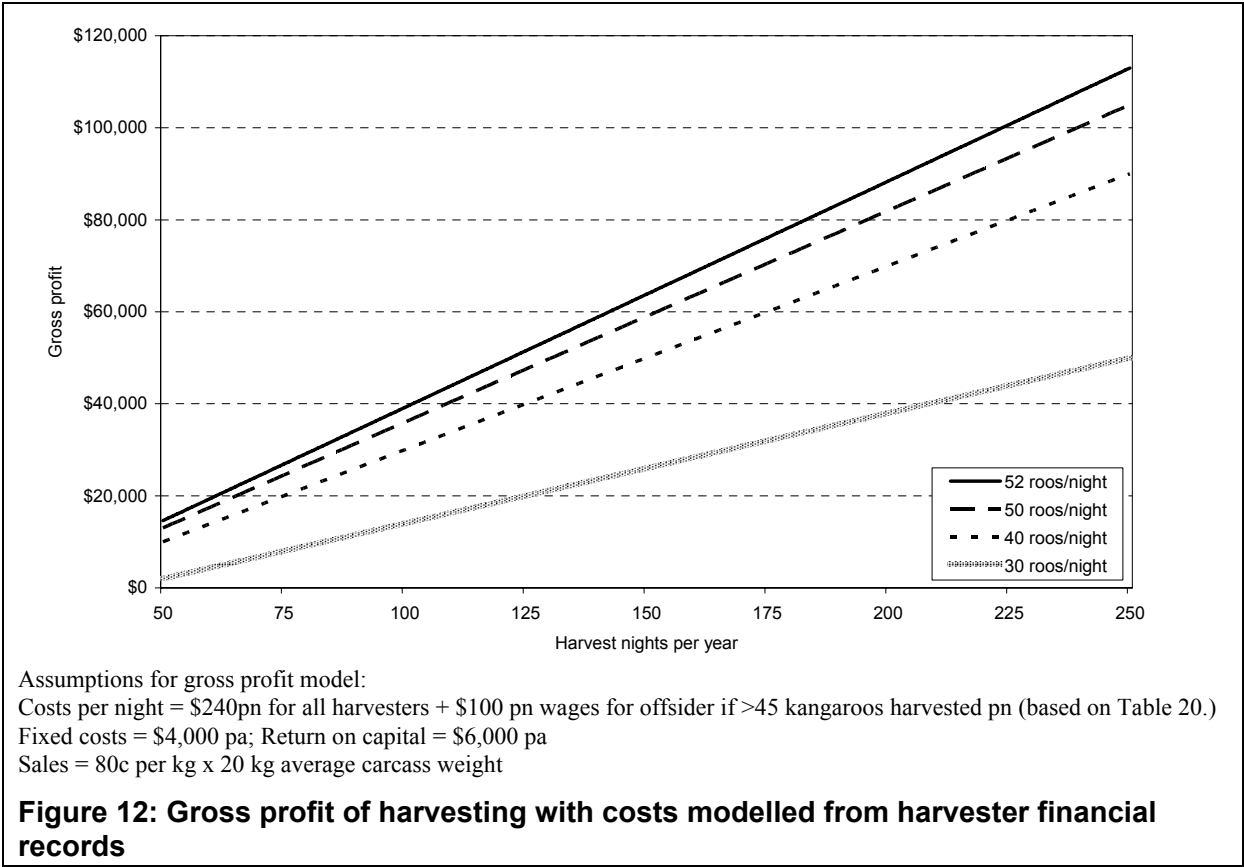
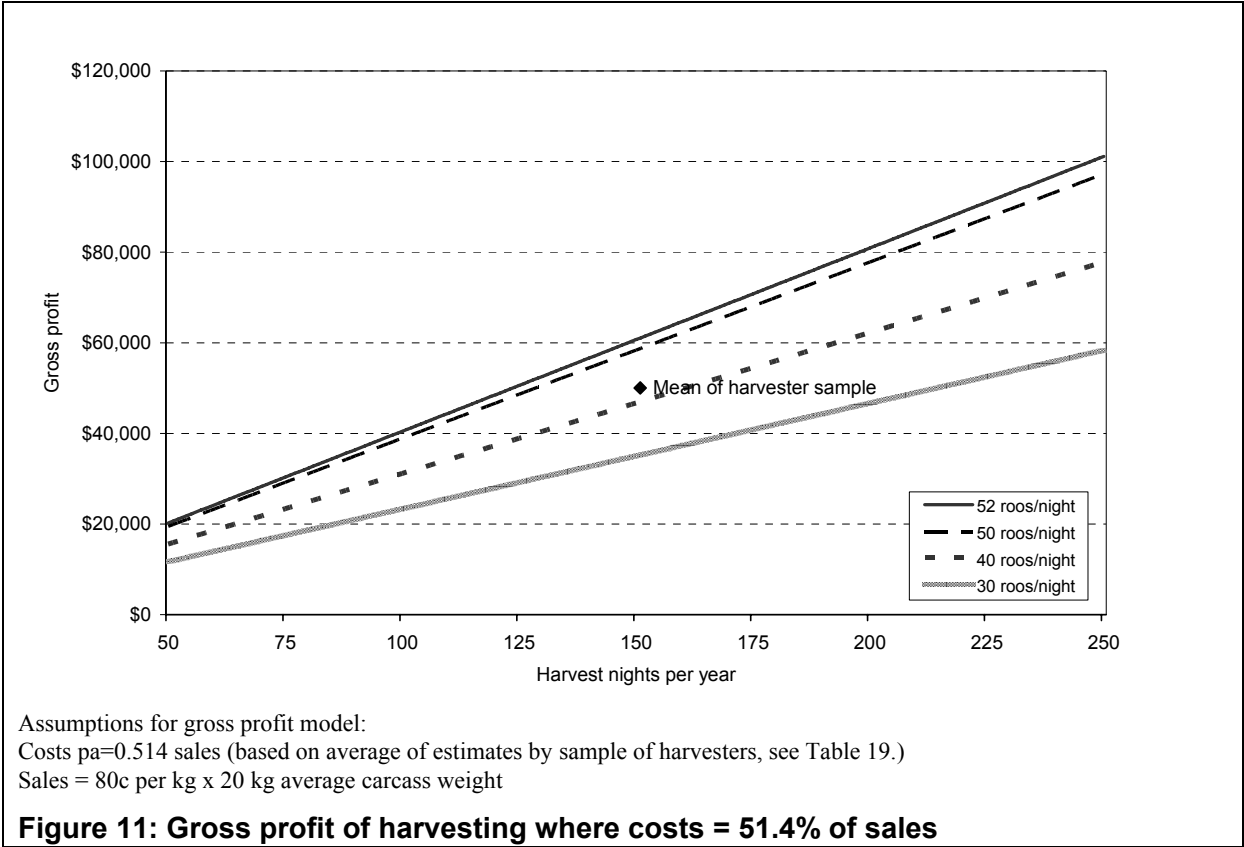
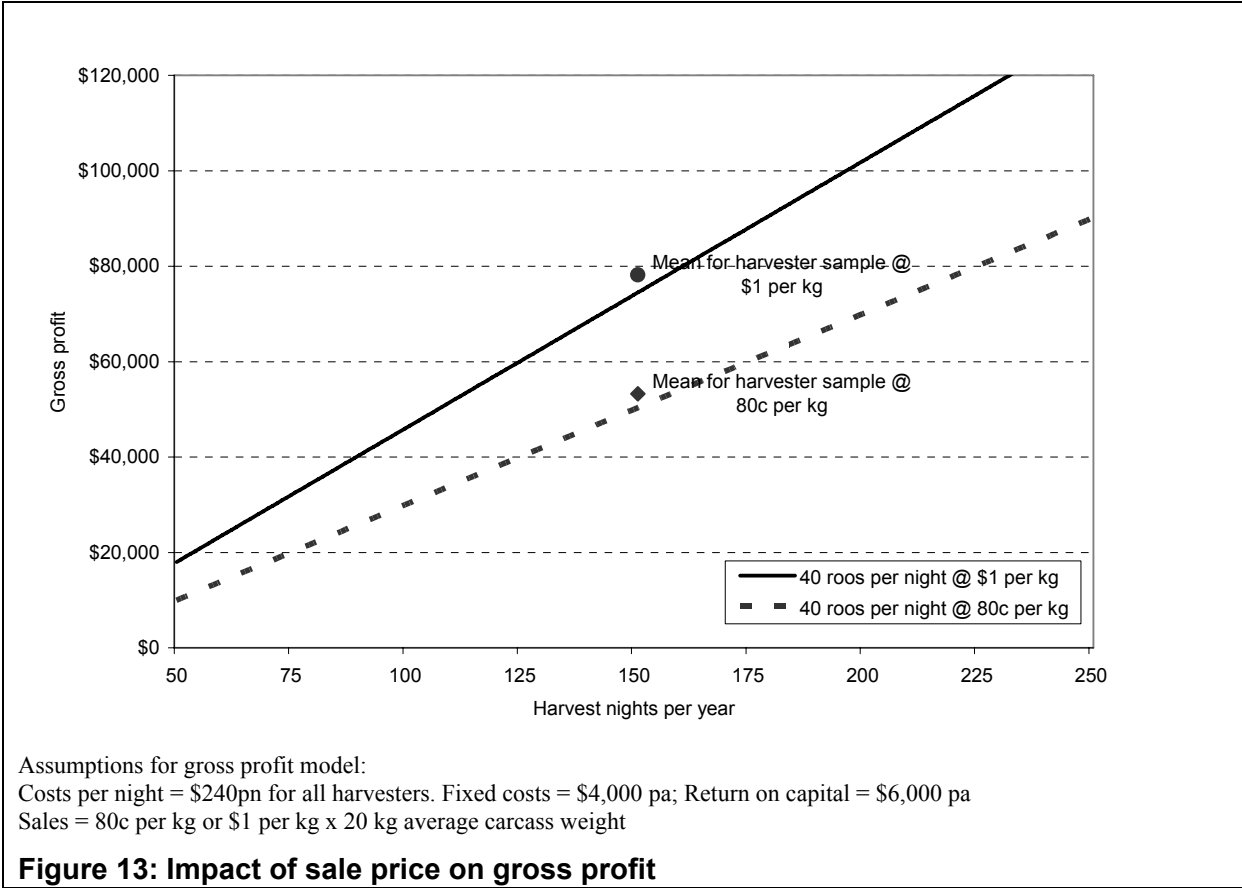


Figure 11 and Figure 12 both show the impact of changes in the average number of kangaroos per night on gross profit, illustrating the greater efficiency of harvest when kangaroo populations are high. There is little difference in the two different gross profit projections at higher values of kangaroos per night and nights per year. However at harvest rates of <40 kangaroos per night or <75 nights per year, Figure 12 shows the impact of capital costs and fixed annual costs resulting in substantially lower gross profits than are shown in Figure 11 which does not overtly account for these costs.

Figure 12 is probably the more realistic model to indicate potential gross profit for people entering the industry. However both models have limitations. Figure 11 is based on harvesters' estimates of the harvest cost per kangaroo. We can expect some of these estimates will be more accurate than others. The low variation between harvesters in cost per kangaroo in the sample data on which the model is based (Table 19) compared to the large variation in total annual harvest per shooter raises suspicions that lower volume harvesters may be underestimating their costs. Alternatively they may be making savings on capital or running costs compared to high volume harvesters, such as through lower cost equipment that is replaced less frequently. A similar limitation applies to Figure 12 in that the costs used in the model are derived from annual costs of high volume harvesters.

As indicated in Figure 13, an increase in price from 80c per kg to \$1 per kg would result in an increase of about 50% in the gross profit of a harvester who takes 6,430 kangaroos per year over 152 nights, the average profile of harvesters in the sample reported in Table 19.



**Social costs**

All the harvesters who participated in this research consider that the social costs of their livelihood are high. Other research participants also said that the lifestyle of harvesters may deter people from entering the industry. Social costs contribute to low numbers of harvesters and help in turn to account for the low proportion of quota taken in South Australia. As outlined previously (see page 20)

kangaroo harvesting involves long hours often under harsh conditions. It takes a special kind of person to do this work.

Table 21 shows the attributes of the harvesters we interviewed. Of these 15 are male and one is female<sup>5</sup>. As discussed previously (see page 17) our sample are those harvesters who harvest on the properties in the study regions. The data for two others who assisted with this research is also included. The results from this sample indicate that it is biased towards high volume harvesters. As shown in Table 19 (page 51), the average annual harvest for our sample of harvesters was approximately 6,000 per annum but the average annual harvest of all South Australian harvesters is only approximately 2,000 per annum (see Table 18, page 48).

In most cases harvesters have a family to support. Partners often manage the finances of their harvesting business and help with paperwork associated with meeting permit requirements. Most South Australian harvesters work alone. They typically spend considerable time living in bush camps. This is also the case for harvesters working in Western Australia (Kelly 2005) due to the long distances that must be travelled to reach places of harvest. There are associated social costs. Harvesters told us about missing out on their children growing up, being grumpy and tired while at home, and the stress that this livelihood places on family and friends.

**Table 21: Attributes of harvesters**

| <b>Number of harvesters (n=16)</b>                |    |
|---|----|
| <b>Age structure of kangaroo harvesters:</b>      |    |
| 20-35 years                                       | 3  |
| 35-50 years                                       | 6  |
| > 50 years  | 7  |
| <b>Bush camp:</b>                                 |    |
| Spend time living in a bush camp                  | 11 |
| Return to home residence every morning            | 5  |
| <b>Employ an 'offsider' to assist in harvest:</b> |    |
| 'Offsider' employed                               | 4  |
| No 'offsider'                                     | 12 |
| <b>Marital status:</b>                            |    |
| Married with children                             | 14 |
| Single and no dependents                          | 2  |
| <b>Other sources of income:</b>                   |    |
| Harvester has another income source               | 9  |
| Rely solely on income from harvest activities     | 7  |
| <b>Entered the trade through:</b>                 |    |
| Family members                                    | 10 |
| Friends   | 3  |
| Own initiative                                    | 3  |

Recruitment of harvesters is low. Table 21 shows that most of those interviewed entered the trade through family members involved in the industry. This suggests that there is a small pool of people from which most industry entrants are drawn. There is a need for the industry to attract new entrants. This is especially urgent for South Australia because harvester numbers are particularly low as discussed previously.

<sup>5</sup> South Australia's only female harvester became licensed during the course of this research and was included as a research participant.

Harvesters are aware that their numbers are declining. Some are concerned about the impact this will have on the future of the industry. Although low numbers of licensed harvesters means more quota is potentially available to each harvester, harvesters recognise the need to balance the contribution of the harvest to management of total grazing pressure, maintaining supply to meat processors and the financial viability of their own enterprises.

### **Entry requirements**

The accreditation process may deter people from becoming harvesters. It is a serious undertaking. All harvesters must complete formal training and accreditation (through TAFE) in meat hygiene, animal identification, firearm safety and accuracy, animal welfare and the regulatory environment (see page 25). One harvester who had undertaken the accreditation process recently estimated that it took one year to go through the required processes. However, this harvester lives in a remote part of South Australia and it may be possible for people living close to Port Augusta or Adelaide to complete the required training processes within a shorter time-frame. Harvesters also make the point that even though TAFE courses are useful for accreditation purposes there are many skills of the trade that cannot be learned in classrooms. On the job training is crucial in this livelihood.

The *Kangaroo Industry Strategic Plan* (Kelly 2005) acknowledges the low recruitment rate for harvesters. It has put high priority on the issue of developing a career path for harvesters. The Plan proposes to make recommendations by 2007 for a 'kangaroo harvesters apprenticeship' which includes business training.

In Queensland a new training scheme allows people entering the industry as harvesters to go through an accreditation process with full training provided. It has been developed by the Queensland Macropod and Wild Game Harvesters Association in conjunction with the Queensland Department of Employment and Training and the Rural Industry Training and Extension Association. The scheme provides entry level traineeship with formal training, both theoretical and practical. Successful trainees are awarded a Certificate II in Rural Operations (Macropod and Wild Game Harvesting)<sup>6</sup>.

## **4.8 Value for landholders**

We question the frequently iterated and commonly held belief that landholders consider kangaroos as pests (Grigg 2002; Olsen & Braysher 2000; Cairns & Kingsford 1995; Ramsay 1994; Shepherd 1983; Hornadge 1972). This was true in the past when large scale kangaroo hunts were an ugly reality (Hornadge 1972). However our research suggests that the attitudes of landholders towards kangaroos are now different, at least in our study regions.

Table 22 shows that of twenty-one landholders interviewed only one classified kangaroos as a pest. Six stressed that kangaroos are not a pest at all. Most landholders conceded that kangaroos can be a 'pest' at times, but also stated that this is only when populations are overabundant. It was more common for landholders to use words such as 'nuisance' or 'problem' to describe kangaroos. These words were almost always clarified by landholders saying 'at times'. The following quote is typical of the views of most landholders interviewed.

At times kangaroos are a problem, when they come in big mobs because they can do a lot of damage, like knock down fences and make it impossible to conserve feed. (Landholder)

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<sup>6</sup> Further information on this training program is available from the Rural Industry Training and Extension Association. Website: [www.rite.com.au](http://www.rite.com.au) or freecall: 1800 808 782.

**Table 22: Landholder views on the status of kangaroos**

| Landholder view of kangaroos            | No. landholders (n=21) |
|---|------------------------|
| Kangaroos are a pest                    | 1                      |
| Kangaroos are not a pest                | 6                      |
| Kangaroos are nuisance/problem at times | 14                     |

We found that landholders generally do not consider kangaroos a pest because they can manage the impacts of overabundant kangaroos through commercial harvest. Landholders do see that kangaroos have economic value and they value the fact that kangaroos allow a second party to make a living from the pastoral lease. Almost all landholders interviewed acknowledged both the instrumental value of kangaroos (for producing meat and leather) and their intrinsic value (their ‘right to exist’). We conclude that landholders value kangaroos as a resource, rather than seeing them as a pest. Animals that are considered pests by landholders are those that they have no control over and that do not have economic value such as locusts, mice or wild dogs.

#### 4.8.1 Financial return to landholders from harvest

We asked landholders for their views about the prospects for financial return from kangaroos and whether this could provide an alternative to livestock production (see page 5). We found that landholders need to be sure of economic returns equivalent to their current sheep or cattle production systems if they are to change them. Landholders see financial value in kangaroos only as a supplement to these established production systems. They generally see prospects for improving land condition by replacing sheep or cattle with kangaroo grazing. However they see problems in using a mobile common pool resource as their principal income.

Economic value comes from the ability to exclude others from use (Tisdell 1995). Hence the question of property rights in kangaroos is important. It was the most common issue raised by landholders in relation to prospects for their own financial return from kangaroo harvest. Other authors have also highlighted the need to address this issue (see for example Chapman 2003; Wilson 1996; Grigg 1995; McCallum 1995).

Some landholders believe they own kangaroos. This is different to the views of other research participants (see Table 23). However even these landholders understand that they do not have clearly defined property rights over kangaroos. The mobility of kangaroos raises obvious problems for excludability since sheep/cattle fencing does not contain them.

How do you control them? You might have this nice mob of roos that are going really well then you have a thunderstorm 150 miles away then they’re gone. (Landholder)

**Table 23: Research participant views on who owns kangaroos**

| Research participant group | Who owns kangaroos? |               |             |
|----------------------------|---------------------|---------------|-------------|
|                            | No-one              | Crown or Govt | Landholders |
| Landholder (n=21)          | 11                  | 2             | 8           |
| Kangaroo harvester (n=14)  | 6                   | 8             | 0           |
| Meat processor (n=4)       | 3                   | 1             | 0           |
| Total (n=38)               | 19                  | 11            | 8           |

Quite apart from these issues, landholders question whether kangaroos could be as productive as sheep/cattle. For example one pointed out that sheep have dual income generating capacity – meat and wool. This contributes to the financial return from one sheep being far greater than potential returns from one kangaroo.

You’ve got to look at the situation right now, where a merino ewe is probably worth \$100. OK, she’ll produce a lamb, she’ll cut a clip worth \$40. So kangaroos have really got to be worth that at least, otherwise, why? You wouldn’t do it. (Landholder)

The harvesters and meat processors we interviewed consider that landholders should not receive a financial return for kangaroos (Table 24). They say they are doing landholders a favour by removing overabundant kangaroos.

The views of the landholders we interviewed on this issue are much less unanimous. Landholders who consider they should get a financial return from kangaroos pointed to their role in maintaining habitat and supplying feed and water for kangaroos. Those who were not in favour of financial return talked about other forms of benefit they get from harvesting such as incidental work that the harvester does around the property (see page 21).

Landholders who were uncertain about the issue said they would like a financial benefit themselves but realise that payments to them would come from the pockets of harvesters who often have tight margins. In Queensland Chapman (2003) also found that even though landholders believe that they should get financial return from kangaroos they consider that harvesters cannot afford to pay.

As noted above (page 48), some meat processors do now pay an access fee to landholders, also known in the industry as a ‘royalty’. Typically this is \$1.00 for each kangaroo harvested. We found that only the smaller meat processors pay this fee to landholders. Based on the information from our sample regions we estimate that not more than 10% of those South Australian landholders who have harvest on their properties are receiving such a payment. Where an access fee is paid to a landholder the price that meat processors pay to harvesters tends to be reduced by a few cents per kilogram to cover this cost.

**Table 24: Research participant views on financial returns to landholders**

| Research participant group | Should landholders get financial return from kangaroos? |    |       |
|----------------------------|---|----|-------|
|                            | Yes   | No | Maybe |
| Landholders (n=21)         | 7   | 5  | 9     |
| Kangaroo harvesters (n=14) | 0   | 14 | 0     |
| Meat processors (n=4)      | 0   | 3  | 1     |

**4.8.2 Increasing landholder involvement**

The introduction of property level quota allocation in South Australia led to an increase in landholder involvement in kangaroo management and harvest through the requirement for landholders to accept quota allocations issued to their properties. We discussed with landholders the prospect of changing the South Australian system to regional level quota allocation. Landholders had mixed reactions to the suggestion. Some were concerned that the level of harvest on their property may decrease because without property specific quota allocation they feel that there is no guarantee that harvesters will come to their property. This was the case for many landholders of small to medium sized properties. In contrast, landholders of large properties were supportive of a change to regional level quota allocation, saying that it is the best way for the system to respond to fluctuating kangaroo populations.

Landholders could get more directly involved in the kangaroo industry by themselves working as harvesters on their own properties or employing staff to do so. However landholders we interviewed do not see this as an attractive option because it involves high set-up costs, including those for training, and night work.

Some landholders have ventured into ‘paddock to plate’ processing though there are no examples of this amongst the landholders in our study regions. In South Australia the Mutooroo Pastoral Company established a processing works in Adelaide to process, market and distribute products from kangaroos harvested on its properties (Hoy 2001). The company owns three pastoral stations in the south eastern part of the South Australian rangelands in an area with relatively high kangaroo populations. A consortium of landholders in western New South Wales near Wilcannia recently trialled a similar venture (Peter Ampt, FATE Program 2005 pers comm.). Both of these schemes have since ceased operations. The FATE (Future of Australia’s Threatened Ecosystems)<sup>7</sup> program is now exploring ways to deliver financial returns to landholders from kangaroo harvest. FATE is working with landholder groups in two areas of New South Wales to develop more strategic and profitable landholder engagement with the kangaroo industry (von Berg and Associates 2003).

Introducing competition into harvester access to properties could help some landholders realise financial return from kangaroos. One landholder we interviewed, whose property has prime kangaroo habitat, discussed his idea of tendering his property level quota to harvesters and allocating it to the highest bidder. South Australian kangaroo harvest regulations do not preclude this happening. It could allow the market to establish the value of a landholder’s quota. Landholders who have large quota allocations, good habitat and easy access for harvesting would realise the highest value. Other landholders, whose properties are difficult to harvest, would be likely to realise nothing. Tendering for harvesters might also work effectively for landholders with smaller quotas if adjacent landholders formed cooperatives for this purpose.

However tendering could not be effective in allowing landholders to realise value from kangaroos unless landholders can effectively exclude unauthorised harvest. Tag swapping by harvesters (see page 30) would continue to make exclusion difficult. Here tag swapping would involve a harvester using some of the tags allocated to properties where he has committed to paying the landholder a low price per kangaroo to harvest on properties where he has committed to paying a higher price. In this situation, SA DEH tag allocation records would indicate that the kangaroos were harvested on the low value property and the harvester would pay the lower agreed price to that landholder. The nature of harvesting effort would make it very difficult for landholders to prevent this tag swapping.

## **4.9 Relationships and communication**

Research participants say that relationships and communication amongst industry stakeholders are important to the operation of the commercial kangaroo industry. Landholders, harvesters and meat processors discussed their communication networks and identified who they communicate with about kangaroo management. The findings are discussed below.

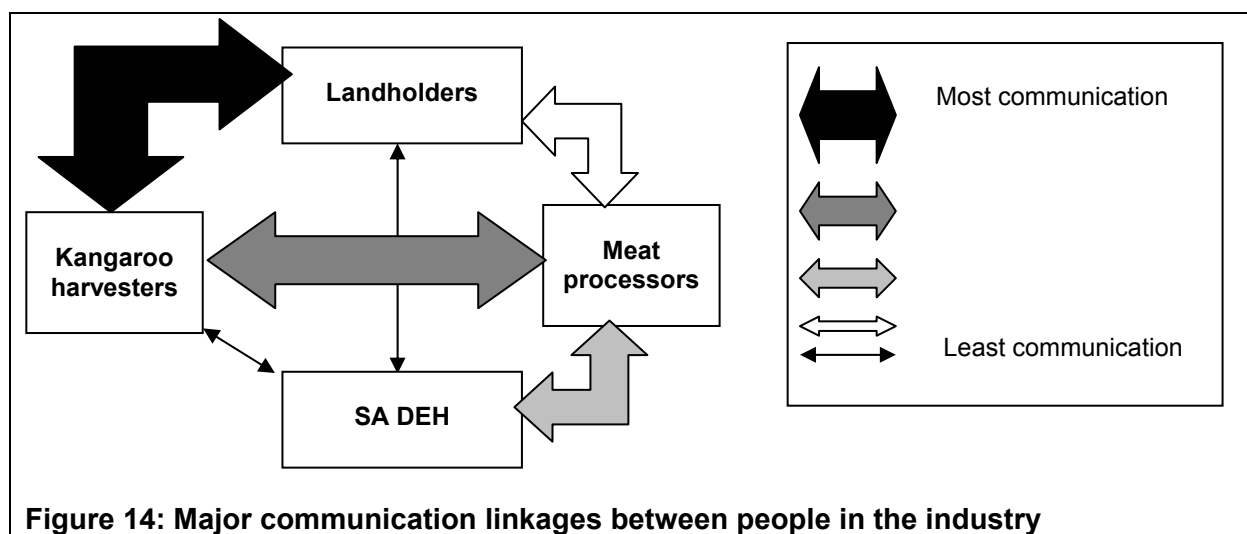
During interviews we asked research participants to draw their communication network about kangaroo issues, weighting each link in the network to show its relative importance. We compared these diagrams and found that people within each group of research participants (landholders, harvesters, meat processors) all identified the same kind of communication network. We generated a series of diagrams showing typical communication linkages for each group. These are combined in Figure 14.

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<sup>7</sup> FATE is an initiative of the Australian Museum and the University of New South Wales that is investigating the commercial use of wildlife as a means of realising conservation goals.

We found that in most cases the closest relationship and greatest communication exists between the landholder and the kangaroo harvester. Communication is relatively high between harvesters and the meat processor who they supply carcasses to. Communication between landholders and meat processors is usually low. An exception is where a small meat processor pays an access fee to landholders. In this case greater communication and a strong relationship has developed between the meat processor and landholders. Very little communication occurs between harvesters or landholders and SA DEH. In contrast there is quite a high level of communication between meat processors and SA DEH.

We did not interview SA DEH staff about their communication pathways so Figure 14 does not account for their perspectives on these communications. Because SA DEH staff communicate with all harvesters about their permits and with all landholders about quota allocation their experience is likely to be that they are in constant communication with these stakeholders. However for individual harvesters and landholders the level of communication is low.



#### 4.9.1 Landholders and harvesters

I talk with [the harvester] the most because I rely on feedback from him. That's two-way communication and there's a lot of communication. (Landholder)

Landholders explained that communication with the harvester maximises harvest with mutual benefit.

The shooter asks me where the roos are and I always try to direct him to the place where he's going to get the most because that will do me the most benefit and do him the most benefit. (Landholder)

The keener he is to come back here the better. Then he's not going somewhere else. Because if they are only going to take half the quota for the state, well, I want him to take all my quota. (Landholder)

Trust is important to both parties. The harvester trusts the landholder to contact him when kangaroo abundance is high and the landholder trusts that the harvester will respond quickly (see page 30). The landholder also needs to be sure that he can trust the harvester to conduct his operations safely and professionally. For example, one landholder told us that he dismissed a harvester who was being careless by shooting too close to the homestead.

If I couldn't have a good reliable roo shooter I'd have no shooter at all. (Landholder).

The harvester's relationships with landholders determine his future harvest rights.

You've got to have communication [with the landholder]. (Harvester)

If you have a fall out with your property holders it's very hard. (Harvester)

The landholder has an interest in maintaining a good relationship also because the landholder wants the harvester to respond to harvest needs promptly and will often have expectations that the harvester will harvest a majority of the quota issued to the property.

#### **4.9.2 Amongst harvesters**

Communication amongst harvesters is low, sometimes non-existent.

Everyone mostly goes their own way because we are so sparse and separated. (Harvester)

Some harvesters and landholders say the norm of one shooter per property that operates in South Australia generates a high level of distrust amongst harvesters.

[Harvesters] like to keep to themselves normally...because we are very protective of our own little areas. If they're having a bad time wherever they are they will go to someone else's [property] without their knowledge. That's why we defend our country. (Harvester)

Some research participants said that this distrust means there is little chance of harvesters cooperating or taking action together for change in the industry. This is evident in the very low membership of the organisation they formed to represent their interests, the South Australian Field Processors' Organisation, which only had about 12 members in 2002. Harvesters also have trouble getting good representation on the Kangaroo Industry Reference Group. Some harvesters say that the people representing them in this forum are presenting their own views and not the views of harvesters as a group. They say that the representatives are harvesters who hold the quota for a lot of properties and have very different views to the majority of harvesters who do not hold a lot of quota. They also say they have little or no opportunity to bring up issues with these representatives.

#### **4.9.3 Harvesters and meat processors**

The nature of communication and relationships between harvesters and meat processors varies depending on the scale of the meat processing operation. We found that harvesters supplying small meat processors communicate more regularly and trust these communications more than do harvesters supplying large meat processors.

There are advantages for both parties in the trusting, secure relationships between harvesters and small meat processors. These meat processors support the harvesters that supply to them such as by paying for the fuel or electricity to run the chiller, or providing short term loans or cash advances to harvesters who are in financial difficulty. These harvesters say that the small meat processor will pay them on the weight of the carcasses when placed into the chiller which will be higher than the weight after transport to the meat works because of drying (see page 46). This requires the meat processor to trust the harvester has recorded the correct weight of carcasses when placing them in the chiller.

In contrast relationships between large meat processors and the harvesters that supply them are not strong. There is less communication than between harvesters and small meat processors. We even came across situations where the large meat processor and harvester have not met in person.

I've worked for them for 3 or 4 years now and they've hired me without ever meeting me. No interview nothing. [I] could be blind with no arms for all they know. (Harvester)

As reported earlier (see page 46) large meat processors pay on the weight of carcasses at the time of arrival at the meat works. They do not trust harvesters to weigh the carcasses at the chiller and pay on that weight, as small meat processors may do. Harvesters feel they are not trusted by these meat processors and they do not always trust the meat processor either. For example some harvesters reported instances where the meat processor did not empty the chiller on the agreed day. This leaves the harvester to pay for the fuel to run the chiller, but unable to harvest because the chiller is full. This research suggests that there is a lack of secure relationship between large meat processors and the harvesters that supply to them.

#### **4.9.4 Landholders, harvesters and SA DEH**

There is relatively little communication between kangaroo ‘producers’- that is landholders and harvesters - and SA DEH. Landholders and harvesters feel that they do not have a two-way communication channel with SA DEH staff. They say they initiate communication with SA DEH staff as they see the need arise, which is not often. Landholders say that the contact they have with SA DEH is generally confined to applying for or accepting quota allocations and harvesters say that their communication with SA DEH usually involves them contacting SA DEH to discuss issues relating to quota allocations and tags. Landholders and harvesters feel that they have much to offer to decision-making for kangaroo management because of their local knowledge. But they consider that the knowledge they hold is not valued by administrators. Also, as discussed above (see page 31), they find it necessary to ignore the rules of the management system in order to achieve their own goals, most notably by ‘tag swapping’.

Landholder and harvester dissatisfaction with the quality of their communication with SA DEH leads them to distrust the management system. For example, some are very critical of the methods used by SA DEH to determine kangaroo populations. They are critical of the cost of aerial surveys and the validity of population estimates that are based on them, especially because surveys are done during the day when kangaroos are difficult to see because they are not active.

They fly around when [the kangaroos are] all asleep, during the middle of the day, then they count what they see...Ray Charles may as well do it! (Landholder)

Landholders and harvesters who participated in this study suggest that SA DEH would get better information about kangaroo movements and abundance if it consulted directly with them and put less reliance on aerial survey.

Hauser et al. (2006) have found that the value of conducting an aerial survey increases with uncertainty of previous year’s population estimate and the occurrence of above average rainfall. They weighed the cost of conducting aerial surveys with improvements to decision-making for kangaroo management and found that optimal monitoring effort depends on rainfall over the previous year and the period of time that has elapsed since the last monitoring event. They have found that it is not cost-effective to conduct aerial survey each year. They conclude that an alternative system that uses long-term population data and rainfall data with periodic aerial survey would be more cost effective than annual aerial survey. We consider that combining this change with improved communication between SA DEH, landholders and harvesters could also make local knowledge of kangaroo population dynamics more accessible to SA DEH managers and build stakeholder confidence in the management system.

Landholders and harvesters are also critical of the SA DEH approach to culling overabundant kangaroos in national parks, and of landholders who cull under ‘shoot and lie’ permits. ‘Culling’ is the destruction of kangaroos without utilisation (see Box 4). We did not raise this issue with research participants but some, particularly harvesters, volunteered their concerns (see Table 25). Aboriginal people also have strong views against the culling of kangaroos (see page 70).

#### **Box 4: Kangaroo culling**

The South Australian kangaroo management plan provides for overabundant kangaroos in national parks and on pastoral leases to be culled. In contrast to harvest, culled animals are not used.

Landholders require a destruction permit under section 53 of the *National Parks and Wildlife Act 1972* before they are permitted to cull kangaroos. Destruction permits are granted where high kangaroo numbers are causing damage to the natural or agricultural environment and commercial harvest is not possible or feasible. This may be because the area is not in the commercial harvest zone or commercial harvest is not financially viable (SA DEH 2002a).

Kangaroo culling also takes place in some South Australian national parks including Flinders Ranges National Park. Kangaroo populations may build up to high levels in parks and reserves that are within the Dog Fence, which excludes dingo predation. SA DEH conducts periodic culls in order to reduce high kangaroo populations and protect the ecological values of parks and reserves. Although SA DEH opts to cull overabundant kangaroos, 'commercial utilisation of kangaroos from a national park or reserve is allowable under section 60J of the *NPW Act*' (SA DEH 2002a, p. 22). The provision available to SA DEH to harvest, rather than cull, overabundant kangaroos in national parks has not yet been implemented.

**Table 25: Research participants who raised the issue of culling**

| <b>Research participant group</b> | <b>No. who raised culling as an issue</b> |
|-----------------------------------|---|
| Landholder (n=21)                 | 5   |
| Kangaroo harvester (n=14)         | 10  |
| Meat processor (n=4)              | 1   |

Landholders whose properties are close to Flinders Ranges National Park expressed their dismay at large numbers of kangaroos being destroyed in that park without utilisation. Through *Operation Bounceback* SA DEH is culling kangaroos in the park as one part of a strategic program to rehabilitate degraded habitats in Flinders Ranges National Park. Some landholders of pastoral properties in the region are also involved in implementing Operation Bounceback on their properties.

Landholders and harvesters who are opposed to culling consider it to be a waste of a valuable resource. In their view licensed kangaroo harvesters should be engaged and the carcasses should be utilised.

They should use that meat and skin. Bloody oath they should... A roo shooter should be able to go in there for a few months of the year and do his job... But I think the reason that Parks won't do it is because of the tourists. (Landholder)

# 5 Aboriginal people and the industry

Aboriginal research participants provided a range of views on the commercial harvest of kangaroos and on kangaroo management generally. The issues raised by Aboriginal research participants are presented here under five main themes:

- cultural and social significance of kangaroos
- access to kangaroos
- culling of kangaroos
- communication and action
- Aboriginal participation in, and benefit from, the commercial kangaroo industry.

More detailed findings and discussion are available in Davies et al. (2004) and Thomsen et al. (2006).

## 5.1.1 Cultural and social significance

Kangaroos are culturally significant to Aboriginal people. Most research participants also expressed the view very strongly that kangaroos, and other native wildlife, belong to Aboriginal people.

The specifics of cultural factors depend upon the particular belief system of different language groups and individuals. Table 26 summarises the cultural issues related to kangaroos brought forward by research participants. This section of the report provides some background to and discussion of these issues.

**Table 26: Cultural beliefs and practices**

| Western Desert cultural region (anangu)   | Northern Flinders Ranges (Adnyamathanha)   |
|---|--|
| Strong customary law associated with the harvest, preparation and distribution of red kangaroo (maḷu) | Red kangaroo and euro have cultural significance   |
| Some people have red kangaroo or euro as their personal totem   | Some people have red kangaroo or euro as their personal totem  |
| Eating kangaroo is very important to the physical and spiritual health of Aboriginal people           | Eating kangaroo is important to the physical and spiritual health of Aboriginal people, especially the elderly       |
| Buying kangaroo products harvested using non-indigenous practices/laws is not culturally appropriate  | Buying kangaroo products harvested using non-indigenous practices/laws is not culturally appropriate for some people |

### Western Desert

Maḷu (red kangaroo) is a pre-eminent figure in Aboriginal customary law. Culturally significant sites featuring maḷu extend across the Western Desert region. Maḷu plays a central and pivotal role in society and specific cultural practices are associated with the harvest and preparation of maḷu for eating.

Harvesting, preparation and cooking of maḷu is regarded as an important cultural event, essential for the maintenance of social structure. A person’s age, sex and social standing will influence what role (if any) they play in the harvesting and preparation of the kangaroo and will also determine which parts of the kangaroo they are entitled to. The matching of responsibility and benefit between various people involved in the harvest and preparation of maḷu acts like an ‘institutional glue’ binding Western Desert people together into a social system. It helps promote reciprocity in social relationships and sustainability in natural resource use, features of many close knit traditional societies.

Customary law sanctions anangu who do not follow these practices in relation to maļu. Anangu speak of the prospect of breaking customary law for maļu in a hushed tone of voice with the implication that the consequences are feared.

Maļu tjukurpa pulka. [Maļu is a big dreaming]. (Anangu research participant)

Anangu cook malu special way. Big trouble if you don't do it. (Anangu research participant)

Walypala [whitefella] way is wrong. We have traditional way of doing it in fire. All the man kill me if we do it [wrong]. (Anangu research participant)

Old people watch the young people when they are cooking it. (Anangu research participant)

Aboriginal people cannot readily accept or condone the commercial harvest of kangaroos in the Western Desert cultural region because of the great significance of maļu law to the cultural and social continuity in the region. A group of men from the Anangu Pitjantjatjara Yankunytjatjara lands who met with us at Amata stated very clearly that there should be no commercial harvesting of kangaroo in the Coober Pedy region and further north - the region where they are concerned for the strict application of that customary law. They stated that they would talk directly with government decision makers about these matters in a culturally appropriate context. Senior men from Coober Pedy and Oodnadatta expressed similar views about the unacceptability of commercial harvesting. However, they reluctantly acknowledge the activities of commercial kangaroo harvest as they consider that nothing they say will make a difference.

### ***Northern Flinders Ranges***

Adnyamathanha people also have important cultural connection with kangaroos. The red kangaroo (oodloo) and the euro (mundja) feature in their Dreaming for the creation of the Flinders Ranges. Adnyamathanha people have particular cultural practices for the harvest and preparation of kangaroos for eating which are important to them. These are different to those in the Western Desert region.

Adnyamathanha protocols are not sensitive to gender and extreme punishment for breaches does not occur. Nevertheless cultural protocols for kangaroos are important to many Adnyamathanha people. For example one Adnyamathanha research participant described the importance of speaking to the spirits before killing a kangaroo or euro, a practice also documented by Tunbridge (1991).

### ***Totems***

Both the northern Flinders Ranges and the Western Desert research participants discussed the importance of totems. The red kangaroo and euro are both totems for some Aboriginal people. Totemism involves close relationships between humans and aspects of the natural world that include responsibility for the species and may also restrain killing or consuming that species (Rose 1997). For example, Adnyamathanha people who have the euro as their totem regard themselves as brothers to the euro and as responsible for the welfare of the species.

Aboriginal people have totems and we don't eat our own totem. (Adnyamathanha research participant)

The Adnyamathanha practice of not harvesting or eating one's own totem species is different to the Western Desert region where people told us it may be possible to eat one's totem. Some Adnyamathanha people who have a species of kangaroo as their totem cannot buy packaged kangaroo meat because they cannot tell whether it comes from their totem species.

### ***Tails***

Aboriginal people commonly eat tails from commercially harvested kangaroos even if they will not eat other meat from these animals. One Adnyamathanha research participant described this as a 'cultural

adaptation'. One reason that Adnyamathanha people tend to only buy tails of commercially harvested kangaroo is that they can be certain they are not eating their totem species.

When someone buys a tail they can tell what species of kangaroo it is. (Adnyamathanha research participant)

Other reasons are related to traditional methods of cooking. The tradition of South Australian Aboriginal people is to sever the tail from the kangaroo and cook it separately from the rest of the carcass in an earth oven. Tails from commercially harvested kangaroo can be cooked in this traditional way - skin-on, roasted in an earth-oven.

### ***Health and well being***

People from both language groups stated that harvesting and eating kangaroo is important to the maintenance of social capital. Many stressed the importance of passing on knowledge about harvesting, preparing and distributing kangaroo and euro to younger generations. This requires that children learn about harvesting from older members of the community in appropriate settings. Teaching the traditional ways to children ensures vitality of culture and society.

Kids and old people go out bush to teach the kids about cooking kangaroo in traditional way. (Anangu research participant)

The nutritional qualities of kangaroo meat as a lean source of high protein are well documented (CSIRO 2004; O'Dea et al. 1988). The high health value that Aboriginal research participants attribute to kangaroo meat also comes from the cultural and spiritual values of kangaroos. People from the Western Desert referred to kangaroo meat as medicine that makes them strong and an Adnyamathanha elder talked about how 'the old euro' reared him up.

### **5.1.2 Access to kangaroos**

Aboriginal research participants raised a number of issues that impact upon their capacity to harvest kangaroos for food. These included finances, access to land for harvesting and availability of necessary equipment and licences. This was the most prominent group of issues raised by Aboriginal research participants.

#### ***Access to pastoral leases***

Most of the Aboriginal people involved in this research live in pastoral areas with relatively high kangaroo populations. South Australian legislation provides for Aboriginal hunting on pastoral leases (see Box 5, page 68). However access to pastoral leases can present problems in practice. A minority of landholders discourage Aboriginal access by locking gates or asking Aboriginal harvesters to leave the property. This was raised most by Adnyamathanha people.

A big issue is access to pastoral lands and [national] parks for hunting. Some pastoralists won't let Aboriginal people hunt on the station. (Adnyamathanha research participant)

There were other Adnyamathanha and Western Desert people who reported no problems accessing pastoral leases for harvesting. These are generally people who have good relationships with local landholders. Some Adnyamathanha people pointed out that if the Aboriginal harvester contacts the landholder and requests permission to harvest on the property then access will nearly always be granted. They say that contacting the landholder first allows the development of good relationships based on mutual respect. Good relationships with landholders are also a feature in the Oodnadatta region where Aboriginal people reported that access to land for harvesting is not a problem due to the support of local landholders.

Today pastoralist say it's okay to hunt. They respect and allow people to cook traditional way - they all right. (Anangu research participant)

Information from research participants suggests that most landholders in their regions comply with legislative provisions that provide for Aboriginal harvesting on their pastoral leases.

We spoke with four Aboriginal pastoral leaseowners during the course of this research. All were participating in commercial harvest by accepting quota allocations and engaging a harvester. However, they regularly accept less quota than they are offered because they believe they have a responsibility to ensure access to kangaroos for Aboriginal people that visit the property to harvest. Two of the Aboriginal landholders we spoke to would prefer to discontinue commercial harvest on their properties but say that neighbours and the Pastoral Board place pressure on them to participate in commercial harvest.

#### **Box 5: Legislation that provides for Aboriginal harvest of kangaroos**

Two pieces of legislation interact to allow Aboriginal people to legally harvest kangaroos on pastoral leases. The *National Parks and Wildlife (NPW) Act 1972* and the *Pastoral Land Management and Conservation (PLMC) Act 1989*. Section 68d of the *NPW Act* exempts Aboriginal people from the requirement for a harvesting permit if the harvested animal will be used '(a) as food for the hunter or for his or her dependents; or (b) solely for cultural purposes of Aboriginal origin.' Section 68 also states that 'it is not illegal for' Aboriginal people to harvest native animals 'from land that is not a reserve or a wilderness protection area or wilderness protection zone'. Section 47 of the *PLMC Act* provides for the right of Aboriginal people to 'enter, travel across or stay on pastoral land for the purpose of following traditional pursuits' except within designated distances from the homestead and constructed water points.

In relation to Aboriginal harvest in national parks, section 68d of the *NPW Act 1972* states that 'it is not illegal' for Aboriginal people to harvest animals from national parks 'in accordance with a proclamation permitting' harvest in that national park or 'in accordance with a co-management agreement'. A number of remote South Australian national parks in the far west that receive relatively few visitors have been proclaimed to permit Aboriginal harvesting (the Unnamed Conservation Park, Nullarbor National Park and Regional Reserve, Yellabinna Regional Reserve and Yumbarra Conservation Park). The Unnamed Conservation Park is now also subject to a co-management agreement. Aboriginal harvesting is not legally permitted in other South Australian national parks although some park managers do permit harvesting in practice under locally negotiated arrangements.

#### **Equipment and licences**

Aboriginal people across Australia now almost always use firearms and vehicles in hunting (Missi 1998; Altman et al. 1996). Localised resource depletion around towns and smaller settlements particularly in arid regions make accessing bush foods particularly difficult without motor transport (Walsh 1992; Cane & Stanley 1985). Research participants in both regions said it is often hard for Aboriginal people to harvest because they do not have registered vehicles, firearms, shooters' licences and/or drivers' licences.

Young people don't go out for maḷu – no car, no gun, no licence. (Anangu research participant)

Access to a firearm is a significant obstacle. Many research participants said that a firearm licence is difficult to obtain due to poor literacy and restrictions on people with a prior criminal conviction getting a licence. The people who are eligible to hold a licence and who have the literacy skills to take the necessary test say that the licence is expensive.

The very low average incomes of Aboriginal people in remote regions severely restrict their capacity to harvest effectively, for reasons such as the cost of running vehicles. This also impacts on Aboriginal people's attitude to commercial kangaroo harvest. From the point of view of Aboriginal people who have difficulties getting the equipment and licences they need to hunt effectively and without risk of police action, commercial harvesters can appear to have unfair easy access to a very important resource.

### ***Landholders and harvesters' attitudes to Aboriginal hunting***

We raised the issue of Aboriginal interests in kangaroos during interviews with landholders and commercial kangaroo harvesters. A majority of landholders and kangaroo harvesters support Aboriginal hunting on pastoral leases. Only one landholder (of a total of 21 interviewed) stated that he discourages Aboriginal hunting on the property. While landholders generally acknowledge the legal right of Aboriginal people to access pastoral leases, approximately half of the landholders interviewed would prefer Aboriginal people to contact them prior to access. The issue of safety is the main concern as described in the comment below.

If someone is driving around your property with a rifle, shooting, you want to know where they are and what they are doing and vice versa. I could be out there doing the same sort of thing, and not know that somebody is there. It's the safety aspect. (Landholder)

14 of the 21 landholders we interviewed said that Aboriginal people come to their property to hunt and for other traditional purposes. Almost half of the landholders interviewed raised problematic issues associated with Aboriginal access to pastoral leases including litter, liability and the combination of alcohol and firearms. Such concerns have also been raised in the other forums (see for example, Stark 2000).

That's where the problem is, as soon as they bring their motor cars, guns and their rubbish, then that's inconveniencing the grazier and that shouldn't be on. (Landholder)

In contrast to the above comment, all of the 14 harvesters we interviewed said that they experience no problems with Aboriginal people accessing pastoral leases to hunt kangaroo. Because harvesters work during the night contact between them and Aboriginal people generally occurs away from pastoral leases. Even so, nearly all of the harvesters interviewed displayed an understanding of the cultural importance of kangaroo to Aboriginal people. They are aware that Aboriginal people accept the tail of commercially harvested kangaroos and have some understanding of the difficulties that Aboriginal people may experience accessing kangaroos. Most harvesters interviewed during this study believe that Aboriginal people should receive some benefit from the commercial harvest of kangaroos and support the supply of kangaroo meat, particularly tails, to Aboriginal people at no charge (see also page 73).

### ***Impacts of commercial harvest on Aboriginal people***

Some Aboriginal research participants, mostly those who have worked on pastoral stations, accept commercial harvest as a necessary tool for managing total grazing pressure in the rangelands. A few research participants, spread over a wide area, said they were concerned about commercial harvest reducing kangaroo populations to levels that make it hard for Aboriginal people to harvest. These fears are perhaps not surprising given the relatively recent decline and extinction of other species (Morton 1990; Burbidge et al. 1988), localised declines of kangaroo populations in the Anangu Pitjantjatjara Yankunytjatjara lands (AWS 2005), and lack of involvement of Aboriginal people in decision-making about kangaroos and commercial harvest.

Some Adnyamathanha people stated that commercial harvesting should not happen on properties that adjoin Aboriginal land in order to ensure high kangaroo populations and ease of hunting by Aboriginal people. However no Adnyamathanha people gave examples of where they had actually experienced impacts on their own hunting from commercial harvest. In contrast, research participants in Oodnadatta spoke about the impact they experienced from commercial harvesting happening for the first time on some nearby stations late in 2003. Several months later they reported that kangaroos were scarce in the places they favour for hunting.

There used to be a lot of maḷu near the police station by the dam. Nothing there now. And out by the creek, now nothing. Went looking for maḷu, find nothing. (Anangu research participant)

They should ask us first. That is our food. Never had roo shooters here before. (Anangu research participant)

Another concern expressed was that commercial harvest may restrict Aboriginal people from accessing properties where it is taking place.

Don't want roo shooters in this area 'cause people free to go anywhere. (Anangu research participant)

One particular issue that Aboriginal research participants from both cultural regions see as important is the conduct of commercial harvesters in relation to cultural sites. Direct liaison between Aboriginal people (especially elders) and commercial harvesters was suggested to educate harvesters about places of cultural significance. Another suggestion was that the South Australian Government should address this issue as part of a broader plan to employ knowledgeable Aboriginal people to improve the awareness of pastoralists and kangaroo shooters about cultural issues on pastoral land. Some suggested that Aboriginal cultural awareness should be included in the training and qualification requirements for commercial harvesters.

### 5.1.3 Culling of kangaroos

The Aboriginal people involved in this research asserted their views about culling kangaroos very strongly. In both cultural regions Aboriginal research participants object to the waste of any animal – native or introduced. As previously outlined (page 62), other research participants - notably commercial harvesters - also raised their concerns about culling. Culling of red kangaroos and euros is particularly disturbing for Aboriginal traditional owners because of the special cultural, social and economic significance of these species to them.

Many Adnyamathanha people expressed their dismay at the culling of kangaroos in Flinders Ranges National Park. Adnyamathanha people have raised this issue often in the past, such as at the 1988 Emu Conference (Kean et al. 1988) convened by SA NPWS (now SA DEH) to seek direction from Aboriginal people on their aspirations for land management and in their input to the development of a national strategy for rangeland management (Johnston 1994).

Adnyamathanha people's feelings are further complicated by limited access to national parks for harvesting kangaroo. There is no provision for Aboriginal harvesting in Flinders Ranges National Park even though culling takes place there. To many Adnyamathanha people this disparity is contradictory and offensive.

Aboriginal people can't get a roo for themselves from Flinders Ranges National Park, but the white people can go in there and wipe them out [referring to kangaroo culling program]. What's happening there is bullshit. (Adnyamathanha research participant)

National Parks and Wildlife [SA DEH] breed roos, then cull them and put them into a big pit. It's a big waste. Up to five or six thousand roos are culled in this way. It makes Aboriginal people very upset. (Adnyamathanha research participant)

Many Adnyamathanha research participants advocate the establishment of an Aboriginal harvesting zone within the park as an alternative to culling.

A senior regional SA DEH representative explained the reasons why SA DEH culls kangaroos in Flinders Ranges National Park rather than harvesting them, as follows:

- SA DEH is a conservation agency and could expose itself to criticism as an exploiter rather than a conservator of wildlife if it used the kangaroos from national parks
- there are risks for the safety and comfort of park visitors to the park. During periodic culls SA DEH closes areas of the park to visitors in order to closely manage risks
- adverse public reaction is possible if visitors were to witness evidence of Aboriginal harvesting.

Adnyamathanha research participants spoke to us about the need to protect the safety of park visitors. Their ideas about a harvesting zone involve excluding park visitors from a designated area in order to manage risks to public safety. They consider that if culling continues to be necessary it should be done by local Aboriginal people and in close consultation with those Aboriginal people who have connections to the particular areas of land where culling is to occur.

An Adnyamathanha elder explained some of their earlier advocacy on this issue.

There was a community meeting about euros and people said that euros should not be shot and wasted. There is an Aboriginal professional kangaroo shooter and we asked for him to do the culling, but Parks and Wildlife [SA DEH] said that it would be too hard for him to do. Then they gave the job to a whitefella. (Adnyamathanha research participant)

Many Adnyamathanha research participants said that Aboriginal employment should be considered as a priority in planning of any required culling programs.

We could be employed to cull roos and goats or do fox control. We could do these things. The money that they are spending paying whitefellas to do these jobs could come back to the Aboriginal community. (Adnyamathanha research participant)

Kangaroo culling in national parks should be done by Aboriginal people who could be paid by the Parks and Wildlife [SA DEH]. Then they could give the meat to other Aboriginal people, especially the old people. (Adnyamathanha research participant)

Adnyamathanha people's experience of marginalisation from involvement in kangaroo management decisions in national parks on their traditional lands is not conducive to them developing positive attitudes towards the kangaroo industry.

#### **5.1.4 Communication with government**

Involvement in decision-making about kangaroo management and about the commercial harvest of kangaroos is important to all Aboriginal research participants. However most participants considered that their perspectives on kangaroo management are not valued by government and would not be incorporated into kangaroo management strategies.

Elders from Oodnadatta and Coober Pedy were most pessimistic. One commented,

Maybe we could tell them [about our issues], but they won't listen anyway. Their hearts and minds are closed. (Anangu research participant)

Adnyamathanha people draw similar conclusions.

The different views of the two Aboriginal groups we consulted about the commercial kangaroo industry and kangaroo management indicates that government efforts to 'promote and encourage the involvement of Aboriginal people in the management of kangaroos' (SA DEH 2002a, p. 29) will need to be different in different regions.

We asked Aboriginal research participants for suggestions about how their views should be incorporated into kangaroo management. Suggestions included:

- meetings with government agencies and industry representatives to discuss the issues
- an Aboriginal advisory council with representation from different cultural regions meeting a couple of times each year.

Some of the issues raised by Aboriginal research participants could be addressed directly by SA DEH in consultation with local Aboriginal people. The most notable example is the ongoing conflict about

culling activities in Flinders Ranges National Park. Other issues are larger scale and affect the operations of the kangaroo industry. Negotiations about these issues would need to include people involved in the industry as well as SA DEH.

### 5.1.5 Involvement in the industry and benefits

Because the two cultural groups involved in this research have different cultural protocols for kangaroos they have quite different views on what is appropriate in relation to Aboriginal involvement in the industry and benefits from the industry. Table 27 summarises these views.

**Table 27: Views of Aboriginal research participants on involvement in the industry and benefits**

| Western desert cultural region ( <u>anangu</u> )                           | Northern Flinders Ranges (Adnyamathanha)                                      |
|--|---|
| Meetings with government and industry to discuss kangaroo management       | Meetings with government and industry to discuss kangaroo management          |
| Aboriginal advisory council representing different cultural regions        | Aboriginal advisory council representing different cultural regions           |
| Financial return to Aboriginal people is not appropriate.                  | Small amount of profit from harvest should be returned to traditional owners. |
|  | Direct involvement in harvesting through employment or business opportunities |
| Supply of kangaroo tails to Aboriginal people at no charge is appropriate. | Supply of kangaroo tails to Aboriginal people at no charge is appropriate     |

#### **Western Desert**

Research participants from the Western Desert cultural region consider that their people should not be involved in the industry or get any financial return from the industry. The underlying reason is that involvement would imply approval of commercial harvest activities even though these are in conflict with their customary law.

#### **Northern Flinders Ranges**

The attitudes of Adnyamathanha people are quite different to those of Western Desert people.

One Adnyamathanha man has been operating as a professional kangaroo harvester – the only Aboriginal person to hold a commercial harvest permit in South Australia. His innovation involves supply of whole carcass kangaroos, skin on, to meet demand from Aboriginal people, particularly in Port Augusta (Thomsen & Davies 2005). To facilitate this, SA DEH offered him a nominal quota allocation that he could utilise on any property where he has the landholder’s permission to harvest. In order to sell kangaroo carcasses direct to consumers, he must also be accredited as a meat inspector. This has been one obstacle to him establishing his business and he now proposes to sell through an established meat processor. Another obstacle is his concern not to ‘step on the toes’ of other harvesters when approaching landholders for permission to harvest on their properties. He has asked SA DEH staff for a letter of introduction that he can present to landholders to establish his legitimacy.

Other Adnyamathanha research participants expressed interest in working as harvesters but had found it hard to get information about the costs and requirements. We compiled a description of establishment, running costs, permit and licensing requirements for harvesting for the information of interested Adnyamathanha people. In follow up discussions, they identified the stringent training and accreditation requirements and the cost of outfitting a vehicle as the greatest barriers. We discussed training options such as bringing TAFE accreditors to regional locations and sourcing local kangaroo

harvesters to train and mentor people in the practical aspects of the industry. We consider the latter options have potential because some established harvesters have positive relationships with Adnyamathanha people and an interest in accommodating Aboriginal interests.

Some Adnyamathanha research participants suggested that a small amount of the profit derived from the kangaroo industry should be returned to the Aboriginal group on whose traditional lands the animals are harvested.

The kangaroo industry should put money back into Aboriginal communities. Aboriginal people should also get a slice of other bush food industries like the quandong, native orange and medicine plants. (Adnyamathanha research participant)

The suggestion was for this money to be managed in a trust fund for scholarships, land management projects, improvements to health services or other community development goals. Some Adnyamathanha research participants also discussed the challenges that management of this money would raise in relation to community decision-making and governance.

### **Tails**

Both Adnyamathanha and Western Desert groups said that kangaroo tails should be supplied to Aboriginal people at no charge. They described this as an appropriate benefit to Aboriginal people because they consider themselves to be ‘owners’ of kangaroos.

The kangaroo industry is wasting the tails. Shooters are being told to leave tails in the paddock. But the tails should not be wasted, they should be given to Aboriginal communities. (Adnyamathanha research participant)

The issue of supplying tails to Aboriginal people was also raised by some landholders and harvesters who acknowledge a need for remote Aboriginal communities to have better access to healthy foods (see also O’Dea 1994; O’Dea et al. 1988). This is particularly pertinent in northern South Australia. The Anangu Pitjantjatjara Yankunytjatjara (APY) lands, where about 10% of South Australia’s Aboriginal population lives, have low kangaroo density compared to adjacent pastoral lands. Populations are particularly depleted close to large settlements adding to the cost of hunting (AWS 2005). Food is also very expensive in APY lands stores.

During our field research harvesters based near the APY lands were selling tails direct to customers at \$1.00 to \$2.00 per tail compared to prices of \$10.00 to \$12.00 in APY lands stores for tails transported from meat processors in Adelaide or Port Augusta. However the practice is illegal and harvesters were told by SA DEH in late 2003 to stop doing it. Aboriginal research participants asked us to raise their concerns about this action with government authorities. The SA DEH kangaroo management program coordinator subsequently agreed to explore the legal issues involved as a first step to understanding how it could be addressed.

## 6 Implications

South Australians eat more kangaroo than people in other states. More people have tasted it, more have cooked it and more people eat it on a regular basis (Purtell & Associates 1997). Yet the South Australian kangaroo industry appears to be in decline. South Australia has low harvest rates compared to other states, a much lower number of harvesters, and its harvesters get a lower price for kangaroos than in other states. The number of harvesters in South Australia seems to be declining further which is against the trend in other states (see Table 17, page 47).

Kangaroos are managed by SA DEH through a 'command and control' strategy. This involves considerable regulation, setting of annual quotas, tagging of harvested animals to show legal harvest, and requirements on all involved in the industry to hold permits and to provide information to SA DEH about their activities. Supply of kangaroo meat to markets involves further regulation in regard to hygiene standards. No-one in the industry fundamentally objects to this degree of regulation. They acknowledge that regulation is important to engendering consumer confidence that the industry is professional and hygienic and that the harvest is ecologically sustainable.

Some aspects of the regulatory environment for kangaroos are unique to South Australia because South Australia has a very defined allocation of quota to individual properties, unlike other states. The 2003 *Kangaroo Harvesting Regulations* implement this property level quota by requiring that each unit of quota for each species, represented by a coloured tag, is authorised for use only on one property by one harvester and one meat processor (SA DEH 2002b).

Some landholders support the allocation of quota to property because they consider it gives them power to direct harvest effort to reducing kangaroo populations on their property. Others say it doesn't allow enough flexibility to manage fluctuating kangaroo populations. Some harvesters support property level quota because it has allowed them to gain exclusive access to a relatively large amount of quota at no financial cost. This allows them to target harvest effort to the places within their 'territory' where they can harvest most efficiently at any particular time. Other harvesters find their opportunities to harvest are quite constrained because they can only secure access to relatively small amounts of quota.

South Australian kangaroo harvest rates have declined significantly since property level quota was introduced. South Australian meat processors import carcasses from interstate to meet steadily growing demand for their kangaroo products. Declining harvests and harvester numbers limit the benefit from the industry for South Australian people and landscapes. People in the industry consider that the industry has a wide range of social, economic and ecological benefits to regional communities and for sustainable management of rangeland vegetation and soils. However these benefits are not provided at an optimal level while commercial harvesting takes only 43% of the harvest quota and while this harvest rate is declining.

### 6.1 Fixing the system?

The interactions between people and kangaroos represent a complex system - that is a system in which every entity influences every other entity and no one entity is in charge. This is a 'social-ecological system', that is a social system 'in which some of the interdependent relationships among humans are mediated through interactions with biophysical and non-human biological units' (Anderies et al. 2004). In this case the relationships among landholders, harvesters and meat processors are mediated through their interactions with rangeland land condition and with kangaroos.

When a system is not working well, such as is the case in relation to kangaroo harvest in South Australia, people typically say someone should fix it. However no single person or organisation can fix a system such as this since no-one has the understanding or the power to influence all its components. Important components of the system such as social networks are self organising and not amenable to control. Hence uncertainty is high. It is also difficult or impossible to experiment to find

what changes to the system will work best. For these reasons it is not very useful to consider how the system can be 'fixed'. It is more useful to focus on improving the way people in the system interact (Anderies et al. 2004; Bar-Yam 2004).

Governments are important players in this system because of their responsibilities for conservation and sustainable use of kangaroos and other natural resources and for sustainable development of rangeland regions. They can have strong influence on the design of the few components of the system that can be designed and changed – the rules governing interactions amongst people and kangaroos. Governments have three fundamental ways to influence people to act in relation to such responsibilities: through incentives, through education and through regulation – the 'top-down' or 'command and control' approach. However the South Australian kangaroo management system relies almost exclusively on regulation.

Dietz et al. (2002) conclude that command and control management systems work well if:

- the system is well attuned to the environmental and social conditions that impact on the resource and its use
- there are sufficient resources for monitoring and enforcement
- there is no need to encourage innovation in the way people behave in relation to the resource.

These criteria do not apply to the social-ecological system of South Australian kangaroo harvest.

The South Australian requirement to tag every harvested kangaroo with a tag that is pre-allocated to a specific property, a specified harvester and a specified meat processor is very poorly attuned to the environmental and social conditions that impact on the kangaroo resource and its use. The process for setting statewide quota is well grounded scientifically such that quotas do reflect temporally variable environmental conditions impacting on kangaroo numbers at a broad scale. However property level quota allocation is not responsive on the localised temporal and spatial variability in kangaroo numbers that results from kangaroo mobility.

The system is also not well attuned to social conditions that impact on harvest rates. We suggest that both landholders, as indicated by their attitude that kangaroos are a resource not a pest, and harvesters, with their goal of efficient harvest, want to retain healthy populations of kangaroos. Their goals and their decision-making processes direct harvest activity to locally overabundant populations. As a result there is a very low risk that harvesting would threaten the viability of harvested populations. The strong emphasis through the command and control approach on restricting the quantity of harvest is mainly necessary to demonstrate that harvest is ecologically sustainable to a public that is familiar with and has confidence in such approaches to natural resource management.

The effectiveness of the command and control approach is also limited in South Australia because the management system does not have sufficient resources for monitoring and enforcement of its regulations. The apparent prevalence of tag swapping between properties by harvesters indicates that there is no enforcement of regulations that prohibit it. Harvesters have also commented on how little monitoring of their activities is carried out by SA DEH.

Tag swapping by harvesters threatens the credibility of the kangaroo management program and the kangaroo industry in South Australia. This vulnerability arises because swapping tags between properties contravenes regulations and also because it renders SA DEH harvest data unreliable except at a whole of state scale (see page 31).

There is a need to encourage innovation in the way landholders and harvesters manage kangaroos. However the command and control approach does not promote innovation. Innovation is important in supporting the attitudinal change that we have noted of landholders valuing kangaroos as a resource. It is also important in promoting harvest of overabundant kangaroo populations in areas where access is difficult. Innovation is important for extending markets and to develop opportunities for product

differentiation. These could include marketing of 'young tender kangaroo', different species, organically produced and 'fair traded' kangaroo. Quality assurance for such differentiated product relies on strong cooperative relationships along supply chains. These conditions are difficult for industry to establish when regulations restrict competition and force harvesters, landholders and producers into rigid relationships.

The irony of the inflexible regulatory environment for management of kangaroo harvest in South Australia is that it evolved out of a reform that intended to provide greater scope for market forces to influence harvest decisions. When property level quota allocation was introduced in 1996 SA DEH envisaged that landholders would trade quota and that property level quota allocation would therefore be very flexible. The option of trading would have meant that landholders who had no need to harvest on their properties could sell quota to those who needed to harvest more. This need might arise because good kangaroo habitat on their properties sustained high kangaroo populations or because locally overabundant populations were impacting on land condition.

Such market-based instruments have growing use in Australia and internationally as alternatives which can have substantial advantages over command and control systems (Whitten et al. 2004; Tietenberg 2002). However in the case of South Australian kangaroo quota, trading never became established amongst landholders. This is not surprising since landholders did not know much about it and there was no 'market place' – no easy way for people who wanted to sell quota and those who might want to buy it to communicate and trade. Experience with market-based instruments emphasises that good design, addressing these kinds of elements and many others, is critical to effective performance (Whitten & Young 2004).

Building a stronger kangaroo industry in South Australia requires building flexibility into the quota allocation system and attention to factors that influence harvester numbers and harvest rate, most notably lack of competition. Social dimensions also need to be accounted for if the industry is to be able to fully represent itself as sustainable. The rights and interests and aspirations of Aboriginal people present the main outstanding issue in this regard.

## **6.2 Competition and cooperation**

Competition and cooperation need to both be present in a dynamic balance for a complex system to work (Bar-Yam 2004). Both are important to the effective operation of kangaroo management and the kangaroo industry. Harvesters, meat processors and the management authority need to cooperate to maintain compliance with the rules established in legislation and harvest standards because compliance is important to consumer confidence in kangaroo products and to grow markets. Access to kangaroos relies on landholders also being part of this cooperative system. Competition is also critical because it promotes innovation by people in the industry and efficient production. Without competition it is not possible for market signals about the value of kangaroos to influence decisions of harvesters and landholders about kangaroo management.

At present competition is very constrained in the South Australian industry. Landholders are effectively locked into reliance on a single harvester and harvesters are effectively locked into a contract with a single meat processor. Lack of competition limits the need for meat processors to use price signals to promote supply from harvesters. Low rates paid to harvesters are an outcome. The cost-price squeeze on harvesters contributes to it being an unattractive livelihood which contributes to the apparent decline in harvester numbers.

### **6.2.1 Impediments to cooperation**

We have found that the closest relationships amongst people involved in the industry are between harvesters and landholders. They communicate most closely and are dependent on each other to meet their own goals – landholders in relation to reducing kangaroo numbers at times of high local populations as part of their management of total grazing pressure and harvesters in relation to being

able to access locally high populations for efficient harvest. Like harvesters, landholders regard kangaroos as a resource, even though they find that it is a resource whose economic value they cannot realise personally.

Both landholders and harvesters have a low level of communication with SA DEH and lack trust and confidence in the South Australian Government's management system for kangaroos. One reason is that the value of their local knowledge of kangaroos is poorly acknowledged in that system. They rely on their local knowledge and their relatively high degree of mutual trust in making harvest decisions rather than conforming to inflexible SA DEH prescriptions about how many kangaroos may be harvested on a particular property. They are tacitly complicit in breaking the regulations that require kangaroos to be tagged with a property specific tag because the regulations do not give them sufficient flexibility to pursue their own goals in relation to this mobile resource. These goals are important to the sustainability of rangeland landscapes. Management of total grazing pressure is important to maintaining ecosystem resilience. Efficient harvest is critical to harvesters' financial viability which contributes to social fabric of rangeland landscapes by supporting the maintenance of populations and a diversity of enterprise.

We have found that landholders do not have good information on the actual harvest from their properties and may think that harvesters are taking more kangaroos from the property than is actually the case. However because landholders' primary goal is the management of total grazing pressure, they will be judging the harvesters' performance by the outcome – by whether kangaroos are impacting unduly on the grazing resource, especially on vegetation that is regenerating after rain - rather than by the actual numbers of kangaroos that are harvested. If the outcome is good, a landholder will continue to place trust in a harvester.

There is a degree of cooperation amongst Aboriginal people, harvesters and landholders and some similarities of views about kangaroo management in spite of differences in cultural background. Although the research raised some points of friction in their relationships, for the most part these groups co-exist in their respective uses of pastoral lease land, including for Aboriginal hunting of kangaroos. Harvesters and Aboriginal people also tend to accommodate each other's interests at a personal level.

Culling programs for kangaroos impact negatively on the attitudes of some harvesters, landholders and Aboriginal people towards SA DEH even though culling is an issue that sits outside the ambit of SA DEH's management of commercial harvest. Some members of each of these three groups have encountered kangaroo culling programs such as occur in national parks to reduce kangaroo grazing impacts on conservation of other species. These people are strongly of the view that kangaroos should not be shot to waste. Their attitude is conditioned by the economic value that kangaroos have to them and by non-economic values. Aboriginal culture demands respect towards red kangaroo and euro in particular as species which have totemic and ceremonial significance and whose stories contribute to explaining the genesis of landscapes and human society. For commercial harvesters the culling of kangaroos represents loss of potential income and waste of a valuable resource.

Cooperation and trust amongst harvesters is generally weak. One indication is that their own organisation struggles for membership. Harvesters do in effect cooperate in a shared strategy of not shooting kangaroos which have detectable dependent joeys in order to look after their collective 'stock of the future'. They also articulate some strong shared norms such as not 'poaching' on each other's territory and resisting payment of access fees to landholders. However the lack of active communication networks amongst harvesters, in part due to the solitary and dispersed nature of their work in sparsely populated regions, means that these norms do not effectively self-regulate all harvesters' behaviour. There is a strong feeling amongst harvesters and meat processors that the monopoly position that some harvesters have over large amounts of quota is not fair. This undoubtedly impacts on levels of cooperation amongst harvesters and on adherence to norms such as not poaching on each others' territory.

## 6.2.2 Impediments to competition

Prices paid to South Australian harvesters for kangaroo carcasses are typically 20% lower than in other states. This impacts on harvesters' gross profit. It reduces the attractiveness of harvesting as a livelihood and leads licensed harvesters to put less effort into harvesting and more into alternative work that pays better.

The allocation of each unit of quota to one property, one harvester and one meat processor inhibits competition in the South Australian industry by making it hard for harvesters, landholders and meat processors to change their alliances. Because harvesters are effectively locked into a relationship with a single meat processor, meat processors do not need to use price signals to attract harvesters to sell to them. This contributes to establishing the low price typically paid to South Australian harvesters.

Harvesters are tied to one meat processor in three interrelated ways:

- nomination for a property
- purchase of tags
- chiller ownership.

Harvesters may only legally sell kangaroo carcasses to the meat processor nominated to SA DEH by the landholder of the property where the kangaroos are harvested. It is possible for a landholder to change nomination of meat processor or harvester but it is a cumbersome process (see page 29). In any case it is generally the meat processor who purchases sealed tags from SA DEH for the kangaroos that will be harvested from the landholder's property. The regulations provide that landholders may also purchase the tags but we found no cases where this actually happens and we expect it has only happened in rare instances where landholders have been involved in 'paddock to plate' processing.

In purchasing the tags the meat processor discharges the statutory obligation to pay royalty on each kangaroo to SA DEH as well as acquiring the means to establish that the kangaroos they process are legally harvested. The harvester is reliant on the meat processor to supply these tags to the harvester prior to them commencing harvest. The harvester can not then sell kangaroos bearing these tags to any other meat processor. Meat processors also own the chillers where harvesters deposit and store the carcasses of harvested kangaroos. Chillers are collected by transport operators contracted to the meat processor. Harvesters who might seek to change meat processors hence face numerous barriers to doing so. It is not surprising that harvesters do not often change the meat processor they sell to.

One option to increase competition appears to be available under the current system of property level quota. This is for landholders to nominate more than one meat processor and harvester for their property and allocate each meat processor/harvester only part of their quota. By expanding the number of meat processors/harvesters that hold some quota for the property, the landholder would increase the likelihood of harvest effort being expended on the property. In practice the harvest effort of harvesters who also hold quota for other properties and who engage in tag swapping would not be limited by the fact that they only hold a partial quota for the particular property they are harvesting on. This option could benefit those landholders who want a higher level of harvest on their property than they are able to achieve under the current practice of nominating only a single meat processor/harvester.

## 6.2.3 Incomplete property rights

Property level quota has extended a limited property right over kangaroos to South Australian landholders. Landholders may harvest a specified number of kangaroos on their property provided the harvest is carried out by a nominated licensed harvester who sells to a nominated licensed meat processor. Some landholders realise a small financial return from this property right. However nominated harvesters can free-ride on this institution by 'tag swapping'. Tag swapping illustrates the difficulties of excluding unauthorised use of kangaroos.

Tag swapping could be reduced or eliminated through increased enforcement effort, such as random field checks during harvesting and at chillers. SA DEH could also mandate use of new technologies such as bar-coded tags and scanners that geo-code harvesting location. This would increase the likelihood that harvesters who swap tags between properties are detected and sanctioned. However such a change would remove the only mechanism that harvesters and landholders have to introduce flexibility into the management system as they need to do to manage locally fluctuating kangaroo populations. The outcome of removing this flexibility would likely be a further decline in statewide harvest rates.

No landholders participating in this study were interested in establishing complete private ownership of kangaroos such as would enable them to ranch or farm kangaroos. Hence we have not given much consideration to the issues that kangaroo farming raises. It could be effected in Australia in a similar way to game ranching in some African countries (see page 5) but faces a number of impediments. Commercial opportunities from kangaroo farming are likely to be more constrained than those from game ranching in eastern and southern African rangelands. This is because African rangelands support a diverse suite of large mammal species that allow landholders to sell a range of meat products, tourism and recreational hunting experiences. Landholders' return on investments in kangaroo-proof fencing would almost certainly be lower than that from fencing African game ranches because of the more limited range of products, if not also because of the lower productivity of Australian rangeland ecosystems, and the small per unit biomass of kangaroos. The prospect of kangaroo farming also raises a suite of other issues that are outside the scope of this research. These include the impact on kangaroo population genetics of isolating a kangaroo population on a farm, the impact on animal health of higher population densities in fenced areas, and the lower productivity of kangaroos compared to domestic livestock.

### **6.3 Establishing competition**

Introduction of property level quota ten years ago and its evolution to the current system has had a range of perverse outcomes in South Australia. We consider that the current system of quota allocation is constraining development of the kangaroo industry and benefit to South Australia from the industry. It constrains both competition and cooperation amongst people involved in the South Australian harvest. Its negative impact on harvester access to quota and on harvester gross profit are undoubtedly reasons why harvest rates and harvester numbers are declining in South Australia. We have not identified any reasons to support retention of property level quota in its current form other than the concern of some landholders that they may not be able to attract harvesters to their property without the enticement of access to their quota. However, as we have discussed, landholders do not get good information about actual harvest levels on their property under the present management system. Hence their conclusions about the positive value of property level quota for promoting harvest on their property might be misinformed.

Property level quota could provide for the flexibility required to manage mobile and fluctuating kangaroo populations under some conditions. These would include:

- making purchase of tags the responsibility of landholders
- re-establishing the option to trade property level quota
- good awareness amongst landholders about the option to trade
- a market place where buyers and sellers can interact efficiently
- no requirement for landholders to nominate specific harvesters or meat processors for properties
- effective measures to eliminate tag-swapping, such as through geo-coded tags.

A critical assessment of this option would be likely to find that the low financial value of kangaroos and the small size of the South Australian industry does not warrant the cost required for effective design and implementation of such a system. Hence we conclude that the best option is to abandon property level quota allocation.

### **6.3.1 Allocating quota to regions**

The commercial kangaroo harvest in other Australian states (Queensland, New South Wales, Western Australia and Tasmania) operates under a quota allocation system based on regions or zones. South Australia is now developing reforms so that its kangaroo management system allocates quota to regions rather than properties (Lisa Farroway, SA DEH pers comm. 2006). This change will engage the management system at a scale more appropriate to the characteristics of the kangaroo resource.

### **6.3.2 Access to quota/tags**

In other states that operate a regional or zone allocation system for quota, it is harvesters who purchase the tags that they are required to attach to harvested kangaroos. In doing so harvesters pay the government management authority the royalties that are prescribed and also obtain the means to show that the kangaroo carcasses in their possession are legally harvested.

Some South Australian harvesters are concerned about the cost implications for them of a change to the current system in which it is typically meat processors, or rarely landholders, who purchase the tags. South Australian tags are more expensive than those in other states and need to be paid for upfront. Harvesters on tight margins are concerned about the impact that paying for tags would have on their cash flow. However we consider it likely that meat processors and harvesters will cooperate where harvesters have difficulty paying the upfront cost of the tags. Meat processors are likely to advance money for tag purchase to harvesters who they have a good relationship with in return for the right to purchase the carcasses harvested.

Payment mechanisms, transport of the tags to harvesters, and refunds for the cost of unused or expired tags also need to be considered in a shift to harvester purchase of tags. Compared to the current system, SA DEH would be selling tags to many more different individuals since there are only five meat processors in South Australia and 79 harvesters. These more complex transactions will need to be efficient to avoid delays to harvesting because payments have not been made, or processed, or tags despatched or received.

### **6.3.3 Permission to harvest on a property**

Under a regional or zone allocation of harvest quota, harvesters would still require landholders' permission to access properties for harvest activities. This is a requirement under the *National Parks and Wildlife Act 1972*.

Landholders could authorise a single harvester or multiple harvesters depending on their preference. Landholders would not be authorising harvesters to take any set number of kangaroos since there would be no quota allocation to their property. However we can expect that landholders would continue to encourage harvesters to come to their properties when populations are high and that

harvesters would continue to want to harvest at these times. The quality of the relationship between harvesters and landholders would continue to be determined by whether harvesters and landholders support each other to achieve their respective goals. We can also expect that the quality of the relationship will determine whether or not a landholder authorises particular harvesters to work on their property in successive years. No regulation is necessary to achieve any of these outcomes as they arise from landholders and harvesters acting in their own interests.

#### **6.3.4 Harvest data**

Under the property level quota system harvesters are required to provide returns to SA DEH about their level of harvest on a property. However we have found that tag swapping means these data are not accurate. SA DEH could still require harvesters to provide data on their harvest on individual properties under a regional or zone quota allocation system. We would expect that harvesters would be more truthful on these returns than they are at present since regulations would not require them to limit their harvest to a specified level on any particular property. Hence more reliable property level harvest data is likely to be collected than at present.

New technologies such as bar-coded tags and scanners that geo-code harvesting location could potentially make it easier for harvesters to provide accurate data on where they harvest. They would also make it easier for SA DEH to process data and monitor harvest rates in different parts of the state. Because harvesters would no longer face the threat of sanctions from SA DEH through breach of property level quota rules they would be much more likely to cooperate in the introduction of such new technology than at present.

#### **6.3.5 Chillers**

Under a system of regional quota allocation harvesters would continue to be tied to particular meat processors because meat processors own the chillers where harvesters store carcasses post-harvest. We consider that the small size of the harvest in South Australia and the relative lack of towns and transport infrastructure makes it unlikely that a system of ‘chiller depots’ such as exists in other states would be viable in most of the commercial harvest zone. Some harvesters have suggested that they could own their own chillers and contract their own transport to the meat processor they choose to supply to. Those harvesters who could not afford to purchase and maintain their own chiller could enter into an agreement with a particular meat processor. Some meat processors would be likely to provide that support to harvesters who they have an established relationship with as a way of promoting secure supply.

#### **6.3.6 Price paid to harvesters**

The changes discussed above would establish a much higher level of competition in the various transactions involved in the kangaroo supply chain in South Australia. They would allow at least some harvesters to supply to meat processors who offer the best price. Harvesters whose product is in demand could potentially command a higher price than at present. This may flow on to increases in the typical price for carcasses.

#### **6.3.7 Relationships**

This research has highlighted the importance of relationships amongst people involved in the industry. Relationships between harvesters and landholders in particular have substantial influence on how harvest happens. We consider that relationships will continue to be important even with the establishment of competition along the lines that we discuss above. Not everyone will make their decisions based solely on their assessment of financial costs, benefits and risks.

Establishing competition in the industry would mean that harvesters, landholders and meat processors have the capacity to choose whether relationships or price are more important to them. A supply chain that recognises and values the importance of relationships is likely to be more stable than one based on

price alone. We expect that landholders will continue to value their relationship with harvesters and the contribution of harvesters to human and social capital on their properties and regions. Harvesters will continue to value close and supportive relationships with meat processors where these exist. Some harvesters will almost certainly decide to continue to supply to particular meat processors because of their established relationship even where other meat processors are offering a higher price.

## **6.4 Increasing harvest rate**

Establishment of competition along the lines discussed above would address some factors that impact on harvest rate. For example, the situation of some harvesters holding down more quota or territory than they can harvest would not arise. One reason is that exclusive access to one property by a single harvester would be far less prevalent. Another reason is that harvesters would have to pay upfront for the purchase of tags and will therefore have financial incentives to limit their tag purchase to what they can reasonably expect to harvest.

There is potential for targeted incentives to be used to encourage individual harvesters to put more effort into harvesting. We have noted that if all currently licensed harvesters had harvested 6,000 kangaroos per year between 1997 and 2004, South Australia would have harvested 77% of the quota on average each year rather than 43% as actually occurred. We also consider that it is in the best interests of the industry, and the broader community, to encourage harvest as a full time occupation as is the case where harvesters are taking 6,000 or more kangaroos in a year. Full time harvesters are more likely to be more skilled because they are more practiced. High skill levels will promote the highest standards in animal welfare and hygiene.

SA DEH could introduce incentives for higher harvest rates such as by a rebate of permit fees or of part of the royalty paid through tag purchase when a harvester reaches a threshold level of annual harvest. Setting this threshold at 6,000 kangaroos per year would mean it applies only to those harvesters who take significantly more than double the average number of kangaroos taken annually in recent years by each South Australian harvester. Alternatively royalty/tag price could decrease at several thresholds such as 2000, 4000, 6000 and 8000 tags. Combining this with staged allocation of tags to individual harvesters, and with bar-coded tags or a similar system that promotes efficiency in monitoring the rate at which tags are used, would promote access to a higher proportion of the overall quota by the most efficient harvesters. Such an incentive structure would encourage licensed harvesters who may be operating 'part time' or who now need to supplement their income through other work to put more effort into harvesting. Incentives could be planned to be cost-neutral as there would be increased revenue to the kangaroo management program through the higher levels of harvest resulting from the incentives.

Efforts to increase harvest rate also require attention to attracting more people to start working as harvesters. The number of harvesters in South Australia is much lower than other states and appears to be in decline. This trend is likely to continue given that many harvesters are approaching retirement age.

Incentives to attract new industry entrants could include apprenticeship schemes such as are in place in Queensland (see page 56). Clear pathways and support for prospective industry entrants to plan their businesses and secure loans for start up costs would also assist. Mentoring and field training by established harvesters would increase the prospects of new industry entrants establishing successful businesses. KIAA and KIRG are established organisations that might assist with such initiatives. South Australian Government agencies that could play an important role include PIRSA, the Northern Regional Development Board, and Indigenous Business Australia in the case of Aboriginal people.

It will not be easy to develop a coordinated strategy to support new entrants to the industry because the industry is small and the people involved it are scattered and do not communicate much with each other. The present environment of impaired cooperation and competition makes it unlikely that people in the industry will cooperate in such strategies. The greatest chance of success will be if incentives to

attract new industry entrants are developed and implemented in conjunction with changes to the management system that address impaired cooperation and competition and promote robust adaptive governance.

#### **6.4.1 Realising value for landholders**

Introduction of property level quota allocation in South Australia aimed to promote financial return to landholders from kangaroos on their property. We estimate that about 10% of South Australian landholders in the commercial harvest zone receive \$1.00 per kangaroo harvested from their property. This money is paid to landholders by small meat processors who want to maintain relationships with these landholders in order to retain access to the quota that their harvesters hold. Although kangaroos are not a profitable production option for landholders at present, this could change if demand for kangaroo products increases markedly, as could potentially happen as a result of increased consumer awareness of the health values of kangaroo meat. It is important that the management system provides for financial return to landholders so that markets can influence their future decisions about whether to focus on livestock or kangaroo production.

If property level quota allocation is discontinued, as we consider is necessary to re-establish competition in the South Australian kangaroo management system, landholders could continue to negotiate a financial return from harvesting on their properties. Landholders would negotiate with harvesters rather than with meat processors as is currently the case. However we expect that harvesters and meat processors would work together closely in these negotiations where they have a strong relationship established. Landholders could choose to negotiate directly with harvesters who they know, or to advertise for interested harvesters, or to tender for a harvester to harvest on their property, or to engage in harvesting themselves.

#### **Access fees**

Landholders could not seek a fee for access to quota through negotiations with harvesters if property level quota allocation no longer existed. They might however seek a fee for access to their property for harvesting. Landholders who choose to do this could consider various options for structuring a fee. For example the fee could be based on the number of kangaroos harvested, or it could be for exclusive access, or for time-limited access. Because SA DEH has been advising landholders for several years about the size of the annual allocation of harvest quota to their properties, landholders can be expected to go into negotiations with harvesters about such fees with a reasonable idea of the level of potential harvest from their property. Those landholders with abundant kangaroos, good habitat and easy access for harvesting will be most likely to be successful in securing a financial return through an access fee.

Although the prospect of financial return from harvester access might appear on face value to be straightforward, it does present legal, public policy and moral issues in relation to pastoral lease land. This is because landholders of pastoral lease tenures have limited property rights. In South Australia they have rights to use natural forage and water resources sustainably for the grazing of livestock and to erect improvements necessary to do this. Other resources on pastoral leases are ‘non-pastoral resources’ and the private rights of the pastoral leaseholder do not necessarily extend to these. The *Pastoral Land Management and Conservation Act 1989*, which governs pastoral leases and their management in South Australia, provides that a pastoral lease is a lease ‘for pastoral purposes’. Pastoral leaseholders who participated in this research are clear that kangaroo harvest and access for kangaroo harvest are necessary to effective management of the lease for pastoral purposes. Nevertheless it is not clear that pastoralists’ rights under the lease extend to the right to charge a fee for access to kangaroos on their lease area.

#### **Native title**

One significant reason for uncertainty about the right of pastoral leaseholders to charge an access fee for access to kangaroos is that non-pastoral resources on pastoral leases are common pool resources managed by the state subject to native title (see Davies 2006; Productivity Commission 2002).

Unpacking the meaning of this statement is a complex exercise. Typically the issues that native title raises are approached solely from a legal perspective and they can be difficult to resolve without lengthy and costly court cases. The situation is also different in different states because of the different characteristics of pastoral lease tenures and of the surviving rights of native title holders. For example in New South Wales, native title has been found to have been extinguished on leasehold land in the Western Division. However it may survive at law on South Australian pastoral leases provided that the native title group has maintained a connection with land in the lease area. In that case, native title rights are property rights that coexist with the rights of the pastoralist under the lease and must give way to those rights in the event of any inconsistency.

South Australia has established an approach to resolving uncertainty arising from native title in a way that emphasises building relationships between pastoral lease holders, native title groups, government and other interested parties. The various parties talk about their respective issues and interests and negotiate ways forward that everyone can agree on. This approach – known as the statewide Indigenous Land Use Agreement (ILUA) process - is unique to South Australia. It involves representatives of mining, fishing and pastoral industries as well as government and native title groups. The process involves negotiations between local stakeholders in parallel with forums that address policy and legislative issues that may impact on the capacity of local stakeholders to reach agreement.

The aim of parties to the South Australian statewide native title process is to ‘achieve certainty over access to and sustainable use of land, water and resources through negotiated recognition and just settlement’ of native title issues (Dixon & McKenzie 2005, p.3; and see Dixon et al. 2004; Agius et al. 2004; 2003). After five years of building relationships, scoping issues and piloting negotiations, the process is characterised by participating parties as now having the potential to rapidly resolve native title claims throughout South Australia (Dixon & McKenzie 2005). Outcomes to date in the pastoral sector include ILUAs between two pastoral lease holders and native title groups. Negotiations between native title groups and pastoral lessees are now underway for a number of contiguous pastoral leases in two regions of the state. The outcomes are progressively changing perceptions that resolving native title claims on pastoral leases is a zero sum game where indigenous people only ‘win’ if pastoral leaseholders ‘lose’ (Davies 2006).

### ***Opportunities through negotiated agreement***

Negotiated approaches are increasingly advocated as the most practical and effective way forward for developing mechanisms that secure cooperative coexistence and mutual benefit between Aboriginal and other stakeholders with rights and interests in land and resources (Farley 1999). The South Australian statewide ILUA negotiations process is a mechanism that is well structured to consider how the rights and interests of pastoral leaseholders, native title groups, the public and industry stakeholders can best be accommodated in kangaroo management on pastoral leases.

Specific issues have arisen in this research that might usefully be addressed in this statewide process. They include financial return and other direct benefits to landholders and to Aboriginal people from kangaroo harvest, and low level conflicts between commercial and Aboriginal harvesting. The process also has potential to foster relationships that might catalyse innovative landholders, harvesters and meat processors reaching agreement with a native title group about harvesting kangaroos in a way that the native title group would endorse as fair and just. Such an agreement would open the door for marketing some kangaroo product as ‘fairly traded’ as further considered below.

### **6.4.2 Addressing Aboriginal aspirations**

The participation of Aboriginal people from two cultural groups in this project has revealed that Aboriginal people hold a wide range of different views about the commercial kangaroo industry and have varied aspirations for kangaroo management in South Australia. Two messages come through clearly. One is that a ‘one size fits all’ approach to Aboriginal issues will not be appropriate or adequate. Another is that Aboriginal people want to be included in decision-making processes for

kangaroo management. There is scope for the industry to generate support from Aboriginal people by listening to and respecting the perspectives and priorities of different language groups. However it will not be easy to accommodate all these perspectives in management given the cultural values of kangaroos. This research has particularly highlighted cultural sensitivity associated with maḷu (red kangaroo) in the Western Desert region of South Australia. This can be expected to have a significant influence on how Aboriginal people in the Coober Pedy-Oodnadatta-Marla area might respond to opportunities to be involved in decision-making about kangaroos and their management.

Improved understanding and accommodation of Aboriginal aspirations in kangaroo management and the kangaroo industry will place the industry in a more secure position. Conversely the lack of consideration of Aboriginal perspectives may inhibit industry development in the long term. Natural resource based industries are being challenged to demonstrate their sustainability on social grounds as well as ecological grounds (WRI 2002). As Davies et al. (1999) have previously argued, although widely recognised as ecologically sustainable, the commercial harvest of kangaroos is not yet demonstrating social dimensions of sustainability. The lack of consideration of social and cultural issues in general, and issues for Aboriginal people in particular, in industry planning and development will ultimately limit recognition of the industry as sustainable.

Aboriginal-endorsed products are likely to have increasing market appeal because of widespread support for reconciliation amongst the Australian public, strong and growing public endorsement of the importance of Aboriginal culture to Australia (Roy Morgan Research 2006) and the growing market share of 'fair traded' produce. Research being conducted by the Desert Knowledge CRC in its Bush Foods, Bush Produce and Desert Branding projects aims to promote benefit to Aboriginal people, other desert people, and industries from wild harvested produce and other products that incorporate 'desert knowledge' (see DK-CRC 2004). This research is anticipated to offer lessons for the kangaroo industry. Suggestions made by Adnyamathanha people in the course of this research about a trust fund to provide for education scholarships and other Aboriginal community initiatives begin to suggest how benefit could flow from a scheme that brands and markets 'fair traded' kangaroo product.

## **6.5 Robust adaptive governance**

Kangaroo management needs to be adaptive because kangaroos are a dynamic resource and people and kangaroos are part of a dynamic social-ecological system. Dietz et al. (2002) identify strategies that show most promise of being effective in organising human activity in such systems. These are:

- dialogue among interested parties, officials and scientists
- a mix of institutional types, including layered institutions
- designs that facilitate experimentation, learning and change.

Here we consider how these strategies relate to the findings of this research and what implications they suggest for designing a kangaroo management system that will support industry development, conservation and sustainable use of kangaroos in South Australia.

### **6.5.1 Dialogue**

Dialogue involving resource users, scientists, officials and other interested people is critical to robust governance in social-ecological systems. This needs to include well structured consideration of key information.

Different people have different ideas about what constitutes valid knowledge for resource management and different processes for using information to constitute that knowledge. Dialogue is needed to build mutual trust in information. The process of various people presenting their perspectives on information, considering other people's perspectives and information gaps can also produce better information (Wilson 2005; Dietz et al. 2002).

Science knowledge, local and indigenous knowledge can all contribute valid knowledge for kangaroo management. Science provides the knowledge base for biology and life histories of harvested species, large scale changes in kangaroo populations and predictions of future population trends. People who live and work in the rangelands know a lot about kangaroo density, movements and habits, particularly at local and regional scales. Experienced harvesters have a detailed understanding of aspects of kangaroo behaviour and where kangaroo density is likely to be greatest under particular weather or seasonal conditions. Observational data from harvesters about the size distribution of kangaroo populations could also be valuable in addressing the question of the extent to which harvest rate is limited by meat processors requirement that dressed carcasses weigh at least 14 kg (see page 34). Landholders have intimate knowledge of features of their property that are relevant to kangaroos, in particular water points and available feed. Indigenous knowledge is based on long-term cultural association with kangaroo species. Some Aboriginal people also have detailed knowledge of aspects of kangaroo behaviour from observations including during hunting. Meat processors have significant knowledge at local and broader scales about trends in supply of carcasses and about markets for kangaroo products.

This research has found that SA DEH currently has strongest communication with meat processors and little communication with harvesters and landholders. Landholders, harvesters and indigenous people consider that their knowledge bases are not valued and applied in kangaroo management. This is not unusual in top-down approaches to natural resource planning and management (Napoli 2001). Pimbert and Pretty (1997) argue that valuing local knowledge can reduce management costs and increase compliance in the management of natural resources.

A change in the management system such that quota/tags are purchased by harvesters rather than meat processors would open up increased communication between SA DEH and harvesters. Nevertheless informed dialogue between these local knowledge holders and SA DEH would continue to be limited. One structural factor that is relevant here is that SA DEH's kangaroo management program is in a sector of government that is not well integrated with other government sectors with responsibilities for natural resource management and regional development in rangeland South Australia. Other agencies or sectors of government that talk routinely with landholders, business people and Aboriginal people in the field but have no responsibilities in relation to kangaroo management include the Pastoral Management Branch of Department of Water, Lands and Biodiversity Conservation, Outback SA, the Arid Lands Natural Resource Management Board and its NRM groups, the Northern Regional Development Board, PIRSA Rural Solutions, Aboriginal Legal Rights Movement and government parties involved with it in the statewide ILUA negotiations process. Opportunities for informed dialogue with local knowledge holders about kangaroo management could be extended at relatively low cost by a collaborative approach. This might involve SA DEH working with people from these agencies to design a way of incorporating issues concerning kangaroos and their management into dialogue with rangeland people about issues that are within these other agencies' areas of responsibility.

## 6.5.2 Institutions

Management in complex systems cannot rely on a single level of centralised control because there are too many unknowns and too much uncertainty. A diversity of institutions is important for robust governance of complex social-ecological systems. It is important to recognise that resource users are often in the best position to develop rules that meet their own goals and that also promote sustainable management (Ostrom 2005; Anderies et al. 2004). We consider that this is the case with the informal rule that harvesters follow when they direct their effort to areas where kangaroo populations are high. Following this rule is in their own self-interest and also meets landholders' goals. Because this rule so frequently conflicts with the regulations governing allocation of quota and tags, the latter are not respected or complied with. The adaptive capability of this local rule could be recognised effectively by reform of the management system that removes the regulatory requirement for pre-allocation of one quota unit/tag to one property and one harvester and one meat processor. Such a reform would mean that harvest would continue to be limited overall (at region or statewide scale) to the level set by annual quota allocations such that the risk of overharvesting would continue to be managed. While overharvesting is not a significant risk at present given low demand/value for kangaroo products and the extent of regulation on harvesting technologies, experience with overharvesting of other natural resources such as fisheries indicates the prudence of continuing to set and enforce annual quota limits.

Institutional design in complex systems also needs to consider how nesting of institutions at different scales can be used to effect. For example statewide forums such as the Kangaroo Industry Reference Group are at a scale that is appropriate to some issues that are addressed in kangaroo management in South Australia, such as designing mechanisms for tag purchase. However other issues are more appropriately dealt with in regional and local forums where local knowledge can be more effectively engaged, and where approaches specific to local conditions can be crafted. Directions for local and regional scale forums are likely to best emerge through opening up dialogue about kangaroo management through other local and regional structures involved in rangeland management, as suggested above.

A mix of institutional types is important. Establishing the conditions for greatly increased competition is critical so that markets can innovate in developing effective institutions, as discussed above. In this report we have also suggested two areas where governments could usefully collaborate with the industry to design incentives to address issues faced by the kangaroo industry. One area is in supporting new people to take up harvesting as a livelihood. Another is in encouraging existing licensed harvesters to put more effort into harvesting.

A third area where it may be important for government to design incentives is in addressing specific conservation objectives. For example from 1997 to 2003 the kangaroo management strategies for the northern Flinders Ranges included an objective of limiting the occurrence of grey kangaroos to trace levels because it was considered that this species had recently extended its range northwards into that region. A higher harvest quota for grey kangaroos was set in this region as a result. However populations continued to rise (SA DEH 2002b; Alexander 1996). In such situations higher quotas are likely to be ineffective in achieving the conservation outcomes because of market failure. Where specific conservation outcomes are important, as they are in this example, government will need to resource and implement specific measures to increase harvest effort, such as waiving royalties or introducing incentive payments to harvesters.

### **6.5.3 Facilitating learning, adaptation and change**

Institutions need to be able to adapt and change because current understandings may prove incorrect, the nature and scale of management issues can shift, and interactions between social and environmental systems are dynamic. Feedback is a critical factor in facilitating learning, adaptation and change.

People need to have honest signals about the impact of their decisions and actions if everyone is to become better at working together in a complex social-ecological system. The kangaroo management system in South Australia generates a lot of data on kangaroo populations, quotas, harvest rates, locations and movement of carcasses as well as about people's levels of satisfaction with the management approach. Little of this is fed back to people involved in the system in ways that might help them understand outcomes from their decisions and actions. We have found that there is a lot of data that is difficult to access without concerted targeted effort. There are also uncertainties and errors in data where institutions are inappropriate and ineffective, such as occurs in relation to tag swapping.

The internet, digital inventory systems and GIS provide strong tools for tracking flows and for visualisation of data. Greater investment in turning data into information and making it accessible to people who are part of the kangaroo social-ecological system is important to developing a learning, adaptive management system.

## 7 Recommendations

These recommended changes to kangaroo management in South Australia will enable the kangaroo industry to contribute more effectively to sustainable rangeland landscapes. They could be implemented by SA DEH in conjunction with KIRG and other people in the industry.

- Establish competition in interactions between harvesters, landholders and meat processors by removing the regulatory requirement for pre-allocation of one tag, to one property, one harvester and one meat processor. This could be accomplished by changing from property level quota to regional or zone scale quota allocation or by an effectively designed system for trading property level quota. The former is much more likely to be cost effective.
- Develop targeted incentives to encourage existing licensed harvesters to put more effort into harvesting such as by rebate of permit fees or discounted tag purchase when a harvester reaches a threshold level of annual harvest.
- Develop a program to encourage and support new people to enter the industry as harvesters, such as by developing apprenticeship mechanisms and facilitating access to loans for start up costs.
- Include issues associated with kangaroo management on the agenda for discussions and negotiations in the South Australian statewide ILUA negotiation process with a view to settling uncertainty about property rights.
- Recognise and respect that the knowledge of harvesters, landholders and Aboriginal people can make important contributions to kangaroo management.
- Recognise the need for a diversity of institutions for robust adaptive governance, rather than being overly reliant on regulation.
- Feedback data collected, such as on harvest rates and locations, to people involved with the industry and kangaroo management to facilitating learning, adaptation and institutional change.

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# Appendix 1: Experts consulted about findings

We consulted the following rangeland management experts about our interpretations of the data in 2005-6 in order to test and refine our research findings:

Charlie Carter – Rangeland management consultant and principal of *Trek Larapinta*

Bill Giles – Principal Industry Consultant, Primary Industries and Resources South Australia

Craig James – CSIRO Sustainable Ecosystems, Alice Springs

John Radcliffe – Commissioner National Water Commission and Honorary Research Fellow CSIRO

Anita Smyth - CSIRO Sustainable Ecosystems, Alice Springs

Mark Stafford-Smith - Desert Knowledge Cooperative Research Centre and CSIRO Sustainable Ecosystems, Alice Springs

Mike Young – CSIRO Land and Water

# Appendix 2: Review of the impact of the Macarthur report

Prepared by Dana Thomsen 30 November, 2002; selectively updated May, 2006.  
Prepared as part of RIRDC Project UA-59A.

## Introduction

*A review of the impact of government policies on kangaroo industry commercial practices was, commissioned by RIRDC and conducted by Macarthur Consulting (RIRDC Report 97/35, 1997, hereafter referred to as ‘the Macarthur report’). It aimed to generate discussion and debate amongst industry stakeholders and it made recommendations for industry development and sustainable resource management. Changes to policy and regulations that have occurred since the publication of the Macarthur report and comments on the appropriateness or applicability of the recommendations made in the report are reviewed below.*

## Methods

This review of the impact of the Macarthur report was conducted in consultation with state government agencies responsible for the administration of kangaroo management plans and relevant state health authority representatives responsible for game meat hygiene standards. Agency representatives were contacted by phone, email, or visited in person (or a combination of these methods). The people contacted were asked:

- about their knowledge of the Macarthur report
- for comments on the recommendations made; and
- if any changes have occurred in regulatory structures since the Macarthur report was produced.

Results are presented below.

## Review

### Awareness of the report

A majority of government agency staff contacted had not previously heard of the Macarthur report. The few that were familiar with this report were doubtful about its value. The key criticisms were:

1. The report has strong industry bias
2. The report lacks substance
3. Any strategy aiming to improve the commercial kangaroo industry must include a long-term marketing plan aimed at increasing the value of product.

### Changes in regulatory structures

The most significant change to kangaroo management policy and regulations that has occurred since publication of the Macarthur report is the implementation of national health and export regulations. All states now follow the *Australian Standard for Hygienic Production of Game Meat for Human Consumption* (AS 4464). Differences between the states remain for a number of policies and regulations. These differences are listed in Table 1 (below).

**Table 1. Areas of disparity in kangaroo management policy and regulations**

| State | Quota & monitoring approach | Tag Ownership                  | Processor Licences  |
|-------|-----------------------------|--------------------------------|---------------------|
| NSW   | Regional                    | Landholder nominates harvester | Restricted          |
| Qld   | Regional                    | Harvester                      | Unrestricted        |
| SA    | Regional                    | Meat processor or Landholder   | Limited restriction |
| WA    | Whole of State              | Harvester                      | Unrestricted        |

Other regulatory changes that have occurred are listed below for each state.

**New South Wales:**

- No change.

**Queensland:**

- Qld Department of Environment and Heritage is now the Qld Parks and Wildlife Service.
- Qld Livestock and Meat Authority (QLMA) now operating as a subsidiary of the Department of Primary Industries called SAFEFOODS.
- Field carcass dressing is now whole carcass (not half carcass, 'trade butt'). This change brings Qld into line with field dressing procedures in other states.
- Qld has moved quota allocation from 'whole of state' to regions.

**South Australia:**

- Sealed tag regulations introduced.
- Sustainable Use and Land Management dual quota system which was in place from 1997 to 2002 has been discontinued. A maximum of 20% of population estimate of each harvested species may be allocated as harvest quota.
- Quota allocations can be moved or transferred within a Kangaroo Management Zone. There is no mechanism for movement or transfer of quota between Kangaroo Management Zones.

**Western Australia:**

- No change.

**Responses to recommendations**

The Macarthur report made recommendations about the management practices that need to be adopted, advocating that "more sophisticated management practices" would enable better resource management (Macarthur Consulting 1997, p. 44). These recommendations are listed below and are followed by a brief discussion of the changes that have taken place since the report was published and/or responses to these recommendations from government agency staff.

1. *"Rationalisation and consistency of the regulatory framework and the consistent application of regulatory requirements particularly with regard to health standards and the management and monitoring of the kangaroo population."*

Comments:

- health standards are now consistent across Australia as all states adhere to the guidelines set out in AS 4464.
- the Australian Government and the states all apply the same methodology for setting quotas.
- some significant differences remain in the way that states manage kangaroo harvest. For example, in regional monitoring and quota setting (see 2 below) and who tags are issued to (see Table 1 above).

2. *“More sophisticated population monitoring and quota management systems including: the development of a regional and sub-regional monitoring system; the integration of all direct and indirect data into a bio-economic model; integration of population dynamics and pastoral and kangaroo industry economics; and rational allocation basis of quota tags to landholders as stewards of rangelands to both manage kangaroo population control to ensure continuity of supply to kangaroo processors and possibly provide ongoing returns to landholders.”*

Comments:

- all kangaroo management program (KMP) managers contacted stated that kangaroo population monitoring is already conducted to world best practice standards and some questioned whether population monitoring techniques actually impact on the kangaroo industry. They stated that it is difficult to see how uniform, or ‘more sophisticated’, population monitoring would have a positive impact on the commercial kangaroo industry, as states do not harvest the full quota in most years. For example, in SA approximately 50% of the quota is harvested in any year, while in NSW the state quota has not been met in nine out of ten years.
- NSW and SA have regional monitoring and quota setting systems in place. Qld has implemented a regional management system in recent years. In WA there appears to be some resistance to regional management, with one KMP representative contacted for this study arguing that, the concept of regional quota setting and management is inappropriate for that state.
- Research completed in 2006 by Professors Grigg and Possingham and Dr Tony Pople of the University of Queensland and collaborators has addressed the need for the integration of direct and indirect data about kangaroo populations. The project used long-term data related to kangaroo density and harvest to explore ways that harvest statistics can be used to indirectly monitor kangaroo populations (for findings see <http://152.98.200.7/roospirt/>).
- KMP managers suggested that there was little apparent benefit for the industry in integration of population dynamics and pastoral industry economics. The real issue as they see it is in market development and increasing the value of kangaroo products.
- tags are allocated to landholders in NSW. Qld landholders do not want tags allocated to them. In SA, tags may be allocated to landholders or meat processors. In practice it seems that they are always allocated to meat processors. The SA KMP (1997-2002) included specific policy to allow for economic return to landholders incorporating provision for a restricted trade in quota. However, this was found not to comply with the requirements of the NPW Act and was omitted from the next KMP.

3. *“Uniform health standards that meet domestic and export market requirements.”*

Comments:

- health standards for domestic and export markets are now consistent across Australia.

4. *“Strategic alliance and relationships between government, pastoralists, shooters, processors and markets.”*

Comments:

- KMP managers believe that alliances form without “governments’ bureaucratic hand” (eg the harvest of feral goats over the last ten years) and that the current alliances and relationships in the kangaroo industry have been sufficiently strategic to keep the industry running despite major challenges from national and international special interest groups.
- in SA, the formation of the Kangaroo Industry Reference Group (KIRG) is an example of strategic alliance. However, KIRG was formed as a result of the KMP review process and not as a response to the recommendations of the Macarthur Report.

5. *“More sophisticated communication systems between the government and the industry.”*

Comments:

- KMP managers stated that they communicate with industry stakeholders in a variety of ways, including: information provision to industry groups and the public, advisory committees, media releases/opportunities, mail-outs, participation in public, industry and scientific forums, progress reports to Regional Boards (SA), websites

- regular, open and frank communication was reported to occur between the Kangaroo Industry Association of Australia (KIAA) and government regulatory agencies at state and National levels. However, a KIAA spokesman has been publicly critical of governments for not joining with the KIAA's efforts to be proactive in countering the animal liberation-based campaign against kangaroo harvest.

### **Other points of interest**

*“The current management of kangaroo populations solely for environmental, conservation and economic reasons is not appropriate. The key to managing sustainable resources is accurate population data. An integrated regional model that takes account of population differences caused by biological, habitat, and climatic variations on a regional basis would seem to be a more appropriate approach”* (Macarthur Consulting 1997, p. v).

- while it makes sense to base management decisions on regional conditions, it is puzzling to read the comment that managing “kangaroo populations solely for environmental, conservation and economic reasons is not appropriate”. There are many reasons to manage kangaroo populations sustainably, and environmental, economic and conservation reasons are of key importance.

*“There is great debate on whether or not processor licenses should be restricted. Given that the supply is limited and a more professional industry is required, it is evident that a restriction of licenses in the short term is necessary to enable current industry players to establish a more mature industry”* (Macarthur Consulting 1997, p. vi).

- KMP managers support this statement and some states impose meat processor licence restrictions (see Table 1). However, such restrictions may hinder the establishment of competition for product from harvesters and make it difficult for landholders to engage in ‘paddock to plate’ processing.

### **Conclusions**

This review of the impact of the Macarthur report highlights the need for the promotion of this report, and other similar reports of value to the kangaroo industry, as most government agency representatives (KMP managers and health officials) contacted were unaware of it.

In spite of lack of awareness of the Macarthur report, there is increasing consistency in approaches to kangaroo management amongst the different states of Australia.