



Dr David Berman

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Dear Secretary

I wish to clarify some of my answers to questions received during the committee's public hearing on 7 September 2023. These issues are complex and very difficult to explain adequately in the short time available during questioning.

Further to this written clarification, the enquiry would benefit from a face-to-face meeting with me, the Senators and the eminent scientists who gave evidence. Also, Terry Korn and Mike Braysher should be invited as well. They, like me, are vertebrate pest managers. We have written about, taught and demonstrated best practice vertebrate pest management for many years.

Senator DAVID POCOCK: Thank you, Dr Berman, for your appearance. I'm interested in what you said about the management being based on impact, not numbers. We heard earlier from some scientists who were talking about impacts being seen down to numbers as low as 100 on the Bogong High Plains. I'm interested in what your view is on impact?

By targeting the impact instead of the animal, it is much easier to gain support for management actions from all community groups. Conflict between community groups is the greatest barrier to effective management.

I define impact as any change caused by feral horses or anything resulting from the feral horses being there. The impact can be detrimental, neutral or beneficial. Direct impacts, the sight of horses, grazed grass, the presence of hoof prints or a dollop of dung in a National Park can be unacceptable to many, while these impacts are tolerated or even valued by many others. Direct impacts such as selective grazing or soil disturbance can result in indirect impacts such as a change in pasture species composition, suppression or facilitation of native species, extinctions, or increased rate of soil erosion. Indirect impacts are difficult to ascribe with certainty to feral horses, because many other factors can cause these. Direct impacts are easier to ascribe to feral horses and are more easily measured than indirect impacts.

On the Bogong High Plains, we detected direct impact along less than 1% of walked transects. So yes, there are impacts seen down to as low as 100 horses on the Bogong High Plains. But at least 99% of the area has no detectable direct impact. Indirect impacts of feral horses are highly unlikely when the direct impact is this low. Further scientific work is required to measure the indirect impact at different feral horse densities, particularly the indirect impact on endangered native species. (Please read our recent paper Berman et al. 2023 <https://onlinelibrary.wiley.com/doi/full/10.1002/wlb3.01107> and my PhD thesis Chapter 8 <https://www.researchgate.net/publication/293555610> The ecology of feral horses in central Australia).

National Parks are for native plants and animals. But removing horses is a complex and very difficult process, particularly removing the last few horses. In many cases, it is not possible to remove them all. If not possible, they must be kept at some acceptable density/population size. Ideally, since National Parks are for native plants and animals, the density of horses selected should be where the detrimental impact on native plants and animals (and soil and water) is removed or at least minimised. Our work on density-impact functions helps identify this target and suggests that the impact on the Bogong High Plains, where there were around 100 horses, is not significant.

Any statement, whether by eminent scientists, local landholders or the taxi driver, needs to be checked to see what evidence the statement is based on. What is the evidence supporting the statement that **even 100 horses on the Bogong High Plains cause significant damage that accumulates over time**? This statement comes from a report (Tolsma and Shannon 2018) to Parks Victoria prepared in a hurry prior to the release of their Management Plan to justify the eradication of horses from the Bogong High Plains. However, the type of data collected cannot prove this statement to be true. It is no more than a hypothesis. I would like the eminent scientists to explain better the evidence they think supports this claim.

When I read the unpublished report by Tolsma and Shannon to Parks Victoria containing this statement, I wanted to check it out for myself. I travelled to the Bogong High Plains and visited 66 sites used in the study, walking with a pack over 100 km. We conducted two further trips to the area, refining methods to obtain a detailed measurement of the impact described in our recent publication. At most of their sites, Tolsma and Shannon estimated the proportion of the site with impact that they ascribed to horses. They did not measure this to determine the proportion of the site with impact. Tolsma and Shannon's method is very subjective. In contrast, we measured the length of our walked transects with impact. Our method is objective and a very good way to measure and monitor changes in impact, as horse distribution and density change as a result of management decisions/actions.

Senator DAVID POCOCK: That makes sense. What's the difference between you or I not being able to see visual impact verses the impact that they're having on species like mountain galaxias?

This is a great question. Rabbits at densities where they are almost undetectable can still prevent regeneration of some species of trees. But where we cannot detect horse dung or hoof prints or horse grazing impact, I think it is very **unlikely** horses are having a significant impact on native animal species populations. However, the fact is we do not know enough about the impact on native species at very low horse density or any other density for that matter. It is essential that we find out using science that has the highest strength of inference. I believe the prevention of extinction of species like the galaxias is far more important than the protection and retention of horses. But anything we do to protect the native species may have desirable or undesirable consequences. I emphasise the importance of thorough, experimental monitoring to make sure that the native species are indeed benefiting from any management action. It would be a shame to remove horses and find they were facilitating an endangered species.

Any interference by us can have beneficial or unexpected detrimental consequences. Horses are thought to be a problem for the galaxias because they increase the sediment on rocks that the fish want to stick their eggs to, apparently. The eggs don't stick because of the sediment. This is the view of the scientists who study the fish and very likely is correct. While this may be suppressing the fish reproduction, the fact is the fish were surviving even with a high density of horses and high horse impact. Now, a fence has been built to keep the horses out. What could happen? The fish could flourish because they can stick more eggs on rocks. Alternatively, the vegetation could grow over and through this stream, causing a loss of open water or some other factor, making the stream less suitable for the fish. This occurred in the northern part of South Australia, Dalhousie Springs, where "extirpations of fish populations can be attributed primarily to habitat changes associated with reduced disturbance and herbivory as a result of the removal of feral livestock" (Kodric-Brown et al. 2007) <https://doi.org/10.1111/j.1472-4642.2007.00395.x> .

It is dangerous to assume that all impact is negative and that the removal of feral horses will suddenly allow the recovery or survival of endangered native species. We need a better scientific understanding of all the threats to these species and monitor carefully the result of any management action.

Senator DAVID POCOCK: That's fine. I'm interested in your views on the evidence that we heard earlier from the Australian Academy of Science and the Fenner School at the ANU and Professor Don Driscoll. Their evidence was that horses are having an impact on a number of threatened

species and there are probably 12 endangered species that will likely become extinct if horse numbers are not drastically reduced. I'm interested in your views on that.

It is most important to protect these species. We must do all in our power to prevent extinctions. Certainly, horse numbers cannot be allowed to increase continually, and distribution must be restricted. But how drastically should we reduce horse numbers? We do not know enough about the impact of horses on these species. We need better experimental research. Horses are not the only potential cause of extinctions. Focusing on horses may mean the necessary interventions are not identified.

Also, demonising the horses will provoke and invigorate horse protectionists and make successful reductions more difficult, if not impossible. Science must measure the impact of horses on these 12 species at different densities and identify or discount any potential positive impacts. Ecology is never simply bad or good. There are always winners and losers for any changes. There are species that will be highly susceptible to feral horse impact, and there will be other species that will not be susceptible or even benefit from the impact. The research can and must be done during the current control operation in a manipulative, preferably randomised, experimental way. The research should be done with the community groups' involvement so that results are accepted. This will provide stronger evidence supporting the removal of horses or will identify any unexpected negative consequences of horse removal for the endangered species.

Everyone working together is the only way to properly protect the 12 endangered species from the many threats, including feral horses.

Please read the Kosciuszko Scientific Advisory Panel report (<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Pests-and-weeds/Kosciuszko-wild-horses/kosciuszko-national-park-wild-horse-scientific-advisory-panel-report.pdf>)

Senator DAVID POCOCK: Is your background in ecology?

This question shocked me because I thought I was well-known in the field of feral horse management, and my submission and cited documents describe my relevant background.

Firstly, I am an ecologist who specialises in the management of vertebrate pests (now referred to as invasive species). I am an applied scientist seeking practical, long-lasting outcomes. I use ecology to assist in efficient, effective management. I have been testing and perfecting the recipe for success for 40 years on feral horses, feral camels, feral pigeons, feral pigs, Indian myna, rabbits, feral cats, foxes and wild dogs. I often collaborated with others to protect our endangered native species and habitats by managing the impact of vertebrate pests.

I worked with the Northern Territory Parks and Wildlife (formerly Conservation Commission) for 12 years, then Biosecurity Queensland for 17 years, then Queensland Murray Darling Committee, Darling Downs Morton Rabbit Board, the University of Southern Queensland and my own company for the last 11 years.

I was the NT representative on the Vertebrate Pest Committee (Australian and New Zealand Ministerial Council) and the National Rabbit Management Advisory Group. More recently, I was Chair of the Kosciuszko Scientific Advisory Panel.

My PhD study of the ecology of feral horses (Berman 1991) led to a significant reduction in the damage caused by too many feral horses in central Australia. This required extensive consultation and collaboration with a diverse range of community interest groups. There was a reduction in conflict by using science as a tool to determine facts, allowing progress towards a solution. I assisted with trapping horses on water, mustering with helicopters, and I audited with a Vet the shooting of 2000 horses from a helicopter on Loves Creek Station in 1986, autopsying 198 horses to determine their age structure (mortality rate) and reproductive rate. Please have a look at the documentary "Brumby Horse Run Wild" on YouTube. <https://www.youtube.com/watch?v=zgv00IndzQ0>

Based on the success of our management of wild horses in central Australia, I was employed as the leader of the Federally funded project to prepare national guidelines for managing Australian feral horses, resulting in the publication of the book, "Managing Vertebrate Pests: Feral Horses" (Dobbie, Berman et al. 1993). This book helped establish and promote the pest management principle that redirects the focus from simply killing the pest to fixing the problem, minimising the damage caused by the pest. We also emphasised the importance of understanding the ecology of the animal and thoroughly engaging the community. Following these guidelines, we were able to remove all wild horses from Finke Gorge National Park and measure the benefits of this to native plants and animals (Matthews, Bryan et al. 2001).

I have authored 25 publications on various aspects of feral horse management, including two books (Dobbie, Berman et al. 1993), and a book chapter (Nuñez, Scorolli et al. 2016). I was a reviewer for the United States National Research Council book "Using Science to Improve the BLM Wild Horse and Burro Program" and also reviewed the New Zealand Kiamanawa Wild Horse Management Plan.

I am not just an ecologist, I use ecology as a tool to make a real difference in the damage caused by vertebrate pests.

Senator DAVID POCOCK: Did you declare that conflict of interest in your submission?

I hope the Senators have now read my submission. My submission is my submission. There is absolutely no need to declare a conflict of interest in my submission. My views expressed in my submission have been consistent for many years prior to the forming of the Australian Brumby Alliance, in fact, prior to the forming of any Australian pro-brumby groups. Please read the proceedings of the workshop held in the Victorian Alps in 1992 (Walters and Hallam 1993), and you will see that I have been saying the same thing for many years. I keep saying these things because they work. I have demonstrated that they work many times for many different species in many different places.

Work with the Australian Brumby Alliance resulted in our recent peer-reviewed publication. A potential conflict of interest was declared to the journal of Wildlife Biology as required.

The density-impact functions are useful to identify a target feral horse density based on impact. Far better than a back-of-the-envelope estimate of 100 horses suggested by an eminent scientist. The target density determined for the Victorian Alps based on density-impact is below 9 horses per square km along drainage lines compared to the current densities of up to 56 per square km. In the Victorian Alps, over 80% of the feral horses live in 17% of the area occupied by horses. These are the areas with the highest direct impact and most likely the highest indirect impact. Reducing the density in these areas to the target identified will result in a substantial reduction in the feral horse population, possibly around 80%. Once that is achieved, there will be very little observable direct grazing or trampling impact. Detailed experimental adaptive management studies, if conducted during the population reduction operation, measuring the response of endangered species will determine whether further reductions are necessary. If the hypothesis that even 100 horses continue to cause cumulative damage is correct, then further reductions and even eradication may be required. Eradication requires first an 80% reduction. Eradication does not happen overnight. It took us 7 years to remove all the horses from Finke Gorge National Park (1100 mustered and 1600 shot from helicopter), even with the use of aerial shooting. Nevertheless, eradication may not be the best option. Once the negative impact is minimised, the limited resources could be diverted to reducing deer or pigs or doing other things to protect endangered species. Once again, I emphasise we must work with caution, keeping an eye out for unexpected, undesirable consequences of reduced feral horse impact.

Work on density-impact functions was recommended by delegates at the workshop I attended at Howman's Gap in 1992. These recommendations were ignored. Consequently, the small feral horse population at the time increased to the massive level it is today. Fortunately, the Australian Brumby Alliance part-funded the work on density-impact, or it still would not be done. Without an understanding of density-impact, we would have to blindly remove as many horses as we can, hoping we have removed enough. This, unfortunately, is still common practice for most vertebrate

pests. 100,000 feral pigs shot from a helicopter is a meaningless figure without knowing what proportion of the population this is. Did this expensive operation make any difference to the impact?

Senator DAVID POCOCK: My concern is that we've heard from some very eminent ecologists and the Australian Academy of Science, and you have one paper that contradicts what they are collectively saying.

Our one peer-reviewed paper does not contradict the eminent ecologists' main emphasis that feral horse numbers must be reduced drastically and that we must do all in our power to protect our unique native plants and animals. Our paper describes how to better do this, including suggestions on how to improve the science. The Academy of Science is in favour of basing management on the best possible science, which is consistent with our paper. **Our paper provides evidence-based targets for areas where control should be and the level of control required.** Further to this, our one powerful paper has begun the process of engaging the community so that instead of wasting our time fighting and blocking each other's efforts, we can all work together to protect endangered species from all their threats.

By the way, there are many other peer-reviewed publications that contradict statements by the participating eminent ecologists.

With all due respect, these eminent scientists who were questioned by the Committee are not eminent in the field of vertebrate pest management and fail to understand the importance of our one paper and the reason this paper was prepared with the involvement of a community group. Unfortunately, I did not appreciate the importance of engaging the eminent scientists as well as the horse advocates. I did try to warn one eminent ecologist that pushing for aerial shooting alone is extremely dangerous if we wish to retain this method where it is essential in outback areas (see my submission for an explanation). Aerial shooting should be a tool available along with all the other methods, and the Scientific Advisory Panel Report describes how it can be used.

So, I (not our one paper) contradict the eminent scientists with regard to their claim that aerial shooting will solve the problem by itself. The evidence from many control operations supports my view. The eminent scientists are unaware of this evidence and lack the experience and understanding that I have on this issue.

For example, the public upset in 1987 caused by aerial shooting of only 33 horses in Namadgi National Park was exceptional compared to the response to aerial shooting in central or northern Australia at that time <https://escholarship.org/uc/item/5974f3mg> . This shoot, prior to there being any horse protection groups, caused all sorts of opposition to aerial shooting for us in central Australia, mainly from animal welfare organisations. This led to the Senate Select Committee on Animal Welfare enquiry (see my submission) that eventually supported the continuation of aerial shooting, but only because of the evidence we provided based on our research in central Australia. This, along with our community engagement work, gained the social licence for aerial shooting to remain available. Unfortunately, then came the Guy Fawkes shoot in 2000. Lacking community engagement, this was a disaster for aerial shooting, and a couple of days of shooting almost undid a decade of our work to retain the method.

While there was indeed a rapid population reduction, the overall result for the management of the impact of feral horses in Guy Fawkes River National Park was poor. I believe there are now possibly twice as many feral horses there than there were before the shoot in 2000.

I can highlight other problems with the eminent scientists' knowledge and understanding, but I appreciate the Committee members already have too much to read.

Senator GROGAN: You just told us that you've been studying the impact of feral horses for 40 years, yet you don't know what the impact of feral horses is in a national park. I'm finding that difficult to piece together.

Again, this question indicates a complete misunderstanding of what I do and how I do it and of the complexity of studies of impact.

I studied the impact of feral horses in central Australia, and then I worked in Queensland, protecting the economy and environment from rabbits and feral pigs, protecting bilbies from feral cats, sea turtles from foxes, native birds from Indian Myna and reducing the risk of collision between feral horses and vehicles. Up until the last few years, I have not had the opportunity to study the impact of feral horses in the Australian Alps. The impacts are different depending on where the national park is.

I am happy to spend as much time as it takes to explain why studies of impact are so difficult, but it is important for my submission and supporting documentation to be read.

Hopefully, this letter has helped clarify my answers.

Regards

Dr David Berman

Adjunct Research Fellow UniSQ
Director Ozecological Pty Ltd

References

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