Submission No 299

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

Organisation: Humane Society International Australia

Date Received: 5 May 2021

HUMANE SOCIETY INTERNATIONAL

AUSTRALIA

Submission to the inquiry into the health and wellbeing of kangaroos and other macropods in New South Wales

This submission has been co-authored with Louise Boronyak, Wildlife Coexistence Researcher, PhD Candidate UTS

30th April 2021

Contact:
Nicola Beynon
Head of Campaigns

Executive Summary

Humane Society International Australia (HSI) appreciates the opportunity to make a submission on this matter and acknowledges the importance of the public consultation process in enabling the consideration of a variety of stakeholder perspectives on the important issue of how kangaroos are managed in NSW. This submission outlines the significant conservation and welfare concerns inherent in the commercial and non-commercial killing of kangaroos in NSW.

Humane Society International does not support the commercial killing of native wildlife and we advocate for non-lethal strategies to mitigate human wildlife conflicts. Kangaroos have existed in the Australian landscape for 16 million years and have evolved to fill the niche of Australia's top herbivores and largest marsupials. Kangaroos are ecosystem engineers that contribute to the health of landscapes. They consume plant biomass contributing to regeneration, reduce vegetation that are important for bushfire hazard reduction, spread the seeds of native grasses when foraging and fertilize Australia's nutrient deficient soils.

The widespread removal of Australia's largest herbivore has major implications for ecological resilience. Over the last decade more than 18.2 million adult kangaroos were recorded as being killed for commercial purposes in NSW, with the annual average being significantly higher when young and females are included. This commercial industry is the largest consumptive mammalian wildlife industry in the world, with a high cost to animal welfare, Australian society, and animal populations. There is a great deal of progress required to improve the transparency, regulation and compliance of kangaroo management in NSW.

This submission covers 4 key areas relating to the inquiry Terms of Reference:

a) risk of localised extinction of the 4 commercially harvested kangaroos in New South Wales,
b) key threats to macropods and their habitat from climate change, drought, land clearing and fencing,
c) current government policies and programs with regards to 'in pouch' and 'at foot joeys' welfare and the welfare of adult kangaroos, and
d) incentives to increase public and private conservation of kangaroos and other macropods

Humane Society International (HSI) is the world's largest conservation and animal welfare organisation. Humane Society International Australia was established in 1994 and our mission is to build an ecologically sustainable and humane world for all animals.

Risk of localised extinction of commercially harvested kangaroos

Four species of kangaroos are commercially killed in NSW. These include *Macropus rufus* (Red Kangaroo)*, M. giganteus* (Eastern Grey Kangaroo)*, M. fuliginosus* (Western Grey Kangaroo) and *M. robustus* (Wallaroo). These kangaroos will be referred to by their common names for the remainder of this submission.

The NSW Commercial Kangaroo Harvest Management Plan 2017 – 2021 aims to provide a management framework for the commercial harvest of kangaroos in NSW. NSW exports kangaroo products internationally which requires Commonwealth Government approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In order to satisfy the requirements of the EPBC Act, the primary objectives of the 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[1].

According to the Department of Planning, Industry and Environment (DPIE) 2021 Quota Report annual commercial quotas are set at a proportion of the estimated kangaroo populations. For red kangaroos, quotas are generally set at 17% of the estimated population and for eastern grey kangaroos, western grey kangaroos and for wallaroos it is set at 15% of the estimated population[2]. As the quotas are determined by the population estimates it is imperative that population estimates are as transparency and robust as possible.

Governance is one of the most important factors for ensuring effective environmental management and conservation actions[3]. Environmental governance encompasses how decisions relating to the environment are made and whether resultant policies and processes lead to environmentally and socially sustainable outcomes. Best practice in terrestrial environmental governance is based on the principles of equity, transparency, accountability, inclusion and fairness[4]. "Transparency refers to: the visibility of decision-making processes; the clarity with which the reasoning behind decisions is communicated; and the ready availability of relevant information about a governance authority's performance."[5]

To evaluate whether the NSW Kangaroo Management Program meets these two objectives to ensure that kangaroo populations in NSW remain ecologically sustainable; and that the methods of killing are kangaroos for commercial use are humane more information needs to

---

[1] NSW Commercial Kangaroo Harvest Management Plan https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Wildlife-management/Kangaroo-management/nsw-commercial-kangaroo-harvest-management-plan-2017-2021-150705.pdf

[2] Department of Planning, Industry and Environment 2021 Quota Report New South Wales Commercial Kangaroo Harvest Management Plan 2017–2021

[3] Bennett, N and Satterfield, T. 2018. Environmental governance: A practical framework to guide design, evaluation, and analysis. Conservation Letters.

[4] Lockwood, M. (2010). Good governance for terrestrial protected areas: A framework, principles and performance outcomes. Journal of Environmental Management, 91, 754–766.

[5] Lockwood, M. (2010). Good governance for terrestrial protected areas: A framework, principles and performance outcomes. Journal of Environmental Management, 91, 754–766. P 759

be publicly available to aid the transparency and robustness of this program. We believe that not enough detailed information is provided in quota reports to enable independent verification across four key areas:

- the methodology for how kangaroo population estimates are calculated,
- the density thresholds in each commercial zone for each commercially harvested species, and what levels they trigger a management intervention such as a reduction or suspension in the quota,
- the methodology to determine correction factors and whether these methods have been peer reviewed by independent scientists, and
- how changes to correction factors affect the ability to detect long-term trends in kangaroo populations.

We raise concerns about how kangaroo population estimates are calculated. There is a significant difference between the raw counts and final population estimates that appears to be open to scientific challenge and without peer review. For example, in 2019 a total of 508 wallaroos were sighted during a DPIE survey of the Northern Tablelands commercial zone. After the application of several statistical models and techniques— including bootstrapping and the application of a correctional factor of 1.85— the population estimates for wallaroos were calculated to be 296,555 - a figure 583 times larger than the actual number of wallaroos sighted. [6] [7] To aid transparency of the governance of a protected species such as the kangaroo, the department needs to explain how this final estimate for wallaroos was determined especially because the quota is based on this final estimated figure. We hold grave concerns in relation to localised extinction when the quota allows for the take of 44,484 wallaroos a figure that is 87 times the actual numbers of wallaroos counted.[8] This can lead to an overallocation of quota.

We focus now on density thresholds in commercial zones for each commercially harvested species. Page 13 of the Management Plan notes that "In setting the quotas and analysing trends, OEH uses accepted population thresholds for each species". There is no explanation of how the thresholds are determined, what science they are based upon and what the thresholds actually are for each species. To our knowledge in the management plan the population density thresholds are only outlined for red kangaroos in zone 2 Broken Hill (see Appendix 1 of the Management Plan (p24). There are two thresholds:

- Initial threshold of 7.8 red kangaroos per square kilometre. If the annual aerial survey indicates that the population of red kangaroos is below 7.8 kangaroos per square kilometre, the annual quota is reduced from 17 to 10 per cent of the estimated population size.
- Lower threshold of 6.4 red kangaroos per square kilometre. If the survey indicates that the population abundance of red kangaroos is below 6.4 kangaroos per square

[6] PORTFOLIO COMMITTEE NO. 7 - PLANNING AND ENVIRONMENT, Tuesday, 2 March 2021 Examination of proposed expenditure for the portfolio area ENERGY AND ENVIRONMENT

[7] DPIE 2021 Quota Report New South Wales Commercial Kangaroo Harvest Management Plan. P2

[8] DPIE 2021 Quota Report New South Wales Commercial Kangaroo Harvest Management Plan p15

kilometre, then all harvesting in the zone will cease until at least the next survey when the annual harvest quota is reappraised.

The quota report should include each density threshold triggers for each commercially killed species in order to determine if objective 1 of management for ecologically sustainability is being met. In the absence of the above information, we use the best available science on kangaroo density levels provided by Hacker et al. (2004) to evaluate whether Department of Planning, Industry and Environment (DPIE) is meeting their first objective.

According to Hacker et al. (2004) the "critical minimum density is not clearly defined, populations below 2/sq km would generally be considered at risk of extinction".

The table below is from DPIE 2021 Quota Report New South Wales. We draw your attention to column 3 red kangaroo densities and column 5 grey kangaroo densities. In 2020, in some commercial zones the estimated population density fell to what is considered to place kangaroos at risk of localised extinction[9] i.e. 2 kangaroos per square kilometre. In 2021 red kangaroo densities are considered at risk of localised extinction in 5 out of 9 harvest zones. While grey kangaroo populations have reached densities generally considered at risk of extinction in 3 out of 9 harvest zones in New South Wales. New South Wales only surveys wallaroo populations every three years, so current populations are unknown and as noted above we are unable to have confidence in the population estimates. The following tables[10] show the estimated population data for three commercially harvested species in NSW red, eastern and western grey kangaroos.

[9] Hacker et al. 2004. Kangaroo management options In the Murray-Darling Basin. Page 37

[10] DPIE 2021 Quota Report New South Wales Commercial Kangaroo Harvest Management Plan

Table 4 **Red and grey kangaroo population estimates and standard errors for 2020 for the Western Plains**

Management zone	Red kangaroo population estimate	Red kangaroo density (km^2)	Grey kangaroo population estimate	Grey kangaroo density (km^2)
Tibooburra	200,465 (± 29,803)	3.65	6,859 (± 3,420)	0.12
Broken Hill	1,197,474 (± 150,143)	13.15	281,410 (± 70,990)	3.09
Lower Darling	583,802 (± 70,355)	10.31	314,639 (± 50,785)	5.56
Cobar	102,480 (± 24,791)	2.54	44,208 (± 16,644)	1.09
Bourke	117,975 (± 20,167)	2.14	41,501 (± 14,670)	0.75
Narrabri	190,468 (± 38,728)	2.90	745,775 (± 189,122)	11.34
Coonabarabran	152,052 (± 39,195)	2.46	891,090 (± 189,447)	14.44
Griffith North	126,160 (± 39,185)	1.92	421,161 (± 95,870)	6.4
Griffith South	253,492 (± 71,510)	3.95	371,796 (± 87,057)	5.8
Total	**2,924,368 (± 241,382)**	**5.27**	**3,118,439 (± 403,442)**	**5.62**

The estimated numbers and densities of red and grey kangaroos in each management zone

According to Hacker et al. 2004 harvesting that *"results in an average long-term density of less than 10 kangaroos/sq km should be rejected since in all such cases the minimum density is likely to fall below the critical level".*[11] Based on this information only three years (2014-2016) out of 18 years (2002 to 2020) the red kangaroo density was more than 10 kangaroos per square kilometre[12]. We also note that this density has been 'estimated' after the correction factors and bootstrapping has been applied which risk inflating kangaroo population estimates to serve the narrative that kangaroos are abundant. Western grey kangaroo abundance has also decreased over the same period from 1.59 million to 630,000 with densities where they are at risk of localised extinctions.

[11] Hacker et al. 2004. Kangaroo management options In the Murray-Darling Basin

[12] DPIE 2021 Quota Report New South Wales Commercial Kangaroo Harvest Management Plan

Table 13 **Population estimates and trends in abundance for western grey kangaroo on the Western Plains, 1997–2020**

Year	Population estimate (millions)	Density (km^{-2})	Trend in abundance (% change from previous year)
2020	**0.63**	**1.13**	**-29**
2019	0.88	1.50	5.7
2018	0.84	1.52	-8.7
2017	0.92	1.68	-42.5
2016	1.59	3.18	7.2
2015	1.49	3.02	-2.6

According to the DPIE 2020 quota report the commercial harvest zones increased by 27,200 km2[13] yet no justification was provided as to why there was a need to increase commercial zones. Part of that area that was expanded by 24,480km was supported by the NSW Government Drought Relief Package announced in 2018[14]. Non-commercial shooting also escalated in NSW during drought in 2018 with the relaxation of regulations to facilitate the increase in volunteer shooters as drought relief. Two concerning issues of with this program were that:

- Physical tags were no longer required so we do not know how many kangaroos were killed, and
- More than two shooters may operate under a landholder licence at any time- meaning groups of hunters could go onto properties killing as many kangaroos as they desired.

This is clearly not responsible or ecologically sustainable management of kangaroos as there is no way of tracking how many kangaroos and other macropods are being shot.

Based on the evidence provided in this section, we have little confidence in the estimated population figures used by the Department to determine commercial quotas.

This lack of transparency and independent evaluation means that the program fails to provide adequate governance in the management of kangaroo populations that reside in NSW. Furthermore, there is no consideration of how non-commercial shooting impacts on kangaroo populations and whether this is factored into the commercial quotas (our understanding that it is not). In 2019, 415,152 kangaroos were reported as killed under non-commercial licences, equivalent to 62.2% of the actual commercial harvest, or 21.9% of the available commercial quota[15]. Moreover other threats to kangaroos from disease, entanglement in fencing, road mortality and extreme weather events are also not considered in the quota. The lack of

[13] DPIE 2021 Quota Report New South Wales Commercial Kangaroo Harvest Management Plan

[14] DPIE 2021 Quota Report New South Wales Commercial Kangaroo Harvest Management Plan

[15] DPIE 2019 NSW Commercial Kangaroo Harvest Management Plan: 2019 Annual Report

transparency and robustness is key criticism of this program. It obscures independent verification of whether the KMP meets its objective of being 'ecologically sustainable'.

Eastern grey kangaroo populations can realistically increase by 10% annually, red kangaroos by 13.5%, and wallaroo by 12%".[16] This growth rate accounts for the high juvenile mortality and changing weather conditions that affect resource availability. Consequently, shooting quotas of 15-20% of population estimates may exceed actual kangaroo population growth rates.[17]The low densities indicate that many commercial zones are being depleted of kangaroos and the department is not detecting decline until there are virtually no kangaroos left.

[16] Mjadwesch, R. 2011. NOMINATION TO LIST THE LARGE MACROPODS AS THREATENED SPECIES IN NSW https://www.kangaroosatrisk.net/2-biology--population-ecology.html

[17] Mjadwesch, R 2011 Kangaroos at Risk, https://www.kangaroosatrisk.net/

Threats to kangaroo and other macropods

Kangaroos face multiple threats that impact their conservation and welfare. This section details threats from a changing climate and extreme events such as drought and fire, habitat destruction, injury or mortality from vehicle strike and entanglement in wire fencing and restriction of movement by exclusion fencing. Shooting is yet another pressure that kangaroos face that can have a severe impact on the welfare of adults their young and their mobs.

According to NSW Commercial Kangaroo Harvest Management Plan 2017-2021, the impacts of climate change on kangaroos are not well documented[18]. A changing climate would likely affect individual kangaroos by altering access to food and water resources, fecundity, survival and behaviour. While effects on populations include changing species abundance, distribution, and genetics[19]. The combined impacts of a severe drought, higher than average temperatures and extreme fires have had a significant impact on kangaroos and macropods yet this does not appear to have been considered in the management of these species as quotas largely remained unchanged only to be suspended in two commercial zones. In NSW, the commercial killing was suspended in Tibooburra in 2019 and 2020 due to low red kangaroo numbers and density e.g 1.4 in 2019 and 3.7 in 2020. Yet was reinstated to a 10% quota in 2021. Commercial killing for the same species was also suspended in Cobar over the same period as red kangaroo density was 0.9 in 2019 and 2.5 in 2020. Yet in 2021 a 17% quota for 2021 was set despite the density not being above 7.8 red kangaroos per square kilometre as stated in the NSW KMP[20].

(i) Impact of drought on kangaroos

Drought can have adverse effects on native vegetation, agriculture yield, biodiversity, soil moisture and water flow and quality. The ‘‘Millennium Drought’’ (2001–2009) is recognised as the worst drought on record for southeast Australia. It was the longest uninterrupted series of years with below median rainfall in southeast Australia since the 1900s[21]. The Commonwealth Scientific and Industrial Research Organisation (2010) concluded that between 1997–2009 was the longest period with lowest average rainfall since 1900s in southeast Australia[22]. However, Van Dijk and Renzullo (2009) found that surface water resources scarcity already started in 1994[23]. Between 2017 to 2019 New South Wales and southern Queensland suffered from extreme drought conditions[24].There was a marked deficit in winter rainfall resulting in severe shortfalls in effective rainfall combined with far above

[18] NSW Commercial Kangaroo Harvest Management Plan 2017 – 2021
[19] NSW Commercial Kangaroo Harvest Management Plan 2017 – 2021
[20] NSW Commercial Kangaroo Harvest Management Plan 2017 – 2021
[21] I. J. M. van Dijk, Hylke E. Beck, Russell S. Crosbie, Richard A. M. de Jeu, Yi Y. Liu, Geoff M. Podger, Bertrand Timbal, and Neil R. Viney.2013.The Millennium Drought in southeast Australia (2001–2009): Natural and human causes and implications for water resources, ecosystems, economy, and society. WATER RESOURCES RESEARCH, VOL. 49, 1040–1057
[22] CSIRO 2010 Climate Variability and Change in South-Eastern Australia: A Synthesis of Findings From Phase 1 of the South Eastern Australian Climate Initiative (SEACI), 31 pp., CSIRO, Canberra
[23] Van Dijk, A. I. J. M., L. J. Renzullo, and M. Rodell (2011), Use of Gravity Recovery and Climate Experiment terrestrial water storage retrievals to evaluate model estimates by the Australian water resources assessment system, Water Resour. Res., 47, W11524
[24] Wittwer, G. et al. 2020 Estimating the Regional Economic Impacts of the 2017 to 2019 Drought on NSW and the Rest of Australia; Victoria University, Centre of Policy Studies/IMPACT Centre

normal maximum temperatures across northern New South Wales and southern Queensland[25]. For example, northeast of Broken Hill had only 17.8 millimetres for the nine months between January to September 2018 and other areas around Broken Hill had less than 30 millimetres. Locations with less than 50 millimetres included Cobar, Wilcannia, Menindee and Pooncarie[26].

Kangaroo populations decline when rainfall levels are 100 mm below average in the east and approximately 60 mm below average in the west of NSW[27]. Drought affects the availability and nutritional content of forage for kangaroos. Caughley et al. (1984) found a reduction in red kangaroos by 41% and 45% for the two species of grey kangaroos during drought[28]. If drought persists for longer than six months wallaroos stop breeding until the drought breaks[29]. During drought, juvenile kangaroos and older males are the most likely to die as they require more food and water than adult females. Proportionally more females are killed because males become harder to find during drought. This corresponds with what was reported in the NSW KMP Meeting Minutes from April 2019 that noted "female take has definitely increased in 2018… roughly 20-25% - up 10% on this time last year [2018]… High Female take in the Reds".[30]

During a mild drought 83% of young red kangaroos die and in a severe drought none survive, and no reserve embryos are carried[31]. Grey kangaroo populations declined when rainfall is well below average[32]. Considering these factors of adult and juvenile mortality some studies conclude that kangaroo populations fall by 60% during a drought[33]. Killing kangaroos in a during drought is a disaster for a slow-reproducing animal. Yet the NSW allowed for increases in non-commercial shooting as a drought relief package for farmers.

Another impact of drought on kangaroos is the increased threat from vehicle collisions, especially when kangaroos graze on the roadside. Kangaroos are attracted by higher quality forage on the road verge relative to surrounding areas during drought. A study by Lee et al. (2004) found that on a 21km stretch of the Silver City Highway between Broken Hill and Tibooburra the rate of roadkill was 8 times higher during drought (20.8 road kills per month) than non-drought (2.6 road kills per month). Red kangaroos and wallaroos were identified to be more likely to being killed on the road than grey kangaroos due to the difference in food

[25] BOM Special Climate Statement 66 an abnormally dry period in eastern Australia 1 November 2018
[26] BOM Special Climate Statement 66 an abnormally dry period in eastern Australia 1 November 2018
[27] Caughley,J. Peter Bayliss and Jack Giles 1984. Trends in Kangaroo Numbers in Western New South Wales and their relation to Rainfall. Aust. Wildl. Res., 1984, 11, 41 5-22
[28] Caughley,J. Peter Bayliss and Jack Giles 1984. Trends in Kangaroo Numbers in Western New South Wales and their relation to Rainfall. Aust. Wildl. Res., 1984, 11, 41 5-22
[29] Tyndale-Biscoe, H. 2005 Life of Marsupials. CSIRO Publishing
[30] NSW KMP Meeting Minutes 3/4/2019
https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Wildlife-management/Kangaroo-management/Advisory-committee-minutes/minutes-of-kangaroo-management-advisory-panel-meeting-april-2019.pdf?la=en&hash=F52BD55E2575A36B7F0967857B59D8A97ABD2980
[31] WDL Ride 1970 A guide to the native mammals of Australia. Oxford University Press
[32] Caughley,J. Peter Bayliss and Jack Giles 1984. Trends in Kangaroo Numbers in Western New South Wales and their relation to Rainfall. Aust. Wildl. Res., 1984, 11, 41 5-22
[33] Mjadwesch, R 2011 Kangaroos at Risk, https://www.kangaroosatrisk.net/

preferences[34]. The majority of road kills were young individuals around 2 years old, who had often not reached sexual maturity affecting species recruitment[35].

(ii) Impact of bushfires on macropods

In NSW an estimated 6.89 million hectares were burnt in the 2019-2020 fire season[36]. A number of these burnt areas occurred within the NSW commercial kangaroo zones including:

- Griffith South zone
- South East Tablelands zone
- Central Tablelands zone
- Coonabarabran zone
- Narrabri zone
- Armidale
- Glen Innes

A WWF 2020 study estimated that more than 143 million mammals are likely to have been present within the 2019-20 bushfire impact area. With an estimated 4.96 million macropods including kangaroos, wallabies and pademelons likely to have been present within the burnt areas. It is unknown how many macropods perished in the fires or later died of starvation, predation and lack of access to clean water.

Concerns were raised about kangaroos being killed in NSW despite the impacts of severe drought and widespread bushfires. Yet despite these extreme events, the NSW government did not take the precautionary approach and suspend quotas during this period until it was better understood how kangaroo populations were impacted, failing in its duty to adaptively manage kangaroo species that are approved for commercial killing.

(iii) Impact of land clearing on macropods

Despite land clearing causing harm to wildlife, it is often ignored or considered only indirectly in environmental decision-making. Yet the act of land clearing (1) causes deaths that are physically painful and psychologically distressing because of their traumatic and debilitating nature; (2) pain, psychological distress, physical injuries and other pathological conditions arising from land clearing will occur over a prolonged period as animals attempt to survive in the cleared environment or in environments where they are displaced to; and (3) based on current clearing rates, more than 38 million mammals, birds and reptiles are likely to be killed annually because of land clearing in Queensland and New South Wales. Mobile species such as macropods may avoid direct injury by machinery during land clearing, yet may suffer from stress and injuries by running into fences or motor vehicle strike.[37]

---

[34] Lee E, Klöcker U, Croft DB and Ramp D, 2004. Kangaroo-vehicle collisions in Australia's sheep rangelands, during and following drought periods. Australian Mammalogy 26: 215-226.
[35] Lee E, Klöcker U, Croft DB and Ramp D, 2004. Kangaroo-vehicle collisions in Australia's sheep rangelands, during and following drought periods. Australian Mammalogy 26: 215-226.
[36] WWF. 2020 Impacts of the unprecedented 2019-20 bushfires on Australian animals.
[37] Finn, H.C. and Stephens, N.S. 2017 The invisible harm: land clearing is an issue of animal welfare. Wildlife Research, 44 (5). pp. 377-391.

It is widely recognised that land clearing is a primary driver of biodiversity loss. Australia is amongst the top 10 countries of the world for clearing[38] and identified as one of seven countries that contribute more than half of global biodiversity loss[39] . Therefore, increasing rates of land clearing in Australia are of international significance. Habitat loss is often linked to society's ongoing demand for agricultural expansion, infrastructure extension, wood extraction and urban development. A recent study by Heagney et al. (2021) found that farmers in NSW primarily clear land in response to economic opportunities presented by favourable market signals (i.e price rises). Livestock prices appear to have the greatest influence on state-wide clearing rates, followed by crop prices[40]. Agricultural clearing in NSW has been responsible for ~50 % of total land clearing (excluding the effect of bushfires) over the past 25 years[41]. In NSW, the *Native Vegetation Act 2003* was superseded by the *Biodiversity Conservation Act 2016*, which allowed rural land holders to clear certain types of native vegetation without development consent provided they satisfied certain criteria (i.e. clearing of paddock trees, thinning of native vegetation or removal of 'invasive native scrub') under a self-assessable framework[42] [43].

This amendment to the legislation contributed to a significant spike the rate of land clearing that rose by more than 350% from ~5500 ha in 2010-11 to ~20,000 ha in 2016-17. This mirrors increasing land clearing rates observed in Queensland (QLD). The spike in land clearing recorded in the 2016/17 financial year (i.e. to end of June 2017) preceded the implementation of the new *Biodiversity Conservation Act 2016*, in August 2017 and is also consistent with increasing prices paid to Australian farmers over the last two years [44]. Native vegetation loss in NSW also coincides with areas where biodiversity is most threatened making this a serious and contentious issue[45].

Kangaroo preference for habitat is dependent upon a variety of factors, such as resource availability, the presence of competitors and the perceived risks associated with each habitat[46]. Yet land clearing removes or substantially alters the habitat features present, including: the abiotic environmental conditions (temperature, humidity); the availability of resources (e.g. shelter/cover, food resources, water); and the biotic and social environment

[38] Taylor, R., 2015. WWF Living Forests Report. World Wide Fund for Nature, Switzerland. http://awsassets.panda.org/downloads/living_forests_report_chapter_5_1.pdf.
[39] Waldron, A., Miller, D., Redding, D. *et al.* Reductions in global biodiversity loss predicted from conservation spending. *Nature* **551,** 364–367 (2017). https://doi.org/10.1038/nature24295
[40] E.C. Heagney D.S. Falster , M. Kova. 2021 Land clearing in south-eastern Australia: Drivers, policy effects and implications for the future. Land Use Policy 102
[41] NSW Office of Environment and Heritage, 2016. NSW Report on Native Vegetation 2013–14. http://www.environment.nsw.gov.au/resources/nativeveg/nsw-report-native-vegetation-2013-14.pdf
[42] NSW Department of Planning, Industry and the Environment, 2019. Clearing in Accordance With Self-assessable Codes of the Repealed Native Vegetation Act 2003. https://www.environment.nsw.gov.au/topics/animals-andplants/native-vegetation/clearing-in-accordance-with-self-assessable-codes-under-the-native-vegetation-act.
[43] E.C. Heagney D.S. Falster, M. Kova. 2021 Land clearing in south-eastern Australia: Drivers, policy effects and implications for the future. Land Use Policy 102
[44] E.C. Heagney D.S. Falster , M. Kova. 2021 Land clearing in south-eastern Australia: Drivers, policy effects and implications for the future. Land Use Policy 102
[45] Bombell, A and Montoya, D 2014 Native Vegetation Clearing in NSW: A regulatory history Briefing Paper No 05/2014
[46] Daniel Ramp and Graeme Coulson (2002) Density dependence in foraging habitat preference of eastern grey kangaroos OIKOS 98: 393–402,

(such as the presence or absence and abundance of other species including predators) leading to stress in macropods[47]. Eastern greys favour foraging in open-woodland habitat[48] such as eucalypt woodland and sclerophyll forest [49] therefore the clearing if this type of vegetation will likely impact the health and wellbeing of these species.

(iv) Impact of fencing such as exclusion fences on macropods

Fencing impacts kangaroos in a variety of ways. They can cause injury and entanglement as well as fragmentation of family groups when at-foot joeys becoming separated from their mothers at fences. A kangaroo struggling to free itself from being entangled in a fence can become badly injured and cannot survive without intervention and care and most often die a long and protracted death[50]. Young can be separated from mobs in instances where finer meshes such as chicken wire have been used. Larger mesh can entangle and injure joeys when they attempt to get through the mesh.[51] It is unknown how many kangaroos suffer from entanglement in fence lines. Exclusion fences prevent the migration of all animals, whether it be kangaroos, emus, dingoes which is detrimental to the whole ecosystem.

[47] Finn, H.C. and Stephens, N.S. (2017) The invisible harm: land clearing is an issue of animal welfare. Wildlife Research, 44 (5). pp. 377-391.
[48] Daniel Ramp and Graeme Coulson 2002 Density dependence in foraging habitat preference of eastern grey kangaroos. OIKOS 98: 393–402.
[49] WDL Ride 1970 A guide to the native mammals of Australia. Oxford University Press
[50] Mjadwesch, R 2011 Kangaroos at Risk, https://www.kangaroosatrisk.net/
[51] Mjadwesch, R 2011 Kangaroos at Risk, https://www.kangaroosatrisk.net/

Government policies and programs with regards to 'in pouch' and 'at foot joeys' welfare and the welfare of adult kangaroos

This section discusses the current government policies and programs in regards to 'in pouch' and 'at foot joeys' given the high infant mortality rate of joeys and the unrecorded deaths of orphaned young where females are killed, as well as welfare issues of adult kangaroos targeted by commercial and non-commercial shooting.

Legal kangaroo killing in NSW is permitted for commercial and non-commercial reasons and requires a license or permit. A commercial license is for the purpose of supplying products to the kangaroo industry, and a non-commercial license is granted under the guise of safety and damage control. The latter entails that kangaroos shot may not be sold[52].

Shooting

Kangaroos are prey species that flee when danger is detected. Hearing a gun-shot and witnessing a member of the mob being killed would likely result in a panic and flight of the remaining kangaroo mob. Kangaroos fleeing from shooters can come in contact with motor vehicles posing a risk to drivers and kangaroos alike. In addition, kangaroos can become entangled in fencing causing injury or mortality.

Adult kangaroos are shot at night when they are most active. These hunting conditions affect the ability of shooters to aim precisely and to comply with the National Code of Practice for the Shooting of Kangaroos and Wallabies (herein referred to as the Code) which requires a head shot. Past studies indicate that non-fatal body shots are a regular part of the industry, potentially causing horrific injuries and painful prolonged deaths to kangaroos.[53] Studies indicate that non-compliance with the Code in commercial killing is a concern, particularly with respect to non-fatal body shots[54] and the euthanasia of both mis-shot kangaroos and orphaned dependent young.[55]

---

[52] Environment.nsw.gov.au, 2017.

[53] In 2002, RSPCA Australia conducted an examination of kangaroo carcasses at meat processing plants, and found that around 4% of kangaroos (representing approximately 120,000 kangaroos killed across the industry based on annual commercial kill assumptions during that period) may be have been shot in the neck or body and not as required by the Code, but a lack of industry monitoring makes it difficult to establish more accurate figures: Ben-Ami D, Boom K, Boronyak L, Townend C, Ramp D, Croft D and Bekoff M, 'The welfare ethics of the commercial killing of free-ranging kangaroos: an evaluation of the benefits and costs of the industry' (2014) 23 *Animal Welfare* 1, 5.

[54] Ben-Ami D, Boom K, Boronyak L, Townend C, Ramp D, Croft D and Bekoff M, 'The welfare ethics of the commercial killing of free-ranging kangaroos: an evaluation of the benefits and costs of the industry' (2014) 23 *Animal Welfare* 1, 5.

[55] Ben-Ami D, Boom K, Boronyak L, Townend C, Ramp D, Croft D and Bekoff M, 'The welfare ethics of the commercial killing of free-ranging kangaroos: an evaluation of the benefits and costs of the industry' (2014) 23 *Animal Welfare* 1, 5.

Compliance with the Code of Practice

Animal welfare standards for the commercial harvesting of kangaroos are detailed in the *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* (herein the Code). According to the NSW Commercial Kangaroo Harvest Management plan 2017-2021 "all kangaroos must be taken in accordance with this Code". Adherence to the code is a requirement of licenses and permits issued by the state, therefore failure to adhere to the code provides grounds to suspend, withdraw or refuse a licence or permit. The Code was recently revised and in 2020 the revised Code of Practice was publicly released. Unfortunately, the revised Code weakens the standards and welfare protections for kangaroos across three areas:

- reduced standard for accurate shooting with the removal of the requirement that shooters aim for the brain as specified in the 2008 Code and replacement with the less rigorous requirement of a head shot;
- weakening of protections for female kangaroos and their dependent young with the removal of the direction in the 2008 Code that shooters avoid targeting female kangaroos with obvious dependent pouch young;
- claims that unfurred joeys are not "sentient" and are therefore unable to experience pain in order to justify allowing shooters to break the neck and/or decapitate young.

According to the NSW KMP Meeting Minutes, April 2019 "30 a day non head shot continues is not new – its not seen till its getting put through as steak or mincer"[56]. Of course this figure is just the kangaroos that are inspected for processing, the numbers of non-head shot kangaroos would be much higher for kangaroos left in the field. Yet this shows the high degree of non-compliance with the Code with at minimum close to 10,950 (30 non-head shots per day multiplied by 365 days) that do not comply with the Code. Page 28 of the revised Code notes "*A misplaced head shot can result in a shattered jaw and if the animal escapes it is likely to experience a prolonged period of significant pain and distress*". Clearly this is a significant welfare concern.

Kangaroo shooting generally takes place in remote and regional areas of NSW far from the scrutiny of government regulatory agencies and the public. Compliance officers face harassment and intimidation by industry participants in field, therefore the majority of monitoring is desk-based only and insufficient to detect Code violations. The NSW minutes indicates there are 4 compliance staff with 3 project officers managing all desktop compliance, can we assume that there is only 1 senior compliance inspector for the entire state that monitors compliance in the field?[57] Given the inherent difficulties of monitoring the

[56] NSW KMP Meeting Minutes 3/4/2019

https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Wildlife-management/Kangaroo-management/Advisory-committee-minutes/minutes-of-kangaroo-management-advisory-panel-meeting-april-2019.pdf?la=en&hash=F52BD55E2575A36B7F0967857B59D8A97ABD2980

[57] NSW KMP Meeting Minutes 3/4/2019

commercial kangaroo industry, compliance with a Code of Practice cannot be assumed. The commercial killing of kangaroos is a high-risk activity due to risks to kangaroo populations, animal welfare and human health and safety.

Animal welfare laws can only be effective where there is a willingness and ability to enforce these laws. There is repeated anecdotal evidence of police dismission of calls from concerned public with regards to in-humane kangaroos shooting. Police say it is not their jurisdiction and that kangaroo shooting is managed by DPIE. Yet DPIE staff generally do not work at night or on weekends leaving a large gap in monitoring of shooters. This reality is a critical failing of the regulation of the commercial industry to date. Prosecutions rarely occur and where prosecutions have been successful, low fines are generally imposed. Yet this is not because violations of the Code do not occur. It is that the evidence is lacking or that whistle blowers themselves are now prosecuted under various legislation designed to remove independent evidence gathering of violations to the Code and acts of cruelty. For example, in 2019, there were no prosecutions and one investigation conducted throughout 2019 was scheduled for court hearing during 2020[58].

During the public consultation for the revision of the Code auditing of killing practices in the field was raised by shooters as well as interest groups such as animal protectionists and conservation NGOs. The Australian public has an expectation of auditing at the point of kill, yet as noted above this is impossible to achieve. The Code fails in its objective to reach an achievable standard of humane conduct due to the lack of oversight at the point of kill and lack of enforcement. This creates a circumstance where there is simply no impetus for shooters to follow the Code.

Welfare issues for young kangaroos

Pouch young and young at foot are collateral damage of the commercial industry and human intolerance. The Kangaroo Industries Association of Australia (KIAA) instituted a male-only shooting policy, but even highly experienced shooters will admit estimating that one in two or three kangaroos they shoot is a female (pers. comm. R Mjadwesch), most of whom are likely to have joeys. Anecdotal evidence suggests that shooters were being directed to put damage mitigation (DM) tags on females that are shot, instead of leaving them untagged. Farmers follow up after the commercial shooters have been through and "mop up whatever is left" referring to females. However, with the relaxation of regulations concerning non-commercial shooting and no requirement to affix tags then we can safely assume that the welfare of kangaroos has significantly decreased.

Euthanasia of dependent young and wounded or injured kangaroos and wallabies

According to the Code pouch young must be euthanased using an acceptable method as soon as their mother has been confirmed dead. These are:

Unfurred pouch young <5cm length (including tail) - decapitation or cervical dislocation

Unfurred pouch young >5cm (including tail) - decapitation

Partially furred to fully furred pouch young - concussive blow to the head

[58] DPIE. 2019. NSW Commercial Kangaroo Harvest Management Plan: 2019 Annual Report

These methods are recommended within the Code as the most appropriate killing methods for pouch young and are detailed in Appendix 5: Standard operating procedure for euthanasia of pouch young. There are concerns that removal of joey when attached to the teat will cause pain and suffering. However, the greatest suffering arises from prescribed methods of killing joeys and leaving young to fend for themselves. For example, page 33 of the Code states that '*There have been no studies to specifically assess the responses of conscious kangaroo pouch young to decapitation or cervical dislocation*'. In addition, "*Correct application of cervical dislocation is also important; when poorly performed it can lead to significant pain and distress*". How can a recommendation be made in the Code about these killing methods without it being verified that it is humane for the target species?

In NSW the specified accreditation course (AMPG306 Use Firearms to Harvest Wild Game) contains no information or performance criteria on killing at foot or dependent young under the methods prescribed in the Code. The AVMA Guidelines (2013) outline that that each of these methods (cervical dislocation, decapitation and blunt force trauma) have significant potential to be inhumane unless performed by highly trained and skilled individuals. The revised Code stipulates blunt trauma to the brain administered by a concussive blow. This is defined as: a violent jarring or shock to the brain followed by a temporary or prolonged loss of function. Attempting to kill pouch young with a blow to the head is not acceptable due to the extreme suffering it is likely to cause if the first blow fails to kill. Therefore, as shooters are not being trained in these methods, and need to be conducted by trained people there are no assurances that this is being done correctly in the field (Australian Government, 2019).

Government research, namely the 2014 RIRDC report titled *Improving the welfare and humaneness of commercially harvested kangaroos,* confirms that most dependent at-foot joeys are left to suffer starvation, dehydration or predation in the field i.e. they are not being killed by shooters mobile joeys may be hard to catch and the methods prescribed in the Code is an unpleasant tasks to undertake. The report was clear that kangaroo shooters "need to make a greater effort to locate and euthanase orphaned young-at-foot. Failure to do so will have significant animal welfare implications"[59].

This report concluded that maternal separation causes a negative welfare impact for young kangaroos. Some young-at-foot observed in this study survived for up to 10 days without their mother yet showed signs of a nutritional shortfall (absence of mesenteric fat)[60]. Furthermore, at foot young who are still reliant on their mothers can be 18 months old in Eastern Grey Kangaroos. These animals are easily mistaken for adult animals.

Welfare concerns with non-commercial shooters

The Non-Commercial Code permits shooters to use shotguns in certain circumstances instead of centrefire rifles. However, the use of shotguns has been heavily criticised on the basis that there are too many variables associated with shotguns to ever achieve a high level of consistency in achieving brain shot outcomes. The RSPCA has found that there are high levels of cruelty in the non-commercial killing of kangaroos and has called for the Commercial Code to apply universally. This is likely to be due to the fact that the competency of non-commercial

[59] McLeod and Sharp (2014) Improving the welfare and humaneness of commercially harvested kangaroos. RIRDC
[60] McLeod and Sharp (2014) Improving the welfare and humaneness of commercially harvested kangaroos. RIRDC

shooters is not tested and the non-commercial killing is even less regulated than commercial killing as the carcasses are not brought to processors.

Non-commercial licences are available state-wide and can be issued for properties where commercial harvesting is also undertaken. As stated earlier, in 2019, 415,152 kangaroos were reported as killed under non-commercial licences, equivalent to 62.2% of the actual commercial harvest, or 21.9% of the available commercial quota[61]. Non-commercial allocation for killing was higher than the commercial harvest in Southeast zone and Central Tablelands South harvest management zones, indicating that there is a substantial reliance on non-commercial killing by rural landholders who want to cull kangaroos[62].

[61] DPIE 2019 NSW Commercial Kangaroo Harvest Management Plan: 2019 Annual Report
[62] DPIE 2019 NSW Commercial Kangaroo Harvest Management Plan: 2019 Annual Report

Incentives to increase public and private conservation of kangaroos and other macropods

Many landholders throughout Australia and NSW care deeply about the welfare and conservation of kangaroos, and have made pledges through programs such as HSI's Wildlife Land Trust to conserve and support native wildlife on their land. The Wildlife Land Trust covers more than 325 private properties encompassing 26,500 hectares across NSW, with a significant proportion of these providing habitat and refuge for kangaroos. In addition, many of these landholders are in active opposition to harassment and killing of kangaroos within local communities and neighbouring properties, as these activities affect local populations and the health of the ecosystems they inhabit.

Similarly, hundreds of licensed wildlife carers across the state dedicate significant time, effort and resources into rescuing and rehabilitating injured and orphaned kangaroos, many of which are victims of shooters. These rehabilitators take on an enormous task in raising kangaroo joeys, utilising a considerable level of experience as well as dedication and time (often up to two years). This task is made more difficult by the kangaroo killing industry, as viable release sites far from shooting activities are few and far between.

These selfless and dedicated people are on the frontlines of disasters such as the Black Summer bushfires, working voluntarily to reduce animal suffering and death at a considerable mental, physical and financial cost. It is appalling that the Government leaves this critical work to unassisted volunteers whilst supporting the kangaroo killing industry impacting these same animals.

These landholders and wildlife rehabilitators dedicate their time, effort, land and resources to recovering kangaroos on an individual and ecological scale, driven by a passion for wildlife and a desire to see these native animals thrive. However, the view of the Government seems to be that these activities have no direct or easily quantifiable economic gain, and therefore the views of carers and conservationists are given less consequence than the views of the more lucrative kangaroo killing industry. As a result, conservation landholders and wildlife carers must rely on non-government organisations for support, and many express concerns about the impacts of kangaroo shooters on the animals they strive to protect.

Wildlife has inherent value in the eyes of many Australians, which far outweighs the economic value of animal products derived from wildlife. The worldwide support and concern for wildlife during the Black Summer bushfires proves that this sentiment is echoed on an international scale. The Government needs to recognise this by supporting conservation-minded landholders and wildlife rehabilitators, as well as respecting the important work they do in protecting and rehabilitating macropods. Reduced killing of macropods would be a critical first step in fostering stronger support for these groups and reflecting the attitudes of many landholders in New South Wales.

Recommendations to improve kangaroo welfare in NSW

Independent verification of population estimates

All information to be collected by the DPIE and stored in a central and publicly accessible database each year. This would remedy the current lack of accurate industry data regarding the industry. This stipulates reporting on:

- The raw counts across each commercial zone for each species
- The numbers of kangaroos have been killed non-commercially and which species.
- The number of kangaroos shot but not retrieved;
- The number of females shot with dependent joeys; and
- The number of dependent young killed (and method used to kill).
- The number of carcasses rejected, and on what basis.

Non-commercial shooting

In order to obtain a S121 non-commercial licence shooters should be required to undergo training and competency tests, and compliance with the Code, in the same way that commercial shooters are required to. In addition, there needs to be greater follow up from DPIE to inspect and verify the damage that kangaroos are supposedly causing to properties. This could be achieved via camera traps set up to determine which animal is causing the damage and then determine the correct cause of action to remedy the situation.

An urgent reinstatement of the previously held basic provisions around non-commercial shooting must be effective immediately. This includes requirement that:

- Physical tags are required,
- Only one shooter may operate under a landholder licence at any time, and
- Shooters need to be listed on the landholder's licence at the time of application and must be listed on landholder licence returns after killing operations.

We also suggest the prohibiting of the intentional driving and/or trapping kangaroos next to a fence line for the purpose of killing them because of the extreme risk of capture myopathy, injuries and risk of separating mothers from their joeys.

Compliance

Much greater steps need to be taken by the department to ensure compliance with the Code of Practice. Due to the current conflict of interest as the department oversees both agriculture and conservation, compliance should be independently audited by a dedicated office of animal welfare. In addition, video surveillance technology should be introduced to aid these inspections and improve reporting on the numbers of injured kangaroos.

We recommend the retaining heads on kangaroos killed for commercial purposes. The current definition of carcass enables kangaroo shooters to decapitate kangaroos in the field. If carcasses are not inspected with the animal's head intact, it is impossible for processors and inspectors accurately to determine whether or not the kangaroo was shot in the brain, as opposed to the upper neck or jaw. Alternatively, if shooters insist on decapitating and

disemboweling kangaroos in the field, heads must be retained for each carcass to enable processors and inspectors to determine an accurate shot.[63]

[63] One study, for example, reported that some kangaroos were decapitated below the atlantal-occipital joint, which is reportedly the most efficient point to sever a kangaroo's head. The authors argue that a harvester would be unlikely to engage in such a difficult cut unless it was necessary to conceal a neck wound. Ben-Ami D, Boom K, Boronyak L, Townend C, Ramp D, Croft D, Bekoff M, 'The welfare ethics of the commercial killing of free-ranging kangaroos: an evaluation of the benefits and costs of the industry' (2014) 23 Animal Welfare 1, 5.

Conclusions

The NSW Kangaroo Management Program is not meeting its key objectives:

- to ensure kangaroo populations in NSW remain ecologically sustainable; and
- to ensure the methods of harvesting kangaroos for commercial use are humane

As clearly articulated in this submission there is a lack of transparency in providing information that could be used to independently evaluate population estimates for the commercially harvested species. The department has yet to define the upper and lower bounds of ecological sustainable populations for each of the commercially killed species. Only then could it be determined if the program meets this objective. Simply stating that they do, does not make it a reality. The conflict of interest between agriculture and wildlife conservation, results in kangaroos being killed in far greater numbers than what is ecologically sustainable or socially acceptable to many Australians and attracts significant international criticism.

Killing kangaroos is not 'humane' due to high numbers of mis-shot kangaroos, high risk of killing females with pouch or at foot young and methods to kill young kangaroo. The lack of compliance is a key issue and therefore the department cannot claim to have achieved its second objective.

Kangaroos have the right to exist and be free of human persecution and intolerance, we envision a brighter future where kangaroos and humans can coexist. In the land of sweeping plains there is room for us all.