Answer to Question on Notice: State Development, Natural Resources and Agricultural Industry Development Committee – Public hearing regarding the Vegetation Management and Other Legislation Amendment Bill 2018

Information relating to the Question on Notice

Details of Hearing in which the Question on Notice Arose
Public hearing – Friday 23 March 2018
Question appears at page 48 of draft transcript
Person asking the Question on Notice: Mr Lachlan Millar MP, the member for Gregory

Person to whom this answer to the Question on Notice is directed
Committee Secretary
State Development, Natural Resources and
Agricultural Industry Development Committee
Parliament House
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Person answering the Question on Notice
Dr Hugh Finn
[redacted]

[redacted]

Date this answer to the Question on Notice Provided
Tuesday 27 March 2018

Details of Question on Notice

1. During the public hearing on 23 March 2018 before State Development, Natural Resources and Agricultural Industry Development Committee regarding the Vegetation Management and Other Legislation Amendment Bill 2018 (the 'Bill'), the following exchange occurred between Mr Lachlan Millar MP, the member for Gregory, and Dr Hugh Finn, a witness before the Committee (the exchange occurs at page 48 of the draft transcript):

> **Mr MILLAR:** I have a quick question relating to the point in your submission on injured or killed animals. You mention 1.1 million mammals, 3.7 million birds and 39.9 million reptiles. How did you get that quantity?
>
> **Dr Finn:** That is a good question. That is from the two reports that are tabled there which describe the methodology. It is really fairly straightforward in terms of the way in which those estimates were calculated. They looked at the population density estimates for mammals, birds and reptiles in the major vegetation areas. They looked essentially at information on the densities of the major vertebrate taxa and then they converted that in a cross-Queensland scale.
>
> It was first done in 2003 and it was done again last year using the latest land-clearing data. They looked at the amount of vegetation which was cleared in the major regional areas and then essentially multiplied that by the population density estimates. The underlying assumption is that all of the native animals in the area are killed when the vegetation is cleared, but as the author has described there are several reasons why those figures are nonetheless likely to be conservative in terms of the actual scale of mortality.
>
> **Mr MILLAR:** Is there any ground truth or is there an error there? It is 39.9 million reptiles.
>
> **Dr Finn:** Essentially, if you think back to Dr Hanger's evidence today, there is well-known information in terms of the actual population density of reptiles.
>
> **Mr MILLAR:** But he said he pulled that out of the air, didn't he?
>
> **Dr Finn:** The point would be that, essentially, for a reptile the scale of existence is not much larger than this room. They talk about a couple of hectares; that is their existence. If you are clearing vegetation and, moreover, if you are driving a bulldozer and removing the vegetation and, as Dr Hanger said, if you do it during the daytime, they have no chance. At least as regards reptiles, in particular, if you clear vegetation, there is a very high likelihood.
>
> I would urge the committee to consider the two reports because they do address these issues in some detail. Their ultimate conclusion is that the estimates like to be very conservative for a number of different reasons. I am happy to take the question on notice as well if that would assist.
>
> **CHAIR:** Mr Millar, do you want that on notice?
>
> **Mr MILLAR:** I guess, yes, if we can get some sort of equation as to how you come up with these numbers. I am not a part of the full-time committee, that is all.
>
> **CHAIR:** We will discuss that at the end then.

2. The following pages provide an answer to the question posed by Mr Millar. I have understood the query to be in these terms:

<u>Question on Notice</u>:

How was the estimate that land clearing kills 44.7 million individuals (1.1 million mammals, 3.7 million birds and 39.9 million reptiles) per year in Queensland based on clearing rates for 2015-2016 calculated?

Answer to the Question on Notice

Background

3. The estimates that land clearing kills 44.7 million individuals (1.1 million mammals, 3.7 million birds and 39.9 million reptiles) per year in Queensland based on clearing rates for 2015-2016 are drawn from a scientific report published by WWF-Australia in 2017 ('the 2017 Report').

4. The citation details for the 2017 Report are:

   Hal Cogger, Chris Dickman, Hugh Ford, Chris Johnson, and Martin Taylor. (2017). Australian animals lost to bulldozers in Queensland 2013-2015. WWF-Australia technical report. Available at: http://www.wwf.org.au/ArticleDocuments/353/pub-australian-animals-lost-to-bulldozers-in-queensland-2013-15-25aug17.pdf.aspx?Embed=Y

5. The details of the authors of the 2017 Report are as follows:

   Dr Hal Cogger AM, Herpetologist, John Evans Memorial Fellow, Australian Museum

   Professor Chris Dickman, Mammalogist, University of Sydney

   Emeritus Professor Hugh Ford, Ornithologist, University of New England

   Professor Chris Johnson, Mammalogist, University of Tasmania

   Dr Martin Taylor, Conservation Scientist, WWF-Australia

6. The 2017 Report is based upon the methodology developed in an earlier WWF report:

   Hal Cogger, Hugh Ford, Chris Johnson, James Holman, and Don Butler. (2003). Impacts of land clearing on Australian wildlife in Queensland.' WWF-Australia: Brisbane. Available at: http://awsassets.wwf.org.au/downloads/sp128_impacts_land_clearing_on_australian_wildlife_qld_1jan03.pdf

7. The 2017 Report was initially published in August 2017. An update to the 2017 Report was published in October 2017 using the information available in the Queensland Government report entitled 'Land cover change in Queensland 2015–16: a Statewide Landcover and Trees Study (SLATS) report', which was also published in August 2017.

8. For clarity, the estimates that land clearing kills 44.7 million individuals (1.1 million mammals, 3.7 million birds and 39.9 million reptiles) per year in Queensland based on clearing rates for 2015-2016 are drawn from the update to the 2017 Report published in October 2017.

Answer to the Question on Notice (continued)

Content of the 2017 Report

9. The text of the October 2017 update to the 2017 Report reads as follows:

> Shortly after the release of the recent WWF report Australian animals lost to bulldozers in Queensland 2013-15, new tree clearing data and maps have been released by the Queensland Government showing a 33% increase in areas cleared relative to the prior year 2014-15.
>
> We have re-estimated the numbers of mammals, birds and reptiles losing their habitat and killed as a result of bulldozing of bushland in 2015-16.
>
> Approximately half the total area cleared in 2015-16 (395,000ha) according to the Queensland Government SLATS report, we estimated to comprise remnant and advanced regrowth forest or woodland (199,273 ha) (Table 1). We only estimated animals killed on the basis of this area, not on total area cleared.
>
> We conservatively estimate 44.7 million individuals were killed due to bulldozing of bushland in 2015-16, composed of 1.1 million mammals, 3.7 million birds and 39.9 million reptiles.
>
> This represents a 30% increase in numbers killed annually relative to the previous two years.
>
> A comparison of these new estimates with the earlier 2013-15 estimates, broken down by state development regions is shown in table 1 below. A map of regions is shown as Figure 1.
>
> Dr Hal Cogger, John Evans Memorial Fellow, the Australian Museum,
>
> Prof. Chris Dickman, University of Sydney
>
> Prof. Emeritus Hugh Ford, University of New England,
>
> Prof. Chris Johnson, University of Tasmania,
>
> Dr Martin Taylor, WWF-Australia
>
> 23 Oct 2017

10. Table 1 and Figure 1 mentioned in the text above have been extracted from the 2017 Report and appear on the next two pages.

Table 1: . Updated estimates of areas of habitat cleared and numbers of animals killed in 2015-16, relative to estimates for 2013-15, by state development region.

	2013-15 annual rate					2015-16				
	Cleared (ha)[2]	Nearest 1000 killed				Cleared (ha)[3]	Nearest 1000 killed			
Regions[1]		Mammals	Birds	Reptiles	Total		Mammals	Birds	Reptiles	Total
Bundaberg/Maryborough/Burnett	5,997	138	148	1,199	1,486	6,650	187	159	1,330	1,676
Rockhampton, Central and West	38,426	174	680	7,685	8,539	48,196	212	960	9,639	10,811
Toowoomba, Darling Downs and West	75,525	312	1,106	15,105	16,523	83,686	337	1,343	16,737	18,417
Cairns and Far North Qld	13,351	19	314	2,670	3,003	20,157	53	491	4,031	4,575
Gulf	2,715	4	41	543	588	7,825	17	124	1,565	1,706
Mackay/Whitsunday	12,823	93	241	2,565	2,898	27,317	181	512	5,463	6,156
Townsville and North Qld	2,317	15	46	463	525	3,297	15	73	659	747
SEQ Brisbane	168	9	3	34	45	140	7	4	28	39
SEQ North	429	22	12	86	119	612	31	13	122	166
SEQ South	552	28	18	110	157	428	22	12	86	120
SEQ West	796	41	24	159	224	966	49	26	193	268
TOTAL (1000s)	**153,098**	**855**	**2,634**	**30,620**	**34,108**	**199,273**	**1,112**	**3,718**	**39,855**	**44,685**

1. 2013-15 data as found in the Appendix in the report Cogger et al (2017) cited above. For regions see Figure 1.

2. Remnant as mapped in Queensland Government's Regional Ecosystems v9 (2013) and detected as cleared in SLATS 2013-15 as well as non-remnant that had not been detected as cleared in the entire SLATS record from 1988, and was also 11% or greater Foliage Projective Cover in 2013 (woodland or forest).

3. Remnant as mapped in Queensland Government's Regional Ecosystems v10 (2015) and detected as cleared in SLATS 2015-16 as well as non-remnant that had not been detected as cleared in the entire SLATS record from 1988, and was also 11% or greater Foliage Projective Cover in 2014 (woodland or forest). Note that the 2015 FPC layer not available yet.

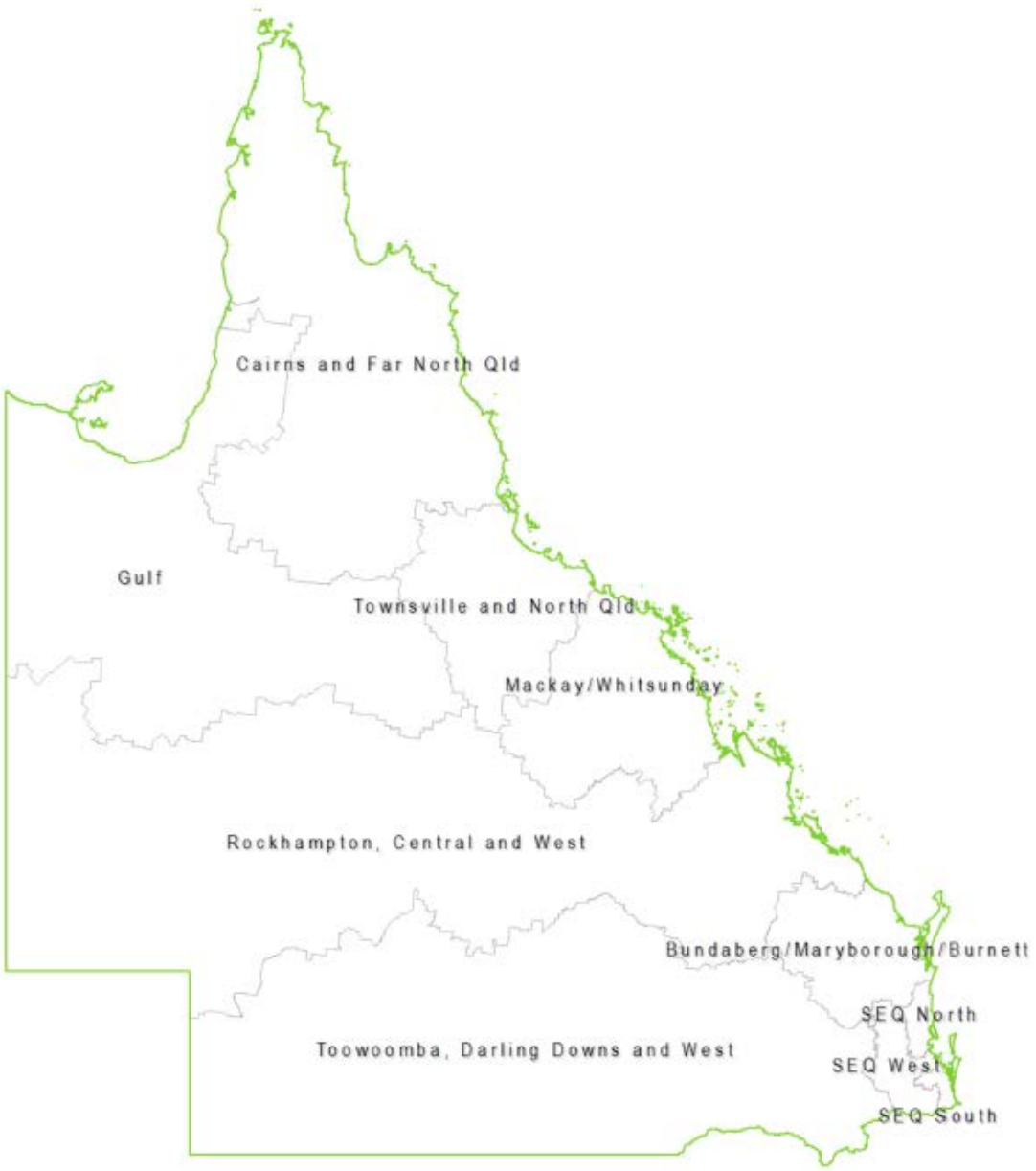

Figure 1. State development administrative regions of Queensland.

Methodology by which the mortality estimates were calculated

11. There are two principal variables underlying the estimates of the numbers of mammals, birds, and reptiles killed by land clearing in 2015-2016:

    (a) **area cleared** (in ha); and
    (b) **density estimates** (of mammals, birds, and reptiles: no of animals/ha).

12. The basic formula for estimating the numbers of mammals, birds, and reptiles killed by land clearing in Queensland in 2015-2016 across the various regions is:

> **Area cleared** (ha) x **Density of mammals/birds/reptiles** = **Number killed**

13. The 2017 Report calculated the amount of remnant and advanced regrowth vegetation that was cleared in each of the eleven regions within Queensland indicated in Table 1 above using data from SLATS. Further detail of the methodology applied to calculate the area cleared for each region is provided on page 25 of the 2017 Report and in footnote 3 to Table 1.

14. The area cleared for each region was then multiplied by density estimates for mammals, birds, and reptiles. The density estimates are shown in Tables 3 (page 19), 5 (page 24), and 8 (page 29) in the 2003 report by Cogger *et al*. By way of example, Table 3 read:

Table 3: Number of selected mammals killed annually in Queensland by land clearing (by bioregion)

Bioregion	Annual clearing rate (ha/yr)[32]	Estimated (minimum) mammal density (individuals/ha)[33]	Number of mammals displaced killed/year
Brigalow Belt	260,200	3.93	1,022,586
Channel Country	500	10.26	5,130
Central Qld Coast	2,600	42.12	109,512
Cape York Peninsula	0		0
Desert Uplands	51,100	3.48	177,828
Einasleigh Uplands	2,800	1.42	3,976
Gulf Plains	2,100	0.58	1,218
Mitchell Grass Downs	26,900	2.86	76,934
Mulga Lands	85,400	2.87	245,098
New England Tablelands	1,800	45.11	81,198
North-west Highlands	3,800	0.16	608
South-east Queensland	7,400	51.24	379,176
Wet Tropics	1,300	50.46	65,598
TOTAL	**445,900**		**2,168,862** Rounded down to 2.1 million

15. The density estimates were based on a suite of studies involving the detailed ecological study of particular species in defined localities and were drawn from databases curated by the authors and from other scientific sources such as publications in the peer-reviewed scientific literature.

16. The 2017 report discusses possible sources of over- and under-estimation at pages 19-23, and the currency of the estimates at page 23. At page 19, the report states:

> Some assumptions of these analyses lead to overestimation while others lead to underestimation. We consider however, that the assumptions leading to underestimation greatly outweigh those leading to overestimation, with the net effect of a substantial underestimate of actual animal deaths.

17. As regards over-estimation, the 2017 report states at page 19 (footnotes excluded):

> The main assumption leading to overestimation is that death rates following clearing are 100%. They may not be 100% in practice if remaining habitats into which some animals may escape happen to be below carrying capacity. Habitats are thought to be generally at carrying capacity for most species and therefore cannot accommodate any significant influx of new immigrants. In the classic study of rainforest deforestation in the Amazon, bird densities increased rapidly in the remaining islands of forest following clearing of surrounding forest, but then progressively 'self-thinned' back down to previous densities as animals died or were displaced further afield.
>
> In the case of koalas however, chlamydial disease has greatly reduced koala numbers even in largely untouched habitats. Therefore, active translocations of koalas to large forest tracts have been unexpectedly successful. However, koalas are likely to be an atypical case due to the history of disease in reducing populations below capacity.
>
> Even in close-to-ideal conditions where vertebrates are actively translocated (rather than having to make their own way) into habitat known to be unoccupied or below capacity, the success rate is still only about 50% on average over time frames of three to five years typically. Success rate varies greatly depending on type of translocation.
>
> As a group, most reptiles are substantially much less motile than mammals and especially birds and so their ability to escape the impacts of land clearing by migrating to adjacent or nearby blocks of suitable habitat is greatly limited.
>
> For almost all bulldozing of habitat in Queensland there is no active effort required or made to assist animals in relocating to habitats known to have excess capacity to receive them. Hence, this source of overestimation can in most cases be considered minor and greatly outweighed by the underestimation sources discussed below

Signature page

Please feel to contact me if the members of the Committee have any queries or require any further information.

Hugh Finn
[redacted]
27 March 2018
[redacted]