

Options for integrated kangaroo management in the Western region

Sustainable land management in the Western region focusses on maintaining critical levels of groundcover to prevent soil erosion, especially under dry seasonal conditions, regardless of the type of land use.

Kangaroo grazing pressure is a key influence on groundcover and sustainable land management, particularly when periods of peak population coincide with declining seasonal conditions and competition for grazing resources is high. Too often kangaroos are considered an unmanageable aspect of Western region landholdings.

Increasingly, landholders are seeking options to manage the impact of kangaroo overpopulation at the paddock or property level. The options detailed in this publication are not presented as best practice given that presently, active adaptive kangaroo management is an evolving field. However a number of principles have been developed to underpin best management approaches.

Principles for kangaroo management

Kangaroo management is subject to high levels of public scrutiny, so building a good reputation is paramount in maintaining a social licence for managing kangaroos across all agricultural industries in the Western region. Landholders have the foremost role in managing the reputation of agriculture through what happens on their own property. The following principles provide a framework for kangaroo management at the property-level:

Healthy, viable kangaroo populations

The intent of kangaroo management is not to fully exclude kangaroos from the landscape, but to regulate the large population fluctuations that negatively impact landscape condition and cause large number of kangaroo deaths during drought.

Total grazing pressure control

The key goal of managing kangaroo populations involves the control of total grazing pressures so pastures can be managed to attain a level of at least 50 per cent groundcover and more perennial species, which protect soil from erosion.

Best practice animal welfare

Most landholders believe in the humane treatment of all animals and this includes kangaroos. Management practices, whether shooting, fencing or other approaches, should be undertaken with due consideration for any welfare risks that may arise for kangaroos or other affected animal life.

Enhanced biodiversity

Overgrazing by kangaroos has been shown to adversely impact biodiversity and culling can directly address this issue. Ensure all activities promote biodiversity, such as careful clearing practices or avoiding fence designs that may injure wildlife.

Protect sites of Aboriginal cultural value

The First Nations People of the Western region value their heritage and have a strong interest in the preservation of sites across the landscape. When undertaking clearing operations and earthworks, be mindful of the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW and maintain awareness of potential sites such as hearths and marked trees (DECCW, 2010).

Kangaroos should be managed as a resource

Kangaroo meat is a valuable source of nutrition in a world where protein is in increasing demand. Most landholders recognise the value of kangaroo meat and regret the wastage of this resource where non-commercial culling is necessary to reduce populations. Consequently, where possible the commercial harvest industry should be the priority avenue for the removal of kangaroos.

Co-benefits should be maximised where possible

Control of kangaroo numbers can have a number of co-benefits beyond reduced competition with livestock for available pasture. These include the reduced biosecurity risk through exclusion fencing, increased long-term resilience to drought through regenerative pasture management, better soil stability through higher groundcover levels and improved wildlife habitat through enhanced food or cover.

All aspects of kangaroo management must comply with current regulations and be transparent

The process of kangaroo management should be transparent, meaning that all activities are undertaken legally and in accordance with statutory codes of practice so that they can be judged as robust in the face of public or legal scrutiny. It is a landholder's responsibility to ensure this occurs.





Gilgunnia cluster fence in Western NSW. Photo: Barrie Turpin.

Management options

The following provides an analysis of current tools available for controlling kangaroo populations at the property scale.

Tool	Strengths	Weaknesses	Requirements	Effectiveness	Acceptability
Commercial harvest	<p>Kangaroos are treated as a resource so there is no wastage of red meat.</p> <p>No carcasses are left in the paddock to attract potential predators of stock.</p> <p>Landholders do not need to undertake the activity and no cost is incurred for harvesters to operate.</p> <p>Strict protocols ensure humane destruction including competency testing of shooters.</p>	<p>Commercial harvesters operate to meet processor requirements in terms of location and type of animal.</p> <p>Harvesting may fail to meet landholder requirements for grazing pressure control especially in drought.</p> <p>Male-biased culling may not reduce populations.</p> <p>As kangaroos are mobile, localised culling will have minimal impact on paddock-scale grazing pressure due to new animals moving in to harvested areas.</p> <p>Landholders receive no return from harvesting and pasture utilised except in under innovative arrangements.</p>	<p>Licensed shooter under the <i>Biodiversity Conservation Act 2016</i>.</p> <p>Mandatory National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes.</p>	<p>No data available on change of pasture yield, land condition or stocking capacity in response to levels of harvesting.</p>	<p>High social acceptability when harvest is conducted by professional shooters to the code.</p>
Non-commercial harvest	<p>Landholder has control of culling operation.</p> <p>Approval process is readily accessible.</p> <p>Mandatory code provides robust framework for method.</p>	<p>Poor adoption of mandatory code of practice is a risk to animal welfare credentials of grazing industry and social licence to manage kangaroos.</p> <p>As kangaroos are mobile, localised culling can have minimal impact on paddock-scale grazing pressure due to new animals moving in to harvested areas.</p> <p>Landholders must invest time in culling or seek other shooters.</p> <p>Carcasses remain in the paddock, attracting potential predators of stock.</p>	<p>Occupier licence to harm native animals on private property under the <i>Biodiversity Conservation Act 2016</i>.</p> <p>Mandatory National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Non-commercial Purposes</p> <p>NSW DPI Volunteer Non-Commercial Kangaroo Shooters best practice guide.</p>	<p>No data available on change of pasture yield, land condition or stocking capacity in response to levels of harvesting.</p>	<p>Low social acceptability when cull is conducted by untrained shooters.</p>
Water point closure	<p>Control of water-points has high biosecurity benefits as feral animals and wandering stock can be discouraged from destocked areas.</p> <p>Prevents bogging and drowning in ground tanks, preserves water supply and may improve quality.</p> <p>Grey kangaroos are sedentary and will be most affected by control of access.</p> <p>Goat trap yards are a cost-effective approach.</p>	<p>Red kangaroos require little water and resident animals may utilise pastures regardless of closure.</p> <p>Fences around ground tanks will be subject to high pressure unless sited at distance from the water.</p> <p>Closed waters will require regular monitoring to avoid animals perishing or getting caught inside a fenced enclosure.</p>	<p>PestSmart Standard Operating Procedure: GOA004: Trapping of feral goats- provides guidelines for trapyards.</p>	<p>Numerous trial results are inconclusive on pasture response due to insufficient spatial scale or response period. Anecdotes suggest some benefit at larger scales.</p>	<p>Low social acceptability when there is a welfare risk of wildlife being excluded from water or trapped within an enclosure.</p>

Tool	Strengths	Weaknesses	Requirements	Effectiveness	Acceptability
TGP fence <i>(Includes either 900 mm prefabricated mesh plus plain, multiple plain wire or multiple electric wire designs to 1.2 m height)</i>	<p>Moderate cost, especially as an upgrade to existing fencing.</p> <p>Provides for some movement of kangaroos.</p> <p>Provides a basis for dorper and managed goat enterprises.</p> <p>Works best if paddock size is manageable for adequate control of kangaroos that get in, especially in scrubby country.</p>	<p>TGP fencing provides partial exclusion only, so during periods of drought there will be increasing numbers of kangaroos crossing the perimeter.</p> <p>Ongoing maintenance required to remain effective, especially in relation to holes dug under the wire. Aprons and electric offsets can address most issues with holes.</p> <p>Some welfare issues with kangaroo entanglement, especially during the first months after construction.</p> <p>Fences constrain emu movement which has damage and welfare implications.</p>	<p><i>Dividing Fences Act 1991.</i></p> <p><i>Crown Land Management Act 2016.</i></p> <p><i>Crown Land Legislation Amendment Act 2017.</i></p>	<p>Moderately effective as provides partial exclusion.</p> <p>Research validates that potential pasture response can be very significant. However, outcomes are dependent on individual landholder skills and commitment to grazing management.</p>	<p>Moderate social acceptability.</p>
Enhanced TGP fence <i>(Includes 900 mm prefabricated mesh with plain wires to minimum 1.5 m height)</i>	<p>Cost is only marginally greater than 1,200 mm high TGP fencing but provides increased exclusion of kangaroos.</p> <p>Cheaper construction than exclusion fences.</p> <p>Provides a basis for dorper and managed goat enterprises.</p> <p>Discourages jumping, so reduced likelihood of kangaroos getting caught in fence.</p>	<p>Fences require ongoing maintenance, especially in relation to holes dug under the wire, to remain effective. Aprons and electric offsets can address most of these issues.</p> <p>Fences constrain emu movement which has damage and welfare implications.</p>	<p><i>Local Land Services Act 2013.</i></p> <p><i>Local Land Services Amendment Act 2016.</i></p> <p><i>Biosecurity Act 2015.</i></p> <p><i>National Parks And Wildlife Act 1974.</i></p> <p>National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010.</p>	<p>Provides a higher level of exclusion than TGP fencing.</p> <p>Pasture response appears to be significant, but is dependent on individual landholder expertise and commitment to grazing management.</p> <p>No structured evaluations have been done.</p>	<p>Moderate social acceptability similar to TGP fencing.</p>
Exclusion fence <i>(Includes prefabricated exclusion mesh to minimum 1.5 m height)</i>	<p>Provides total control of kangaroo movement, as well as stopping pest species (pigs, deer and wild dogs).</p> <p>Acts as a long-term control measure.</p> <p>Addresses digging and discourages jumping.</p> <p>Gives landholders complete control of grazing pressures.</p> <p>Co-benefit of improved containment for animal and plant biosecurity.</p>	<p>Cost-effectiveness has yet to be established and will depend on grazing management.</p> <p>Requires strategies to address initial kangaroo and pest concentrations both inside and outside of the fence.</p> <p>Long-term viability of internal kangaroo populations needs to be addressed.</p> <p>Proliferation of fences will impact mobile wildlife, especially emus.</p> <p>Creates traffic hazard on adjacent roadways.</p>	<p>Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales.</p> <p><i>Heritage Act 1977.</i></p>	<p>Provides complete exclusion with ongoing maintenance.</p> <p>Potential pasture response similar to TGP fencing which is validated by research.</p> <p>Outcomes are dependent on individual landholder skills and commitment to grazing management.</p>	<p>Moderate social acceptability.</p> <p>Concerns focus on effects on movement of wildlife.</p>
Cluster group	<p>Per-hectare costs for individual participants to erect exclusion fencing are reduced as the cluster perimeter treats a large area.</p> <p>Clusters provide opportunities for coordinated management of kangaroos and pests across neighbouring properties.</p> <p>Opportunity to maintain a stable managed kangaroo population across a large area.</p>	<p>There may be varied levels of expertise and commitment within the cluster, influencing overall results.</p> <p>Insufficient attention to pre-planning may lead to unresolved pest management issues both inside and outside of the perimeter.</p> <p>Robust governance is essential to accommodate long-term issues such as property transfer to ensure commitments to maintenance and management are upheld.</p>	<p>Legal issues as above.</p> <p>Good governance structure, such as a body corporate, to ensure commitment, financial capacity, adequate pest and fauna management, achievement of groundcover targets, change of ownership protocols, maintenance and audit arrangements, as well as non-compliance processes across all participant landholdings in perpetuity.</p>	<p>Potential for success but is dependent on individual kangaroo, pest and grazing management.</p> <p>Evaluations ongoing.</p>	<p>Moderate social acceptability.</p> <p>External neighbours may have concerns about pest and kangaroo management.</p>
Other options: - Relocation - Fertility control - Guardian dogs - Poisoning - Do nothing	<p>No assessments relevant to the region available.</p>	<p>Relocation and fertility control not suitable for rangeland scale operations.</p> <p>Possibly some potential for the use of livestock guardian dogs.</p> <p>Poisoning (e.g. use of urea) is illegal and inhumane.</p> <p>Do nothing has a high opportunity cost.</p>	<p>Poisoning kangaroos is illegal under the <i>Biodiversity Conservation Act 2016</i> and <i>Prevention of Cruelty to Animals Act 1979</i>.</p>	<p>No assessments relevant to the region available.</p>	<p>Non-lethal options have high social acceptability.</p> <p>Poisoning is not acceptable.</p>

Assessing population impact at the property level

While kangaroo over-population issues may be obvious, several factors may affect total grazing pressure at the paddock or property level:

- too many kangaroos
- too many unmanaged goats
- too many domestic animals
- poor land condition and lack of response to rainfall.

A simple approach to assessing pasture growth involves the use of exclusion cages, small structures which prevent all grazing. These can be particularly revealing when placed in destocked paddocks, where kangaroos and unmanaged goats comprise the greater part of grazing pressure.



Fence construction considerations

Issue	Construction considerations
Fence alignment	Keep fence lines out of areas where runoff is concentrated. Seek to use natural drainage by following high ground. Cross drainage depression areas perpendicular to the direction of flow. Try to preserve natural sheet flow patterns. Keep gateways and other pressure points on stable areas, away from run-on areas.
Construction earthworks	Soil erosion can reduce long-term fence integrity. Install erosion control structures such as trafficable diversion banks (whoa-boys) during construction, rather than waiting to fix problems later. Avoid leaving grader windrows that concentrate runoff along the cleared line. For the same reason, crowning is not recommended. Details on techniques to minimise erosion along fence lines and access tracks can be found in the Managing Outback Roads manual.
Overland flow areas	Areas of shallow low-flow in rain events carry large volumes of water and debris. Fence designs need to accommodate the movement of debris and the additional pressure of flow and sediment.
Floodgates	Creeks and other channels create weak spots in fences. Investment in robust floodgates reduces this risk.
Gateways and grids	Kangaroos can get access where there is a gap under a gate created by soil loss due to concentrated runoff. Install trafficable banks to protect these areas from runoff. Gates need to be latched tightly enough to prevent kangaroos squeezing through. Movement sensors attached to alarms and light systems can limit movement over grids
Fence visibility	Having fences visible to wildlife reduces fence damage and decreases entanglement, especially if a new fence crosses a well-used pad. Try horse sighter wire or orange poly pickets.
Exit points	Welfare issues arise where wildlife is trapped by fences. Reducing wildlife trauma may reduce damage to fences. Minimise pressure points such as sharp fence corners. Innovations include emu stiles and kangaroo flaps but are yet to be evaluated within the Western region.



Domestic stock was removed from the paddock on the left 12 months before this photo was taken. All grazing came from unmanaged herbivores such as goats and kangaroos.

An integrated management approach

The options presented are likely to work best if considered as integrated components of an overall management plan:

1. Harvesting or non-commercial culling work best within a defined TGP or exclusion fence perimeter that limits immigration.
2. Water point closure is a supplementary control to reduce impact on spelled areas even if exclusion fencing is in place. It is an important biosecurity measure.
3. TGP or exclusion fencing provides a perimeter but requires culling to manage internal populations to desired levels.

A progressively-implemented integrated management plan based on property requirements and the kangaroo management principles is likely to have the best outcomes. The advantages of fencing to manage kangaroos will only be realised if good grazing management is implemented, including practices such as regular pasture spelling and the maintenance of 50 per cent groundcover. To date a structured cost-benefit analysis of an integrated approach has yet to be undertaken in the Western region.