

**Supplementary
Submission
No 270a**

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

Name: Mr Raymond Mjadwesch

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RE: Inquiry into the Health & Wellbeing of Kangaroos and other Macropods in NSW

MJADWESCH: ADDITIONAL INFORMATION I WISH TO PROVIDE TO THE COMMITTEE

THE DEPARTMENT TOOK A LOT OF QUESTIONS ON NOTICE – WHO WILL ANSWER THESE QUESTIONS?

The DoPIE / NPWS representatives who fronted the Inquiry took many of the questions that were put to them on notice; they answered other questions incorrectly. I am not going to go through their responses one by one here, however Mr Quirk's reference to the population density being "...200 kangaroos per hectare..." in Sturt National Park before the drought does bear mention.

A hectare is an area of 100m x 100m. If there were 200 kangaroos per hectare in Sturt National Park you would not have been able to move for all the kangaroos; Dr Letnic would have run one over every time he drove 7 meters in any direction. Sturt National Park is 3,253 km², and there are 100 hectares per square kilometer. A density of 200 kangaroos per hectare would have been a population of 65M kangaroos in the park; there were only ~2M kangaroos (combined species) in the entire Tibooburra zone in 2016. While Mr Quirk may have meant 200 kangaroos per square kilometer (and anyone can make a simple mistake), these sort of statements really prove that the departments admitted lack of expertise as it pertains to kangaroos and the kangaroo management program was amply demonstrated by their verbal evidence.

The questions the department took on notice will be sent to their stable of supporting experts; people who have been involved in the kangaroo management space in some cases for decades. One of the department witnesses stated that Dr Cairns had been queried about the reported ~260% increase between 2014 and 2016 in Wallaroo estimates in the Glen Innes KMZ, and that assurances were provided that such an increase was within the acceptable margin of error for the survey program. This is despite Cairns (2004a) writing that "*in order to set harvest quotas that will guarantee sustainability, it is necessary to have reasonably accurate estimates of the sizes of the kangaroo populations proposed to be harvested.*"

It is clear that one or other of the estimates was *not* accurate, however the explanation provided was that Wallaroos sometimes hide under trees. What magnitude of reported increase would fall outside of the expected margin of error for the survey program? Would Dr Cairns like to comment on the reported increase of 426% for grey kangaroos in the Tibooburra zone between 2014 and 2015?

It is worth noting Dr Cairns' first two Central Tablelands survey reports (Cairns *et al* (2009) and Cairns & Bearup (2012)) which both stated "*state forests, reserves and gazetted national parks... ..were all excluded from the survey areas of each zone*", and this was not the case. These critical errors effectively deprived the Central Tablelands zones of valid baseline population estimates.

Dr Cairns has played a key role in the development of the survey program in NSW, and was central to the 2001 mid-drought revision (proportional increase) of the correction factors which were being used at the time, which he did in partnership with the then manager of the Kangaroo Management Unit, Josh Gilroy. He has written other reports for the Kangaroo Management Unit with other KMU managers (one of the *et als* in Cairns *et al* (2008) was the then KMU manager Ms Nicole Payne), and he continues to be engaged to conduct surveys in the eastern kangaroo management zones, despite having made clear errors in the design and implementation of these survey programs.

Given the Ms Molloy testimony to the Inquiry, it seems likely that Dr Cairns will assist the DoPIE with their Questions on Notice, and it seems likely that he will also provide assurances that everything is absolutely fine, and even biologically impossible increases in reported populations of 260% (or over 400%) should be easily explained by someone who has been involved in this space since he was one of the *et als* in Grigg *et al* (1986).

THINKK AND THEIR PROPOSAL TO COMPENSATE FARMERS FOR DAMAGE TO FENCES

The cost of kangaroos damaging fences was identified as something that should be compensated to farmers. In my experience as someone who handles kangaroos frequently, and who has worked in the wildlife space for my entire adult working life, I would like to suggest that kangaroos do everything in their power to *not* damage fences.

I have responded to numerous kangaroo rescues where the observer has reported kangaroos as having crashed into a fence and hurt itself, whilst being pursued by their dogs for example, or running away from people or an approaching vehicle. Mr Keightley pointed out in his evidence kangaroos are used to rushing through the bush – hitting a fence can come as quite a surprise to them, and a nasty surprise at that. I have also frequently attended to kangaroos which have been strung up in fences – I suppose that landholders would consider this to be a situation where the kangaroo has damaged the fence.



Some people would say that this kangaroo is damaging the fence, even though it tried not to touch it¹

However in my experience observing kangaroos, and my experience observing kangaroos is not inconsiderable, kangaroos do everything in their power to *not touch* fences. They hop along fence-lines looking for a way through; if they are under pressure or scared they will sometimes try to push or crash through the fence. If they are not under any pressure they assess the fence carefully; they look for pre-existing holes that other animals have made, or they go under or between the wires if they are loose enough. I have seen a Wallaroo hopping uphill jump *between* the wires of a fence, without seeming to touch them.

When they come to a corner they will jump over if they can, or they might crash into the fence if they don't see it in time.

¹ Unfortunately the same logic is applied when someone hits a kangaroo in their car – the accident was invariably caused by the kangaroo (even though the kangaroo was not the one driving the car) and “*the kangaroo has damaged the car*”. NOTE: the kangaroo is invariably broken and dying, or dead.

Yes they get entangled in fences, and sometimes wires may be twisted or broken, however the offending kangaroo also generally ends up with twisted and broken feet and legs in the process, and almost always ends up dead.

Instead of signing off on possibly millions of dollars as compensation for farmers, by far the more logical solution is to review the design and construction of rural fences so that kangaroos can pass through them without being injured or killed. We have had over 100 years to figure this out, however historically farmers were probably quite happy that fences killed kangaroos. In fact rural fences could be interpreted as having been designed deliberately to catch and kill them – the mesh makes them go over, and two closely spaced strands at the top of the fence catches their feet, if they make the slightest miscalculation.

There are numerous fencing modifications which would provide favorable outcomes for everyone (fewer dead and injured kangaroos, and reduced fence repair costs), without going to a compensation model, while animals would still be getting harmed and killed, and fences would still be getting damaged.

A VERY BRIEF HISTORY OF THE KANGAROO SKIN & MEAT INDUSTRY

Mr Dennis King submitted some promotional material to the Inquiry on behalf of the KIAA (*Facts about the Australian Kangaroo Industry*), which is essentially a marketing pamphlet. I am not going to go through this document point by point correcting the various so-called “facts” presented therein, however I think it is important to resolve how the “misconception” that “kangaroos are killed to make leather” has been addressed by the KIAA, with their assertion that “hides are a byproduct of the meat industry, which would otherwise be discarded”. A brief history of the industry will provide some clarification on this point.

When the First Fleet arrived in New South Wales in **1788** kangaroo meat quickly found its way onto the tables of the officer, settler and convict alike, and it has even been written that... *...in the very earliest days of settlement at Sydney Cove, kangaroo meat sustained the population...* ([Jackson & Vernes \(2010\)](#)); indeed given the hardships that the British experienced, particularly the convicts, the colony probably owed its survival to the kangaroo.

Collins (the Colonial Secretary to Governor Arthur Phillip) wrote in **1794** that shoes were becoming scarce, and (from [Collins \(1798\)](#))... *...A convict who understood the business of a tanner had shewn that the skin of the kangaroo might be tanned... [however] ...the skin itself was not of a substance to be applied to the soling of shoes...* In **1806** the *Sydney Gazette* reported... *...The fitness of the kangaroo skin for upper leathers will no doubt obtain a preference over most of the imported leather, as it is in general lighter and equally durable, at the same time that in the hands of finished workmen, no objection would be admissible on the score of neatness and fashion: Of this kind of Leather we have abundance...* ...and subsequently a trade in hides was established. John [Stevens](#) wrote in **1839**²... *...the skins make good leather, whether for shoes or gloves, and form an article of export from NSW...*

However once the sheep flocks and herds of cattle were established, the British colonisers went back to the diet of the motherland by preference; mutton, beef and pork, and kangaroos became a pest to the agricultural industry. By the **1860s** kangaroos were being killed *en masse* simply to rid the land of “the noxious marsupial”. The killers were not particularly interested even in the skins (from [Queenslander \(1877\)](#))... *...we are assured that nothing weaker than chains could have kept either shooters or beaters back to skin the beasts they had slain. The excitement is too strong—stronger even than the love of money. Several of the gunmen were men who usually devote themselves to shearing, bush work, and other descriptions of skilled bush labor, but who joined the battue for the love of the sport alone. Except in cases of necessity, the sportsman does not skin his own game; but if the skins prove to be of value, a gang of skinners will follow the battues, and devote themselves to their trade...*

Taking the skins from the bloody work of extermination was profitable; Joseph Packer started work in a tannery in **1878**, and in **1891** he opened his own tannery in Brisbane... *...five generations later, Packer Leather is an internationally recognized performance leather specialist...* [and, they claim] *...kangaroo leather is “weight for weight” the strongest and lightest natural leather available...*³ In **1894** *The Advertiser* in Adelaide reported... *...A sudden change has taken place in our attitude towards the despised animal, and though he still suffers from an evil reputation in the matter of grass, we have agreed to forego extreme measures since the possibility has been conceived of initiating a profitable industry in the conversion of his fine soft skin into gloves and boots, not to speak of the utilisation of his flesh for the table...*

However while the skins were increasingly being traded as a valuable commodity, the meat remained a novelty dish, rather than becoming a mainstream staple; from [Knox \(1896\)](#)... *...The flesh of the young*

² <https://books.google.com.au/books?id=NDsXAAAAYAAJ&printsec=frontcover#v=onepage&q&f=false>

³ <https://packerleather.com/kangaroo/>

kangaroo is put up at meat-canning establishments for transportation to England, and they also export large quantities of soup made from kangaroo tails. Some people think this soup is preferable to ox tail, or even to turtle. I asked one of our friends about it, and he said, with a smile, that it was better when you couldn't get either of the others. It is certainly an excellent soup, and it's a pity that so much of the raw material goes to waste...

Because it was farmers who were having to do most of the killing, and bullets and labour were expensive, the government chipped in by paying bounties, which incentivized anyone with a gun to kill them. This ground has all been covered before: [Kirkpatrick & McDougall \(1970\)](#) wrote... *...In Queensland during the forty years prior to 1917 kangaroos were considered only as pests... ...a million pounds as bounty and government subsidies were paid for 26 million scalps of kangaroos, wallaroos and wallabies, and some annual takes approached the million mark...Poole (1978) wrote... ...before kangaroos were harvested for meat, an industry based on the taking of scalps and subsequently skins had existed for many years. In one State alone, some 2 million dollars were paid in bounties and government subsidies for 26 million scalps over a period of 40 years prior to 1917...*

In 1920 the [Geraldton Guardian](#) reported... *...The export of hides and skins has for many years past been an important factor in the prosperity of the Victoria District. Hides are sent away in large numbers... ...Kangaroo hunting is an established industry in this part of Western Australia, many thousands of marsupial skins being despatched to the Eastern States for transmission to the United Kingdom and America, where they are made into the finest leather for the uppers of boots... ...etc etc etc. I have extensive files on all of this. Govts started putting royalties on skins so everyone got a slice of the pie, but it really was all about skins, until the 1950s.*



Skinning multiple kangaroo carcasses using a vehicle and a convenient tree, Jeff [Carter \(1950s\)](#)

It was still about skins in the 1950s; from [Kirkpatrick & McDougall \(1970\)](#) again... *...during the period 1950-1960 the annual harvest of marsupial skins was 450,000, about 90% kangaroos, conservatively assessed as worth £150,000 at the level of prices to shooters...*

However myxomatosis was released in 1950, which crashed rabbit populations. Strahan in his evidence to the [House of Representatives Select Committee on Wildlife Conservation \(1971\)](#) described what happened next... *...the exploitation of kangaroos for meat is related to the introduction of myxomatosis, a rapid decline in rabbit populations, and the consequent collapse of the chilled rabbit industry. The shift from rabbits to kangaroos was rapid and unpremeditated and we are suddenly faced with a large vested semi-industrial interest in predation upon kangaroos...* According to Strahan this led... *...to an expansion of the industry on a get-rich-quick basis and, even now, most of the operators are concerned with short-term gains rather than the long-term maintenance of a resource...* [Wilson \(1974\)](#) also wrote... *...Initially only kangaroo skins were used commercially but by 1960 the utilisation of kangaroo meat had been recognised as a valuable alternative to the rabbit industry which was waning because of myxomatosis...* ...however the kangaroos being killed were still being processed almost exclusively as pet meat (after they had been skinned, obviously).

In [1964 TIME USA](#) wrote⁴... *...Some consider this a waste. "In kangaroos," says Basil J. Marlow, curator of mammals at the Australian museum⁵ in Sydney, "you have a valuable source of protein. Instead of being shoved into bloody dogs and cats, it could be more profitably shoved into humans. Kangaroo meat is quite tasty when properly butchered."*

Subsequently there was a push to promote kangaroo meat for human consumption, including to domestic and international markets, as selling product to fine-dining restaurants or to people from super market shelves increases the sale price per kilo, compared to the prices people will pay for pet meat.

However the human consumption market has been plagued by controversy, as food hygiene standards during processing have been necessarily difficult to maintain. In Germany in **1960** (from [MacFarlane \(1970\)](#))... *...Complaints have been received by the veterinary authorities that "living worms" had been found when the meat was fried. It was ascertained that there were no living worms in the meat, but the samples contained parasites, usually bundled in a sheath between the muscles...* *...In an article in the Records of Food Cleanliness Dr Bathel writes: "there is no doubt that this kangaroo meat is to a very large degree infected with worms. It is a nauseating and deteriorated food and is therefore not suitable for human consumption".* The shooters, processors and exporters all try their best, and seem to have unwavering government support (trade delegations have been sent to Russia and China to promote the industry, and the industry is supported in the USA at the highest diplomatic levels) however most recently (in 2009 and 2014) Russia twice banned the import of kangaroo meat for human consumption, on account of food hygiene issues.

So the history shows that kangaroo killing has been driven in large part by the skin industry for at least ~150 years; meat only became an important commodity in the 1950s and 1960s as pet meat, and kangaroo meat has only relatively recently been mass-marketed for human consumption, simply as a strategy by the industry to maintain their profit margin from a declining resource (harvest rates have been in long-term decline; this is an agreed fact). Promotional strategies have included product placement in shows

⁴ <http://content.time.com/time/subscriber/article/0,33009,938455,00.html>

⁵ ...interestingly Australian Museum mammalogists have consistently supported the killing of kangaroos, dating back to Gerard Krefft historically, through Marlow's tenure, and continuing to the present day, with ongoing support even of the contemporary industry (refer to work by Mike Archer and Mark Eldridge, for example).

like Master Chef (see [Pobjie \(2021\)](#) for a recent example) and by targeting celebrity chefs (for example see [RIRDC \(2010\)](#))⁶.

If we consider the financial side of the market (refer to the graph on page 20 of my submission to the Inquiry titled *NSW Monthly Kangaroo Carcass Loading Rate*) we can see from the yellow line and the scale on the right of the graph that sales from skins peaked in 2003 at \$70M, while the Russian meat market (the red line) peaked at only ~\$33M in 2007, and the international meat market (the pale blue line) slowly increased during the period 1997-2016 from \$10M *per annum* to a peak of \$20M in 2015 ([Australian Bureau of Statistics \(2018\)](#)).

[Pople & Grigg \(1999\)](#) provided “*Kirkpatrick & Amos (1985) described the trade in skins as the backbone of the industry, and it remains so*”, and; skins are “*the mainstay of profitability for the kangaroo processing industry*” ([Macarthur Agribusiness & EconSearch \(2003\)](#)). The final word on the topic comes from Fox (according to [Lunney \(2010\)](#)) who described skins as “*the most valuable single product*” of a kangaroo.

Entirely counter to the industries promotional material submitted to the Inquiry then, it is clear that kangaroo meat *is* a by-product of the skin industry, and kangaroos *are* principally killed for their hides. Providing raw materials for \$150-\$300 soccer boots or a seat for a Ducati creates a lot more incentive to kill kangaroos (and a lot more profit) than a box of “*nauseating and deteriorated*” meat ever has.

Obviously the KIAA can produce whatever materials it wants to, to promote itself, its operations and its products, including misleading material – it is the role of the ACCC to ensure that there is truth in advertising. However I thought the Committee would benefit from a brief factual account of the derivation and focus of the kangaroo skin and meat industry, rather than relying on the industries advertising / promo material as fact.

⁶ RIRDC research and development projects are funded and directed by the rural industries they represent; in this case that will have been the meat sector of the commercial kangaroo industry.

DR ALLENS MAXIMUM RATE OF INCREASE

Dr Allen seems to have misunderstood the intent of his first supplementary question, thinking that the Committee was interested in the reproductive biology of 50 species of macropods. Nonetheless he provided the following statement, with regard to the commercially harvested species, which I took to be the focus of the Committee's line of questioning.

...populations of the harvested kangaroo species can double every 3–5 years under good conditions, and can halve even faster under poor conditions (see the various harvest quota reports in each State for more details)...

Notwithstanding that actual/observed maximum rates of increase do not concur with Dr Allen's stated hypothetical maximums, doubling in 3 years is equivalent to a 33% increase *per annum*; doubling in 5 years is equivalent to 20% increase *per annum*. These three- and five-year periods would all need to be non-drought years, as everyone knows kangaroo populations decline during drought.

These maximum rates still seem to be a long way shy of 426% increase in one year, which is reported in the "*various harvest quota reports*" Dr Allen referred to. Perhaps a better question for Dr Allen would have been to request an explanation, in biological terms, for increases up to and exceeding 400% in the official population estimates.

SOME FACTS ABOUT CORRECTION FACTORS (CFs) & THEIR DERIVATION

This section is a bit tedious, which is why it has been included here rather than within the answer to Q1.

Cairns & Gilroy (2001) provided the following measured fixed-wing CF's for 12 western NSW bioregion blocks, compared to results from helicopter surveys. Note that the Queensland experts (DSE/ESR (2018)) consider helicopter-based macropod surveys to be “*accurate and precise*” if they are used in conjunction with a DISTANCE methodology and analysis, and in their opinion observations do not need to be “*corrected*” (beyond the in-built detection probability corrections used in DISTANCE), except for Wallaroos⁷.

Bioregion Block	KMZ	CF FW 200m STRIP						CF FW 100m STRIP					
		RK 200			GK 200			RK 100			GK 100		
		'98	'99	'00	'98	'99	'00	'98	'99	'00	'98	'99	'00
Broken Hill 1	2	3.34	1.70	4.77	5.60	3.04	5.01	2.88	1.76	2.83	3.72	1.90	5.09
MD Depression 2	2+4+6	5.18	3.49	2.40	6.78	4.19	8.25	3.26	4.36	1.08	3.46	4.55	3.77
MR Plains 3		2.00	1.35	4.60	6.21	1.55	2.21	2.19	1.08	3.48	6.89	2.78	3.15
MR Plains 4		2.58	1.49	2.42	4.94	2.60	2.91	2.67	0.64	1.57	4.40	1.32	2.03
Cobar PP / MDD 5		2.80	12.45	4.44	4.40	18.15	8.23	2.10	3.85	2.31	2.54	4.49	6.23
MD Depression 6	1	3.39	8.96	3.13	4.84	13.62	8.74	1.65	4.07	2.11	2.70	4.57	4.07
White Cliffs Plateau 7	10	3.43	3.04	9.53	4.10	9.10	14.9	2.60	2.03	4.98	5.66	2.69	5.66
NW Sands / TD 8		2.21	-	4.61	3.21	-	3.28	1.20	-	3.07	2.50	-	3.33
Cobar Penepplain 9		-	4.47	3.78	-	12.59	12.5	-	4.09	3.00	-	8.81	10.02
DR Plains 10		1.72	1.71	7.06	2.60	3.82	6.12	1.29	1.32	2.57	1.87	2.46	3.81
Warrago Fan 11		1.56	12.03	12.67	5.95	15.96	21.9	1.51	3.33	3.66	4.16	4.67	6.93
DR Plains 12		3.16	1.46	9.79	4.04	3.27	5.76	1.53	1.42	5.22	2.62	3.09	4.89

I accept that counts of 200m strips (the strip count methodology being used in NSW western district surveys in the period 1984-2000) will have been less accurate than counts of 100m strips (the strip count methodology used in the period 2001 - 2015).

Cairns & Gilroy (2001) CFs above quantify this, providing a measure of the relative accuracy of 200m and 100m methodologies. While the 1988-2000 survey methodology (200m strips) had been considered to be good enough for the purposes of estimating kangaroo densities by the experts at that time, there is no question that counting a 100m strip has less error, and would be a more accurate methodology.

However Cairns & Gilroy (2001) also found that even 100m fixed-wing surveys could be up to 10 times less accurate than helicopter surveys⁸ (according to the highlighted field in the table above), so they

⁷ Note that in his verbal evidence MR Brill indicated that NSW had incorporated a CF 1.85 into their Wallaroo analysis on the basis of “*the best available science*” done by “Clancy” in Queensland. Confusingly the Queensland DSE / ESR (2018) report indicates that they incorporated a CF 1.85 for Wallaroos into their analysis since 2011 “*in line with that used in New South Wales*” (see https://www.qld.gov.au/__data/assets/pdf_file/0037/67996/macropod-aerial-surveys.pdf). The NSW 2021 Quota report variously states that “*The Wallaroo population has been corrected by a factor of 1.85 as suggested by Cairns et al (2004)*” (however no reference is provided for Cairns et al (2004)) and “*Wallaroo densities have been multiplied by 1.85 as recommended by Cairns (2004)*”. To resolve the confusion as to its origin Cairns et al (2008) tells us “*Clancy et al (1997) had previously suggested that helicopter line-transect surveys of wallaroos were likely to underestimate numbers by a factor of 1.85 when compared with the results of walked line-transect sampling*”, so that seems to be where the figure came from. Cairns et al (2008) tells us that the 1.85 CF for Wallaroos was applied to his estimates for the Northern Tablelands in Cairns (2004).

⁸ Cairns & Gilroy's data indicates that Queensland's helicopter-based macropod surveys are considerably more accurate than fixed-wing aircraft. The assertion by Ms Molloy that NSW is applying “*the best available science*” using a fixed-wing MRDS / DISTANCE methodology during survey is not supported by the evidence from experiments done by their own supporting scientists. Before the department again suggest that NSW is a big place, I would like to point out that QLD is a bigger place.

combined their measured CF's for fixed-wing survey in each bioregion, applied a geometric mean, and came up with the most recent CF's, officially raising them once again (results from their report are reproduced in the table below).

	Red Kangaroo		100m % of 200m CF	Grey Kangaroos		100m % of 200m CF
	200m	100m		200m	100m	
Broken Hill Complex	3.00±0.98	2.43±0.76	81.0%	4.40±0.80	2.98±0.57	67.7%
Murray Darling Depression	4.00±0.65	2.45±0.71	61.3%	7.16±0.63	4.29±0.63	59.9%
Murray Riverine Plains	2.21±0.64	1.67±0.76	75.6%	3.04±0.68	2.99±0.73	98.4%
Cobar Peneplain	4.83±0.79	2.97±0.60	61.5%	10.07±0.77	5.75±0.78	57.1%
North-west Sands	3.83±0.68	2.46±0.65	64.2%	6.32±0.80	3.65±0.58	57.7%
Warrago Fan	6.05±0.89	2.61±0.63	43.1%	13.37±0.86	5.55±0.64	41.5%
Darling Riverine Plains	3.38±0.87	1.92±0.71	56.8%	4.08±0.57	2.98±0.57	73.0%

The graph which opens Q1 in my Supplementary Questions tracks the different CFs. The numbers from the table above define the latest grey- and red- dashed- and dotted boxes (the period 2001-2011 in the graph).

These CFs uniformly step upwards from the 100m and 200m CFs which had been previously defined (according to [Pople \(2004\)](#)), so the assertion on behalf of the DoPIE that CFs have not been changed was not correct. In fact CFs were “*reviewed*” (increased) three times between 1980 and 2001.

However by also choosing to change the counting method from 200m to 100m wide strips Cairns & Gilroy also brought a *proportional* increase in CFs into their analysis at the same time, which resulted in a compounding positive bias in the officially reported population estimates from 2001-2015.

So what is a “*proportional*” increase?

DoPIE / NPWS explained to the Inquiry how the DISTANCE methodology works. Basically the further away something is, the harder it is to see – DISTANCE accounts for this, with its own in-built corrections based on a “*detection probability curve*”. To suggest that MRDS surveys do not use correction factors is semantics; “*corrections*” for visibility are built into the DISTANCE analysis, though they call it a different thing.

Correction factors used doing strip counts work the same way, however in this case the wider the “*strip*”, the higher the CF needs to be. If you consider the CFs which were adopted (from the table above) you can see that the 200m CFs are bigger than the 100m CFs, which is as it should be.

However consider again the departments’ explanation, essentially: “*the further away something is, the harder it is to see*”. So if you are counting a 1m strip, you probably don’t need to correct your observations at all; if you are counting a 10m strip, the required correction would still be minuscule; if you are flying a 50m strip, you would probably still be seeing just about every animal within the sample area.

We come to 100m. Kangaroos are pretty big, and they are reported to have a reactive response to the passing aircraft (they move), so they are still generally considered to be pretty easy to see and count during aerial surveys – 100m is not very far. But there might be some vegetation, so the observations may need to be corrected⁹, so we might adopt the 100m corrections from the table above, just for arguments

⁹ ...it is accepted that in some habitat types observations may need to be corrected, however in open landscapes it is not accepted that corrections of 2, or 4, or 6, or up to 13 (for 200m strips), are appropriate. Failure to stratify the data by vegetation type and land use in analysis, generating different corrections for different habitat types, is another critical error in the derivation of the official CFs and resulting population estimates.

sake. By this stage the experts are multiplying grey kangaroos seen in a 100m wide strip by up to ~6x in some broad habitat types (which are defined at a bioregional level).

Consider, would you expect to see more of the kangaroos that are in the *next* 100m (out to a distance of 200m) as a proportion of how many there might be in the sample area, or less than the proportion you saw in the first 100m? Note that both the increasing distance and the possible occurrence of vegetation increasingly obscuring more distant animals needs to be taken into account? Logically you would think that as a proportion of the animals within the total sample area, the observer will see and count more of the kangaroos in the closest half of the sample area, compared to the number observed in the further 100-200m section of the strip.

Effectively the counting “*error*” in the closest half of the strip (0-100m away) should be smaller than the “*error*” in the further section of the sample area (100-200m away). Thus the amount of correction required for the distant half of a 200m strip should be more than the correction required for the first 100m.

What this means is that CFs for 200m strips should be *more than double* the CFs for 100m strips; conversely 100m CFs should be *less than half* of the 200m CFs, and detection function graphs derived using the DISTANCE analysis illustrate this to be the case (for example refer to [Cairns et al \(2020\)](#)). More animals are seen closer to the line of survey, and the biggest corrections using a DISTANCE analysis are applied to the numbers counted in the more distant “*bins*” referred to in the departments evidence.

However 100m CFs in Cairns’ and Gilroy’s table above are greater than 50% of the 200m CFs (refer to the 100m % of 200m CFs column), with the only exception being those values provided for both red and grey kangaroos in the Warrego Fan bioregion.

By choosing to change the methodology to 100m strips in 2001, there was a decision made to use the most accurate counting methodology, whilst **applying proportionally higher corrections in analysis**, than if they had used the 200m CFs.

Indeed even though the experts went to a 100m strip count methodology, in the case of grey kangaroos in the Murray Riverine Plains bioregion (now termed the Riverina bioregion), they affectively applied a 200m correction to 100m strips (ie: the 100m CF is 98.4% of the 200m CF)¹⁰.

The effect of this is that even though the survey strip width was halved, greatly increasing the accuracy of the counts, a proportionally higher correction was applied, effectively *increasing* the correcting influence of the CFs used from 2001-2015, even though the CFs themselves look smaller.

¹⁰ ...note that the Riverina bioregion is quite large, and includes extensive sections which are heavily vegetated. The notion that correction factors for 100m strip counts should be uniformly ~the same as correction factors for 200m strips in this district is absurd. Again the failure to stratify data according to vegetation types and land uses across such a large range of habitat types as occur in the Riverina bioregion (and other districts across NSW) remains a critical flaw in the way the official analysis is done.

CONCLUSION

My knowledge of the biology and ecology of kangaroos, and of their history and management, is fairly comprehensive. I would be pleased to make further representations to the Committee or interested members, talking to a visual presentation in Macquarie Street. I have previously driven interested individuals around NSW as a guided tour, talking to the history, biology and ecology, and the data. I would be pleased to do the same again.

The father of the “*rangeland therapy*” notion, Gordon Grigg, made a plea in 1988... *...This is my honest attempt at solving some very real problems. I hope that the idea will be discussed and explored thoroughly, fully and rationally. If, after proper debate, it turns out to have no merit, then the proposal can be dropped. My plea is for a good but disciplined debate...*

When I first entered this “*debate*” in 2009 I was told to go away – NPWS rangers were “*not interested*” in the rather obvious decline in the data sets. Despite being the expert they came to, to identify plants, and lizards, and butterflies and other insects, and to deliver surveys including for threatened species, I was told “*better people*” than me were looking after kangaroos. When I put my concerns in writing (the 2011-13 threatened species nomination and supplements) my findings were arbitrarily dismissed (“*it’s drought*”). Scientists in the field for whom I had a lot of respect, people like Dr Lunney, did not answer emails.

No-one entered into a spirit of rational discussion about my findings, despite having taken years to carefully itemize the serious problems with the harvest model and survey methodologies, errors in the application of the surveys, and catastrophic decline in the datasets, which was later confirmed to be the case by the NSW Scientific Committee. I was clearly an unwelcome outsider.

Subsequently the department and their supporting scientists seem to have manufactured population increases. Long running survey methodologies have been abandoned, I have been derided publicly and privately by legislators and industry supporting scientists who I have never met or even talked to. Meanwhile pro-industry experts have published “*peer reviewed*” papers in their own journals which give the program an A+++ . To date no-one has made any attempt to counter the evidence I have presented to the Inquiry, all we hear is that everything is absolutely fine, and the department will “*take that question on notice*” . Griggs’ impassioned plea for “*disciplined debate*” has gone unanswered.

I would sincerely value the opportunity to discuss and share my research and finding with the experts from the OEH / DoPIE Kangaroo Management Unit and their supporting scientists, or the experts from the universities, or the members of the Kangaroo Management Task Force. It is not rocket science – the evidence of decline is clear, and any reasonable thinking person should be able to understand the basic concepts of the kangaroo’s reproductive biology and behavioural ecology, as well as our human impact on the environment and the species in it. I am told I am an effective science communicator.

If we – government, scientists and farmers – are going to describe ourselves as the custodians of kangaroos, then we must accept responsibility for whatever has happened and is happening to kangaroos in Australia. If it turns out that they have been and are continuing to be systematically eliminated from many of the landscapes in which they formerly abounded, then we will be held accountable by future generations.

The facts remain unchanged, and shooting continues.

Yours Sincerely

Consulting Ecologist / Conservation Biologist