Submission No 160

INQUIRY INTO HEALTH AND WELLBEING OF KANGAROOS AND OTHER MACROPODS IN NEW SOUTH WALES

Organisation: THINKK NSW (The Think Tank for Kangaroos, Centre for Compassionate Conservation, University of Technology Sydney)

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Centre for Compassionate Conservation, University of Technology Sydney

Submission to the NSW Parliamentary Inquiry:

Health and wellbeing of kangaroos and other macropods in New South Wales

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An Alternative Kangaroo Management Plan

Summary

There is increasing evidence that the current NSW Kangaroo Management Plan (NSW KMP) does not address farmers' needs, causes international resistance, and thus results in increasingly poor welfare and ecological outcomes. We propose an Alternative NSW KMP that aims to ameliorate the current NSW KMP deficiencies by directly addressing the loss of income to farmers and by ending (or substantially minimizing) the killing of kangaroos. We show that while the increased cost is likely to be negligible, the improved welfare and ecological outcomes will be substantial. If based on scientifically based guidelines and indexes for management, an Alternative NSW KMP has the potential to be **effective, affordable, transparent, and transformative for Australia's relationship with kangaroos.**

The proposal includes the following sections:

I. Terms of Reference

This submission refers to the following terms of reference for the Portfolio Committee No 7:

"(a) historical and long-term health and wellbeing indicators of kangaroos, and other macropods, at the local, bioregional and state levels, including the risk of localised extinction in New South Wales,"

Submission - Quota based killing, during drought, can lead to localized extinctions

"(d) current government policies and programs for kangaroo management, including:
(i) the method used for setting quotas for kangaroo culling,
(ii) the management of licences to cull kangaroos,
(iii) temporary drought relief policies and programs,"

Submission - The aerial survey method of setting quotas is not particular to farmers' needs, but more relevant for the maintenance of sustainable quotas.

"(f) regulatory and compliance mechanisms to ensure that commercial and non-commercial killing of kangaroos and other macropods is undertaken according to the Biodiversity Conservation Act 2016 and other relevant regulations and codes,"

> **Submission** - The removal of kangaroos from their native landscapes contravenes the core values of the NSW Environmental Biodiversity Conservation Act:
>
> (a) to conserve biodiversity at bioregional and State scales, and
>
> (b) to maintain the diversity and quality of ecosystems and enhance their capacity to adapt to change and provide for the needs of future generations, and

"(h) current and alternative measures to provide an incentive for and accelerate public and private conservation of kangaroos and other macropods."

> **Submission** - Alternative measures will be presented to incentivize farmers to conserve kangaroos.

II. Background

The NSW kangaroo management plan applies to the four kangaroo species, Red Kangaroo (*Osphranter rufus*), Eastern Grey Kangaroo (*Macropus giganteus*), Western Grey Kangaroo (*M. fuliginosus*), and the eastern subspecies of the Common Wallaroo (*Osphranter robustus robustus*). These species vary in distribution according to habitat use and population numbers across the state. The most abundant is the Eastern Grey Kangaroo (EGK) and the least abundant is the Common Wallaroo, but the latter may reflect the lack of population estimates from the rangelands. Kangaroos are not killed because they have been proven to cause ecological damage across all the NSW estate they occupy. They are killed and, under a commercial quota, their body parts are harvested because of the perceived damage they cause to farmers and pastoralists. This is often summarized at their 'unmanaged' contribution to 'total grazing pressure' in the pastoral zone (Hacker et al., 2019), along with damage to fences and use of stock water resources. In cropping zones, it is direct damage/offtake of crops. None of these perceived impacts are audited. The industry provides a means of covering some of the management costs of the killing and creates jobs in the rural areas.

Until 2002 the aims of the NSW KMP were to minimise the impacts of kangaroos on landholders (Gilroy, 2004; Boom et al., 2012). Currently, the primary aims of the current NSW Kangaroo Management Plan are "to ensure kangaroo populations in NSW remain ecologically sustainable, and to ensure the methods of harvesting kangaroos for commercial use are humane" (Office of Environment and Heritage (NSW), 2017). The advent of the commercial industry occurred in response to the indiscriminate killing of kangaroos by landholders, who perceived them as pests that competed with introduced livestock for resources or as causing damage to fences and crops (Lunney, 2010). Although, kangaroos became protected fauna in 1918 (Boom et al., 2012), farmers'

perception of kangaroos as pests enabled the commercial industry to gradually develop. Government managed kangaroo plans were developed in response to growing concerns about kangaroo populations and a USA ban on kangaroo imports (Boom et al., 2012). The plans centred around the monitoring of populations to determine sustainable commercial killing quotas.

To summarize, the unstated aim of the NSW KMP is to minimise the financial burden to farmers caused by kangaroos, and the stated aims are to ensure the ecological sustainability and humane treatment of kangaroos. However, this submission will show that there is increasing evidence that the NSW KMP is not achieving these goals (Hacker et al., 2019; McLeod and Hacker, 2020). For example, the non-commercial kill and the cluster fencing are clear indications of farmers needs not being met by the commercial kill. Cluster fencing is also an ecological disaster for kangaroos and other wildlife whose movement across the landscape is impeded. Welfare continues to be an unresolved issue, as dependent young are inevitable collateral of the commercial kill and there is no regulation in the field of shooting accuracy. The increased non-commercial kill is also unregulated and the cause of immense kangaroo suffering.

This submission will also show that an Alternative NSW KMP can deliver much improved outcomes in relation to these aims. This is possible due to new information emerging over the last 25 years of the commercial kangaroo industry and since the last review of the NSW KMP:

- The kangaroo species in the NSW KMP and livestock (sheep, cattle, goats) utilize different food resources (pasture species, sward lengths of grass species in common). Evidence of direct and deleterious competition has only been recorded during drought when there is a convergence on non-resilient pastures (i.e. dominated by ephemerals) that are depleted by drought (Dawson and Ellis, 1994; Edwards et al., 1995; Dawson and Ellis, 1996; McLeod, 1996).
- The various kangaroo species not only segregate spatially from each other but may also avoid livestock, if given the opportunity (Witte, 2002). Competition, when it occurs, is reciprocal with sheep, likely unidirectional with cattle to the disadvantage of kangaroo species (Newsome, 1975; Frank et al., 2016), and little studied with goats (they compete to the detriment of other macropods like rock-wallabies).
- Contrary to popular opinion, the arid adapted kangaroo species (Red kangaroos, Common Wallaroos) do not show water focused grazing (unlike sheep and cattle) and do not depend on artificial water points placed for livestock due to a relatively low water requirement, a capacity to lap from very small and shallow water sources and, in the case of Common Wallaroos, the ability to create their own through digging soaks (Montague-Drake and Croft, 2004; Fukuda et al., 2010; Letnic and Crowther, 2013; Lavery et al., 2018).
- Effects on crops are often exaggerated; for example, Western Grey Kangaroos will only venture up to 400 m into crop fields that are adjacent to woodland (Arnold et al., 1989) and are easily repelled with fencing (Arnold, 1990).

- As a result of research into kangaroo-livestock interactions and physiology, the most recent estimate of the annual national cost incurred by four species of kangaroos has decreased from 200 Million AUD (Sloane Cook and King Pty Ltd, 1988) to 76 Million AUD (Mcleod, 2004).
- The welfare cost to kangaroos is unacceptably high (Ben-Ami et al., 2014), creating staunch opposition to the commercial kangaroo industry nationally and internationally. For example, legislators seeking to ban importation of kangaroo meat into Europe (Eurogroup, 2020) and kangaroo leather into the USA (Center for a Humane Economy, 2021).
- There is also increasing recognition that the current kangaroo management programs, including the NSW KMP, do not address the needs of farming and grazing enterprises (Ampt, 2018; McLeod and Hacker, 2020).
- The failure to meet farmers' needs and the resistance to exported kangaroo products is jeopardizing the perceived benefits of the current KMP, such as humane treatment of kangaroos and the ecological sustainability of the kangaroo industry (Wilson and Read, 2021).

III. Current NSW KMP - not benefiting farmers, kangaroos, or ecological sustainability

Not in line with farmer's needs

Kangaroo presence in the landscape is problematic in times of drought when the presence of livestock is reduced. However, the commercial industry is not necessarily synchronized with farmers' needs. Fluctuations in market demand for kangaroo products, driven in part by animal protection activism (McLeod and Hacker, 2020), and the boom and bust population cycles of kangaroos impede kangaroo killing (Bayliss, 1985; Shepherd and Caughley, 1987). The boom and bust can cycles of kangaroo population also confound industry management (McLeod and Hacker, 2020). Distance from harvester locations can also lead to uneven variation in the quota taken (McLeod et al., 2004). Importantly, the current harvest quota takes are simply not high enough to control kangaroo population levels (McLeod and Hacker, 2020). They may very well signal increased effort to find kangaroos as populations are over estimated. The key determinant of kangaroo populations are the preceding half year rainfall levels, which also determine the amount of available feed in the rangelands (McCarthy, 1996). As such, the current KMP NSW addresses the interests of the regulator, but not the landholder (McLeod and Hacker, 2020).

High welfare cost

Proponents of the commercial industry argue that the NSW KMP and similar plans seek to improve the welfare outcomes for kangaroos, particularly in comparison to the non-commercial kill, by requiring minimum marksmanship training, and the adherence to the National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purpose (Wilson and Read,

2021). However, in practice commercial shooters are unable to capture all young (Croft, 2004; Sharp and Mcleod, 2014). Those young that are captured are killed in a questionable manner with blunt trauma to the head and as collateral damage to the industry (Ben-Ami et al., 2014), and the enforcement is difficult and lacking (Boom et al., 2013). When higher quotas were realized from 2000-2009, a staggering estimated 800,000 dependent young per year were killed annually as collateral damage (Ben-Ami 2014), and an estimated 200,000 dependent young per year (using the same calculations) since the Russian ban in 2010 and the self-imposed male only kill in 2016 by some of the kangaroo processors.

There is increasing evidence that adult kangaroos also suffer an inhumane death. Although RSPCA assessment of shooters showed a 98% accuracy (RSPCA Australia, 2020), this was done with observer bias. In a random sampling of carcasses in a chiller 40% were found to be potentially not shot in the head due to an apparent evisceration of the head below the easy-to-cut occipital joint (Ben-Ami, 2009). This result (about 40% miss-shot) was repeated in another independent sampling of remains of heads left in the field by commercial shooters (n=120) over a period of 8 years (see submission by Diane Smith & Greg Keightley). These outcomes are not humane and not endorsed by RSPCA Australia (RSPCA Australia, 2020), nor international organizations (Eurogroup, 2020; Center for a Humane Economy, 2021), which will continue to exert pressure on the industry.

These uncertainties and lack of targeted kangaroo management have caused landholders to seek alternative kangaroo management options such as increased culling (non-commercial shooting) which do not require a shot to the head, thereby increasing the welfare cost. Another outcome is the use of cluster fencing, which are becoming ubiquitous in the landscape in QLD and western NSW (Wilson and Read, 2021). The fencing has a number of welfare ramifications such as excluding wildlife from food and water resources, causing entanglement, and impeding movement during fire and floods (Bradby et al., 2014).

Ecologically questionable

There is no argument that the four kangaroo species are uniquely adapted to the Australian landscape having evolved 1-2 million years ago. They drive ecosystem processes through soil turnover and catchment of litter in their diggings (hip-holes), cycle nutrients, disperse seeds and maintain open pastures with greater diversity and less fuel for fires (Eldridge and Rath, 2002). Although kangaroos are broadly perceived as over abundant after wet years, there is no evidence as to what their numbers should be in the landscape. In fact there is no known carrying capacity (McLeod, 1997), and inference from indigenous landscape management suggests that prior to European settlement the dominant grey kangaroo species would have benefitted from a mosaic of open and forested landscapes (Pasco, 2018). As it is, the NSW KMP creates commercial killing quotas that pertain to population numbers, but do not reflect the ecological role of kangaroos in the landscape.

The lack of convergence between farmers needs and those of the commercial industry are also leading to ecological problems. Because farmers feel that the kangaroo offtake by the industry is lacking, they are implementing cluster fencing to thwart kangaroo movement in the landscape around their properties (Wilson and Read, 2021). This practice impedes the movement of emus, dingoes, kangaroos, and other wildlife which are integral to the ecological functioning of the rangelands.

IV. Alternative NSW KMP

- No commercial killing of kangaroos.
- Kangaroo management for farmers based on compensation, wildlife capacity incentives, or credits purchased by animal protection groups.
- Evidence based triggered management per property. A key index for triggering management will be the 30 g/m^2 biomass (of forage) threshold. Other indices that are based on farmers needs and scientific assessments may be developed.

Management/Compensation Scenarios:

- All farming properties may receive ongoing compensation for fencing damage.
- Only properties in the rangelands may receive per need compensation for loss for wool productivity when the drought index (30 g/m^2 biomass) is reached.
- All crop farms may receive separate per need compensation based on a crop damage index (to be developed).

Note - the cost to compensation or incentive payments would be instead of cost of implementing the KMP.

V. Benefits of an Alternative NSW KMP

Specific to farmers' needs, therefore reduced management

An Alternative NSW KMP will intervene when kangaroo prescience results in a cost to farmers. The intervention period will be based on scientifically established indices for when kangaroos become a cost to farmers due to competition with livestock for food in the rangelands.

Based on measurable indices

In arid far north-western NSW, kangaroos cause a small cost to farmers when plant biomass dips below 30 g/m^2 (Edwards et al., 1996; McLeod, 1996). There are likely to be geographically specific indices depending on mean rainfall levels and landscape types and the type of agriculture. It is important to mention that loss of income due to kangaroos has not been documented outside the

rangelands, although there is perceived competition regardless of rainfall, pasture degradation and replacement of native grasses with exotics.

No significant cost increase

The impetus for the kangaroo industry and subsequent NSW KMP was damage mitigation (to farmers) by kangaroos. However, as the kangaroo industry matured a series of studies undertook to assess the impact of kangaroos on landholders, particularly in the arid rangelands (<250 mm rain per year). Surprisingly, studies that considered the impact on wool productivity, loss of crops, and relative energetic needs indicated that competition was at a minimum. The semi-arid rangelands are less than a third of the total area under the NSW KMP, and in the remaining more temperate two thirds there is no competition for resources because of the more abundant rainfall levels (Fig 2). Subsequently, damage mitigation was removed as an aim from NSW kangaroo management plans, and throughout the country. The findings of these studies (see below) are important because they indicate how kangaroos can be managed in a way that is both evidence based and relative to farmers' needs.

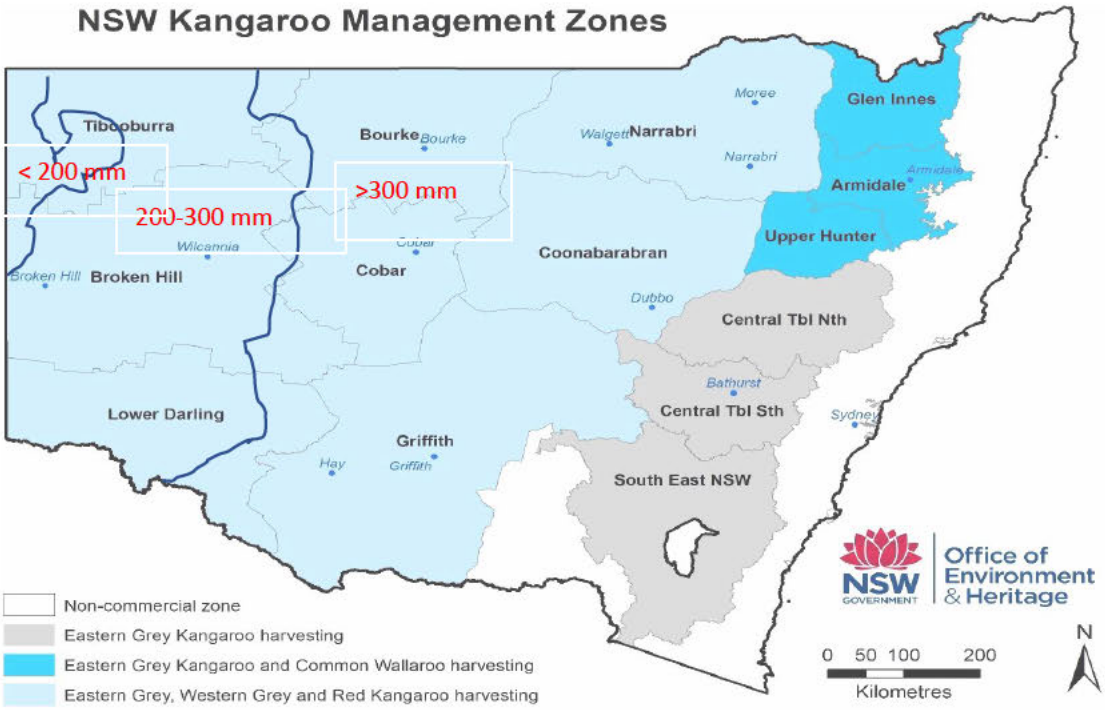

Figure 2. The NSW KMP management zones (Office of Environment and Heritage (NSW), 2017) and long-term average rainfall levels between the blue line dividers (BOM, 2021a).

A series of studies on the interaction between kangaroos, livestock and the landscape which showed little competition for food resources (Dawson and Ellis, 1994; Edwards et al., 1995; Dawson and Ellis, 1996; McLeod, 1996). Limited competition was identified during drought beyond the low pasture biomass of 50-60g/m^2 (Edwards et al., 1996), but later corrected to and 30 g/m^2 in a longer

term study (McLeod, 1996). Another study showed that grey kangaroos venture very little into crop fields, constrained by a distance of 400 m from the tree line (Arnold et al., 1989). The commercial impact of kangaroos is dependent on the type of crop grown. The mitigation measures to crop browsing by kangaroos are easy to implement. They included either establishing crop fields at 300 m or more from the nearest tree line or fencing, which eliminated nearly all incursions by kangaroos into the crop fields (Arnold, 1990).

Physiologically, kangaroos were shown to be dramatically more efficient and better adapted to the semi-arid Australian environment. The energetic requirement of kangaroos was found to be 1/3 of sheep and their water turnover rate 13% of sheep (Munn et al., 2008). Multiple studies indicate that the location of kangaroo populations are not governed by artificial watering points (Montague-Drake and Croft, 2004), even in times of drought (Fukuda et al., 2010; Letnic and Crowther, 2013).

After 10 years of data analysis from semiarid NSW, including two drought periods, Mcleod (1996) concluded that competition between sheep and red kangaroos for resources is negligible and that even if culling occurs increased productivity from sheep is unlikely (McLeod, 1996: pp 106):

> "The current justification for culling red kangaroos in the rangelands is to minimise the effect of competition between domestic stock and kangaroos for native pasture (Shepherd and Caughley, 1987). The present study indicates that under most conditions, red kangaroos have a negligible effect on the productivity of sheep and that culling at these times is unjustified. During times of drought, culling is justified but significant increases in sheep productivity should not be expected."

These findings were reflected in the latest assessment of the annual cost impact of kangaroo in Australia. In 2004 the total cost throughout Australia was conservatively estimated at 76.16 Million AUD (Mcleod, 2004) (Table 1), a significant decrease from the earlier estimate of 200 Million AUD (Sloane Cook and King Pty Ltd, 1988). If NSW presents about 1/3 of the agricultural properties in Australia, then the relative cost of kangaroos to farmers in NSW is 14.72 Million AUD, comprised of 9.15 Million AUD due to farm production loss and 16.70 Million AUD due to fencing damage.

Table 1. Annual Cost Impact of Kangaroo (Mcleod, 2004)

Cost Component	Control $A million	Loss $A million	Total $A million
Agricultural Production [a]			
Sheep Production Loss	-	7.46	7.46
Cattle Production Loss	-	8.12	8.12
Cropping Industries	-	11.90	11.90
Fencing Cost [b]	16.70	-	16.70
Traffic Accident Cost [c]	-	30.00	30.00
Research Cost [d]	2.00	-	2.00
TOTAL COST	18.70	57.48	76.18

(a) Agricultural production losses are included in this cost component. The gross margin per sheep or head of cattle sold is multiplied by the numbers in each region and the estimated reduced carrying capacity estimates. ABARE (2003) farm level statistic have been utilised to calculated production loss values

(b) An average fence damage cost of $0.2 per head shorn or head of cattle sold is used to calculated additional fencing costs imposed by this species. This estimate is a consultant estimate derived from Gibson and Young (1987)

(c) Assumed 5,000 kangaroo-related accidents pear year nationally at a cost of $6,000 per accident.

(d) Consultant estimate assuming there are 10 full time scientists involved in kangaroo research, at a cost of $0.2 m per scientist per year (includes support staff and other overheads)

We estimate that the cost to damage mitigation is even lower when the frequency of drought is taken into account. Because competition for resources occurs only in drought (300 g/m2 of biomass), in the semi-arid rangelands, long-term climate patterns can yield an estimated predictor of the need to compensate. Over the last 30 years in the rangelands, broad-scale drought (>75% of the landscape) occurred only in 3 years (Table 2). Compensation during non-drought years should only cover fencing cost and loss of crops. Therefore, in most years kangaroo cost to farmers in NSW would only amount to 5.57 M AUD (fencing) and 4 M AUD (cropping) for a total of 9.6 M AUD. This reflects annual costs of not killing between 600,000 to 1 million adult kangaroos and 40,000 to a few hundred thousand dependent young (depending on the amount of females killed).

Table 2. The occurrence of drought in the NSW rangelands, <300 mm rainfall (BOM, 2021b)

Year	Drought[1]	Year	Drought	Year	Drought
1991	-	2001	-	2011	-
1992	-	2002	>75%	2012	-
1993	-	2003	-	2013	-
1994	<25%	2004	-	2014	-
1995	-	2005	-	2015	-
1996	-	2006	-	2016	-
1997	-	2007	<25%	2017	-
1998	-	2008	-	2018	>75%
1999	-	2009	<25%	2019	>75%
2000	-	2010	-	2020	-

[1]Drought is defined as at least a **serious** rainfall deficiency where rainfall lies above the lowest five per cent of recorded rainfall but below the lowest ten per cent for the period in question (BOM Glossary 2021). Percentages are the portion of the NSW rangelands under drought.

The costs of the Alternative NSW KMP can be even reduced further. The authors are not aware of any livestock industry in which farmers are reimbursed for damages caused to fencing because of wildlife. In addition, the cost to crop farmers can easily be mitigated through distance from canopy or fencing (as stated earlier). Creative management schemes could also be adopted such as tradeable licenses open to animal protection stakeholders (Boronyak et al., 2015)(Boronyak-Vasco and Perry, 2015). The Alternative NSW KMP should strive to increase the wildlife acceptance by landholders. By doing so, it may enable a shift in attitudes towards kangaroos, perhaps even untapping the unrealized commercial potential of eco-tourism around kangaroos (Croft, 1999; Higginbottom et al., 2004). A similar mechanism has already been adopted by the new management plan for Koalas (Office of Environment and Heritaga (NSW), 2018). If based on scientifically based guidelines and indexes for management, an Alternative KMP has the potential to be affordable, transparent, and transformative for Australia's relationship with kangaroos.

Improved welfare outcomes

Abolition of the commercial industry will stop the cruel treatment of dependent young by humans. With the commercial industry in place, 210,333 kangaroos were still culled during 2020 in NSW (Department of Agriculture Water and the Environment, 2020). Based on the statistics above, even if farmers were allowed to cull kangaroos instead of receiving payments, there would be a dramatic reduction of the number of kangaroos killed (compared to current culled and commercially killed).

Ecologically sustainable

The four kangaroo species in the NSW KMP are co-evolved with the Australian landscape and they are uniquely adapted to its various landscapes and climates. As such their ecological roles is undisputed and more research needs to be done to quantify the positive value these kangaroo species have in the landscape through spreading the seeds of native grasses and fertilising soils. There are disagreements about how many kangaroos there should be. This typically is a conflation of the abundance of four species not the abundance of each individual species. This conflation becomes absurd when compared to the human population (a single species) in statements like there are more kangaroos (~50 million) than people (~25 million) in Australia. If every Australian ate two kangaroos a year from the commercial zones of WA, SA, VIC, NSW and QLD (a mere 26 kg of meat from an average 25 kg kangaroo) then there would be none left! We need better understanding of the impact of increased or decreased kangaroo populations and species on the ecological integrity of landscapes in the NSW Kangaroo Management Zone. The uncertainty principle clearly states management by killing of kangaroos (or any protected wildlife) should be avoided if the outcomes are unknown. Furthermore, management should only start when there is clarity about the ultimate and proximate causes of a human-wildlife conflict. This is frequently lacking in lethal control programs in Australia that conflate ultimate (e.g. land-clearing) and proximate (e.g. cats and foxes) causation and the interactions between threatening factors (Woinarski, 2019). The NSW KMP is no exception.

Learning for the past about future possibilities

Australia banned whaling in 1979 due to concerns around both ecological sustainability and animal welfare. Since then, Australia has become a global leader for whale conservation. The small whaling industry that operated in NSW was closed. Now the towns were the industry previously operated have become tourist destinations that offer unmatched opportunities for whale watching. NSW has an opportunity to take a lead in Australia by transitioning from a commercial kangaroo industry to a state that is the leader of Australia in macropod conservation through prioritising coexistence.

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