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The Macropod Conservation and Management Plan For South Australia—Conservation and Management of Common Kangaroos

A REVISED management plan for common Kangaroos (Red Kangaroo, Western Grey Kangaroo and Euro) in South Australia has been adopted under section 601 of the National Parks and Wildlife Act 1972.

Copies of the plan may be inspected or obtained at no cost from the Environment Shop, Ground Floor, SA Water House, 77 Grenfell Street, Adelaide, S.A. 5000 (G.P.O. Box 1047, Adelaide, S.A. 5001), telephone (08) 8204 1910 or at <http://www.environment.sa.gov.au/biodiversity/kangaroo.html>

PREAMBLE

The Macropod Conservation and Management Plan for South Australia is a new two-part management strategy for macropods in South Australia. This management plan forms one part of the *Macropod Conservation and Management Plan for South Australia* and covers conservation and management of common macropod species (kangaroos). The other part of the plan will cover conservation and management of threatened macropod species (including wallabies, hare-wallabies and bettongs). This overarching approach represents a new goal for conservation and management of macropod species in South Australia.

Management plans for common kangaroo species in South Australia have been in place for a number of years, as these are a requirement for harvesting of a native species under Commonwealth and State legislation. Conversely, a management plan for threatened macropod species has been lacking. Although conservation and management of threatened macropod species has been addressed as a high priority in a number of landscape scale projects conducted by National Parks and Wildlife South Australia (NPWSA) (e.g. Project *Bounceback* in the Flinders Ranges, and *Ark on Eyre* in the Eyre Peninsula), these regional projects have not yet been consolidated under a single threatened macropod management plan.

There are many stakeholders in the management and conservation of macropod species within South Australia. The Government of South Australia makes significant contributions to both the conservation of threatened macropods and the management of common kangaroos, through the maintenance of the protected area network and targeted conservation and management projects. The commercial kangaroo industry and the general community are also key stakeholders in kangaroo management. Every member of the community has the potential to benefit from the effective conservation and management of macropod species in South Australia.

Aboriginal people have a unique social and cultural interest in kangaroos. This document works within the boundaries of the *Native Title Act 1983* and Section 47 of the *Pastoral Land Management and Conservation Act 1989*, and any actions completed under this two-part management plan that might affect native title must follow the relevant provisions of this legislation.

This management plan and management strategies described in it are designed to integrate with the natural resource management (NRM) strategies of the South Australian government when developed.

It is hoped that this two-part plan will consolidate macropod management in South Australia, and lead to a broad and overarching approach to conservation and management of all macropod species in the State. It is important to consider both parts of the plan to gain a thorough understanding of the content and extent of macropod management in South Australia.

This management plan was prepared by the Kangaroo Conservation and Management Plan Review Task Group (Appendix 1).

MACROPOD SPECIES IN SOUTH AUSTRALIA

Of the 50 species of macropod found in Australia, 18 were present in South Australia at the time of European settlement (Table 1). Subsequent changes to the natural landscape of South Australia, such as agricultural, pastoral and urban development, have markedly changed the abundance and distribution of macropod species. Some species have been negatively impacted by these changes and some have been positively impacted.

Table 1: Macropod species of South Australia (Superfamily Macropodoidea), and their conservation status in South Australia and Australia. Species covered by this management plan are shown in bold type.

Species	Conservation Status	
	South Australia	Australia
FAMILY MACROPODIDAE		
Red Kangaroo <i>Macropus rufus</i>	Common	Common
Western Grey Kangaroo <i>Macropus fuliginosus</i>	Common	Common
Euro / Hill Kangaroo <i>Macropus robustus</i>	Common	Common
* Eastern Grey Kangaroo <i>Macropus giganteus</i>	¹ Rare	Common
Red-necked Wallaby <i>Macropus rufogriseus</i>	¹ Rare	Common
Tammar Wallaby (Mainland) <i>Macropus eugenii eugenii</i>	¹ Endangered (extinct in wild)	N/a
Tammar Wallaby (Kangaroo Is) <i>Macropus eugenii decrees</i>	Common	N/a
Toolache Wallaby <i>Macropus greyi</i>	¹ Endangered (presumed extinct)	² Extinct
Yellow-footed Rock Wallaby <i>Petrogale xanthopus</i>	¹ Vulnerable	² Vulnerable
Black-footed Rock Wallaby (McDonnell Ranges) <i>Petrogale lateralis lateralis</i>	¹ Endangered	² Vulnerable
Black-footed Rock Wallaby (Pearson Island) <i>Petrogale lateralis pearsoni</i>	¹ Vulnerable ³ Rare	² Vulnerable
Swamp Wallaby <i>Wallabia bicolor</i>	¹ Vulnerable	Common
Rufous Hare-wallaby <i>Lagorchestes hirsutus</i>	¹ Endangered (presumed extinct)	² Endangered
Eastern Hare-wallaby <i>Lagorchestes leporides</i>	¹ Endangered (presumed extinct)	² Extinct
Crescent Nailtail Wallaby <i>Onychogalea lunata</i>	¹ Endangered (presumed extinct)	² Extinct
Tasmanian Pademelon <i>Thylogale billardierii</i>	¹ Endangered (presumed extinct)	Common
FAMILY POTORIDAE		
Brush-tailed Bettong <i>Bettongia penicillata ogilbyi</i>	¹ Rare	² Conservation dependent
Brush-tailed Bettong <i>Bettongia penicillata penicillata</i>	¹ Endangered (presumed extinct)	² Extinct
Burrowing Bettong <i>Bettongia lesueur</i>	¹ Endangered	² Endangered
Desert Rat-kangaroo <i>Caloprymnus campestris</i>	¹ Endangered (presumed extinct)	² Extinct
Long-nosed Potoroo <i>Potorous tridactylus</i>	¹ Endangered (presumed extinct) ³ Endangered	² Vulnerable

* The Eastern Grey Kangaroo was not present in South Australia at the time of European settlement.

¹ Species listed on threatened species schedules under the *National Parks and Wildlife Act 1972*.

² Species listed on threatened species schedules under the *Environment Protection and Biodiversity Conservation Act 1999*.

³ Proposed changes to conservation status under the *National Parks and Wildlife Act 1972*.

Species Disadvantaged by European Settlement

European settlement has had a greater negative impact on the smaller macropods than the larger kangaroo species. Macropod species that have gone extinct or declined in number since European settlement tend to fall below a mean adult body weight of 5.5kg (Critical Weight Range, CWR; Burbidge and McKenzie, 1989), namely the smaller wallabies, hare-wallabies and bettongs. Many species have severely declined in range or number since European settlement, persisting only as small populations in remnant patches of native habitat, or in island populations. The Tammar Wallaby is extinct on the mainland in South Australia, but common on Kangaroo Island where large populations can cause unwanted impacts to other land uses.

No single cause for the decline of small macropods has been identified (Johnson *et al.*, 1989). Instead a combination of factors has been suggested, including habitat modification and loss, changes in fire regimes, and grazing by introduced herbivores. Predation by feral foxes and cats has been implicated as a major cause of local extinctions following habitat fragmentation.

Species Advantaged by European Settlement

The larger-bodied kangaroo species have generally been advantaged by European settlement, and these species are secure and widespread across South Australia. Kangaroo population estimates in South Australia in 2001 were 1,775,000 for Red Kangaroos, 751,000 for Western Grey Kangaroos and 401,000 for Euros. A reduction in predation following the construction of a dingo-proof fence around the sheep rangelands, and the provision of additional water sources and pasture are the most likely reasons for population increase (see discussion in Pople and Grigg, 1999).

Some kangaroo species have also recorded increases to their distribution. The Western Grey Kangaroo is currently present in at least two regions of South Australia that were not part of its natural range. Similarly, the Eastern Grey Kangaroo has undergone an extension of the western boundary of its range (Caughley *et al.*, 1984), and is now present in the south-east region of South Australia, and eastern South Australia immediately south of the dog fence. Although classified as rare in South Australia, the Eastern Grey Kangaroo has also been advantaged by European settlement and is common in the Eastern States.

LEGISLATION AND SCOPE OF THIS MANAGEMENT PLAN

The Macropod Conservation and Management Plan in South Australia: Conservation and Management of Common Kangaroos has been developed to satisfy the requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the *EPBC Act*), and the requirements of the South Australian *National Parks and Wildlife Act 1972* (the *NPW Act*) and its subordinate legislation.

This management plan is restricted in its application to the conservation and management of the three common kangaroo species in South Australia: the Red Kangaroo (*Macropus rufus*), the Western Grey Kangaroo (*M. fuliginosus*), and the Euro (*M. robustus*). From hereinafter, the term *kangaroos* will be used to denote these three species.

Considered within this management plan is the commercial utilisation of *kangaroos*. The export of commercial *kangaroo* products from Australia requires Commonwealth government approval under the *EPBC Act*, and annual commercial *kangaroo* harvesting quotas for South Australia must be approved by the Commonwealth Minister for the Environment and Heritage. A condensed version of this plan covering commercial harvest management actions has been submitted as an *Approved Wildlife Trade Management Plan* under the *EPBC Act*.

Kangaroos and all native fauna in South Australia are protected under the *NPW Act*. Harvesting of a protected species in South Australia requires a management plan approved under Section 60I of the *NPW Act*, and is only allowable when there is sufficient scientific information available to address ecological issues relating to the harvesting of that particular species. The taking of *kangaroos* in South Australia is regulated via the *NPW Act*, and through permit and tag procedures detailed in Regulations under this Act. This legislative framework applies to the entire State of South Australia.

Non-commercial destruction of *kangaroos*, and management of *kangaroos* on National Parks and reserves are both regulated by the *NPW Act*, and are also considered within this management plan. Some aspects of *kangaroo* management may not be covered by this management plan, particularly where they are included in other legislation. Major pieces of legislation and policy that apply to the conservation and management of *kangaroos* in South Australia are listed in Appendix 2.

This management plan is valid for a five-year period, from 1 January 2003 to 31 December 2007.

GOAL OF THE MANAGEMENT PLAN

This management plan has an overarching goal that is used for all macropods in South Australia:

Conserve and manage *kangaroos* in South Australia in an ecologically sustainable manner.

For the purpose of this management plan, the use of the term ecologically sustainable development is to encompass the following principles as they relate to *kangaroo* conservation and management:

- Protect biological diversity and maintain viable populations of *kangaroos* across their natural ranges.
- Apply a precautionary approach to management, to ensure that management actions conducted within this management plan minimise the risk of unwanted or unintended outcomes to *kangaroos*, their habitat and ecosystems (the precautionary principle).
- Provide for inter-generational equity by ensuring that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- Ensure that decision-making processes relating to *kangaroos* effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.
- Ensure that conservation and management programs for *kangaroos* acknowledge and accommodate the interests of Aboriginal stakeholders.

Measures of Performance

This management plan has five aims that set strategic directions for management of *kangaroos* in South Australia. Under each aim are one or more objectives that detail operational directions for *kangaroo* management.

Progress towards each objective will be measured by the completion of key actions and clearly defined performance targets and measurable indicators.

Objectives will be audited against performance measures annually, with a major assessment and review at the end of the five-year term of the management plan. A feedback mechanism will be developed to ensure that performance measures are linked to future management strategies, by incorporating information learnt from previous successes and failures.

AIMS OF THE MANAGEMENT PLAN

The aims of this management plan for *kangaroos* are:

1. Ensure conservation of *kangaroo* species through monitoring and promotion of research.

Monitor *kangaroo* populations using appropriate survey techniques, support research targeted to key areas identified for *kangaroos*, and promote the regional conservation of *kangaroo* populations.

2. Manage *kangaroo* populations as a sustainable commercial harvest.

Manage commercial harvest of *kangaroo* species through a best practice quota setting system, effective permit and tag procedures, and monitoring and maximising compliance with relevant legislation. Improve understanding of the impacts of commercial harvest on *kangaroo* species, their habitat and ecosystems.

3. Manage *kangaroo* populations to minimise unwanted impacts to other land uses.

Allow for non-commercial destruction of *kangaroos* to minimise unwanted impacts, and manage *kangaroo* populations on National Parks and reserves for restoration and protection of biodiversity.

4. Adhere to best practice animal welfare standards in conservation and management programs for *kangaroos*.

Adhere to animal welfare standards by maximising compliance with the *Code of Practice for the Humane Shooting of Kangaroos* and the *Prevention of Cruelty to Animals Act 1985*.

5. Ensure effective communication and education of *kangaroo* conservation and management programs throughout the community.

Promote the SA Kangaroo Management Program (SA KMP) through public education and consultation. Increase the involvement of landholders in property-based decision making on *kangaroo* harvest. Support and administer an industry group to guide the development of the commercial *kangaroo* industry in South Australia, and investigate an equitable and efficient distribution of costs within the commercial *kangaroo* industry. Promote and encourage the involvement of Aboriginal people in *kangaroo* management, and promote legislation and policy relevant to *kangaroo* management in South Australia.

Ensure conservation of kangaroo species through monitoring and promotion of research

Conservation of *kangaroo* populations within South Australia is an essential aim of this management plan. All management actions conducted within this management plan must not be detrimental to the long-term conservation and population viability of *kangaroos* across their natural ranges.

1.1 MONITORING

Objective: Monitor regional *kangaroo* populations using an appropriate survey technique.

Adequate monitoring of a population is essential to ensure its proper management. NPWSA has conducted standard aerial surveys of South Australian *kangaroo* populations since 1978 (in collaboration with the University of Queensland; see Grigg *et al.*, 1999 for details of methodology), providing a high quality monitoring dataset on which to base management decisions. In addition, regular monitoring provides direct information on population trends and conservation status of *kangaroo* populations in South Australia.

Monitoring is conducted in a number of Kangaroo Management Regions (Figure 1, p.31). These regions are currently based on the administrative boundaries of district Soil Conservation Boards. As board boundaries and names are subject to change, Soil Conservation Boards will hereinafter be referred to as *Regional Boards*.

The following three techniques may be used for monitoring *kangaroo* populations:

1. Broad-scale aerial survey using fixed wing aircraft and fixed strip-width transect survey methodology.
2. Medium-scale aerial survey using fixed wing aircraft and fixed strip-width transect survey methodology.
3. Small-scale (intensive) ground surveys on foot using line transect survey methodology.

Frequency of monitoring will vary according to region. *Kangaroo* populations in regions that are subject to sustained commercial harvest are currently monitored annually using broad-scale aerial survey. *Kangaroo* populations in areas that are subject to infrequent commercial harvest are currently monitored within a three-year time frame using medium-scale aerial survey or small-scale ground surveys on foot. Ground surveys are used primarily for areas that are not suitable for aerial survey. Areas that are not subject to commercial harvest, but on which *kangaroos* are managed actively or particular issues arise (e.g. National Parks), are currently monitored on an annual or as needs basis using small-scale ground surveys on foot.

Reviews of survey methodology, such as the revision of species correction factors and the frequency of monitoring events, may be conducted in the future. Full details of survey techniques and monitoring results will be reported in the quota proposal document submitted annually to the Commonwealth Minister for the Environment and Heritage. Monitoring results will also be released to stakeholders and the general public.

Key Actions:

- Monitor all regions subject to sustained commercial harvest annually, and all regions subject to infrequent commercial harvest within a three-year time frame.
- Review survey techniques regularly, and update practices where necessary.

Performance Measures:

- Regional *kangaroo* populations described and quantified in a manner that allows for informed management decisions to be made on an annual basis. Measured via:
 - Number of Kangaroo Management Regions monitored and reported in quota proposal.
 - Precision of population estimates for each Kangaroo Management Region.

1.2 RESEARCH

Objective: Support research into key areas specified for *kangaroos*.

Along with regular monitoring, promotion and completion of strategic research is an integral component of successful wildlife management. Research improves scientific knowledge of a species and its interaction with its environment, and can allow for the experimental testing of management strategies. Results of research can be used to guide and prioritise future management decisions and actions.

NPWSA will base involvement in *kangaroo* research on a number of key research areas, which are those that are currently considered most important and relevant to *kangaroo* conservation and management in South Australia.

Research projects are currently focused within one of the following key areas:

1. Population dynamics, distribution and abundance of *kangaroo* species in South Australia.
2. Impacts of commercial harvest and non-commercial destruction on *kangaroo* species, their habitat and ecosystems of which they form part.
3. Impacts of *kangaroo* density on biodiversity, and pastoral and agricultural industries.
4. Social and institutional factors impacting on commercial *kangaroo* harvest in South Australia.

Research projects that are currently supported by NPWSA include the demographics of harvested red *kangaroo* populations in South Australia, spatial and temporal modelling of *kangaroo* populations (including use of abundance data, harvest data and greenness indices), social and institutional factors that impact on commercial *kangaroo* harvest including a review of Aboriginal involvement, *kangaroo* grazing impacts on native vegetation in National Parks, and the management of total grazing pressure on pastoral leases.

Specific projects that may be promoted for research in the future include revision of *kangaroo* correction factors and aerial survey methodology for South Australia, and an assessment of remote sensing or a combination of remote sensing and aerial survey methodology as tools for quota setting. Particular emphasis will be placed on investigating the impacts of *kangaroo* grazing on the pastoral rangelands of South Australia, and determining the *kangaroo* component of total grazing pressure. Future research may be promoted as part of an adaptive management experiment (see text box on p.9). NPWSA may also support or promote future research in other relevant areas (e.g. animal welfare).

NPWSA will endeavour to maintain a current understanding of *kangaroo* research being conducted in government departments, industry and universities across Australia. Worldwide trends in wildlife management will also be assessed. Literature surveys of *kangaroo* and wildlife management research will be completed regularly, with key findings and results disseminated to staff as appropriate and included within current practices when necessary.

Key Actions:

- Conduct periodic literature reviews of current research.
- Maintain regular contact with university and industry partners conducting research on *kangaroos*.
- Incorporate research findings into current techniques where appropriate.

Performance Measures:

- Networks established and maintained with university and industry research partners allowing for NPWSA to maintain a current understanding of *kangaroo* research developments and issues.

Measured via:

Number of active *kangaroo* research projects with NPWSA involvement.

Number of industry and university research partners.

Attendance and involvement of NPWSA staff at scientific conferences and workshops relevant to *kangaroos*.

1.3 REGIONAL CONSERVATION

Objective: Facilitate the regional conservation of *kangaroo* species.

Conservation of *kangaroos* in South Australia may be maximised by focusing efforts at the level of regional *kangaroo* populations. Regional conservation will ensure that the wide diversity of natural landscapes within South Australia is incorporated in the conservation of *kangaroos*. In addition, community involvement in *kangaroo* conservation will be maximised by focusing communities and interest groups on their own region. A regional conservation approach is consistent with the regional approach applied to the management of the commercial *kangaroo* harvest.

Regional conservation ratings will be developed for all Kangaroo Management Regions in South Australia. Ratings will be developed using regional monitoring data and an assessment of available *kangaroo* habitat and potential threats to regional populations. Mapping of available habitat refuges may help ascertain the roles of the protected area system and the network of privately-held land under conservation tenure in the regional conservation of *kangaroos*. Areas of low harvest pressure may also act as refuges for harvested *kangaroo* populations. Once developed, regional conservation ratings will be reported annually as part of the quota proposal document.

Regular population monitoring will be extended to include occasional monitoring of *kangaroo* populations in parts of the State outside of the commercially harvested region (e.g. lands under Aboriginal management). These surveys will be designed to provide a more complete picture of *kangaroo* density and distribution in South Australia, and ensure that the regional conservation of *kangaroos* covers regions with both high and low densities of *kangaroos*.

Key Actions:

- Develop regional conservation ratings for *kangaroos*.
- Map public and privately-owned nature reserves, including the extent of suitable *kangaroo* habitat.
- Extend population monitoring to survey *kangaroos* outside the current commercially harvested zone.

Performance Measures:

- Regional conservation of *kangaroos* is facilitated via the development of regional conservation ratings, and determining the extent and distribution of available habitat for *kangaroos*. Measured via:
 - Number of regions with conservation ratings for *kangaroos*.
 - Number of regions with identified extent and distribution of *kangaroos* and *kangaroo* habitat.

Adaptive Management

Adaptive management is currently being suggested as more appropriate for natural systems than traditional management approaches (e.g. Johnson, 1999; Olsen and Braysher, 2000; Pople and McLeod, 2000). Adaptive management (“learning by doing”) addresses the inherent uncertainty and complexity of natural systems by directly manipulating management actions, and using the results to obtain an optimal management capacity. It promotes the use of information gained from the successes and failures of management actions, instead of the sole use of detailed scientific studies.

Adaptive management is appropriate for a socially complex system such as *kangaroo* management, as the conflicting goals and desired outcomes of all user-groups will be considered in the development of future management strategies.

The actions covered by this management plan will incorporate the use of adaptive management principles and strategies where possible. Adaptive management strategies will be detailed in the annual quota proposal document submitted to the Commonwealth Minister for the Environment and Heritage, and released to the general public.

Aim 2. Sustainable Commercial Harvest

Manage kangaroo populations as a sustainable commercial harvest

Commercial harvest allows for a specified number of *kangaroos* to be taken on an annual basis for commercial utilisation. Commercial quotas are set annually by NPWSA to be approved by the Commonwealth Minister for the Environment and Heritage, and specify the maximum number of *kangaroos* that can be harvested for commercial utilisation in a calendar year.

The commercial harvest of *kangaroos* in South Australia is managed by NPWSA at the property level, through the release of property-based quota allocations to landholders and a system of licensed field processors (shooters) operating on individual properties.

Commercial harvest quotas are set at a regional level, using the Kangaroo Management Regions detailed earlier (Figure 1) and the involvement of *Regional Boards*. The entire State is potentially available for commercial harvest, but each Kangaroo Management Region must meet specified criteria to receive a commercial harvest quota allocation (see Appendix 3).

Commercial harvest allows for landholders to manage *kangaroos* as a component of total grazing pressure, and for *kangaroos* to be promoted and used as a resource (see text box on p.13). Over the last 5 years, NPWSA has consistently argued for higher harvest quotas to facilitate the effective management of total grazing pressure at the property level. Within the life of this plan, NPWSA will promote and/or support research investigating the *kangaroo* component of total grazing pressure, and the impact of *kangaroo* density on rangeland biodiversity and condition.

2.1 QUOTA SETTING

Objective: Determine the number of *kangaroos* to be taken for commercial harvest through a best practice quota setting system that takes account of regional priorities.

The total number of *kangaroos* that can be taken for commercial harvest within South Australia in a calendar year is the *commercial kangaroo harvesting quota*. A quota proposal document is submitted annually to the Commonwealth Minister for the Environment and Heritage for approval under this management plan.

A best practice quota setting system is used to set variable harvest quotas for each species, based on a percentage of direct estimates of population size. The quota setting system utilises the most recent *kangaroo* density estimates, and accounts for the size and suitability of regions to each *kangaroo* species. Commercial harvest quotas are currently allocated to Kangaroo Management Regions. Management regions may be lumped into larger management zones for the purpose of quota setting and distribution, and to provide sufficient flexibility to adjust the distribution of quota, should there be evidence of broad-scale changes to *kangaroo* density or distribution. Use of management zones and proposed distribution of quota will be detailed in the annual quota proposal document submitted to the Commonwealth Minister for the Environment and Heritage.

Regional management of *kangaroos* is further promoted through 'Kangaroo Management Strategies', which have been developed for each commercially harvested region by NPWSA in consultation with *Regional Boards*. These management strategies detail regional objectives for *kangaroo* management, providing guidelines by which NPWSA can adjust the management of *kangaroos* to reflect regional directions and priorities. 'Kangaroo Management Strategies' are reported in the annual quota proposal document, which is publicly available. *Regional Boards* may also be involved in the distribution and allocation of quota within regions.

Commercial Harvest Quota

Commercial harvest quota is allocated to allow for a long-term sustainable harvest of *kangaroos* from each property. Quota percentages are set regionally, and are currently up to 20% of estimated population size for Red Kangaroos, and 15% of estimated population size for Western Grey Kangaroos and Euros. These harvest levels are within the range that is considered sustainable for *kangaroo* populations harvested at a constant rate (Caughley, 1987), and populations harvested at these levels are expected to fluctuate primarily in response to seasonal conditions such as rainfall and pasture availability.

An alternative harvest strategy is to harvest at higher rates above a threshold density. This strategy is the theoretical optimum for maximising yields from a fluctuating population (Engen *et al.*, 1997; Milner-Gulland *et al.*, 2001), yet a drawback is an increased variation in yield including some years of zero yield (i.e. no harvest).

Allocation of higher harvest quotas above identified threshold *kangaroo* densities may be requested as an alternative harvest strategy for specific Kangaroo Management Regions in the future. Higher harvest quotas should be identified in the 'Kangaroo Management Strategy' for a region, and must also be approved by the Commonwealth Minister for the Environment and Heritage in the annual quota proposal document. Higher harvest quotas will only be requested where they are part of a demonstrated sustainable harvesting strategy at the level of regional *kangaroo* populations.

Special Land Management Quota

Small amounts (around half a percent of estimated *kangaroo* populations) of special land management commercial quota may be requested in the annual quota proposal document to the Commonwealth Minister for the Environment and Heritage. Special land management quota will only be released when the commercial harvest quota for a Kangaroo Management Region or zone has been fully issued, and *kangaroo* management issues remain. This additional commercial quota will allow for landholders to minimise the potential unwanted impacts of high *kangaroo* densities, without the need to resort to non-commercial destruction. This quota is only for the harvest of *kangaroos* that would otherwise be shot and left in the field.

Special land management quota percentages will be set at a State level, and will be distributed between Kangaroo Management Regions where required (proportionally distributed based on size of regional *kangaroo* populations). Release of this quota will require recommendation from *Regional Boards*, and may warrant property or regional inspection(s) of *kangaroo* density and/or potential impact(s).

Threshold Densities

'Kangaroo Management Strategies' include specified density ranges or 'threshold densities' for regional *kangaroo* populations, which are set in consultation with *Regional Boards*. Threshold densities represent a range of *kangaroo* density within which *kangaroo* populations will be sustainable and over which there will be relatively low impact of *kangaroos* on land condition. Threshold densities are a key component of the management of commercial harvest in South Australia, as they specify an upper and lower threshold for regional *kangaroo* populations. In some Kangaroo Management Regions harvest strategies may be linked to identified upper and lower densities for regional *kangaroo* populations (see threshold harvesting strategy below).

Threshold densities must be sustainable at the level of regional *kangaroo* populations, and take account of habitat types and suitability, long-term *kangaroo* monitoring data, precision of population estimates, and the potential impacts of different harvest strategies. Threshold densities must be approved annually as part of the quota proposal document submitted to the Commonwealth Minister for the Environment and Heritage.

Management Actions to Regulate Quota Setting

One of two harvest strategies will be employed in each Kangaroo Management Region:

1. Constant proportional harvest will set harvest quotas at a standard percentage of estimated populations each year. These levels are currently set at a maximum of 20% of estimated Red Kangaroo populations, and 15% of estimated Western Grey Kangaroos and Euros.
2. Threshold harvest will set higher harvest quotas above an identified threshold, and no harvest quotas below. Harvest quotas requested for threshold harvest must be sustainable for *kangaroo* populations, and be approved by the Commonwealth Minister for the Environment and Heritage in the annual quota proposal document.

In addition to one of the two harvest strategies identified above, the following management action will be completed for all regions that commercially harvest *kangaroos*:

3. Harvest returns will be analysed regularly to check for the presence of sudden or severe shifts in the sex bias of commercial harvest, or the regional or Statewide harvest rate. Where these shifts are detected, further population monitoring may be conducted, and/or commercial harvest in a region or zone may be restricted, and/or a region may be closed to commercial harvest. This management action serves as a safeguard during environmental conditions such as drought, to ensure that commercial harvest does not negatively impact on the sex or size structure of *kangaroo* populations.

Property Weighting System

A property weighting system is currently used to allocate regional commercial harvest quota to individual properties (e.g. see Gammon, 1999). The property weighting system allows for the refinement of regional *kangaroo* densities to the characteristics of individual properties through the incorporation of property *kangaroo* suitability assessments including the extent of suitable habitat, and may incorporate climatic indicators and/or results of localised surveys or inspections. The suitability of remote sensing or other techniques to a property weighting system, or the setting of regional only quotas, may be investigated in the future, with an appropriate replacement system incorporated into the future development of property weightings.

Where a property does not qualify for a quota in its own right, a consortium of neighbouring properties may be formed. Consortia are a means for small properties to receive commercial harvest quota without the need to resort to non-commercial destruction. Properties in a consortium must be located within the one Kangaroo Management Region, and comprise similar land systems where possible. Consortia quotas are allocated using the same process that is applied to individual properties, and are reviewed annually based on harvest returns.

Quota setting mechanisms for each Kangaroo Management Region, including quota percentages, threshold densities and property weighting systems, will be clearly stated in the annual quota proposal document submitted to the Commonwealth Minister for the Environment and Heritage.

Key Actions:

- Use quota setting system to set annual quota and submit to the Commonwealth Minister for the Environment and Heritage for approval.
- Distribute regional commercial harvest quotas to properties using property weighting system.
- Release special land management quota to properties when necessary, including consultation with *Regional Boards*.
- Review and refine quota setting procedures, including property weighting system, regional 'Kangaroo Management Strategies' and threshold densities.

Performance Measures:

- No change to statewide conservation status of *kangaroo* species due to commercial *kangaroo* harvest.
- Regional *kangaroo* populations maintained above or within regional threshold densities as a result of commercial *kangaroo* harvest.

Kangaroos as a Resource

Kangaroos can be so numerous in rural areas they are considered as pests, due to fears of competition with domestic stock for pasture and water. In the latter part of the 19th century, *kangaroos* were considered vermin and bounty payments and organised drives were common.

Over the last 20 years, management plans for *kangaroos* and the scientific literature have started to suggest that *kangaroos* should be considered as a resource and not a pest. The SA Kangaroo Management Program has promoted this ideal for the past five years, and continues the promotion of resource use within this management plan.

The nature of competition between domestic stock and *kangaroos* is frequently debated, and greater scientific evidence is required to qualify the extent and type of competition. Yet it is generally acknowledged that at high densities *kangaroos* can cause unwanted impacts to a number of competing land uses.

This management plan does not promote the pest status of *kangaroos* by allowing for commercial harvest solely to mitigate the impacts that may be caused by *kangaroos* at high densities. Rather, this management plan promotes the use of *kangaroos* as a sustainable resource, and requests additional commercial quota for allocation when commercial harvest quota is fully utilised and localised high *kangaroo* densities may negatively impact on other land uses. Allowing for this land management component of the commercial quota promotes the commercial utilisation of *kangaroos*, and should minimise the amount of *kangaroos* that are shot and left in the field (either illegally or under non-commercial destruction permits).

Kangaroos have the potential to be a significant economic resource to rural communities. Commercial harvest may enable landholders to generate an economic return from *kangaroo* harvest off their property, either indirectly through reduced grazing pressure, or through direct involvement in the industry.

Kangaroo meat is recognised as high quality game meat, being both low in fat and cholesterol. *Kangaroo* meat has been approved for human consumption in South Australia since 1980, and *kangaroo* meat products for human consumption are sold within Australia and exported overseas. *Kangaroo* skins provide a high quality and durable leather for a number of uses. Harvest of *kangaroos* in South Australia is only permitted for whole carcasses with the skin attached, ensuring that maximum use is obtained from each carcass.

Management of total grazing pressure is now recognized as a land management practice by pastoralists and government agencies. Along with this comes the recognition that *kangaroos* represent only a component of the total grazing pressure, and that domestic stock and feral herbivores need to be managed in combination with the control of *kangaroos*. Grigg (e.g. 1987, 1989, 1995) has long maintained that "sheep replacement therapy" may be necessary to reduce land degradation, by encouraging farmers to reduce sheep numbers and shift focus to the harvest of *kangaroos*. Yet, such a mixed-farming enterprise may only result when *kangaroos* are a resource with a notable monetary value.

2.2 PERMITS AND COMPLIANCE

Objective: Maintain effective regulation of the commercial *kangaroo* industry through permit and tag procedures, and monitoring of compliance.

Permits and Tags

The commercial *kangaroo* industry in South Australia is closely regulated via a number of permit and tag procedures. The commercial harvest process begins when a landholder applies to commercially harvest *kangaroos*. Any landholder who wishes to commercially harvest *kangaroos* requires a commercial quota allocation, which enables them to harvest a specified number of *kangaroos* on their property. *Kangaroos* are shot by an accredited *Kangaroo Field Processor* and stored in a registered field chiller, before being transported to a *Kangaroo Meat Processor* for processing of meat and skin. Any carcass that enters the commercial *kangaroo* trade must have a *sealed tag* attached, for which a royalty must be paid.

A flow chart of the current regulation of *kangaroo* management in South Australia is shown in Figure 2 (p.32). An outline of current permit and sealed tag issue procedures used in South Australia is shown further within this section. A change to permit and *sealed tag* issue procedures will be investigated in the future (see Aim 5: Objective 4, p.28).

Monitoring of Compliance

NPWSA is responsible for overseeing enforcement and monitoring of compliance with the *NPW Act*, Regulations under this Act, and specified conditions of permits. Specialist investigations and compliance staff, including a legal officer, may be involved in compliance or enforcement issues that relate to *kangaroo* management. At least one specialist Regional Investigator is involved in compliance and enforcement issues within the commercial *kangaroo* industry on a regular basis.

Non-specialist operational and administrative staff that operate within the Kangaroo Management Program of NPWSA are involved in compliance checks on a regular or as needs basis. Wardens designated under the *NPW Act* may also be used in compliance checks and operations. This includes employees of NPWSA and other welfare and wildlife management agencies, and every member of the South Australian Police. Wardens have the ability to exercise powers in any part of the State, and are able to issue on-the-spot fines for breaches of compliance.

NPWSA officers conduct regular and random checks of *kangaroos* stored at registered field chillers and *kangaroo* processing works. Each *sealed tag* carries a unique identification number, and is issued to a species, *Kangaroo Field Processor*, *Kangaroo Meat Processor* and property. This number can be used to track a carcass detailing when and where it was taken, by which *Kangaroo Field Processor*, and to which *Kangaroo Meat Processor* it was sold.

Carcasses are inspected for compliance with the *Code of Practice for the Humane Shooting of Kangaroos* and meat hygiene legislation. Potential breaches of compliance with the *Meat Hygiene Act 1994* witnessed by Wardens are reported directly to the Meat Hygiene Unit, Primary Industries and Resources South Australia. A Memorandum of Understanding between the two departments may be developed in the future to maximise compliance efforts.

Kangaroo Meat Processors and *Kangaroo Field Processors* are required to submit returns to NPWSA. NPWSA maintains a computerised database that stores this return information along with all quota, permit, and sealed tag details. Regular reports will be compiled and checked for compliance, and reports on potential offenders or individual properties will be provided to field-based compliance staff in a timely manner.

The SA KMP will regularly review its compliance strategy and operations, to ensure that compliance efforts are strategically targeted and cost-efficient, are adequate to detect non-compliance incidents, and are adequate to promote and enforce compliance with relevant legislation.

Key Actions:

- Maintain effective permit and *sealed tag* issue procedures for the commercial *kangaroo* industry (e.g. landholders that receive a commercial quota allocation, *Kangaroo Field Processors, Kangaroo Meat Processors, Kangaroo Skin Tanners*).
- Maintain an up-to-date database and produce reports for regular compliance checks.
- Conduct regular and ad hoc compliance checks at field chillers (e.g. an appliance, room or structure approved by the Meat Hygiene Unit, Primary Industries and Resources South Australia for providing refrigeration purposes, and registered with NPWSA) and processing plants.

Performance Measures:

- Compliance program, including maintenance of database and field monitoring, are adequate to evaluate levels of compliance within the commercial *kangaroo* industry. Measured via:
 - Number of compliance checks at field chillers and processing plants.
 - Number of staff involved in compliance that relates to commercial *kangaroo* harvest.
 - Extent and type of compliance reports produced by database.
- Levels of compliance with legislation (*NPW Act, Regulations under this Act, Conditions of Permit*) maintained above 90% and approach 100% within the commercial *kangaroo* industry in South Australia. Measured via:
 - Number of non-compliance incidents and expiations.

(see p.23 for specific compliance with the *Code of Practice for the Humane Shooting of Kangaroos*).

LANDHOLDER

Authorised under *National Parks and Wildlife Act 1972*

Allows:

A landholder or property manager to harvest a specified number of *kangaroos* off a property for commercial utilisation.

Relevant detail:

- The property must be located within a *Regional Board* that is approved for commercial *kangaroo* harvest. The property must qualify for a commercial quota based on property size, property suitability weightings for *kangaroos* and regional density estimates. Where a property is too small to receive a commercial quota under its own right, consortia may be formed. Consortia must nominate a person to manage the quota allocation.
- The permit holder may choose to approve the harvest of less than the number of *kangaroos* offered by NPWSA.
- The landholder is currently required to nominate a *Kangaroo Meat Processor* to harvest the *kangaroos* taken off their property.
- The landholder currently may or may not choose to nominate a *Kangaroo Field Processor* to shoot the *kangaroos* on their property. If the landholder does not nominate a *Kangaroo Field Processor*, this will be determined by their *Kangaroo Meat Processor*.
- *Kangaroos* can only be harvested on the property specified between 01 January and 31 December of the relevant year.
- The landholder is currently required to submit an annual return on a form provided by NPWSA.

ISSUE OF SEALED TAGS

Issued under *National Parks and Wildlife Act 1972*

Allows:

Sealed tags to be purchased by a landholder with a commercial quota allocation, or by a *Kangaroo Meat Processor*. Royalties must be paid for *sealed tags*. A *sealed tag* must be attached to every *kangaroo* carcass that enters the commercial trade.

Relevant detail:

- Tags must be self-locking, individually numbered, and coloured differently for each species.
- Tags are valid for the year of issue, but may currently be extended upon application to the Director NPWSA for an additional 12 months.
- Tags are issued to a property and must only be used on that property, unless they have been renominated for use on another property.
- Tags may currently be renominated for use on an alternative property within the year of purchase and an additional year following purchase, provided the *Kangaroo Meat Processor* in ownership of the tags is also the nominated *Kangaroo Meat Processor* for the alternative property, and the number of transferred tags does not exceed the amount of unharvested quota on the alternative property.
- Tags may currently be returned to NPWSA for refund within three months of expiry.

KANGAROO FIELD PROCESSOR

Permit issued under *National Parks and Wildlife Act 1972*

Allows:

The permit holder to take *kangaroos* by means of a firearm on a property for which there is a commercial quota, and sell the carcasses to a *Kangaroo Meat Processor*.

Relevant detail:

- The applicant must hold a current Firearms Licence.
- The applicant must have successfully completed an approved Kangaroo Field Processors Firearms Accuracy Accreditation Course in SA or another State.
- The applicant must have successfully completed the Game Meat Field Hygiene Course run by Primary Industries and Resources South Australia.
- The permit holder may only shoot *kangaroos* on a property on which they have been nominated to shoot by the landholder or the *Kangaroo Meat Processor*, and must shoot no more than the total number of each species allocated for harvest on that property.
- All *kangaroos* must be shot in accordance with the *Code of Practice for the Humane Shooting of Kangaroos*.
- The permit holder must affix to each carcass a *sealed tag*. The *sealed tag* must be valid for the species, and for the property on which the *kangaroo* was shot.
- Once the zero tolerance policy has been introduced, the permit holder must not attempt to sell a *kangaroo* that has a bullet wound in any part of the body other than the head.
- The permit holder must supply returns to NPWSA in the approved format.

KANGAROO MEAT PROCESSOR

Permit issued under *National Parks and Wildlife Act 1972*

Allows:

The permit holder to keep and sell *kangaroo* meat products and skins.

Relevant detail:

- Approved applicants must have a thorough knowledge of the *National Parks and Wildlife Act 1972* and Regulations under this Act.
- The permit holder must only accept *kangaroo* carcasses from an accredited *Kangaroo Field Processor*.
- The permit holder must only accept *kangaroo* carcasses that have a *sealed tag* affixed.
- The permit holder must supply returns to NPWSA in the approved format.
- The permit holder must abide by the *Meat Hygiene Act 1994* and Regulations under this Act.
- The permit holder must be accredited by Primary Industries and Resources South Australia.

KANGAROO SKIN TANNER

Permit issued under *National Parks and Wildlife Act 1972*

Allows:

The permit holder to keep and sell *kangaroo* skins.

Relevant detail:

- The permit holder must only purchase and tan skins that have a *sealed tag* affixed.

IMPORT OR EXPORT PERMIT

Permit issued under *National Parks and Wildlife Act 1972*

Allows:

The permit holder, being a *Kangaroo Meat Processor* or *Kangaroo Skin Tanner*, to export or import *kangaroo* products.

Relevant detail:

- Every consignment of *kangaroo* products must be accompanied by an import or export permit issued by NPWSA.
- Permits for multiple consignments may be issued.
- Compliance checks may be conducted to ensure that the permit holder has legally acquired the carcasses or *kangaroo* products.

NB: Export of *kangaroo* products from Australia requires a separate permit issued by Environment Australia.

2.3 IMPACTS OF COMMERCIAL HARVEST ON KANGAROOS

Objective: **Improve understanding of the impacts of sustainable commercial harvest on *kangaroos*, their habitat and the ecosystems of which they form part.**

Monitoring and minimising the potential negative impacts of the activities covered by this plan are classed as high priorities among regular management actions, particularly for the activity of commercial harvest. This is consistent with the requirements of Commonwealth and State legislation that oversee harvesting of native species, and the precautionary approach that is used for management actions covered by this plan.

Monitor Harvest Levels

The annual commercial harvest of *kangaroos* from each region will be collated regularly. This information will be submitted in quarterly harvest reports to the Commonwealth Minister for the Environment and Heritage, and presented to stakeholders and the public at an annual public forum or other consultative measures. Harvest figures will also be considered in combination with numbers removed through other methods (e.g. non-commercial destruction), and with environmental conditions that may impact on population size or structure (e.g. drought).

Information on the demographics of *kangaroo* harvest (currently sex and weight) will be provided by harvest returns submitted by *Kangaroo Field Processors* and *Kangaroo Meat Processors*. Long-term datasets of harvest returns from SA, NSW and Qld are currently being analysed as part of a collaborative research project between the Government departments responsible for management of *kangaroos* and external scientists. Alternatives to using harvest returns may be considered in the future.

Identify Potential Impacts of Harvest

Potential positive and negative impacts of harvest on *kangaroo* populations, habitat and ecosystems are discussed in Appendix 3. Within South Australia, these impacts are likely to vary both spatially and temporally.

The following recommendations are given to improve understanding of the impacts of commercial harvest:

1. Identify all potential positive and negative impacts to *kangaroos*, their habitat and ecosystems. Expand on current knowledge through regular perusal of scientific literature, results of previous actions, and consultation with key stakeholders and community.
2. Develop ways to monitor the presence of the impacts identified in (1).
3. Identify or develop management controls that can be implemented to minimise or prevent negative impacts.

Information to assist this process may be obtained through an adaptive management approach or through current research projects in which NPWSA is involved.

Key Actions:

- Record and analyse number and sex of each species taken through commercial harvest.
- Submit quarterly reports to the Commonwealth Minister for the Environment and Heritage detailing numbers removed through commercial harvest and non-commercial destruction.
- Use literature survey and consultative techniques to identify all potential impacts of harvest.

Performance Measures:

- Potential impacts of harvest documented and monitored in a way that allows for the development of management controls to minimise the potential negative impacts of harvest on *kangaroos*, habitat and ecosystems. Measured via:
 - Number of regions with documented totals of commercial and non-commercial destruction.
 - Extent and type of monitoring conducted to detect potential impacts.

Aim 3. Minimise Unwanted Impacts

Manage kangaroo populations to minimise unwanted impacts on other land uses

Although management of *kangaroos* to allow for sustainable resource use is promoted as part of this management plan, commercial harvest is not the only allowed take of *kangaroos* under the *NPW Act*. While less significant in number than that taken commercially, *kangaroos* are also taken under permits for non-commercial destruction.

At high densities, *kangaroos* may cause unwanted impacts to biodiversity, agricultural and pastoral industries, or other land uses. As commercial harvest will not be a practical management option for all localities and situations, minimisation of these impacts through non-commercial destruction of *kangaroos* is retained as an option for landholders, and on National Parks and reserves.

3.1 NON-COMMERCIAL DESTRUCTION

Objective: **Maintain an effective permit system for non-commercial destruction of *kangaroos*, where there are reported unwanted impacts or damage.**

Although the extent of South Australia is potentially available for commercial harvest, non-commercial destruction of *kangaroos* is retained for properties where commercial harvest is not practicable, due to location (e.g. urban setting), or ecological (e.g. low or highly variable *kangaroo* densities) or economic (e.g. difficult terrain, extreme distance from regional centres) factors.

Non-commercial destruction is initiated when a landholder submits an application for a destruction permit. The landholder must provide on this application a reason under which destruction is warranted, by listing the unwanted impact(s) being caused by *kangaroos* on their property (e.g. damage to crops, plantations, native vegetation). Applications for non-commercial destruction are independently assessed by an authorised NPWSA officer. The assessment procedure may involve consideration of property size and characteristics, number of previous permits issued, nature of *kangaroo* populations on neighbouring properties and recent climatic conditions.

The number of *kangaroos* issued on destruction permits will be monitored closely at a regional level. All permit holders will be requested to provide returns detailing the number of animals destroyed, to assist with monitoring of actual take. Within commercially harvested regions, non-commercial destruction will be monitored to ensure the combined commercial and non-commercial take for a region does not present serious or irreversible threats to *kangaroo* populations. Within commercially harvested regions, NPWSA will actively promote the use of commercial quota over non-commercial destruction.

Regular *kangaroo* population monitoring is not conducted in all non-commercial only regions (i.e. regions that are not subject to commercial harvest). This means that additional measures must be used to ensure that non-commercial destruction does not negatively impact on *kangaroo* populations. In non-commercial only regions, close monitoring of permit requests, number of *kangaroos* issued on permits, and number taken (as indicated by returns) will be conducted. When these numbers are unnaturally high or widespread climatic events (e.g. drought) raise concern, regional or local surveys of *kangaroo* populations may be considered. Following survey results, the destruction permit issuing process for a region may be adjusted, which may include a limit on the maximum number allowable on an individual permit or the closure of a region to further non-commercial destruction.

Kangaroos shot under destruction permits may be left in the field, or retained for personal utilisation. If carcasses are to be used, yellow (personal use) tags must be obtained from NPWSA and the prescribed fee paid to NPWSA. Carcasses must not enter the commercial industry or be sold. All *kangaroos* must be shot in accordance with the *Code of Practice for the Humane Shooting of Kangaroos*.

The non-commercial destruction system will be reviewed during the life of this management plan. Factors that may be considered during the review are maximising the extent of compliance with the *Code of Practice for the Humane Shooting of Kangaroos*, maximising the utilisation of carcasses, and maintaining a simple system that can be adequately enforced and effectively covers landholder concerns.

Current issue procedures for destruction permits and yellow tags are detailed further within this section.

Key Actions:

- Promote utilisation of commercial quota before non-commercial destruction.
- Facilitate monitoring of non-commercial destruction by encouraging permit holders to provide returns.
- Review the current non-commercial destruction system.
- Report non-commercial destruction as part of quarterly harvest reports submitted to the Commonwealth Minister for the Environment and Heritage.

Performance Measures:

- Commercial harvest quota promoted and utilised in a manner that allows for non-commercial destruction of *kangaroos* to be maintained at low levels within commercially harvested areas.
Measured via:
 - Proportion of commercial quota utilised at the regional level.
 - Number of *kangaroos* issued on non-commercial destruction permits in commercially harvested regions.
- Levels of compliance with permit conditions maintained above 90% and approach 100% for non-commercial destruction. Measured via:
 - Number of non-compliance incidents and expiations.

(see p.23 for specific compliance with the *Code of Practice for the Humane Shooting of Kangaroos*).

DESTRUCTION PERMIT

Issued under *National Parks and Wildlife Act 1972*

Allows:

A landholder or property manager to destroy a specified number of *kangaroos* on their property that may be causing unwanted impacts to other land uses. Carcasses may be left in the field or utilised for personal use. Yellow tags must be attached to carcasses if they are to be used. Carcasses must not be sold.

Relevant detail:

- The applicant must state on the permit application the number of *kangaroos* being requested for destruction, the size of the property, the estimated number of *kangaroos* on that property, and the nature of the impacts being caused by *kangaroos* on their property.
- A destruction permit will not be issued if the applicant has held a previous destruction permit and has not provided a return to NPWSA.
- All *kangaroos* must be shot in accordance with the *Code of Practice for the Humane Shooting of Kangaroos*. The permit holder may shoot the *kangaroos* themselves or may nominate a person to do so for them. The permit holder is responsible for the actions of any shooter that they nominate on the permit.
- Destruction permits are issued for a period of 3 months, 6 months, 9 months or until the end of the calendar year in the year of issue.
- The permit holder is required to provide NPWSA with a return stating the number of animals destroyed on permit.
- Other conditions may be prescribed by the issuing officer at the time of permit issue.

ISSUE OF YELLOW TAGS

Issued under *National Parks and Wildlife Act 1972*

Allows:

The holder of a (non-commercial) destruction permit to purchase yellow tags, which allows for personal use of carcasses. Carcasses must not be sold.

Relevant detail:

- Tags must be self-locking, individually numbered and yellow in colour.
- Tags are valid for the length of the destruction permit. Tags may be renominated for use with a further permit held by the same permit holder on the same property.
- Tags may not be renominated to another property or returned for refund.
- Tags must be attached to the carcass before it leaves the property.

3.2 KANGAROO MANAGEMENT ON NATIONAL PARKS AND RESERVES

Objective: Manage *kangaroo* populations on National Parks and reserves for protection of ecological assets.

Land set aside for nature conservation has a long-term objective of maintaining the natural biodiversity of a region. In some situations, management of *kangaroo* populations may need to be considered as part of this objective. The removal of natural predators, control of feral herbivores and presence of ample food and water resources can all lead to unnaturally high *kangaroo* densities on National Parks and reserves.

Experience from areas such as Flinders Ranges National Park shows that complete removal of domestic stock will not necessarily result in improvements to land condition (e.g. Alexander, 1997). Populations of feral and native herbivores can increase following removal of stock to capitalise on increased grazing opportunities, and a minimal or no reduction in the total grazing pressure may be observed. This situation highlights the importance of considering all sources of grazing pressure acting on native plant communities, including domestic stock, feral herbivores such as rabbits and goats, and management of free-ranging *kangaroos*.

High grazing pressure can negatively impact on vegetation biodiversity, pose a risk to threatened plant species, and lead to an increase in non-palatable weed species. *Kangaroos* at high densities can also out-compete other native species for space and food resources.

Methods of Controlling Kangaroo Numbers

Controlled culls are currently used as a management strategy for *kangaroos* on some National Parks and reserves within South Australia and in other States. Non-commercial destruction of *kangaroos* on National Parks and reserves in South Australia is allowed under Section 53(1)(c) of the *NPW Act*, where animals are causing, or are likely to cause damage to the environment. Controlled culls of *kangaroos* on National Parks and reserves are conducted with the utmost concern for animal welfare, and culls are timed to minimise the potential impacts on pouch young or young-at-foot. NPWSA marksmen or contractors that have successfully completed the equivalent firearms accuracy accreditation course as *Kangaroo Field Processors* are currently used to conduct the shooting.

All *kangaroos* must be shot in accordance with the *Code of Practice for the Humane Shooting of Kangaroos*. A representative from the RSPCA will be periodically invited to attend culls as an independent observer, to ensure that culls are completed in compliance with animal welfare legislation.

Commercial utilisation of *kangaroos* from a National Park or reserve is allowable under Section 60J of the *NPW Act*. To date, this has not been employed as a management strategy in South Australia. If commercial utilisation is considered as a management strategy in the future it must fall within the strict guidelines provided by the *NPW Act*, and an extensive and comprehensive briefing must be provided to the Minister for Environment and Conservation. The Minister's recommendation will be made on a case-by-case basis following review of all relevant information.

Further methods of *kangaroo* control may be considered for National Parks and reserves in the future, provided they are conducted within an ecological framework, and with regard to land management, animal welfare and species conservation objectives. Choice of a control method is individually assessed for each Park, and once decided, management strategies for *kangaroos* are incorporated into Park Management Plans.

Management Recommendations

The following recommendations are made for management of *kangaroos* on National Parks and reserves in South Australia:

1. Controlled culls of *kangaroos* will only be considered if there are demonstrated negative impacts of *kangaroo* grazing on native plant communities or other native species.
2. An integrated feral herbivore management program must be implemented successfully before an accurate assessment of *kangaroo* grazing pressure can be made.
3. Establish baseline *kangaroo* densities prior to control of *kangaroo* populations (currently using regular line transect surveys conducted on foot; see survey methods detailed on p.7).
4. Set target ranges for *kangaroo* density, based on monitoring data, regional threshold densities and biodiversity considerations.
5. Choose an appropriate strategy for control of *kangaroos*, given land management, species conservation and animal welfare concerns.
6. Conduct regular monitoring of *kangaroo* populations prior to and following control events.
7. Review management strategies regularly following an assessment of previous results.

Key Actions:

- Manage *kangaroo* populations on National Parks and reserves as part of the total grazing pressure, and within the recommendations established above.
- Report on numbers removed from National Parks and reserves as part of non-commercial destruction in quarterly harvest reports submitted to the Commonwealth Minister for the Environment and Heritage.

Performance Measures:

- Demonstrated recovery in native vegetation communities and/or indicator species as a result of *kangaroo* management actions (indicators will vary between National Parks/reserves).
- Demonstrated change in *kangaroo* densities on National Parks and reserves towards specified target ranges due to *kangaroo* management actions.

Aim 4. Animal Welfare

Adhere to best practice animal welfare standards in conservation and management programs for kangaroos

Minimisation of animal suffering is a key aim of the management of *kangaroos* in South Australia. All reasonable efforts will be made to ensure management actions covered within this management plan are humane and minimise animal suffering.

Regular reviews of the humaneness of *kangaroo* management policy and practice will be conducted, and modifications to existing practice will be made as required. Any research on *kangaroos* conducted by NPWSA requires approval from an animal ethics committee.

4.1 MAXIMISE COMPLIANCE WITH ANIMAL WELFARE LEGISLATION

Objective: **Maximise compliance with the *Code of Practice for the Humane Shooting of Kangaroos and the Prevention of Cruelty to Animals Act 1985*.**

All *kangaroos* taken in South Australia under the *NPW Act* must be killed in accordance with the *Code of Practice for the Humane Shooting of Kangaroos* (published by Environment Australia, Second Edition, dated 1990, as varied from time to time; hereinafter referred to as the *Code*). This requirement is enforced for all permits that allow for destruction of *kangaroos*.

To maximise compliance with the *Code*, a copy of this document is distributed to *Kangaroo Field Processors* upon receipt of their initial permit, and upon every occasion this permit is renewed. A copy of the *Code* is also distributed with every non-commercial destruction permit. Distribution of the *Code* will be extended to include distribution to landholders that receive commercial quota allocations and to *Kangaroo Meat Processors*. All regional staff that may issue destruction permits will be informed of the *Code* and its requirements.

Adherence to the *Code* by *Kangaroo Field Processors* is reinforced as part of their firearms accreditation, which has been a compulsory permit requirement in South Australia since 1 July 2002. Compulsory training ensures that accredited *Kangaroo Field Processors* are suitably trained to use firearms and maximises the probability of a humane shot as per the *Code*. The firearms accreditation course completed in South Australia requires that participants conduct shooting accuracy tests under field conditions (i.e. shooting from a vehicle at night with a spotlight), and other States are being encouraged to adopt a test under similar conditions (RSPCA Australia, 2002).

A recent report investigating the extent of compliance with the *Code* found that 96.7% (95% confidence interval: 94.3-98.1) of commercially harvested *kangaroos* in South Australia were head-shot (RSPCA Australia, 2002). This result was the second best of the four States in Australia that commercially harvest *kangaroos*, and above the national average of 95.9%. NPWSA will continue to strive to improve these figures through regular examination and review of compliance and enforcement strategies. Within the life of this plan, NPWSA will implement commercial *kangaroo* industry standards by enforcing appropriate regulations to prevent non head-shot carcasses entering the game meat trade.

NPWSA recommends and supports the regular review of the *Code*. NPWSA will participate in the 2003 review of the *Code*, and will distribute and enforce the revised version of the *Code* (once completed) for all types of permits that allow for the destruction or harvest of *kangaroos*.

Compliance with the *Prevention of Cruelty to Animals Act 1985* is maximised through some of the measures listed above, such as compulsory firearms accreditation for *Kangaroo Field Processors* and enforcement with the *Code*. In addition, compliance with the *Prevention of Cruelty to Animals Act 1985* is listed as a condition of destruction permits, to ensure that animals taken under non-commercial destruction do not suffer unnecessary pain. The non-commercial destruction system will be reviewed within the life of this plan (see p.20), to ensure that compliance with animal welfare legislation and the extent to which this legislation can be enforced are maximised.

Compliance with animal welfare legislation is a priority for NPWSA staff conducting checks of field chillers and meat processing plants. NPWSA officers will routinely check for compliance with the requirements of the *Code of Practice for the Humane Shooting of Kangaroos* and the *Prevention of Cruelty to Animals Act 1985*.

NPWSA will also investigate anecdotal reports and public concerns that relate to non-commercial destruction or illegal take of wildlife.

Key Actions:

- List compliance with the *Code of Practice for the Humane Shooting of Kangaroos* as a condition of permit for all permits that allow for destruction of *kangaroos*, and compliance with the *Prevention of Cruelty to Animals Act 1985* as a condition of permit for non-commercial destruction.
- Distribute *Code of Practice for the Humane Shooting of Kangaroos* as part of permit issue processes.
- Participate and support the 2003 review of the *Code of Practice for the Humane Shooting of Kangaroos*.
- Enforce adequate training and firearms accuracy standards for *Kangaroo Field Processors*.
- Include animal welfare checks as part of routine compliance inspections.
- Review the current non-commercial destruction system, to ensure that compliance with animal welfare legislation is maximised and enforceable.

Performance Measures:

- Levels of compliance with animal welfare legislation maintained at or near 100% for all actions detailed within this management plan (compliance to be reported separately for commercial harvest, non-commercial destruction, and *kangaroo* management on National Parks and reserves). Measured via:
 - Number of non-compliance incidents and expiations
 - Extent of monitoring and compliance activities.
 - Extent and type of anecdotal reports and public concerns.
 - Results of commissioned reviews and reports.

Aim 5. Communication and Education

Ensure effective communication and education throughout the community

The public profile of *kangaroo* management in South Australia is high, in part due to the political nature of specific management objectives, in part due to the large number of stakeholders involved in the commercial *kangaroo* industry. Consequently, the maintenance of effective communication links between NPWSA, industry stakeholders, regional land management and conservation groups, and the wider community is considered a key component to the success of the program. NPWSA will also focus on the development of strong links with other *kangaroo* and wildlife management organizations within Australia.

Effective communication structures are essential for adaptive management experiments, which require high levels of stakeholder involvement. Both industry and community are likely to benefit from their involvement, by the incorporation of their feedback into future management policies and practices for *kangaroos*.

5.1 PROMOTE KANGAROO MANAGEMENT PROGRAM

Objective: **Promote the South Australian Kangaroo Management Program through public education and consultation with stakeholders and the community.**

Promotion of the SA KMP and its approved management plan was recently identified in a public forum as an issue requiring refinement and further attention (Southern Rangelands Rural Plan Kangaroo Forum, held at Port Augusta on 4-5 March 2002).

The SA KMP, and particularly this management plan, will be promoted regularly to the commercial *kangaroo* industry and the general public. Promotion may include the use of radio and print media, and attendance at scientific conferences and rural field days. A SA KMP website (<http://www.environment.sa.gov.au/biodiversity/kangaroo.html>) will be developed to serve as the major point of public access to program reports, quota allocation and harvest progress, and information. Annual program reports will also be provided to the Commonwealth Minister for the Environment and Heritage.

NPWSA will develop factual information sheets for the major stakeholders in the commercial *kangaroo* industry, including landholders, regional Natural Resource Management (NRM) groups, *Kangaroo Field Processors* and *Kangaroo Meat Processors*. Information sheets will cover background information on commercial harvest and opportunities within the industry, and detail current permit procedures and conditions. Fact sheets will also be developed for the general public, schools and interest groups, providing an easy-to-read synopsis of *kangaroo* management in South Australia. Fact sheets will promote the need to control total grazing pressure, including that of *kangaroos*, to assist conservation of biodiversity. For the purpose of public education, these fact sheets should be provided in combination with material detailing the conservation of threatened macropod species.

Considerable effort will be focused on the promotion of positive involvement of *Regional Boards* in the quota allocation process. There will be regular interaction between NPWSA and *Regional Boards*, including consultation during the development of commercial harvest quotas, issue of commercial destruction permits, and reviews of 'Kangaroo Management Strategies'. During the year, NPWSA will provide progress reports on allocated and issued quota to *Regional Boards* to facilitate the effective distribution of remaining quota. NPWSA will also provide reports of non-commercial destruction to *Regional Boards*. The recent development of local or regional NRM groups may provide a further opportunity for *kangaroo* management to be encouraged and promoted at the regional level.

Communication efforts will also be focused on encouraging the involvement of Aboriginal communities in *kangaroo* management, and the development of culturally relevant regional management strategies for *kangaroos* (see Aim 5: Objective 5, p.29).

NPWSA currently holds an annual forum to inform stakeholders and the general public on *kangaroo* management issues in South Australia. The forum provides an opportunity for the dissemination of information to land managers, wildlife managers, the commercial *kangaroo* industry, government departments, interest groups and local communities. An alternative to a forum may be considered in the future.

Key issues for discussion currently include presentation of the proposed harvesting quota for the following year, presentation of recent *kangaroo* population monitoring results and an assessment of the size of the year's commercial harvest to date. Relevant stakeholder and community groups will be invited to participate through an opportunity to provide annual updates. Wildlife managers and research scientists from other government departments and universities will be invited on a regular basis to present a topical issue for discussion at the forum. The forum will also provide an opportunity for stakeholders and the community to give feedback to NPWSA and thereby influence future decision-making on *kangaroo* management in South Australia. Further consultation with stakeholders and the general public may be incorporated in the future.

Key Actions:

- Promote SA KMP, and particularly this management plan, through radio and print media and attendance at scientific conferences and field days.
- Maintain a SA KMP website as a point of access for the general public.
- Develop fact sheets for major stakeholders in the commercial *kangaroo* industry and the general public.
- Maintain high levels of consultation with *Regional Boards*.
- Hold an annual public forum (or alternative) to discuss *kangaroo* management issues.

Performance Measures:

- SA KMP promoted and explained in a manner that provides opportunities for both the commercial *kangaroo* industry and the general community to be adequately informed on *kangaroo* management issues and practices. Measured via:
 - Number of media submissions and requests.
 - Extent and type of feedback received by NPWSA.
 - Amount of consultation and communication with targeted groups.
 - Number of public forums and/or public meetings with SA KMP involvement.

5.2 INVOLVEMENT OF LANDHOLDERS

Objective: Increase the involvement of landholders in property-based decision-making on commercial *kangaroo* harvest.

Landholders represent an integral component of the commercial *kangaroo* industry in South Australia. Landholders are responsible for initiating the commercial harvest process through the request of a commercial quota allocation. In addition, landholders direct the activities of the commercial *kangaroo* industry by making decisions regarding the number of *kangaroos* that can be harvested on their property. The direct on-ground knowledge and experience of landholders provides them with a good background on which to base these decisions.

Involvement of landholders should be encouraged and maximised on all occasions. NPWSA considers that the best decisions on *kangaroo* harvest will result when landholders are well informed. Consequently, NPWSA will provide increased feedback of information to landholders, including estimates of *kangaroo* population size on their property and information on the harvest of *kangaroos* taken from their property each calendar year. Provision of this information should enable greater decision-making on *kangaroo* harvest, most notably the selection of appropriate *Kangaroo Field Processors* and *Kangaroo Meat Processors* to match the harvest requirements and land management goals of each landholder.

Under current tag issue procedures, landholders can choose to increase their involvement in the harvest of *kangaroos* on their property by deciding to receive and purchase directly from NPWSA the *sealed tags* for use on their property.

The SA KMP will be promoted to landholders using media types appropriate for rural areas. Promotion may include submissions to rural newspapers and circulated publications, interviews on rural radio stations, and attendance at rural field days or meetings specifically convened for landholder input and attendance. Promotion of the program to landholders will focus on dissemination of information related to operational procedures such as permit and tag issue, survey techniques and quota setting procedures. NPWSA will also aim to provide ample opportunities for landholder feedback to the program.

A research project currently being supported by NPWSA is investigating landholder attitudes towards *kangaroo* harvest decisions and perceptions of the SA KMP. Results of this research that may maximise the involvement of landholders will be incorporated into the SA KMP where appropriate.

Key Actions:

- Provide information on property-based *kangaroo* densities and commercial harvest to landholders.
- Promote SA KMP through media directed to reach landholders in rural areas.

Performance Measures:

- Increase in the involvement of landholders in the commercial *kangaroo* industry, measured via:
 - Proportion of commercial harvest quota that is utilised.
 - Attendance of landholders at public forums and consultative procedures.
 - Amount and type of feedback from *Regional Boards* on landholder involvement.
 - Amount and type of feedback direct from landholders to NPWSA.

5.3 INDUSTRY REFERENCE GROUP

Objective: Continue to promote and support an industry group to guide the development of the commercial *kangaroo* industry in South Australia.

NPWSA has supported a reference group for the commercial *kangaroo* industry since 1998, when the Kangaroo Industries Reference Group (KIRG) was formed. The KIRG provides an opportunity for all stakeholder organisations to actively participate in directing the future development of the commercial *kangaroo* industry in South Australia.

The current terms of reference of KIRG are:

1. Provide a forum for discussion and policy development between key industry and regulatory groups.
2. Identify key opportunities and threats to the development of the *kangaroo* industry.
3. Identify issues relating to product marketing and to research and development efforts.
4. Develop clear communication structures between decision-making groups and participants in all sectors of the industry.

Members are appointed following nomination by their respective organisations and stakeholder groups. Current membership comprises one nominee from each of the;

- Australian Quarantine and Inspection Service
- Soil Conservation Council (specifically a district Soil Conservation Board member)
- Pastoral Board of South Australia
- A rangeland ecologist (currently from Government of South Australia)
- A meat hygiene unit representative (currently from Government of South Australia)
- An industry development representative (currently from Government of South Australia)
- National Parks and Wildlife South Australia (specifically a staff member of the SA KMP)

and two nominees from each of the;

- Kangaroo Industries Association of Australia (South Australia branch)
- South Australian Farmers Federation
- South Australian Field Processors Organisation

Representatives from industry, animal welfare or community groups may be requested to attend specific meetings as deemed necessary based on agenda topics. Future membership of KIRG may be expanded to include other industry, natural resource management and community groups. NPWSA provides secretarial and executive officer support to the group. Terms of office are currently appointed for a period of three years. Meetings are convened quarterly, and non-government members qualify for sitting fees and reimbursement for travel at standard rates approved for use within the Government of South Australia. The group currently reports directly to the Minister for Environment and Conservation.

Major achievements of KIRG to date include the introduction of compulsory firearms accuracy training for *Kangaroo Field Processors*, and the support and development of a zero tolerance policy on non head-shot carcasses within the commercial industry. In addition, KIRG jointly developed and held a widely attended forum exploring *kangaroo* management issues in March 2002 in collaboration with a regional INRM group (Southern Rangelands Rural Plan). Current issues under consideration by KIRG include an investigation of the factors influencing a declining State harvest, and an investigation of a more equitable distribution of costs within the commercial *kangaroo* industry in South Australia.

Updates on the progress of KIRG are currently presented annually at the SA KMP public forum, and will be incorporated into routine promotion of the SA KMP where necessary.

Key Actions:

- Convene quarterly meetings of the Kangaroo Industries Reference Group.
- Provide executive officer and secretarial support for the Kangaroo Industries Reference Group.

Performance Measures:

- Quarterly meetings of the Kangaroo Industries Reference group allow for the investigation of key *kangaroo* management issues, and facilitate the adoption of revised management procedures within the SA KMP. Measured via:
 - Extent and type of issues covered by the Kangaroo Industries Reference Group.
 - Number of recommendations from Kangaroo Industries Reference Group to SA KMP.
 - Extent of correspondence between Kangaroo Industries Reference Group and other parties.

5.4 DISTRIBUTION OF COSTS

Objective: Investigate an equitable and efficient distribution of costs within the commercial *kangaroo* industry.

The SA KMP is maintained on a cost-recovery basis, with costs currently recovered through *sealed tag* royalties and permit fees. Recovered monies are used to fund key scientific, operational and administrative staff operating within the program, the annual monitoring program, and general operational and administrative expenses associated with the management of the commercial harvest.

A more equitable distribution of costs across all sectors of the commercial *kangaroo* industry will be investigated, with particular focus on streamlining procedures and maximising *kangaroo* harvest. The costs of managing the commercial harvest of *kangaroos* may be passed onto the commercial *kangaroo* industry via royalties, fees and levies and/or on land managers gaining an economic return from *kangaroos*.

This review of the current permit and *sealed tag* system will be delegated to the Kangaroo Industries Reference Group, who may choose to invite representatives from other stakeholder or community groups

to participate in the review. Further industry consultation or small-scale trials of potential replacement systems may be incorporated as part of the review.

Key Actions:

- Facilitate a review of the current permit and tag system, using the Kangaroo Industries Reference Group.

Performance Measures:

- Development and implementation of revised permit and *sealed tag* systems leads to an equitable and efficient distribution of costs within the commercial *kangaroo* industry. Measured via:
 - Number of stakeholders involved in review of permit and *sealed tag* systems.
 - Extent and type of consultation regarding revised permit and *sealed tag* systems.
 - Extent and type of feedback to NPWSA on revised permit and *sealed tag* systems.

5.5 ENCOURAGE ABORIGINAL INVOLVEMENT

Objective: Promote and encourage the involvement of Aboriginal people in the management of *kangaroos*.

Aboriginal people have a unique connection to the Australian landscape, and native fauna and flora. The relationship between Aboriginal peoples and *kangaroos* is identified in South Australian legislation such as Section 68 of the *NPW Act*, and Section 47 of the *Pastoral Land Management and Conservation Act 1989*.

The rights and interest of Aboriginal peoples in *kangaroos* are diverse, encompassing economic (subsistence and commercial), cultural and social dimensions. These rights and interests should be considered and accommodated within the management of *kangaroo* populations in South Australia, through promoting and encouraging the involvement of Aboriginal people in *kangaroo* management.

The involvement of Aboriginal people in *kangaroo* management will be encouraged through targeted promotion of the SA KMP to Aboriginal groups, including Aboriginal pastoral leaseholders and other landholders. Areas of potential Aboriginal involvement in *kangaroo* management will be identified (e.g. commercial harvesting), and collaborative programs with traditional owners and managers of Aboriginal lands will be promoted and developed where possible.

The SA KMP will support and participate in the development and consolidation of strong relationships between Aboriginal people and other stakeholders of the commercial *kangaroo* industry, including NPWSA and the Kangaroo Industries Reference Group.

Current research being supported by NPWSA is investigating Aboriginal stakeholder views and opinions of the SA KMP and management policies. Any information gained through this research will be incorporated into future management decisions, to ensure that the SA KMP is best able to meet the aspirations and interests of Aboriginal people.

NPWSA may support or encourage research in the future including the monitoring of *kangaroo* populations on lands under Aboriginal management, quantifying the extent and the potential impacts of subsistence harvest on *kangaroo* populations, and investigating the potential impacts of commercial *kangaroo* harvest on Aboriginal subsistence harvest.

Key Actions:

- Support and participate in the continuing development and consolidation of strong relationships between Aboriginal people, NPWSA, the South Australian Farmer's Federation and the Pastoral Board as a basis for improved understanding and cooperation on *kangaroo* management issues.
- Conduct targeted promotion of the SA KMP to promote informed decision making by Aboriginal landholders about *kangaroo* harvest decisions on their property.

- Identify and promote opportunities for Aboriginal involvement in commercial *kangaroo* harvesting in conjunction with other government support for Aboriginal economic development.
- Develop improved understanding of the potential impacts of commercial harvest on Aboriginal rights, interests and aspirations for *kangaroos*.

Performance Measures:

- Increased recognition of Aboriginal aspirations, rights and interests related to *kangaroo* use and management. Measured via:
 - Number of Regional Kangaroo Management Strategies that contain recognition of Aboriginal rights and interests in *kangaroos*.
 - Extent of information obtained about *kangaroos* in regions under Aboriginal management.
 - Extent of liaison and communication between SA KMP, KIRG and Aboriginal stakeholders.
 - Number of agreements between government and Aboriginal stakeholders about issues related to *kangaroo* management and conservation.

5.6 PROMOTE RELEVANT LEGISLATION AND POLICY

Objective: Promote legislation, policy and guidelines relevant to conservation and management of *kangaroos*.

Kangaroo management in South Australia is influenced and regulated by a number of pieces of Commonwealth and State legislation and policy (Appendix 2). This legislation includes the *NPW Act*, which provides for harvesting of a protected species (Section 60J), non-commercial destruction of a protected species (Section 53(1)(c)) and hunting and food gathering by Aborigines (Section 68D). Other key guidelines, policy or legislation for *kangaroo* management in South Australia include the *Code of Practice for the Humane Shooting of Kangaroos*, the *Prevention of Cruelty to Animals Act 1985*, the *Meat Hygiene Act 1994*, the *Pastoral Land Management and Conservation Act 1989*, and the *Native Title Act 1983*.

NPWSA will aim to promote relevant legislation, policy and guidelines to the commercial *kangaroo* industry and the wider community, through one or more of the following measures:

1. Distribution of relevant legislation/policy as part of a permit issue process.
2. Inclusion of legislation/policy details and requirements on fact sheets for industry and community.
3. Promotion of legislation/policy during media submissions and correspondence.

All staff that work on the SA KMP will maintain a current awareness of relevant legislation and policy through regular information transfer or training.

Key Actions:

- Distribute legislation/policy as part of permit issue process where necessary.
- Incorporate promotion of relevant legislation/policy in fact sheets for stakeholders and community.
- Promote legislation/policy wherever possible through involvement with media and on website.

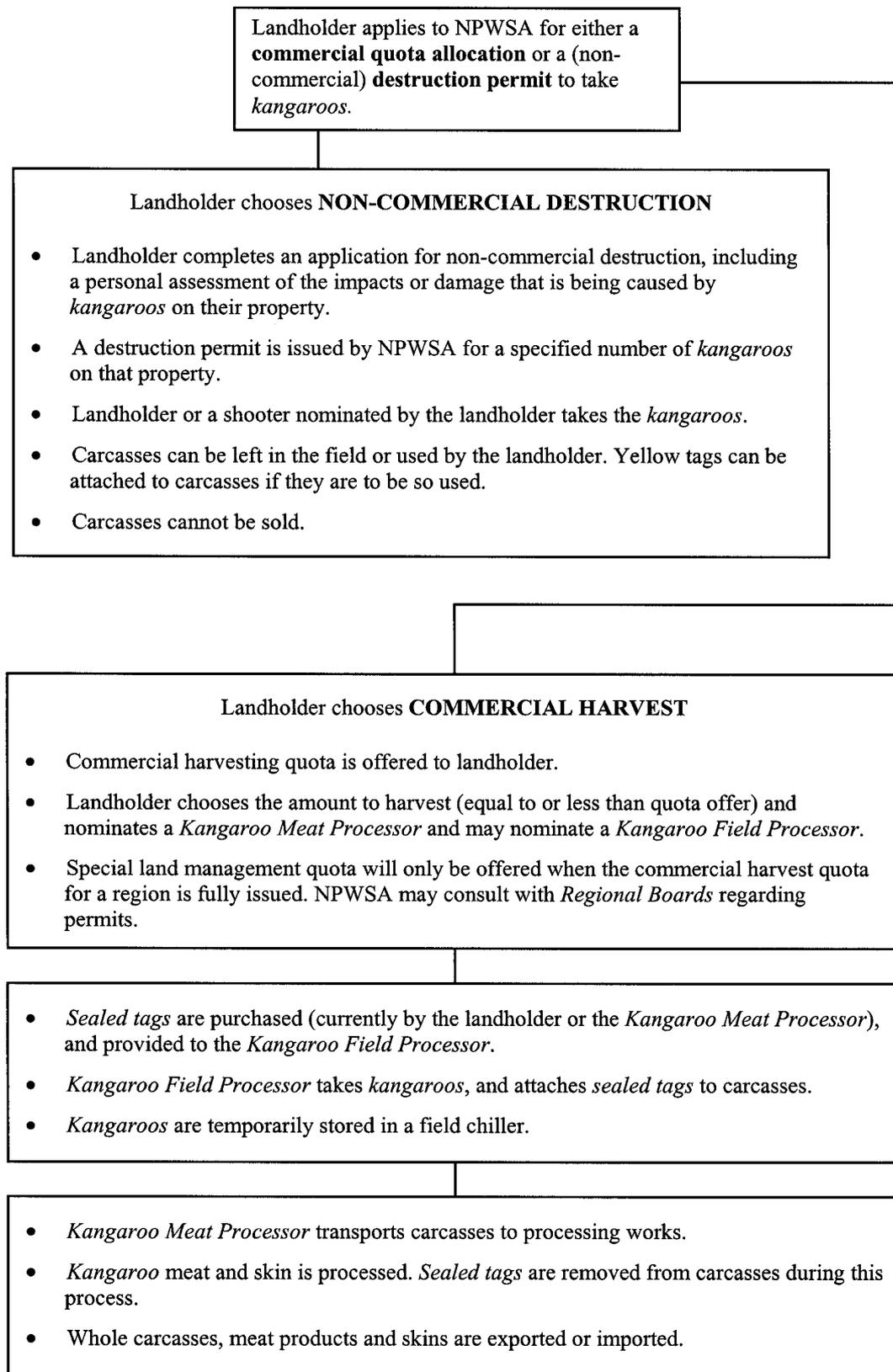
Performance Measures:

- Legislation promoted in a manner that provides an opportunity for all stakeholders in the commercial *kangaroo* industry and interested members of the community to maintain awareness of relevant legislation. Measured via:
 - Extent of distribution of legislation/policy with permits and fact sheets.
 - Number of times legislation/policy promoted in media submissions and correspondence.

Figure 1: Map of current Kangaroo Management Regions of South Australia (based on administrative boundaries of district Soil Conservation Boards). Bold type indicates regions that are currently subject to commercial harvest. The species currently harvested in each region are indicated by R (Red Kangaroo), WG (Western Grey Kangaroo) and E (Euro). Note that regions and boundaries are subject to change in the future.

	Kangaroo Management Region	Area (km ²)	Species harvested
1a	Marla-Oodnadatta	125,100	R
1b	Marla-Oodnadatta	1,700	R
2a	Marree	183,300	
2b	Marree	13,000	R, E
3	Kingoonya	71,400	R
4	North Flinders Ranges	34,400	R, WG, E
5	Gawler Ranges	45,400	R, WG, E
6	Central Flinders Ranges	4,100	R, WG, E
7	North East Pastoral	31,300	R, WG, E
8	Goyder	4,700	R, WG, E
9	Nackara	3,000	R, WG
10	West Broughton	5,800	R, WG
11	Eastern Districts	24,300	R, WG
12	Hummocks	5,100	R, WG
13	Yorke Peninsula	6,600	
14	Lower North	6,800	
15	Northern Hills	1,700	
16	Central Hills	1,200	
17	Southern Hills	3,300	
18	Murray Plains	4,800	
19	Murray Mallee	19,700	R, WG
20	Coorong And Districts	10,400	
21	Lacepede-Tatiara	8,300	
22	Lower South East	11,400	
23	Kangaroo Island	4,400	
24	Lower Eyre Peninsula	7,300	WG
25	Eastern Eyre Peninsula	11,800	WG
26	Central Eyre Peninsula	12,000	WG
27	Western Eyre Peninsula	11,500	WG
28	Far West Coast	10,800	WG
29	Nullarbor	90,100	
30	Maralinga Tjarutja	92,500	
31	Pitjantjatjara	87,100	
	Other	366,800	
	TOTAL	1,037,200	

Figure 2: Flow chart of commercial and non-commercial destruction of *kangaroos* in South Australia. Note that landholders play a key component in the process.



Glossary

- **Commercial Kangaroo Quota**

The total number of *kangaroos* that can be taken for commercial utilisation in a calendar year. The *commercial kangaroo quota* must be approved annually by the Commonwealth Minister for the Environment and Heritage.
- **Ecologically Sustainable Development**

Uses the definition of the Commonwealth Government (1990), that ecologically sustainable development is “using, conserving and enhancing the community’s resources so that ecological processes on which life depends are maintained, and the total quality of life now and in the future can be increased”.
- **Kangaroo**

The three kangaroo species to which this management plan applies: Red Kangaroo (*Macropus rufus*), Western Grey Kangaroo (*M. fuliginosus*) and Euro (*M. robustus*).
- **Kangaroo Field Processor**

The shooter who is allowed by permit, under the *National Parks and Wildlife Act 1972*, to take *kangaroos* by means of a firearm, and sell carcasses to a *Kangaroo Meat Processor*.
- **Kangaroo Meat Processor**

The holder of a *Kangaroo Meat Processor* permit, allowing them to process *kangaroo* carcasses, and sell whole carcasses, meat products and skins.
- **Kangaroo Skin Tanner**

The holder of a *Kangaroo Skin Tanner* permit, allowing them to tan and sell *kangaroo* skins.
- **Landholder**

The owner or occupier of specified lands. May have a commercial quota allocation or a *Destruction Permit*.
- **Precautionary Principle**

Uses the definition of the Rio Conference on Environment and Development (1992), that the precautionary principle is “where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation”. This is recognised as a principle of Ecologically Sustainable Development.
- **Quota Proposal Document**

A document prepared by the SA KMP, outlining proposed commercial quotas for each *kangaroo* species for the upcoming year. Submitted to the Commonwealth Minister for Environment and Heritage for approval under the *Environment Protection and Biodiversity Conservation Act 1999*.
- **Regional Boards**

The regional land management or natural resource management board or group that are involved in the regional allocation of commercial harvest quota, and the development and review of regional ‘Kangaroo Management Strategies’. Currently Soil Conservation District Boards.
- **Sealed Tag**

A tag issued for attachment to the skin or carcass of a *kangaroo* taken for commercial use.
- **Yellow Tag**

A tag (yellow in colour) issued for attachment to the skin or carcass of a *kangaroo* taken for personal use.

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Appendix 1:

Kangaroo Conservation and Management Plan Review Task Group

The Kangaroo Conservation and Management Plan Review Task Group was formed in early 2002 to oversee the preparation of this management plan. Nominations for membership were requested from relevant stakeholder organizations, conservation and community groups, and Government departments.

Non-government members of the group were eligible for sitting fees and reimbursement for travel at standard rates approved for use within the Government of South Australia.

Membership of the Kangaroo Conservation and Management Plan Review Task group for the development of this management plan comprised:

- *Conservation Council of South Australia*
John Hunwick
- *Kangaroo Industries Association of Australia (South Australia branch)*
George Morgan
- *Native Title Unit, Aboriginal Legal Rights Movement*
Sally Skyring
- *Pastoral Board of South Australia*
Michael McBride
- *Primary Industries and Resources South Australia*
Bill Giles
Brendan Lay
- *Soil Conservation Council*
Iain Grierson
- *South Australian Farmers Federation*
Kent Martin
- *South Australian Field Processors Organisation*
[no specific member]
- *Wildlife Advisory Committee*
Don Pfitzner (Chairperson of review group)
- *National Parks and Wildlife South Australia*
Lisa Farroway Ecologist, Kangaroo Management
Barbara St John Senior Ecologist, Abundant Species Management
Rod Henderson Senior Wildlife Officer
Frank Dal Piva Manager, Investigations and Compliance Unit

Appendix 2:

Policy and Legislative Framework for Kangaroo Management in South Australia

There are a broad range of policies, legislation and guidelines that set a framework for the conservation and management of *kangaroos* in South Australia. Legislation and policy exists at both the Commonwealth (National) and State level. In addition, there are many plans that operate at the regional or local level which incorporate *kangaroo* issues; such as regional natural resource management plans.

Key legislation and policy in place at the Commonwealth and State level are shown below.

COMMONWEALTH

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Export Control Act 1982*
- *National Residue Survey Administration Act 1992*
- *National Residue Survey (Excise) Levy Act 1998*
- *Native Title Act 1983*
- Code of Practice for the Humane Shooting of Kangaroos 1990
- National Kangaroo Management Guidelines (draft)

STATE

- *National Parks and Wildlife Act 1972*
- *Prevention of Cruelty to Animals Act 1985*
- *Pastoral Land Management and Conservation Act 1989*
- *Meat Hygiene Act 1994*
- Macropod Conservation and Management Plan for South Australia: Conservation and Management of Common Kangaroos.

Appendix 3:

Assessment of the Impacts of this Management Plan

BACKGROUND INFORMATION FOR THIS MANAGEMENT PLAN

Current Conservation Status of Kangaroos, Distribution and Extent of Habitat

The three species of kangaroo covered by this management plan are all listed as common in both South Australia and Australia. In addition, these species are not listed on threatened species schedules for the Commonwealth or any of the States.

The distribution of *kangaroos* in South Australia is detailed in Pople and Grigg (1999). Information on the annual distribution of *kangaroos* in South Australia will be presented in the quota proposal document submitted to the Commonwealth Minister for the Environment and Heritage. The current distribution of *kangaroos* generally reflects the extent of suitable habitat for each species. The extent of suitable habitat for *kangaroos* will be mapped at a finer scale as part of an objective of this management plan (Aim 1: Objective 3, p.9).

Background Information to Kangaroo Populations

The reproductive biology of *kangaroos* has been extensively studied (see review in Dawson, 1995). Female *kangaroos* are polygamous. Breeding of *kangaroos* can occur year round, except under very poor environmental conditions. *Kangaroos* have a short gestation, and embryos are born at an early stage of development, with further development occurring in the pouch. Under good seasonal conditions, *kangaroos* can have three young simultaneously at different stages of development.

Kangaroo populations fluctuate primarily in response to seasonal conditions, such as rainfall and pasture biomass (Caughley, 1987). Survival rates of juveniles and adults are highly variable, with much lower survival of *kangaroos* during drought conditions.

History of Commercial Harvest

The commercial harvest of *kangaroos* in South Australia has been managed by NPWSA at the property level since the early 1970's. Historically, commercial harvest was restricted to a commercial utilisation zone, further divided into 10 independently managed zones, with zonal boundaries based on broad biophysical boundaries.

Involvement of Regional Boards

In 1996, Kangaroo Management Regions were changed from biophysical zones to a system based on the administrative boundaries of *Regional Boards*. This change was based on a decentralisation of *kangaroo* management, to encourage increased decision-making at a regional level. *Regional Boards* were recruited for active involvement in *kangaroo* management in their region, including assistance with the allocation of quota within their region, and the opportunity to set targets for *kangaroo* densities in their region in accordance with regional land management goals. Regional management of kangaroos is promoted by 'Kangaroo Management Strategies', which have been developed by NPWSA and *Regional Boards*. 'Kangaroo Management Strategies' can be at a preliminary, draft or adopted status, and are subject to regular reviews of content.

Availability of the Entire State for Harvest

Another change initiated in 1996 was the potential availability of the entire State for commercial harvest. Regions that are not currently subject to commercial harvest may apply for a commercial quota allocation. Regions that request new allocations of quota need to meet criteria specified by NPWSA. This process may involve consultation with *Regional Boards* or local councils, refinement of existing or development of

new monitoring surveys, and an assessment of the logistical suitability of the region to commercial *kangaroo* harvest. In acknowledgement of the fact that some regions will remain inappropriate for commercial harvest, alternative management options are retained.

Dynamics of Kangaroo Harvest

Recent commercial harvest levels in South Australia have fluctuated around 300,000 carcasses per annum. These harvest levels represent a 40-50% utilisation of the annually approved commercial harvest quota. The greatest harvest of *kangaroos* in South Australia is from Kangaroo Management Regions situated in the pastoral rangelands of South Australia.

Commercial harvest is biased towards larger *kangaroos* as *Kangaroo Field Processors* are paid on a per kilogram basis. The size dimorphism between the sexes means that more male *kangaroos* are harvested than females. Red Kangaroos are taken preferentially over Western Grey Kangaroos and Euros, due to their easier accessibility and their larger size. Euros are the least taken commercial species in South Australia, due to their preference for rocky, difficult to access, habitat.

Economic factors are likely to influence *kangaroo* harvest in South Australia, with harvest levels greatest on properties close to regional centres and services. Harvest may be impeded on isolated properties, due to low levels of infrastructure, and distance from regional centres and services.

Economic considerations result in a commercial *kangaroo* harvest that is patchy even within individual properties. Greatest harvest levels occur around easily accessible tracks and terrain. Highly timbered or rocky areas can remain inaccessible to commercial harvest, and act as refuges for harvested *kangaroo* populations.

Management of Total Grazing Pressure

This management plan promotes the management of *kangaroos* as part of the management of total grazing pressure on pastoral leases in South Australia. Excessive herbivore grazing pressure can lead to negative impacts on biodiversity and land condition.

Experience from areas that have had domestic stock removed (e.g. Flinders Ranges National Park; Alexander, 1997) suggests that effective regulation of grazing pressure can require the control of all sources of grazing pressure acting on the land, including domestic stock, feral herbivores such as rabbits and goats, and management of free-ranging *kangaroos*.

South Australia is the only State in Australia to have completed an intensive land condition assessment of all pastoral leases. Each lease has been assessed against land condition criteria developed under the *Pastoral Land Management and Conservation Act 1989* and the *Soil Conservation and Landcare Act 1989*. Maximum stocking rates for pastoral leases are determined following consideration of all components of grazing pressure acting on the land.

For the last five years, NPWSA has promoted and implemented a system of variable harvest quotas set around identified regional target densities for *kangaroos*. This system frequently set quotas at levels higher than what is considered a sustainable harvest using a proportional harvest strategy. The aim of higher harvest quotas was to provide a system whereby landholders could actively manage *kangaroo* populations as part of the total grazing pressure on their land, in the hope of promoting an overall increase in the condition of the pastoral rangelands of South Australia.

While this quota setting system is not continued in this management plan, NPWSA will work to further research and understanding of the impacts of *kangaroos* on rangeland biodiversity and condition, and the component of total grazing pressure that *kangaroos* represent.

LEGISLATIVE REQUIREMENTS

This management plan for *kangaroos* is required to satisfy the requirements of the legislation specified in Section 303FO of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Section 60I of the *National Parks and Wildlife Act 1972*. These requirements include ensuring that this plan must not be detrimental to the survival of a species covered by this plan, or any relevant ecosystem. In addition, the legislation requires that the impacts covered by this plan on the species and the species habitat are properly assessed, that the plan is ecologically sustainable, and that the plan includes measures to monitor any potential environmental impact(s).

Information to address these issues for *kangaroo* management and the activities of this plan are covered below. An assessment of this plan against both pieces of legislation is shown in Tables 2 and 3.

Potential Threats to Kangaroo Species

Reviews by Pople and Grigg (1999) and Olsen and Braysher (2000) have detailed potential threats or impacts to *kangaroo* populations. A summary of these impacts is provided below.

- **Environmental impacts**

Drought is likely to be the greatest environmental impact on *kangaroo* populations. The rate of increase of *kangaroo* populations is strongly linked to rainfall through its impact on pasture availability. Declines of *kangaroo* populations during drought are likely to have occurred since prior to European settlement, as *kangaroos* were restricted to habitat around permanent waters. The increased availability of water points across the pastoral rangelands means that food resources are now the major limiting factor of *kangaroo* populations during drought. Mortality during drought is highest amongst adult males and juveniles (Bayliss, 1985). *Kangaroo* populations have high rates of increase when conditions improve.

Flooding may impact on *kangaroo* populations through increasing the chances of localised epizootics (see Disease below).

- **Habitat loss and modification**

Since European settlement, large tracts of native habitat have been cleared to make way for pastoral and agricultural land uses. Native vegetation remains in remnant patches and in National Parks and reserves. *Kangaroos* have generally benefited from these changes to land use, although heavily cleared areas are thought to be detrimental (Pople, 1989).

- **Disease**

Disease outbreaks have been reported as causes of mortality in *kangaroo* populations. Speare *et al.* (1989) have reviewed the diseases of *kangaroos*. Irregular localised population crashes have been associated with lumpy jaw, arbovirus infection, coccidiosis and choroid blindness. Disease by itself is not considered an important mortality factor, but may have a compensatory effect in combination with stressful conditions such as over-crowding, lack of food, or periodic flooding.

- **Predation**

Predators of *kangaroos* include dingoes, wedge-tailed eagles, foxes and humans. Robertshaw and Harden (1989) have identified dingoes and humans as major sources of predation. Mortality due to dingo predation is likely to be low South of the dog fence where dingo numbers are controlled. Non-human predators generally focus on juvenile *kangaroos*. Predation on *kangaroos* may be influenced by other factors that increase vulnerability, such as poor seasonal conditions. Predation by man on *kangaroo* populations includes commercial harvest, non-commercial destruction and traditional Aboriginal hunting practices. Current commercial harvest levels are considered sustainable for *kangaroo* populations (Caughley, 1987). Population monitoring suggests that rainfall remains the main influence on *kangaroo* populations.

POTENTIAL IMPACTS OF THIS MANAGEMENT PLAN

Potential impacts of this management plan are considered below for the activities of commercial harvest, non-commercial destruction and management of *kangaroos* on National Parks and Reserves. Management controls in place to minimise or monitor these impacts are also detailed.

Impacts on Kangaroos

Commercial harvest could potentially impact on *kangaroos* directly via harvest at unsustainable levels, or via demographic or genetic impacts on harvested populations. Animal welfare concerns are a potential impact for all types of destruction.

- **Sustainability of Commercial Harvest**

The following factors promote the sustainability of commercial harvest in South Australia:

1. Commercial harvesting quotas are based on direct monitoring data of *kangaroo* populations.
2. Conservative species correction factors are used (see Pople and Grigg, 1999).
3. Commercial harvest quotas are set at levels that are considered ecologically sustainable for *kangaroo* populations (Caughley, 1987).
4. Commercial harvest is patchy within Kangaroo Management Regions and individual properties, leaving many areas of (unharvested) refuge habitat.
5. The size of the region harvested is small in comparison to the large geographic distribution of *kangaroos*.

Management controls are in place within the commercial quota setting system to ensure that harvest levels remain sustainable, and to maintain *kangaroo* populations within or above specified threshold densities. Annual monitoring allows for any other mortality agents acting on *kangaroo* populations to be accounted for in the setting of annual commercial harvest quotas (e.g. animals lost through drought, disease, or road kill).

Where higher harvest levels are requested as part of an adaptive management strategy, they must be sustainable at the level of regional *kangaroo* populations. Full details on harvest levels and strategies will be included in the annual quota proposal document.

Numbers removed through non-commercial destruction and management of *kangaroos* on National Parks and reserves are low compared to that taken through commercial harvest. These figures are monitored and compiled regionally in quarterly harvest reports to the Commonwealth Minister for the Environment and Heritage.

- **Demographic impacts of harvesting**

Commercial *kangaroo* harvest in South Australia is biased towards large *kangaroos*, and more males are taken than females due to size dimorphism. Potential changes to the sex and age structure of harvested *kangaroo* populations could result, such as harvested populations having a female bias or a lower average age compared to unharvested populations.

Intensive harvesting may change the age structure of *kangaroo* populations at particular localities. However, the patchy nature of the harvest will decrease the demographic impacts of harvesting on *kangaroo* populations, due to rapid recolonisation of harvested areas by immigrating *kangaroos*, and the presence of refugia for *kangaroos* in unharvested areas. Demographic impacts of commercial harvest are mirrored in unharvested *kangaroo* populations following drought (e.g. female-bias, less large adults).

Pople and McLeod (2000) have shown that harvesting a *kangaroo* population going into a drought is likely to have population impacts that are quickly lost as the population recovers from drought. This is because harvesting at the onset of drought removes animals that would otherwise be lost from the population as the drought progresses.

Potential demographic impacts of commercial harvest on South Australian *kangaroo* populations are currently monitored through carcass sex and weight data provided on harvest returns. There is a

management control in place to ensure that there are no irreversible negative impacts on the sex or size structure of harvested *kangaroo* populations.

Demographic impacts are considered unlikely for non-commercial destruction and management of *kangaroos* on National Parks and reserves, as harvest strategies are non-selective for age or sex.

- **Genetic impacts of harvesting**

There are concerns that selective harvesting of *kangaroos* will lead to impacts on the genetic diversity and fitness of harvested populations. Research (see review by Hale, 2000; report to NSW National Parks and Wildlife Service) suggests that commercial harvesting at current levels has negligible impacts on the genetic diversity and fitness of *kangaroo* populations, due to:

1. The size of *kangaroo* populations in relation to the numbers removed through harvesting.
2. Large geographic ranges of genetic *kangaroo* populations relative to the size of the harvested area. This is in part due to the migration of individuals across large distances.
3. Patchiness of the commercial harvest, and immigration of new individuals into harvested areas.

Levels of non-commercial destruction and culls of *kangaroos* on National Parks and reserves are considered too low to lead to potential genetic impacts.

- **Animal Welfare Concerns**

Allowing for a commercial harvest and non-commercial destruction of *kangaroos* from the wild has potential impacts on animal welfare. Animal welfare concerns are considered unlikely for actions conducted as part of this management plan, due to:

1. Presence of Commonwealth and State policy and legislation for animal welfare, include the *Code of Practice for the Humane Shooting of Kangaroos*.
2. Enforcement of legislation and policy as a condition of permit for *Kangaroo Field Processors* and destruction permits.
3. Presence of training requirements for *Kangaroo Field Processors* and NPWSA marksmen that conduct culls on National Parks.
4. Presence of a compliance program to maximise and monitor compliance with *kangaroo* management legislation and policy.

Impacts on Habitat

Impacts on habitat due to actions detailed within this management plan are more likely to be positive than negative. Reduced *kangaroo* grazing pressure on palatable vegetation species may lead to an increase in regeneration of these species, and an increase in biodiversity. Regeneration of native vegetation may lead to a reduction in the amount of non-palatable weed species.

Vegetation recovery following *kangaroo* management is most likely on National Parks and reserves, where domestic stock has been removed and numbers of feral herbivores are closely controlled. Ability to achieve the desired vegetation response is likely to depend on the extent of the reduction in *kangaroo* grazing, and the length of time of reduced grazing pressure.

Potential negative impacts on habitat include damage to vegetation caused by *Kangaroo Field Processors* driving off track. These disturbance events are considered unlikely in South Australia as *Kangaroo Field Processors* tend to operate off already-formed tracks. The impacts of disturbance events to vegetation may vary according to the type of vegetation.

Impacts on Ecosystems or Other Species

There are few potential ecosystem impacts of commercial *kangaroo* harvest, or non-commercial destruction. There is a potential positive impact on feral species such as foxes and cats, through the presence of *kangaroo* carcasses left in the field as a food resource. Commercial harvest is likely to have less impact than animals that are shot and left in the field, as most of the carcass is removed for processing. Potential impacts on feral species are considered during the management of *kangaroos* on National Parks and reserves, to ensure that management strategies aim to minimise these impacts.

There are no likely trophic level impacts of *kangaroo* harvest, given the position of *kangaroos* in the food chain. The only prey of *kangaroos* that is likely to increase through reduced *kangaroo* density is native vegetation. The only predator that might be disadvantaged through a reduction of *kangaroo* numbers is the dingo, and this is unlikely as dingoes are largely excluded from the main harvest region by the dog fence.

Table 2: Requirements of the *Environment Protection and Biodiversity Protection Act 1999*, Section 303FO – Approved Wildlife Trade Management Plan.

Legislative Requirement	How Requirement is Addressed in this Management Plan
(1) The export of a specimen is in accordance with an approved wildlife trade management plan	<ul style="list-style-type: none"> • This management plan is submitted for approval as an <i>Approved Wildlife Trade Management Plan</i>.
(3)(b) There has been an assessment of the environmental impact of the activities covered by this plan, including an assessment of <ul style="list-style-type: none"> (i) The status of <i>kangaroos</i> (ii) The extent of the habitat of <i>kangaroos</i> (iii) The threats to <i>kangaroos</i> (iv) The impacts of the activities covered by the plan on the habitat or relevant ecosystems 	<ul style="list-style-type: none"> • Conservation status of <i>kangaroos</i> is detailed in Appendix 3. Ref: p.38. • Distribution of <i>kangaroos</i> is detailed in Appendix 3. Ref: p.38. • Habitat will be mapped as part of Aim 1: Objective 3. Ref: p.9. • Threats to <i>kangaroos</i> are detailed in Appendix 3. Ref: p.40. • Potential impacts of the activities are detailed in Appendix 3. Ref: p.41. • Regional differences in management will be detailed in the annual quota proposal document.
(3)(c) The plan includes management controls directed towards ensuring that the impacts of the activities covered by the plan are ecologically sustainable to <i>kangaroos</i> , other taxa and ecosystems	<ul style="list-style-type: none"> • Ecological sustainable management is included within the goal of this management plan. Ref: p.5. • The quota setting system includes management controls and performance measures to ensure that commercial harvest levels are sustainable in the long-term for <i>kangaroo</i> populations. Ref: p.12.
(3)(d) The activities covered by the plan will not be detrimental to the survival of <i>kangaroos</i> , the conservation status of <i>kangaroos</i> , and any relevant ecosystem.	<ul style="list-style-type: none"> • Harvest levels are based on direct population monitoring. Ref: p.7,11. • No change to the conservation status of <i>kangaroos</i> due to commercial harvesting is listed as a performance indicator. Ref: p.12.
(3)(e) The plan includes measures to: <ul style="list-style-type: none"> (i) Mitigate and/or minimise the environmental impacts covered by this plan (ii) Monitor the environmental impact of the activities covered by this plan (iii) To respond to changes in the environmental impact of the activities covered by the plan 	<ul style="list-style-type: none"> • Effective permit procedures are in place to regulate the commercial harvest. Ref: p.15-17. • Minimising impacts is detailed in Aim 2: Objective 3. Ref: p.18. • <i>Kangaroo</i> populations are monitored regularly across the entire commercial harvest zone. Ref: p.7. • Harvest returns are collected to monitor characteristics of harvest. Ref: p.18. • Monitoring the impact(s) of harvest is detailed in Aim 2: Objective 3. Ref: p.18. • Harvest returns will be collated and submitted quarterly to Environment Australia. Ref: p.18. • An adaptive management approach will be promoted as part of this management plan. Ref: p.9. • Management controls are in place for commercial harvest levels, along with performance measures and a feedback mechanism to ensure that these are linked to future management actions. Ref: p.12.
(3)(f) The conditions applicable to the welfare of <i>kangaroos</i> are likely to be complied with.	<ul style="list-style-type: none"> • Aim 4 relates to ensuring that management actions conducted under this plan are humane to <i>kangaroos</i>. Animal welfare legislation is stated, and management actions are detailed. Ref: p.23. • Compliance with animal welfare legislation is enforced as a condition of permit. Ref: p.16, 20, 23. • There is a compliance program in place to monitor and enforce compliance with animal welfare legislation. Ref: p.14.

Table 3: Requirements of the *National Parks and Wildlife Act 1972*. Section 60I – Harvesting of protected animals. Plan of Management.

Legislative Requirement	How Requirement is Addressed in this Management Plan
60(1) The Minister must prepare a draft plan of management in relation to the harvesting of each species of protected animal. The draft plan must-	<ul style="list-style-type: none"> This management plan is prepared in relation to the harvesting of <i>kangaroos</i>.
(2)(a) Assess the likely impact of harvesting <i>kangaroos</i> ,	<ul style="list-style-type: none"> Potential impacts of harvest on <i>kangaroos</i> are detailed in Appendix 3. Ref: p.41. Potential impacts of harvest on ecosystems are detailed in Appendix 3. Ref: p.43. Potential impacts of harvest on species diversity are detailed in Appendix 3. Ref: p.42. Potential genetic impacts of harvest on <i>kangaroos</i> are detailed in Appendix 3. Ref: p.42.
(2)(b) Identify factors that are likely to reduce or increase the number of <i>kangaroos</i> to be harvested	<ul style="list-style-type: none"> Threats to <i>kangaroos</i> are detailed in Appendix 3. Ref: p.40. Factors that influence <i>kangaroo</i> populations are incorporated into the quota setting system for commercial harvest. Ref: p.10-13.
(2)(c) Identify other factors that will affect <i>kangaroos</i> as a renewable resource for the purposes of harvesting in the future	<ul style="list-style-type: none"> The quota setting system includes management controls to ensure that commercial harvest levels are sustainable for <i>kangaroo</i> populations. Ref: p.12. Potential impacts of harvest will be investigated as part of Aim 2: Objective 3. Ref: p.18.
(2)(d) Assess whether there is a need to reduce the number of <i>kangaroos</i> to protect the environment, crops, stock or other property	<ul style="list-style-type: none"> Non-commercial destruction is retained for situations where <i>kangaroos</i> may be causing unwanted impacts. Ref: p.19.
(2)(e) Specify humane methods and procedures for the killing of <i>kangaroos</i>	<ul style="list-style-type: none"> Aim 4 relates to ensuring that management actions conducted under this plan are humane to <i>kangaroos</i>. Animal welfare legislation is stated, and management actions are detailed. Ref: p.23. The <i>Code of Practice for the Humane Shooting of Kangaroos</i> is attached to the management plan as Appendix 4. Ref: p.46.

Appendix 4:

Code of Practice for the Humane Shooting of Kangaroos

Endorsed by the Council of Nature Conservation Ministers

The Council of Nature Conservation Ministers (CONCOM) was composed of all Commonwealth, State and Territory Ministers having responsibility for national parks and wildlife. In July 1991 the CONCOM was amalgamated with the Australian and New Zealand Environment Council to form the Australian and New Zealand Environment and Conservation Council (ANZECC).

Addresses of government nature conservation agencies are found on page 53.



Department of the Environment and Heritage

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PREFACE

The Council of Nature Conservation Ministers (CONCOM) is composed of all Commonwealth, State and Territory Ministers having responsibility for national parks and wildlife. CONCOM is advised by a Standing Committee consisting of the Heads of Commonwealth, State and Territory Authorities responsible for national parks and wildlife matters.

This 'Code of Practice for the Humane Shooting of Kangaroos' has been prepared by the CONCOM Special Working Group on Cruelty Aspects of the Taking and Holding of Native Fauna. During the course of its preparation, drafts of the Code were circulated widely for public comment.

The Code sets an achievable standard of humane conduct and is the minimum required of persons shooting kangaroos.

Endorsed in principle by Council on 30 May 1985, the Code is intended to be implemented through education and State and Territory legislation as appropriate. This Code is based on the knowledge and technology available at the time of publication and may need to be varied in the light of new knowledge.

PREFACE TO THE SECOND EDITION

Since the code was originally published, there have been numerous comments on its value and suggestions on its improvement. In particular, the RSPCA and the National Advisory Committee on Kangaroos have recommended a number of changes. An ad hoc Working Group on the Code of Practice for the Humane Shooting of Kangaroos was formed to consider these suggestions and revise the code. The revised code was endorsed by CONCOM on 20 September 1990. Further comments are welcome, and should be forwarded to the Wildlife Management Section, Environment Australia - Biodiversity Group, GPO Box 787, CANBERRA ACT 2601.

INTRODUCTION

This Code of Practice has been produced to ensure that all persons intending to shoot a free-living kangaroo are aware of the welfare aspects pertinent to that activity. In this Code the term 'kangaroo' means all species of the family Macropodidae within the superfamily Macropodoidea and so applies to kangaroos, wallaroos or euros, wallabies and pademelons.

All shooting of kangaroos, whether on public or private land, is subject to law. The laws may differ between localities and the Government Wildlife Authority in the state or territory in which the shooting will occur can advise on the relevant provisions. Except where specifically exempted by law, states and territories will require the shooter to have a licence or permit issued by the Government Wildlife Authority and this Authority will specify any conditions or restrictions applying to that licence or permit.

When shooting a kangaroo the primary objective must be to achieve instantaneous loss of consciousness and rapid death without regaining consciousness. For the purposes of this Code, this is regarded as a sudden and painless death. Commonsense is required to assess the prevailing conditions. Where the conditions are such as to raise doubts about achieving a sudden and painless kill, shooting must not be attempted.

The Code is divided into three sections covering the method of shooting, despatch of injured kangaroos and pouch young and shooting for scientific purposes, and has three schedules specifying firearms, ammunition and points of aim. In each section an introduction provides background to the conditions which must be adhered to by all persons shooting kangaroos.

METHOD OF SHOOTING

The species of kangaroos which are shot differ in size and there is enormous variation in the terrain and prevailing weather conditions at the time of shooting. The combinations of firearms and ammunition are considered adequate to ensure a sudden and painless death for the target animal under most environmental conditions, provided that the shooting is done in accordance with the other conditions set out in this Code. However, it is the shooter's responsibility to ensure a sudden and painless death for target animals, and under unusual conditions firearms and ammunition that exceed the minimum requirements may have to be used.

With a centrefire rifle a sudden and painless death is consistently achieved by the projectile striking the brain of the target animal. Thus the brain is the required point of aim for this class of weapon. Centrefire rifles are specified for all kangaroo shooting except where the smaller wallabies are to be shot in or adjacent to forest or scrub. Such shooting is often carried out in daylight; the animals are flushed at close quarters and are unlikely to be stationary. In these cases the licence or permit issued by the Government Wildlife Authority may authorise the use of shotguns. At ranges up to the maximum specified in Schedule 1 a shotgun will cause a sudden and painless death if the pattern is centred on the head, neck or chest of the target animal. The shooter must be able to place a clear shot into one of these target areas whether the animal is moving or stationary.

Firearms

Conditions

- (i) The minimum specifications for firearms and ammunition are set out in Schedule 1. Kangaroos shall only be shot with a combination of firearms and ammunition that complies with or exceeds those minimum specifications.
- (ii) In the environmental conditions in which the shooter operates the combination of firearm and ammunition selected must ensure the sudden and painless death of each target animal. Evidence of compliance with the minimum specifications in Schedule 1 is no defence in administrative and/or legal proceedings concerning a breach of this Code if the combination used by the shooter has not achieved a consistently sudden and painless kill.

- (iii) Kangaroos must be shot using a centrefire rifle unless use of a shotgun is specifically allowed by the licensing authority.
- (iv) A rifle must be sighted in against an inanimate target before commencing each day's shooting.

Shooting platform

Conditions

- (i) Kangaroos must not be shot from a moving vehicle or other moving platform.

Target animal

Conditions

- (i) The target kangaroo must be clearly visible.
- (ii) When a rifle is used the target kangaroo must be stationary and within a range that permits accurate placement of the shot.
- (iii) When a shotgun is used the target kangaroo must be within the range specified in Schedule 1 and in a position where a clear shot can be fired at the head, neck or chest.

Point of aim

Conditions

- (i) A shooter using a rifle must aim so as to hit the target kangaroo in the brain (see diagram in Schedule 2), except in the case of an injured or wounded animal where a brain shot may be impractical.
- (ii) A shooter using a shotgun must aim so that, whether the target kangaroo is stationary or mobile, it will be hit in the head, neck or chest by the centre of the pattern.

INJURED KANGAROOS AND POUCH YOUNG

No matter how carefully the shooter aims, some kangaroos will not be killed outright. Wounded kangaroos must be dispatched as quickly and humanely as possible.

When killing a wounded animal a brain shot may be impractical. For example, the accurate placement of a shot in the brain may require capture and restraint of the animal; this would increase suffering and be inconsistent with the objective of sudden and painless death. In such circumstances a heart shot may be the most humane means of dispatch. In some special circumstances, where a wounded kangaroo is encountered, it may not be practicable to shoot the animal, as at a practical range the acceptable points of aim may be obscured, and at a close range the use of a high powered rifle may be unsafe. In these special circumstances a heavy blow to the skull to destroy the brain may be the most appropriate and humane means of dispatch.

Kangaroo shooters often shoot more than one kangaroo out of a group before driving to the carcasses to retrieve them. This is acceptable provided that where an individual kangaroo is wounded no further kangaroos are shot until all reasonable efforts have been made to dispatch the wounded animal.

Shot females must be examined for pouch young and if one is present it must also be killed. Decapitation with a sharp instrument in very small hairless young or a properly executed heavy blow to destroy the brain in larger young are effective means of causing sudden and painless death.

Larger young can also be dispatched humanely by a shot to the brain, where this can be delivered accurately and in safety.

Conditions

- (i) The shooter must be certain that each animal is shot dead before another is targeted.
- (ii) If a kangaroo is thought to be alive after being shot, every reasonable effort shall be made immediately to locate and kill it before any attempt is made to shoot another animal.
- (iii) When located, wounded animals must be killed by a method that will achieve a rapid and humane death, where practical by a shot to the brain.
- (iv) Under circumstances where a shot to the brain of an injured animal is impractical or unsafe, a shot to the heart is permissible (see Schedule 3).
- (v) In circumstances where, for dispatch of a wounded kangaroo, a shot to either the brain or heart is impractical or unsafe, a very heavy blow to the rear of the skull to destroy the brain (see Schedule 2) is permissible. To ensure a humane kill, a suitably hard and heavy blunt instrument must be used (e.g., metal pipe, billet of wood etc., carried for this purpose).
- (vi) If a female has been killed, the pouch must be searched for young as soon as the shooter reaches the carcass.
- (vii) The pouch young of a killed female must also be killed immediately, by decapitation or a heavy blow to the skull to destroy the brain, or shooting.

SHOOTING FOR SCIENTIFIC PURPOSES

Permits to shoot kangaroos for scientific purposes are sometimes requested. Because of the circumstances and locations in which such shooting may take place, and because of specific research requirements (e.g. to obtain anatomical items such as intact skulls for diagnostic examination and museum reference collections), it may be necessary to allow exemptions from the general conditions such as point of aim and shooting platform.

Such variations must never detract from the primary responsibility of the shooter to provide a sudden and painless death for the target animals.

Conditions

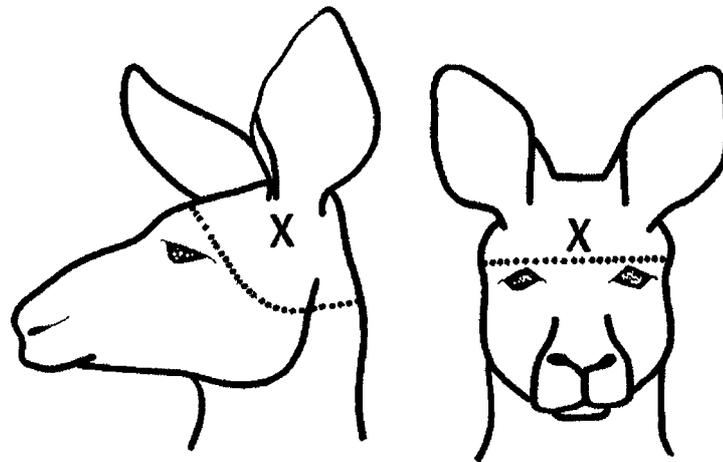
- (i) The provisions of this Code shall apply to the shooting of kangaroos for scientific purposes except where express provision to the contrary is included in the permit/licence under which the animals are shot.
- (ii) The licensing authority should only issue such a permit/licence if it is satisfied that;
 - (a) the Animal Care and Ethics Committee (or equivalent) at the relevant institution has examined and approved the proposal; and
 - (b) the method of shooting will result in sudden and painless deaths for the animals authorised to be killed.
- (iii) The waiving of any requirements of this code shall not relieve the shooter of the absolute requirement to provide a sudden and painless death for the target kangaroos.

SCHEDULE 1: Minimum Specifications for Firearms and Ammunition

(Note: Ammunition must be loaded to at least the specifications shown to ensure a sudden and painless death for the target animals).

Species	Prescribed firearm and firearm/ammunition combinations
Group 1	
Red kangaroo (<i>Macropus rufus</i>), Eastern grey kangaroo (<i>M. giganteus</i>)	A centrefire rifle, fitted with a telescopic sight. Nominal bore size 0.569cm (0.224") and centrefire case capacity of at least .222 Remington.
Western grey kangaroo (<i>M. fuliginosus</i>) Euro or wallaroo (<i>M. robustus</i>)	Ammunition shall have an expanding projectile (soft or hollow point) of not less than 324 mg (50 grains) and provide a minimum muzzle energy of 1542 Joules (1137 foot-pounds).
Agile wallaby (<i>M. agilis</i>) Whiptail wallaby (<i>M. parryi</i>)	[.222 Remington with 50 grain projectile must be loaded to achieve a muzzle velocity of 975 m/sec (3200 ft/sec) to achieve this minimum muzzle energy].
Group 2	
All members of the family Macropidae other than those listed in Group 1.	<p>a) A centrefire rifle fitted with a telescopic sight. Calibre and ammunition sufficient to achieve at least a minimum muzzle energy of 975 Joules (720 foot-pounds) {e.g. .22 Hornet; 45 grain projectile and loaded to achieve muzzle velocity (m.v.) of at least 2690 ft/sec, or .17 Remington; 25 grain projectile loaded to achieve m.v. of at least 3610 ft/sec}.</p> <p>or</p> <p>b) Shotguns of 12 gauge or larger, using No.2, 1, BB or larger shot. Maximum range for shotguns of 30 metres.</p> <p>Shotgun cartridges must be loaded to provide a dense and random pattern (e.g. 12 gauge cartridge requires a shot load no less than 36g = 1.25 oz = 63 BB shot pellets).</p>

SCHEDULE 2: Point of Aim (X) for a Shot to the Brain and Location of the Brain. (All kangaroos).



Note: A shot to the side of the head is preferred as it is a larger target area.

SCHEDULE 3: Point of Aim (+) for a Shot to the Heart. (Applicable only as described for injured kangaroos and specified shotguns).



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