# TRANSCIPT

# LEGISLATIVE COUNCIL ECONOMY AND INFRASTRUCTURE COMMITTEE

## Inquiry into Wildlife Roadstrike in Victoria

Bendigo – Wednesday 6 August 2025

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Renee Heath

Sarah Mansfield

Rachel Payne

**WITNESSES** *(via videoconference)*

Dr Kylie Soanes, Research Fellow, School of Agriculture, Food and Ecosystem Sciences, University of Melbourne; and

Dr Rodney van der Ree, National Technical Executive in Ecology at WSP Australia.


**The CHAIR**: I declare open the Legislative Council Economy and Infrastructure Committee's public hearing for the Inquiry into Wildlife Roadstrike in Victoria. Please ensure that mobile phones have been switched to silent and that background noise is minimised.

I would like to begin this hearing by respectfully acknowledging the Aboriginal peoples, the traditional custodians of the various lands we are gathered on today, and pay my respects to their ancestors, elders and families. I particularly welcome any elders or community members who are here today to impart their knowledge of this issue to the committee or who are watching the broadcast of these proceedings. I also welcome any other members of the public watching via the live broadcast.

To kick off, we will just have committee members introduce themselves to you, starting with Mrs Deeming on the screen.

**Moira DEEMING**: Hi, my name is Moira Deeming. I am a Member for Western Metropolitan Region.

**Gaelle BROAD**: Hi, I am Gaelle Broad, Member for Northern Victoria.

**Richard WELCH**: Good morning. I am Richard Welch, Member for North-East Metropolitan Region.

**The CHAIR**: Georgie Purcell, Member for Northern Victoria.

**John BERGER**: And John Berger, Member for Southern Metro.

**The CHAIR**: Thank you very much, Dr Soanes and Dr van der Ree, for appearing before us today.

All evidence taken is protected by parliamentary privilege as provided by the *Constitution Act 1975* and further subject to the provisions of the Legislative Council standing orders. Therefore the information you provide during this hearing is protected by law. You are protected against any action for what you say during this hearing, but if you go elsewhere and repeat the same things, those comments may not be protected by this privilege. Any deliberately false evidence or misleading of the committee may be considered a contempt of Parliament.

All evidence is being recorded. You will be provided with a proof version of the transcript following this hearing, and then transcripts will ultimately be made public and posted on the committee's website.

For the Hansard record, could you both please state your full names and an organisation you are appearing on behalf of, if any.

**Kylie SOANES**: My name is Dr Kylie Soanes. I am from the University of Melbourne.

**Rodney van der REE**: And I am Dr Rodney van der Ree, University of Melbourne and also WSP Australia Pty Ltd.

**The CHAIR**: Wonderful. Thank you so much. We now welcome your opening comments but ask that they are kept around 10 to 15 minutes to ensure plenty of time for discussion and questions.

**Rodney van der REE**: Great, thanks. Kylie and I had briefly chatted yesterday about this, and we have tried to avoid overlap between both of our presentations in our remarks, so hopefully that turns out the way we planned. I am just going to share my screen with just a little bit of information to illustrate some of the things that we are talking about today.

**Visual presentation.**

**Rodney van der REE**: Basically this is a great opportunity for both Kylie and me. I have been working in this space since the mid-90s, so about 30 years of thinking about the impacts of roads and traffic and how to mitigate those. So I am really excited that the Vic government is taking this on as a serious issue and looking for solutions that work. There are a bunch of things that I have been involved in. We can go to that later if you need.

For me, there are five main issues or topics that I want to cover today, and Kylie will cover some of these as well and additional ones. There are three things we need to think about when we are considering wildlife–vehicle collisions, so I will touch on those. We need more and better data, we need to consider the existing road network, not just new projects, and then we need to think about the best solutions that are evidence-based and fit for purpose and also think about future directions for some of those technological solutions to roadkill. The three goals that I think we have to keep in mind whenever we are thinking about a solution are considerations related to animal welfare; human health, wellbeing and costs – and that is not just the cost to repair a vehicle but it is also human injury and the rehab costs that wildlife carers bear; and conservation outcomes as well. If we just think of one of these things we can get perverse outcomes. For example, 'the best way to stop roadkill is to put up a fence': that can reduce roadkill for many different species, but it also creates a barrier to their movement, so the conservation outcome is compromised because animals cannot get from one side of the road to the other. So we need to keep these three goals in the forefront of our minds.

We need better data: where is the roadkill happening, what time of the year or day is it happening, what kinds of road conditions, which species and why? We need to know where the roadkill is. At the moment we try and pull together evidence from a whole range of different sources with a whole range of reliability, and it makes it really problematic to make good decisions about where we do some of this mitigation work. For example, there are dozens – literally many dozens – of phone apps around the world that are being used to collect roadkill data. We do not have a centralised system in Australia that can be used to collate this information. It is not that complicated technologically, but we just need to think about making it fit for purpose for a whole range of users: wildlife carers, community members as they are going on their holidays, clean-up crews that are engaged by VicRoads and road agencies, local councils, insurance claims, police stats et cetera. So there are a few things to think about with that, but if a couple of things that come out of this hearing and this process are that we get some good data, I think that will make a huge difference.

The other one is most of the time and money gets spent on new road projects and new rail projects rather than the existing road network. We need some of this landscape-scale systematic planning that identifies the existing hotspots on the existing road network, because if you compare it, new roads are less than 1 per cent of where the problems might be occurring across the state. So we need to think more broadly than just new projects. It is not just threatened species – that is where we tend to focus most of our time and effort in these new projects – but also some of the common species. Also, I think a threat that we are not quite aware of yet is the impact of deer in increasing numbers and population density across the state. Overseas most of the mitigation work on roads is because people die at a higher rate when they collide with deer than they do when they collide with some of our smaller native animals. Just to put it into perspective, this is the Netherlands – one-sixth the area of Victoria. They have got 75 land bridges across that area – we do not have one land bridge in Victoria – and they have also got hundreds of other underpasses and different types of overpasses right across the country. So we have got a fair way to go in comparison to some of our international comparisons.

This is the bit that I think is the most exciting, and that is: what are the potential solutions to roadkill and wildlife–vehicle collision in Victoria? We have just spent some time with Transport for NSW developing this schema, because there are so many different things it can get really confusing. If we just think about the physical approach, this is what we have been using mostly up until this point. These are things like fencing and wildlife crossing structures, underpasses and overpasses, and Kylie will touch on how effective some of these are in her presentation. That is what we have used. They can be really effective, but we cannot build fences and crossing structures everywhere.

That brings us to this signal-based approach and signal-based approaches with detection systems. Let me just explain signal theory: animals, in this context, talk to each other, so they are sending a signal. There is a sender – in this case, let us say it is a male frog – he sends a signal; he calls, a female frog hears that call and says, 'He sounds like a suitable mate. I'll go over to that male, and let's lay some eggs.' For the signal to be effective it needs to be heard by the intended receivers. The female frog has to hear the call, and it has to elicit the appropriate response – that is, in this case, the female is attracted to the male. The problem arises when the

signal could be confounded or compromised; potentially in the case of roadsides it is vehicle noise. The call of the frog is not able to be heard above the noise. In the case of mitigation, if there is a response – let us say it is a noise to stop animals getting on the road – they need to be able to respond to that noise in the appropriate way, and I will explain that in a moment. In wildlife vehicle collision mitigation the receiver can either be the animal or it can be the vehicle operator, and the systems can get complicated depending on the level of steps. The simple one here is just like a little ShuRoo or a whistle on the front of the vehicle as the car drives along; in theory, it creates a noise. The animals hear the noise, and theoretically they hop away. The other way is where the sender is the sign on the side of the road, and the receiver is the vehicle operator. They see the sign, and the vehicle operator should drive more cautiously, hopefully. Then it can get a bit more complicated. so perhaps there is a system that detects animals on the side of the road. It sends a signal to the driver, and the driver then has to respond. It could be a sign; it could be an in-car app or something like that the driver is responding to. There are multiple signals, multiple senders and multiple receivers, depending on the system.

The signal-based approach or the signal-based approach with a detection system is I think where the future of mitigation for wildlife vehicle collision is moving not just here but internationally. I think it is the way of the future provided we know what the appropriate signals are and the animals respond to those signals in the right way or, vice versa, the drivers respond to those signals in the right way. A good example – there is a cassowary camera in northern Queensland that detects cassowaries, and it uses an AI system in the background. Then that turns on a sign on the side of the road that says there are cassowaries next to the road right now, and the drivers hopefully take that sign seriously and slow down. The best option ultimately will depend on the context. Is it a low traffic volume road? Is it a high-speed multilane freeway? Also the stage of the development of that system over time – so at the moment we do not have an off-the-shelf system that we can deploy on the country roads around Bendigo, which actually is ironic in some ways: that is the area with the highest rates of roadkill in Victoria, around Bendigo, but we do not have a system that we can deploy off the shelf today to stop kangaroo roadkill in and around Bendigo. This is the way that we are going to develop those systems. Up until this point we have not had this sort of framework, if you like, where we go through the steps of what is the biology and behaviour of the animal. We do some tech and some concept designs; we do some in-the-lab testing. We can sort of figure out if it works as a proof of concept. We then do a field trial, we test it on the side of the road, we get to the end and we can say, 'This product is ready' or 'At some point along the process it fell over, and it was not quite working properly.'

So this system allows us to do this in a sensible and logical kind of framework. Because the problem is, and Kylie will touch on this, the virtual fence is a product that has just been developed internationally, not in Australia, and we have put it out on the side of the roads in Australia expecting it to work. Without stealing Kylie's thunder, there is very little evidence that virtual fences actually work as a tool.

That QR code will take you to the work that we did for Transport for NSW – we reviewed the effectiveness of a whole range of technological solutions – and that gives the current status of those systems in relation to Australian animals and some other information there, if you want to look into those websites. That is it from me. I am happy to take questions, or we can go to Kylie.

**The CHAIR**: Wonderful. We might go to Dr Soanes first, if you have more comments to add, and then we will go to collective questions.

**Kylie SOANES**: Beautiful. I will be brief, which is famously what people say before not being brief. My expertise is in wildlife crossing structures, in evaluating their success and in supporting practitioners and land managers to trial these novel conservation actions. I am going to touch on those three things briefly. I have been part of two global research syntheses that looked at both the effectiveness of measures to reduce roadkill for wildlife and the effectiveness of things like wildlife crossing structures to help wildlife move across roads. The science is pretty clear. Things like wildlife crossing structures and fences – those physical structures that we can put in – are incredibly effective. We know that they support enormous different numbers of species, and that idea of keeping the path for animals separate to the path for traffic is one of the best ways that we can completely eliminate, or very, very highly reduce, the risk of roadkill happening. But as Rod said, unfortunately it is not practical to put them everywhere. Even the simple matter of having driveways means that we cannot fence every road and completely reduce the ability of animals to come into contact with cars, which is why things like these signal methods are being explored in earnest.

We know that with wildlife crossing structures in particular – even though they are a very well-established tool; they have been used all over the world for all different kinds of species – we still are not good at evaluating these kinds of measures in a way that really helps us understand if we have been successful. In our study we found more than 300 different pieces of work that had evaluated wildlife crossing structures, and something like 14 per cent of them were actually capable of telling us whether or not the amount of movement across a road increased or decreased. Most of them simply looked at photos of animals and said, 'They use them. It must be fine.' So there is a real gap in the way that we try to understand how well these mitigation measures work, and it really limits our capacity to make good recommendations for what works, where. This is really important for these novel conservation actions and these new innovative technologies coming through.

I see very frequently, particularly with virtual fences, the language 'It's a trial. We're going to trial these virtual fences', but there is very rarely any measuring accompanying that. If you are not evaluating the success, if you are not measuring what happens, you are not really conducting a trial; you are just implementing an untested action, and that is what we are at a really high risk of, I think, in Victoria at the moment. I live in a community on the Surf Coast. We have a virtual fence trial nearby. We have a really passionate community of people that are desperate for this problem to stop. There seems to be an enormous groundswell at the moment of community interest in reducing this problem. We need to make sure that we are supporting them to make the right decisions, because we all want this problem to be solved, but there is a very big risk that we are grasping at solutions that make us feel good and feel like we have accomplished something, even though we have not. So any kinds of trials of these new technologies have to be paired with a proper evaluation, whether that is measuring the amount of roadkill before and after and allowing us to see whether or not it changes, comparing it to sites that we did not put any virtual fences in at all, or whatever technology it is. We have to be able to compare that to these baseline levels so that we understand what kind of impact we are having, and we can really communicate that story clearly, because if we do not understand what works, the context in which it works and the context in which it does not, we are not going to be able to safely scale and grow these technologies, and we are not going to be able to fix this problem.

Rod touched on the signals and the pairing of warning signals with animal activity, and I think that is a really promising way forward for reducing this problem, because what we need, rather than just warning signs or just educating people, is that real, meaningful pairing of risk and consequence. It is not enough to say, 'This is a high-risk area.' We need to tell people when it is a high-risk area, am I at risk of running into a kangaroo right now, and I think that is going to be the strongest thing that we can do to change behaviours and help have that cultural shift where we really understand that when we are driving on roads there is a risk of hitting an animal, and what we can do, what actions we can take, to change that. I think I might leave that there and open it up for questions.

**The CHAIR**: Wonderful. Thank you so much, Dr Soanes. Members, we will go to questions now. We have a little bit less time for questions than the previous witnesses, but I will let you know when you have got one more to go. We will start with Mr Berger.

**John BERGER**: Thank you, Chair. Thank you both for your appearance today. Dr Soanes, I am struggling to get my head around this virtual fencing. Fencing to me, by its very word, is a barrier, yet the virtual side of it – Can you just explain to the committee a little bit more as to how it would work and how you would implement a virtual fence?

**Kylie SOANES**: Of course. It is a very trippy concept, isn't it? The virtual fences are a series of posts. They look exactly like the normal white reflector posts that you see along the roadsides. They are set out at intervals of 10 or 20 metres, and the idea is that each of them emits a sound at a really high frequency that is quite irritating to wildlife. The idea is that as there are wildlife in the surrounding area, if there is a kangaroo hopping along in the bushland next to the road – here we go; thank you, Rodney – road ecologists all over the world are taking photos of these very strange posts. But as an animal is moving along the roadside, the fence can detect the movement, it emits this high-pitched noise, the animal is like, 'Oh, no, what is this noise? This is very unnatural and irritating. I am going to hop away from it.' And so the idea is that we have this essentially virtual irritating barrier that keeps animals from approaching the road surface. Some of them are activated by vehicle headlights as well, so as a car is coming along, it sends out a signal regardless of whether an animal is there, and if there are any animals in the vicinity, they know to associate that noise with, 'I'd better leave this area.' But yes, the idea is that it emits this virtual signal and it becomes an impenetrable barrier that wildlife do not like to cross. That is the theory.

**John BERGER**: So do they need to operate in a series – if the fence is broken somewhere along the line – or can it still operate independently on each post?

**Kylie SOANES**: I believe it operates independently on each post, and if there was a post missing, that is basically tantamount to there being a hole in a physical fence. There have been trials of these all over the world and more recently in Australia. There are only six published reports evaluating these in Australia, where they have measured the number of animals killed before and after the fence was installed or compared it to control sites. Five of those studies have found that there was no reduction in roadkill at all as a result of those fences, and one study found that there was a 50 per cent reduction. So when you see virtual fences being talked about in the media or indeed by the manufacturer, that 50 per cent reduction in roadkill is the claim that you will see, but there are an additional five studies that found no reduction in roadkill at all for the same species across different areas.

**John BERGER**: I suspect if you are a motorist driving up a particular freeway and you knew that these virtual fences were there, you would become complacent, think that they would work, yet they are powered, I suspect, by solar or something like that and would have some limited working time on them. Are there any thoughts about that concept?

**Kylie SOANES**: My biggest concern is that if they are not 100 per cent effective people who would ordinarily be quite cautious or adjust their driving to the conditions at dusk and dawn will not do that because they will think, 'I'm safe now. I have the virtual fence. The kangaroos are not going to jump out in front of my car.' So that is a real risk, I think, that we need to consider. Rodney, do you have anything you want to add to that?

**Rodney van der REE**: All of these solutions will require maintenance. If a post gets knocked over, it needs to be replaced. If there is vegetation growing in front of it, it needs to be replaced. For me, the biggest problem with these is the noise. It is a high-pitched noise. The problem with that is that high-pitched noises attenuate quickly. They are just like a high-pitched squeaking really, which means that if you are a few metres away from these things and you have got traffic noise and you have got headlights, because they only work at night, and you have got streetlights, there are all these competing things trying to get the animals' attention. The animals do not associate a high-pitched squeaking noise with impending collision with a car. Some work out of Sweden found that the most effective noise to deter deer, moose and wild boar, wild pigs, is actually the human voice. Hunting is a serious thing in Sweden, and so the animals associate the human voice with the hunting threat. That is what drives them away from the road or the railway. A different kind of animal deterrent system is being deployed.

**Kylie SOANES**: I would add that the other risk associated with that is that high-pitched noises may be annoying at first, but if it is something that is around you a lot, you get used to it and start to tune it out, and then you do not associate it with danger anymore. I have small children; I am very good at tuning out high-pitched noises now. There is a risk that over time it just becomes another part of that species' environment, the same way that traffic noise itself has. Then that method suddenly becomes ineffective because they are not driven away by the noise. One of the concerns about the research and the way we evaluate these is if we do not measure for a long enough time, they may work for the first year or two and then suddenly the animals get used to them and that effectiveness drops off, and that is a really big concern.

**John BERGER**: Thank you. Dr van der Ree, I am just interested in the slide you showed us of the Netherlands. I am just wondering: are there any further studies around other countries that have the same issues with wildlife strike and what they have identified as being able to make the issue a lot more workable for their particular situations? Are there any lessons that we could learn?

**Rodney van der REE**: There are lots. What are some of the key ones – I suppose the Netherlands is a unique situation because every square metre of nature is managed, because it is a similar population, broadly speaking, to Australia but one-sixth the size of Victoria roughly, so every bit of nature is precious to them. In the US and other parts of Europe most of it is driven by actual human injury and fatality and costs. In Australia the challenge is: if you hit a kangaroo at 100 kilometres an hour, you are less likely to be injured seriously and die compared to hitting a moose at 100 kilometres an hour. That is what has driven, since the 60s, a lot of the work overseas.

Having said that, I think some of the key lessons are a really good understanding of where the hotspots are occurring, the collision hotspots, knowing which species are involved and – not that the community here does not care – that the community seems to care more in some of those countries at least or in regions of those countries, so there is a community drive to try and avoid, minimise and mitigate those impacts. There is good evidence also that fences and crossing structures are actually cost-effective. They are expensive. A land bridge might be $10 million, but if you build it at the right location with fencing you can reduce collisions and the crossing structures will eventually pay for themselves through avoided costs.

**John BERGER**: Thank you.

**The CHAIR**: Thanks, Mr Berger. Thank you so much for your incredible presentation. It was genuinely impressive and very interesting. I just have a couple of quick questions. I am happy to admit that I was very involved in the establishment of the virtual fencing trial on the Surf Coast. There has been, like you said, really mixed feedback, and it is important that any changes that we bring about are backed by that data and evidence. I would be really interested to hear, Dr Soanes – and of course if you have anything to add, Dr van der Ree – despite what you have outlined in your submission, is there any context where you think it is still worth testing emerging technology like that, if it was backed up by the right dataset afterwards?

**Kylie SOANES**: I still fully recommend trials of these. With only six studies, that is only six data points, so I have no problem with the trial and implementation of these. In my day job as an urban ecologist, I am always working with councils to try and get them to trial these new ideas and bring the community along on that journey as well. The issue that I think we want to avoid is when that trial is not accompanied by some independent collection of evidence. Reports to wildlife carers of whether the number of phone calls that they get has declined or not is not really a strong enough measure for us to understand the effectiveness of those fences. One really perverse outcome could be, for example, that maybe people are much more comfortable driving along the road because they know the virtual fences are there, which means they are driving faster, which means they are more likely to hit an animal at a very high speed and kill it rather than injure it, which means they are less likely to call a wildlife carer in the first place. In theory the number of calls they get could drop even if the mortality of wildlife does not, and that would be a really bad outcome. I think with virtual fences and these other emerging technologies, put them in, but pair them with the scientific evaluation so that every time we are doing this, every time we are investing, we are learning something so that other councils and other areas can learn and then we start to build that broader knowledge base. But if we keep doing it just hodgepodge without learning anything from it, then we are not going to get anywhere fast and we are going to keep spending money doing it.

**Rodney van der REE**: I agree to some extent with what Kylie has just said, in terms of doing trials properly and independent data points. But in relation to virtual fences I would say let us go back to the beginning. I fully support the development and testing of technological solutions, but why would we put out an off-the-shelf virtual fence where we do not think, perhaps, that the high-pitched squeak that they put out is actually going to trigger a response from the animals, the right response that we want? Do we have proper understanding of the biology and behaviour of the animals that we are trying to stop? Do we have concepts and tech that we have trialled in a lab? Do they support it? With virtual fences, we do not have any of this background information with which to judge whether we think it might work to some degree. I think the concept of a virtual fence is good. Regarding the current system that is available, I have no confidence in it working in a significant way that we want it to, unless we can demonstrate that we understand the biology and behaviour of the animals, because remember, the kangaroos on the Surf Coast are not the wombats near Wilsons Prom and are not the wallabies in Frankston or the deer in the High Country in Victoria – different species, different auditory capabilities, different behaviour and response to stimuli et cetera. What we can do with this is put in traffic lights and say, 'Right, we have no clue about the biology and behaviour of the animals in relation to this system.' The actual device might be okay, but the field trialling has failed and we can put different colours or traffic lights of colouring on that system.'

**Kylie SOANES**: I would agree with that.

**The CHAIR**: Thank you. Just one final question from me. You mentioned that physical separation, either through fencing or crossing structures, is kind of the gold standard for addressing this issue, and your example of the Netherlands, I saw last year when I went there myself they have built these huge eco-ducts and other structures that help animals to pass safely, and they eventually develop the habit of using them. But obviously

that is a really big and expensive task. Do you think some of the things that we could be doing here in Victoria that can be actioned relatively simply are things like underpasses, and, if so, could you just tell us a little bit more about what species would benefit from them?

**Rodney van der REE**: Yes. I will admit I am a little bit biased about how good the Netherlands is with my surname – might be a bit of a giveaway there – but yes, underpasses can work for a whole range of species. We have done research on the Calder Freeway. We have got kangaroos, wallabies, wombats and snakes using underpasses. We have built them for southern brown bandicoots to the south-east of Melbourne. With Kylie and me, her PhD was focused on canopy bridges and glider poles; they are maybe $10,000 apiece, and the gliding possums can glide across the road. We know they are super effective; Kylie can talk for hours on that. Birds and bats will use underpasses if they are large enough.

**Kylie SOANES**: Particularly underpasses associated with creek crossings. So if you have a road that goes over any kind of watercourse, just making that bridge a little bit longer so that it includes the riparian zone, the land along the edge of the creek as well – creeks are often natural movement pathways for animals – means you are getting great bang for your buck, because you are allowing them to cross where they were already moving anyway rather than having to redirect their behaviour, and just by extending that bridge a little bit longer you have suddenly got an effective underpass as well.

**Rodney van der REE**: If I can just quickly add on that one as well: we have done some work for some councils in and around Brisbane where we basically reviewed their existing drainage network and identified which of those drains, which could be culverts or bridge underpasses, could be cheaply and easily modified to make them effective for wildlife, so that might be putting a ledge or a shelf on the side of a drainage culvert for terrestrial animals to walk through or even just simply excavating some soil from the front of a culvert, which means the water is just sitting in the culvert. So if you excavate some of that built-up sand or soil, it drains freely and animals can use it, or adding a fence to a short section at the front of a culvert or bridge underpass will allow animals, when they hit the fence, rather than going straight across the road, to turn right, go down and under the underpass and out the other side. So you can actually do a fair bit at relatively low cost. If we know what the maintenance and repair regime is for the local council or the Department of Transport and Planning – if we know they are rebuilding a culvert or increasing the size of bridges, because with climate change we can expect more flooding, and we need to enhance our drainage infrastructure – at that time we could be adding in a second culvert. The drainage culverts may be lower, the animal one is higher, it is dry all year round and animals can use that. If we can combine that and do it smartly, which we can, that would make cost-effective solutions quite easy and within reach.

**The CHAIR**: Wonderful. Thank you. I will hand to Ms Broad.

**Gaelle BROAD**: Thank you both for appearing before the committee today. It is very helpful to have your insights. You mentioned, going back to the beginning, and from what I have read about population of kangaroo numbers in particular, the surveys show about 2.4 million kangaroos, and close to 500,000 in the Loddon Mallee area. You mentioned deer as well, and I have heard reports about them being around Macclesfield and Bacchus Marsh. Are you studying that at all, the population numbers? Can you talk to what you are seeing across different species?

**Rodney van der REE**: I am not studying population numbers specifically. I can only talk to what might be available that others are doing. I am not sure – Kylie, are you tracking any populations at the point?

**Kylie SOANES**: Tracking of population numbers in conservation ecology is incredibly rare. We very rarely have the resources to monitor population numbers broadly. What I would say to that is that the broader population numbers across the entire country or across the entire state are one indication of how many animals there are. There are also very localised effects that are quite important from a conservation perspective, because it is very possible that with a new development, increase in road traffic in an area can suddenly wipe out just that one local mob of kangaroos, and if that happens again and again and again, we start to get local extinctions in places. We do not have the data to understand that. I know one of the terms of reference in the inquiry is what the potential impact is of new developments and the associated traffic. We simply do not have the data and the information to understand that. And there is a very real risk that at local scales populations are being wiped out before we even understand what is there. That is one thing to keep in mind when we are talking

about population numbers and one of the reasons why Rodney's point about having those broader data sources is really critical for understanding this problem.

**Gaelle BROAD**: Just on that, with virtual fencing, you mentioned that five out of six studies showed it is not a great result but more studies could be required. How many studies are needed? Because you said it changes between different animals. So how can you, or when can you, determine what works?

**Kylie SOANES**: Most of the studies that have been done so far have been on wallabies and kangaroos, and there has been one, I believe, on wombats. Interestingly, the one about wombats was reported in the media as a success, even though the data said quite a different story. So it just shows how eager we are to have solved the problem. To reach a scientific consensus, I guess it depends on what your goal is and what you call a success, and this is something that Rodney and I spoke about yesterday. To some people, even a small reduction in the number of wildlife vehicle incidents counts as a success, but to others, they would like to see zero roadkill ever on their roads. So before we even get into what is good enough evidence we need to agree what we think is success in the first place. At the moment, with just six studies, I would say that that is not enough to really draw a conclusion. But with five of those weighted towards the non-successful end, it does not paint a great picture of the potential for these to be effective, which again is why I think Rodney's point about maybe going back to the underlying biology and design of these first before we do more trials is probably a really worthwhile point.

**Rodney van der REE**: I would not be investing a lot of money in more trials of virtual fencing. If you said, 'Rodney, here's $5 million to spend on –' I am not asking for 5 million, or anything, actually. But if you were to say, 'Develop a technological system,' I would be skipping the virtual fence entirely and going straight to systems that detect animals on the roadside and then either send a warning to the driver, which could be a sign on the side of the road or it could be something in the car, or the vehicle operator could be the operating system of the car. It could also include a deterrent system to the animals on the road, and it only works when there are animals present on the roadside and there are vehicles approaching and not this kind of almost naive 'approach' where it just operates all the time. And then it is figuring out exactly what deterrent system we need for the animals, what stimulus or signal they are going to respond to, and making sure they actually respond appropriately. I would add to Kylie's comment that the five studies that showed that virtual fences do not work are the best, most well designed studies of them, compared to the first study, which suggested a 50 per cent success rate.

**Kylie SOANES**: I would just like to add: I think in my description of how virtual fences work I misspoke when I said that they respond to animals being near the road. They respond to headlights, whether or not the animals are near the road. It is probably important for me to correct that while I am here.

**Gaelle BROAD**: I am interested too just in your thoughts generally – high level – but how important is prevention in this issue? Because, say, if you consider malaria, I guess there are treatments for malaria, and some of the things that you are suggesting are the tools or the treatments. But with malaria, you may then look at the number of mosquitoes and address that issue. So in this whole discussion, when you are talking about where to invest, do you think prevention is a big factor in all of this to reduce wildlife road strike?

**Kylie SOANES**: Are the mosquitoes the cars or the wildlife?

**Gaelle BROAD**: The wildlife, if you like, I guess. The proliferation of kangaroos or deer – do you think that that needs to be addressed?

**Kylie SOANES**: I would need to see really strong evidence that there is a proliferation of kangaroos or deer, and I would like to see that be very spatially explicit, because I do not think that that is going to be a solution that could ever be applied broad scale. So is it a proliferation of kangaroos in one particular area and that is why that is being caused? You then would not apply that to, say, the Surf Coast or some other area. I think that would need to be very carefully and very strongly supported by data, and that is also just a very minor part, again, of the broad wildlife toll issue. They are just one species. I know that they are one of the most common species that people think of when they think of roadkill, but there are a whole host of other tiny and equally important critters that are being crushed on our roads, leading to very big conservation problems and basically a depopulation of wildlife across our landscapes. I think that could be a problem, particularly for invasive species if they are growing in number and posing a risk to people – there are reasons to control those even beyond the

roadkill issue – but I would need to see very, very strong, clear, spatially explicit data to support a decision like that.

**Rodney van der REE**: And that goes to the three objectives I spoke about: animal welfare, biodiversity conservation, and the human health and injury-type approaches. We need to keep all three of those at the front of our minds as we are thinking of solutions.

**The CHAIR**: Thank you. Thanks, Ms Broad. Mrs Deeming, do you have any questions?

**Moira DEEMING**: I do. Thank you so much. It was a great presentation – very, very interesting. Am I correct in thinking that one or both of you know about or have been involved in Australian-specific solutions that have already really been proven, that could actually become part of our pre-planning of our basic infrastructure in the long term? Could you explain a bit more about that, and any hurdles that you see in getting those incorporated into early design processes?

**Rodney van der REE**: Yes, we have both worked on that. In my current role as a consultant with a large engineering consulting company, we are the technical adviser at the moment to Major Road Projects Victoria. When there are big road projects, they go to MRPV. We help with the design, and that includes the installation of fences or crossing structures depending on the location and the species. One of the challenges is when you end up on a road where everything else has been built around it and we are then upgrading a road in the middle. Ideally we would build a crossing structure, but we are constrained by adjacent land uses. Maybe it is privately owned on one side and on the other side you have got this bushland area that is full of kangaroos. As much as we would like to put in an underpass, it is going to go straight into old mate's backyard, so he is going to have a hundred kangaroos crossing into his farm every night. So we are constrained by existing constraints. Cost is another one. There are solutions to everything – engineering solutions, if you like, to everything – if we are prepared to pay. We could buy that farmer's land and make it into a corridor for kangaroos to go from what is now completely surrounded forest – it is bushland that is completely surrounded by housing and roads, and that is the only last place for them to get out – if we are happy to buy the farmer's land and create that corridor for them. We can raise the road and build an underpass – it is very expensive. If we want to put a canopy bridge for possums and gliders to get across, we can put the powerline that is up there already underground, so it does not collide with the canopy bridge in the air for the possums and the gliders. There are solutions – we can do it. It is a cost thing, it is a constraint thing and it is a willingness to do it.

**Moira DEEMING**: Thank you. That is good. You said that is the only way for them to get out; do you mean to get out permanently or just to travel around and go back and forth between two places?

**Rodney van der REE**: I mean to travel around, because we do not want them just to get out of a patch of forest or bush. We want them to be able to survive and move safely and persist, because at what point do we say, 'Let's just get rid of the kangaroos from this location or whatever. They're a nuisance, they're a problem.' Then we have got to get rid of them here and here – we just repeat that same thing. We need to learn how to live together with our biodiversity.

**Moira DEEMING**: Sure. But in situations where we cannot retrofit and you are faced with those problems, we have green wedges. We have percentages of land in Victoria that have to be used for certain conservations and species, and often you will have odd little corners of one development actually taken over by the state because of this percentage. I was just wondering if that could be applied somewhere like this in those situations, but that can be done separately. I was also wondering, and I am sorry if you did already say this, about whether there is research that helps predict hotspots like the ones that we have heard about earlier this morning so that we can predict. I am all about predicting and preplanning. It sounds like you are doing that work. It sounds like you already were looking at which species were in those areas. In terms of a long-term strategy, in terms of long-term legislation and policy design that integrates this from the beginning to the end and takes into account situations like you have just described, where you are actually hemmed in, what do you see as the biggest barriers to smoothing that out in terms of what red tape is in the way?

**Rodney van der REE**: I think the first thing is I am not sure who is responsible for large landscape scale planning in Victoria, so I do not know whose job it is to actually say, 'This is our master plan for the next' – it is also very complicated and difficult to do because there are lots of competing demands – 'bioregional planning that identifies where these movement corridors of animals are.' Queensland has these different levels

of corridors across the state. When we have designed roads in those places, we have had to think about, when they cross those corridors, what are we going to do for the animals at those locations? I do not think we have that in Victoria, these bioregional large landscape scale corridors that cross the state.

**Moira DEEMING**: That could be something that we could look into then.

**Rodney van der REE**: Absolutely. A recommendation to develop and legislate the location of important corridors for conservation across the state would be fantastic.

**Moira DEEMING**: I have to say that I would want some very, very stringent data as well, like you have been talking about. We have disputes over where I am, in the west, about a frog and whether it really did exist in this area where development is happening and all that kind of thing. I was just thinking about what you were saying about evidence and how that is really important. I like the things that you are saying, and you sound like you have really practical solutions, which is what we are all about. But if we are going to be talking about evidence and things like that, regarding the evidence, is there that kind of high-quality evidence that this road strike issue, these roadkill incidents, are creating really, really bad species conservation issues for particular species? In terms of how many kangaroos or how many groups of them could we actually – in a worst-case scenario, yes, we could cull them. That could be the option there. But we would still keep a great percentage of them. What is the leeway, and is there evidence that we can actually start doing these objective measurements that would be reasonable? Not to just go out and wipe them all out, but if we have got to be reasonable, we have got to be realistic – is there research that gives us this?

**Kylie SOANES**: I would say probably not. I think it is largely based on risk – the same way you are talking about hotspots, for example. One way to think about hotspots is a hotspot occurs when an important place for wildlife is suddenly severed by human infrastructure, so a road or an urban development. If we are going to be creating these hotspots by putting our urban developments in places that are important to wildlife, then we have a responsibility to ameliorate it. That is one thing just to keep in mind about why these hotspots occur and then whose responsibility it should be to fix them in the first place.

In terms of data of population decline, it is very species specific. Species that are already rare or occur in restricted population areas are the ones that are going to be most impacted by the extra mortality of roadkill. The other thing to think about is Rodney's slide where he talked about the three reasons that people talk about the roadkill issue, and one of them is from a wildlife welfare standpoint, which I think probably applies quite strongly to kangaroos, in that there are lots of kangaroos. On the whole at the moment roadkill is probably not going to be sending them extinct in the next five to 10 years, although we will likely lose local patches. But the sheer number of animals that are being maimed by vehicles I think most people find unacceptable. It is not a great way to go. I think that is where we need to be very explicit about what problem we are trying to solve, and understand that it is going to be quite context specific. Rodney's framework was a really great example of what kinds of tools are we using, and it is likely to be a whole toolbox, right, rather than one snap decision. That is the way to think about it, because we do not have the data to show that certain species are going extinct because of roads. But likewise we do not have the data to show that roads are not causing any issues as well.

**Moira DEEMING**: And they clearly are. That is not in dispute. I am just trying to work out, if we are trying to use objective measurements and things, there might be a situation where we can know that a hotspot will be created and we can pre-plan the infrastructure, like you said. I love that idea. I think that is the ideal. But we are going to have more development, so there are going to be situations where it would be better for everyone really to somehow move those species on somewhere else. And you want to keep track of numbers so you do not wipe anything out or drop them below a certain level. I am just trying to get your ideas about that.

**The CHAIR**: I am very sorry, I am going to have to interrupt.

**Moira DEEMING**: Sorry.

**The CHAIR**: It is a little bit hard when we do not have members in the room. Sorry, Mrs Deeming. We are out of time for this session, and we still have another member to ask questions. Is it okay if I get you to submit your others on notice?

**Moira DEEMING**: Yes. Sorry, I got carried away.

**The CHAIR**: Great questions. We will move to Mr Welch. Just for the witnesses in the room, we will not shorten your session; we will go a little bit into the lunch break. But if we can try and keep the remaining 5 or so minutes as succinct as possible, that would be amazing. Thank you.

**Richard WELCH**: Thank you, Chair. Thank you, Dr Soanes and Dr van der Ree. If it looks like you are going to give a long answer, I am very happy to take the answer on notice so that we can get through it. I have got a few questions. I think the Netherlands example is useful in a reverse way, in that when we are in a country of our scale, actually the viability of implementation becomes much bigger. Maybe that should be a fourth point on your three points – viable implementation of it in what we do. Around that, just a first question, Dr Soanes, on the data, and many questions came to my mind: if you do a trial on a hundred-metre section of road and it is successful, will animals just move 200 metres down the road and cross somewhere else that is viable, and then you do not know? Do you have the framework of what a viable trial should have, in terms of time, how long the trial should go for, the geographical distance it should cover and any other elements that it should have?

**Kylie SOANES**: Yes, there are frameworks for that. The issue that you just described is called the fence end effect. We discovered that if you only measure at the fence, animals do indeed just go around the edge when it is too short. And if those ends of the fences are the places that you measured as being the unfenced comparison, it also increases the roadkill in those areas and makes your fence look really super effective, because everywhere the fence is not, animals are dying, even if the fence is the cause of that displacement. There are frameworks in science to help guide that. It can be very species specific. So for an animal that moves a long distance, we need a longer fence and a longer measure of evaluation; it has to be appropriate to the ecology of the individual species. But there are frameworks to guide that.

**Richard WELCH**: Thank you. If you could provide to the committee any documentation you have around that, that would be lovely. I am a big believer in technology, but again there is that question of scale, of implementing technology at the Australian roadside scale and maintaining it – the cost becomes really, really challenging. Are there more natural ways? I know we talk about land bridges and shaping landscapes, but are there smaller scale things that we could do in terms of what we plant or where we put artificial water sources or other natural triggers that trigger instincts, maybe at a scale that, say, Landcare groups could do around that? Is that a viable idea?

**Rodney van der REE**: I think there is some merit in it, but it has got to be very localised. For example, on the Calder Freeway there is a location where there are a patch of trees on one side of the road and there is a farm dam on the other side of the highway, and we would have a hundred kangaroos crossing every night through a culvert to get to that dam and then back to the forest to sleep during the day. So if we knew where that was happening, we could come up potentially with some of those less intensive, less cost-prohibitive solutions. But it has got to be on a case-by-case basis. I think it is part of the toolkit; I do not think it is the full toolkit.

**Richard WELCH**: Yes, thank you. The other point would be that, as we build infrastructure, what becomes prohibitive is if we have to do very particular studies unique to each location every time – it adds to costs, it adds to time, it makes it less likely to happen. On roadsides where every 5 kilometres or something we have an emergency telephone or something of that nature, could we build something standardised into roads so that every 1 kilometre we have an animal culvert and it is just standardised? It may not be the most optimal place, but because it is standardised we keep the costs down, there will be more of them and therefore they are more likely to work?

**Rodney van der REE**: I think that could work if it lines up. So if a culvert is every kilometre and that is the rule and that culvert turns out to be between two houses, yet 50 metres up the road away from the house there is a little bit of bushland. I think a standard, like approximately every X kilometres, and provided it is in the habitat for the species, has some merit. But I do not think the blanket 'every X kilometre distance' as a rule will work, because what we have found is that high rates of use of these crossing structures are when we put them in the best habitat for the species.

**Kylie SOANES**: People are less likely to adopt that rule if they feel that it is frivolous, and then it becomes another piece of red tape and a barrier to implementation when what it should be is something that is facilitating a good action.

**Richard WELCH**: Thank you. My last question –

**Rodney van der REE**: Finally, I think we –

**Richard WELCH**: No, we will have run out of time, so I just need to get one more question. If you have got some more, please provide it. If you can provide it, that would be very valuable. We who care about roadkill are our own worst enemies, because the people who are most passionate about this issue join volunteer groups and align to those volunteer groups, and they are the ones gathering most of the data. The key obstacle to overcoming that, it seems to me, is getting that universal point of truth in the data so that we know where to invest. But to do that we actually have to get the individual volunteer groups to give up strong senses of allegiance to the groups that they are in to work to a common system. Do you have any thoughts on how that can be overcome without killing the passion of those volunteers?

**Rodney van der REE**: A universal app on your phone, because it is not just carers who will record this information, it is travellers, it is road users, it is quite a large percentage of the population that will collect –

**Richard WELCH**: Dr van der Ree, that will mean group A need to give up their app and group B need to give up their app. 'Our app is so much better than their app. We don't like the new app, and we are going to keep using our app.' That is the structural challenge.

**Kylie SOANES**: There are centralising data. The Atlas of Living Australia is a good example. It is a public platform that has all sorts of sightings of nature, and it draws its data from multiple other sources, like the Victorian Biodiversity Atlas, from iNaturalist, from global databases. Every time there is an app, there is a community that owns the app. So having a public platform that siphons all of that data is one way to get around that, because then people are using the app that they feel comfortable with, but the data is going to a centralised place.

**Richard WELCH**: Yes. Thank you. Thank you, Chair.

**The CHAIR**: Wonderful. Thank you so much, Mr Welch. Dr Soanes and Dr van der Ree, thank you so much for appearing before us today. And I am very sorry that we went a little bit over time. We will need to move to the next session now, but some members may submit questions to you on notice after the hearing. Thanks so much. Have a great day.

**Rodney van der REE**: Thank you for having us.

**Kylie SOANES**: Thank you.

**Witnesses withdrew.**