LEGISLATIVE COUNCIL ECONOMY AND INFRASTRUCTURE COMMITTEE

Inquiry into Wildlife Roadstrike in Victoria

Geelong – Wednesday 20 August 2025

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WITNESSES *(via videoconference)*

Dr Christine Connelly, Lecturer, Environmental Science, Victoria University; and

Ron Day, Phillip Island Community Member.

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 get committee members to introduce themselves to you, and we will start with Richard on the screen.

Richard WELCH: Good morning. It is Richard Welch, Member for North-East Metro.

John BERGER: John Berger, Member for Southern Metro.

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

The CHAIR: Georgie Purcell, Member for Northern Victoria.

Katherine COPSEY: Katherine Copsey, Member for Southern Metropolitan.

The CHAIR: Thanks, everyone. 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 the 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, can you both please state your full name and any organisation that you are appearing on behalf of.

Christine CONNELLY: Yes. It is Dr Christine Connelly, and I am here as a representative of Victoria University.

Ron DAY: Ronald Day. I am here as an individual.

The CHAIR: Thank you both. We now welcome your opening comments but ask that they are kept to around 10 to 15 minutes max to ensure plenty of time for discussion and questions. Just for any members of the public watching via the live broadcast, this presentation might have a few images of deceased animals.

Visual presentation.

Christine CONNELLY: What I am presenting today are the results of our long-term study looking at the impacts of virtual fencing as a measure for mitigating roadkill, which has been fairly popular amongst the community. But we, unfortunately, found that it is not a successful roadkill mitigation measure. I detailed that in my submission to the inquiry, and now I just want to provide some more details and context around how we conducted our study and why we believe our study is the gold standard. I just want to acknowledge that this is a collaborative work that was carried out by me, Ron Day – who you are going to hear from in a moment

regarding some of the practicalities associated with using the virtual fence – and Dr Duncan Sutherland, who is from Phillip Island Nature Parks.

I will just start by explaining, for those who do not have a good understanding of what virtual fencing is, how the technology works, to my understanding. These are devices that are a number of bollards that sit on the side of the road and are triggered by approaching headlights to provide both an auditory and visual stimuli to any wildlife that is sitting on the roadside, usually on the verge of the road. Quite often we are targeting here wildlife that is foraging for food and other resources on the side of the road. It emits a series of flashing lights and siren sounds. They are not particularly loud, but the premise is that they are loud enough to dissuade or discourage wildlife from crossing a road or from entering a carriageway at the time of a vehicle crossing. These devices operate at night-time, which is really beneficial in the context of Australian wildlife because a lot of our target species that are frequently encountered on roads are marsupials, which are usually diurnal, but it can work on a number of other species that are active at night as well.

There was a study in Europe, in Austria, that found that these devices were highly successful in relation to ungulates, so that is hoofed animals, over there with regard to discouraging them from crossing vehicle carriageways. This was seen as a significant success, and so other countries have tried to, particularly in Australia, adopt this technology as a roadkill mitigation strategy. As far as I have been able to glean, this study in Europe has not been validated by a peer-review process, which is the gold standard when it comes to scientific research. It was presented at a conference and has since then been picked up as the, I guess, flagship study for this particular device.

In Australia there have been attempts to replicate that success, and initially it was looking like it was going to be an excellent solution because there was a study by a number of researchers in Tassie who reported a 50 per cent reduction in roadkill in the area where they had employed the virtual fence technology. But unfortunately this was heavily critiqued by other researchers in the scientific peer-reviewed literature. There has been some critique where there was essentially a conversation in the peer-reviewed literature about the efficacy of this trial, critiquing in particular the study design, which is really important in any kind of trial of this type. Further studies have not indicated that there is any significant effect of the virtual fence, so the results of Samantha Fox and her colleagues have not been replicated.

What I want to talk to you today about is our study design in particular. Importantly, we also were not able to replicate that successful reduction in roadkill in our study, but particularly our study design has been appraised as a gold standard by at least one of these critical academics who have critiqued other studies. We did our study on Phillip Island, which is a place of, unfortunately, particularly high wildlife roadkill, and there are previous studies that give us a good understanding of where the hotspots for roadkill are. For those of you who might not know about Phillip Island, it is about 120 k's south-south-east of Melbourne. It is about 10,000 hectares in size. It is predominantly agriculture, so 60 per cent of the land, roughly speaking, is used for farming; 20 per cent is, roughly, urbanised, though that number is increasing; and then the remaining 20 per cent of the island is a series of nature reserves. Critically, it is a major tourist hotspot. We have around 1.85 million people visiting the island each year. The majority of those are self-drive tourists, which equates to a lot of traffic and also an enormous number of witnesses to the excessive loss of wildlife that we see on the island. Unfortunately, as a wildlife tourism destination, that is very worrying. What I am showing on the screen now – as well as a map of Phillip Island and those orange circles and blue circles showing where the hotspots are – are the outcomes of a study that was published in the peer-reviewed literature in 2021 comparing roadkill numbers from the late 90s to now and showing that massive increase, particularly focusing on wallabies and possums as being those species that are being hit by cars on our roads.

Now I will just explain our study design, and I will try to do that as quickly as possible. We did our trial into virtual fencing on Cowes-Rhyll Road, which is a fairly major thoroughfare for traffic travelling between Rhyll and Cowes, two of the townships on the island. The section that we looked at is 3.6 k's, and as I will show in a moment, it is situated between two conservation reserves. We set up fenced and unfenced sections with buffers around those so that we can account for the movement patterns and essentially ensure that each segment can be considered to be independent of each other. By having those buffers in between, we were not getting the effects of the virtual fence pushing animals to cross the road in other locations and therefore perhaps pushing up the results in the unfenced section and artificially giving us a good result in terms of the outcome of the study.

Importantly, our study was carried out over three years. I am yet to discover another study that has looked at the effects of virtual fencing for as long as we did. We started our study in 2019, and in the first two years we employed a gold-standard study design known as a 'before–after control–impact', where we had both controls and impact sections. Much like in a medical study where you might have controls for a particular drug intervention, we had controls for the intervention of the virtual fence, and then we had a crossover period. I should mention as well that we had a before and after period; before, we monitored the entire road for a year, and then a year afterwards, so that we were able to account for any seasonal variation. And then we did a crossover design, which even elevated our study design further, so that we had the study location crossed over so that we could eliminate any impacts of location of the virtual fencing on the results of our study.

Here you can see that the road runs through a number of conservation reserves, which essentially provide a continuous habitat connection from the north-eastern part of the island and right through to the middle of the island, important resources for wildlife on either side of the road, so lots of reasons for them to cross. You can see that the purple sections were fenced in the second year of the study and the yellow sections were fenced in the third year of the study, when we had the crossover.

Here is Ron carrying out a wildlife survey. He surveyed the road three to four times a week, geolocated every single instance of roadkill and took photographs and identified any biological features – age, sex, all of those sorts of things.

We used a generalised additive mixed-effects model, which is probably something that most folks out there might not understand, so I will try to explain it. Basically what we did was tried to use our analysis to tease apart the impacts and isolate the effect of the virtual fence from other factors that might influence the roadkill numbers. What we are interested in is the influence of both time and the presence of the virtual fence. It is essentially acting like a smart filter, this type of analysis, so that we can see the real signal in amongst the potentially noisy data that might have other effects, like seasonality.

Over the course of our study – 38 months in total – we had a total of 1127 roadkill instances, comprising 24 species, which is a really unfortunate number of roadkill. The death rate for our study was about 8.24 individuals that were killed per month per kilometre, which is much higher than previous studies, but noting that the other studies have focused on the island as a whole, whereas were just looking at the 3.6 k stretch of road that is a hotspot.

I just want to not necessarily ask you to interpret these graphs, but what I want you to do is to focus on the 'P' at the bottom of these graphs. What we are looking at is the statistical significance between the interaction terms – this is getting a bit heavy and jargony, I am sorry – of both year and roadkill rate. So when those two are interacting significantly, that tells us that the virtual fence has an effect in some way or that there is a result that is worth us looking into further. The blocks themselves overlapping tells us something as well. It means that they are not significantly different. So if there is an increase or a decrease, it is usually only a minor effect that we cannot attribute to the virtual fence itself. So what we found – sorry, I should go back one – was that across all species, the virtual fence did not have a significant effect. So having the virtual fence in place for two years with the location swapped in year 3 did not cause us to see a decrease in roadkill at all across all of the roadkill that we encountered.

If we drill down and look at those two groups of species that are our main contenders in terms of deaths on our road, we are actually seeing that we saw a slight increase, which is statistically significant in the fenced area for wallabies, which weakly – and I say 'weakly' in a statistical sense – indicates that there were actually more deaths of wallabies in the section of the fence that had the virtual fence. So in this crossover phase, we switched the location of the virtual fence such that the segments that were previously unfenced became fenced and vice versa. And so now in our study, we found that after that change the segments that had the virtual fence had an increase in roadkill whereas the segments where the virtual fence had been removed showed a decrease in roadkill. This was our only statistically significant result, which I have highlighted there with that orange box. Looking at possums, again, neither of the results were significant, and there was not any real difference in when the virtual fence was in place versus not.

So how do we interpret this? There is no significant effect of the virtual fence as far as our study shows. We can say that the rate of roadkill on Phillip Island is really high and we really need a management intervention, but virtual fence is not the solution in this situation. In our study we think that the location was more important in

determining whether or not animals were killed. It did not matter whether the virtual fence was there or not. And of course there is lots more work that needs to be done if we are going to pursue virtual fencing as a potential mitigation strategy. We do not recommend it as part of our study, but if folks want to look into it further, we would encourage them to investigate this technology with the rigour that we have used – so three years, one year of before data and then two years of after data with the location of the virtual fence swapped. And further, we would encourage investigating, looking at different types of strategies.

I will just leave you with a video here of a virtual fence going off and not much happening with a wallaby. I have got further videos, if you can see them on the screen there, of wallabies doing absolutely nothing in response to this. In fact if you look at the image on the video on the right, the wallaby enters the road carriageway after the virtual fence goes off. That is just some anecdotal evidence to finish. I will now hand over to Ron, who is going to tell you a little bit more about the practicalities of working with the virtual fence and some of the issues that we encountered as part of our study.

Ron DAY: Thanks, Christine. I look at it as Christine and Duncan being the scientists. I am the tradie that did the manual work.

I would just like to make the first point my evaluation of virtual fencing and wildlife protection on Phillip Island. I can tell you that, just three days after the virtual fencing system was installed in April 2019, I observed a wallaby undisturbed beside an active virtual fence bollard in the darkness. The animal appeared unaffected by the flashing LED lights and, presumably, the warning alarm. On testing the unit the following day, I confirmed that it was operational. Also, the virtual fence system proved not to be a simple set-and-forget installation. Throughout the trial, numerous issues arose. Twelve devices were stolen and had to be replaced; some devices became non-functional due to ant infestation, water ingress, condensation and cobwebs; and several devices suffered damage from vehicles, roadside mowing or verge maintenance. As a result, all these units had to be replaced.

The installation on Phillip Island was the second of its kind in Victoria, following an earlier installation by VicRoads on Wellington Road north in Lysterfield. That installation was at Lysterfield Park there. In February the installation established the approval precedent for roadside virtual fencing in the state. In other words, up until that installation on Wellington Road there had been no approval for installing these sorts of devices along roadsides. But once VicRoads had installed an installation, that set the precedent that they could be installed throughout Victoria. When I inspected the Lysterfield site early this year, it appeared neglected and abandoned, with multiple devices missing, broken, smashed or with mounting bollards bent almost to the ground. Testing of some of the units revealed they were non-functional, so the state of that installation indicated that it was not worth maintaining.

I note from the submissions that many submissions to the inquiry expressed strong support for bridges and tunnels to provide wildlife with safe passage across roads. Research indicates these structures are effective. However, on Cowes-Rhyll Road I argue that such measures are impractical for several reasons, and I will list some of them. There is uncertainty about the number and placement of crossings required along the 3.6-kilometre section of road, with potential costs reaching possibly in excess of $1 million. The guiding fencing to the crossovers would eliminate much critical bush habitat and would require clear space along the fence lines for fire access and maintenance. Our roadkill research shows a high proportion of bird fatalities, which crossings would not address. Phillip Island Nature Parks has successfully eradicated foxes from the island and is actively working to eliminate feral cats with support from Commonwealth subsidies under the Ramsar convention. Parts of the road border the Rhyll wetlands, a section of the internationally recognised Western Port Ramsar site.

As a result of these pest control efforts, nature parks are reintroducing vulnerable and endangered species to the island in partnership with organisations like Melbourne Zoo and Parks Victoria. So far, the eastern barred bandicoot and the bush stone-curlew have been released onto the island. Regrettably, during the eight-month data recording period – that is the current recording period – eight bandicoots have been recorded killed, and prior to the study a curlew was struck and killed.

I maintain allowing just a couple of extra minutes of travel time on this road could significantly contribute to the success of the species reintroduction program. From 1 January to the present 265 animal deaths have been recorded on this road, involving 20 species. There is a clear need for reduced speed limits. I recommend

implementing dynamic driver-interactive solar-powered LED signage to indicate enforceable – not merely advisory but enforceable – speed reductions. Suggestion: reduce daytime speeds from the existing 80 kilometres to 70 kilometres an hour, and further decrease the speed at night to 50 kilometres per hour. That is when most of our kills are occurring. As indicated in my written submission, I have been advised that because changeover speeds from dawn to dusk and then dusk to dawn are not fixed time settings such as at school crossings, such a system does not comply with Australian road standards, and it would require the federal minister for road transport and safety to approve such a trial.

I refer any further comments to my submission, but that is what I would like to say today. Thank you for your time.

The CHAIR: Thank you so much, Ron and Christine, for that really great presentation. I might kick off with a couple of questions, and then we will go to other committee members. You have spoken about the virtual fencing trial being largely unsuccessful on this stretch of road, and obviously, Ron, you have highlighted speed limit reductions as a simple, cost-effective way that we can reduce wildlife road strike. Are there any other emerging technologies or examples used overseas that you are familiar with that we could also apply in wildlife hotspots?

Ron DAY: I am not familiar. Christine may be.

Christine CONNELLY: I know that there is some work being done looking at the RooBadge, I think it is called, with Volkswagen. That is in Australia, and my last check-in with that project, which would have been I think probably a year or so ago, was that researchers were undergoing behavioural trials. That I think is really important and particularly something that appears not to have been done, to my knowledge, with the virtual fence. A key error I think is having a mismatch between behavioural responses to stimuli and the appropriateness of the technology. So to my understanding that is an investigation into a technological solution that might be suitable for macropods, so wallabies and kangaroos.

As far as other work overseas goes, I am aware that there is some work being done looking at using AI to help drivers to identify, potentially, wildlife on the road. I have spoken to someone who was looking at doing a trial into that, but that was also in Australia. I am not aware of any other technological solutions, but I have to say I have not looked at it in depth. I have been very focused on our project and the Australian situation.

One thing, though, that I would add as a word of caution with looking overseas is that there is potential mismatch with technology that is developed for species that come from a very different biological situation to ours. In particular, one of the things that was brought up by Associate Professor Graeme Coulson in his critique of the study of virtual fencing in Australia is that there is a mismatch between the wavelengths of light – this is just one example – that is emitted by the virtual fence devices and the cones within the eye structures of marsupials. Just blanket applying technology from overseas – I would do that with significant caution and consideration of the biology of our species, I think. I do not have any particular solutions for you but more cautionary tales, I suppose.

The CHAIR: That is fine. There is actually a company called Cherrp that is using AI to deter birds with great success. It will be interesting to see if that can be expanded further into macropods and other animals. Sort of peeling it back to basics and not so much looking at new technologies, would certain things like rope bridges, underpasses or overpasses have any impact on stretches of road like the one you looked at?

Christine CONNELLY: For the particular situation that we are looking at, I do not think any of those solutions are appropriate. Perhaps they might have a mild impact, but because we are looking at a site that is a smaller road that passes between two very significant conservation reserves, the infrastructure would be challenging. I am not quite sure how it would work in our situation. Also, one of the things I skipped over in our talk is that we had an enormously high, like an order of magnitude higher, number of wallabies, so they are unlikely to use any of those structures unless it was an enormous underpass. Thinking about the target species is really important and what they are likely to use. What I would like to implement a trial on is exactly what Ron is proposing. I should have given him more of a preamble, but what he is proposing is what I as a researcher would like to see, which is that we actually trial a speed reduction that is dynamic and appropriate to the conditions in Australia, where we have many species that are crossing these roads at night-time rather than during the day. That is what I am very keen to see from the perspective of a researcher.

The CHAIR: Yes, great. Thank you. This might be one for both of you. One thing that has been really, really clear throughout the hearings we have had so far is just how valuable information and support from volunteers are in responding to this crisis, and that is something that I think is really important – that it is not taken away from them but rather supporting them. Could you tell us just how valuable community-led data collection and citizen science have been to the work that you have been doing?

Christine CONNELLY: I might start with that, because Ron is a citizen scientist and has contributed all of his time voluntarily. My background is actually in citizen science and I used to run a statewide citizen science program, so I am absolutely, 100 per cent on board with the community providing an enormously valuable resource with regard to this, because we are looking at, from a science perspective, a lot of data points that cannot be collected within the budgets and time constraints of researchers. However, I have a caveat there. As someone who is a strong advocate for community involvement and citizen science – like I said, I worked for a community organisation running a citizen science program, so I just want to make clear that I am hugely supportive of community input and citizen science and the data that can be provided by citizen scientists and community – what we have discovered through the course of doing our trial on virtual fencing is that we need to build in and make sure that the science is in there and, particularly from the perspective of our study, that there is rigour around study design. There is a lot of data coming out in support of virtual fencing. But once we drill down and look at what is the baseline that they are comparing to, do they have control segments or control locations even and impacts and what is the time period that the data is being collected over, it does not stand up to the rigour that is required to properly test this and any other sort of technological intervention. So a caveat there: I absolutely, wholeheartedly, fully support and think we need to support the community in collecting data, but we need to have a good scaffold around how to do that scientifically.

The CHAIR: Thank you so much for that. Those are all of my questions, so I might hand over to Mr Welch.

Richard WELCH: Thank you, Chair. Thank you, Dr Connelly. Thank you, Ron. First of all, I really want to congratulate you on the rigour that you are applying to it. I think you have hit the nail on the head there. There is a real risk of falling into confirmation bias in some of these works, so it is probably a bitter pill that the findings were such. Could I ask just a couple of questions around some of the variables that you were controlling for? Were you monitoring traffic volumes as well along the route?

Christine CONNELLY: We did actually. Sorry, Ron. I might talk to the study design. This is very hard for me to explain in 10 minutes, or more than 10 minutes – I am sure I went well over 10 minutes. But it is really hard to explain the nuances of the study design and how that actually accounts for all of this variation. What we did, essentially, was we had a traffic counter in, and we do have that data. However, it is not necessary for us to consider it, and I will explain to you why. When we do a before–after control–impact study, we can compare that in two ways. We can compare the traffic volumes. Presumably there is a lot of seasonality in the variation, particularly on an island like Phillip Island, so we can compare year 1 to year 2 and essentially not worry about that. We just have an assumption. Well, I guess in this study that assumption is yes.

Richard WELCH: Yes, I get what you are saying.

Christine CONNELLY: We get some variation that occurs seasonally, so we account for that. The second thing that we did was to have in place, in situ, at the same time a control – in fact two controls – and two impacts. They are tracking through the time. We would assume that traffic volumes are going to go up and down at the same rate across the entire stretch of the road. Therefore we are eliminating that need for us to actually investigate traffic volumes as a cause.

Richard WELCH: I have got you, yes.

Christine CONNELLY: What we can do, now that we have essentially eliminated the virtual fence as being influential in our study, is start to look at traffic volumes and see. But for the purposes of understanding what happened with the virtual fence, we have eliminated the need to do that because we are tracking those two things at the same time exactly the same. They are subject to the same traffic fluctuations. That is why our study design is one that I would really strongly advocate that others take on board.

Richard WELCH: Thank you, Doctor, that makes perfect sense.

Christine CONNELLY: Great. It is tricky to explain.

Richard WELCH: No, no. You explained it well. The other variable I am curious about – and we have heard from other volunteers – is if the extent of roadside vegetation was a constant across it, and I guess to expand from there, do you think that is an interesting variable to be investigated?

Christine CONNELLY: Once again, because we had a crossover design in our study, the answer to the first part of your question is, yes, there is a lot of variation – well, there is variation; I will not say 'a lot' because there are some consistencies throughout that stretch of road. However, once again we accounted for that with study design, which is the best way that we can do that, rather than retrospectively looking at, 'Well, did this type of vegetation influence crossing behaviour?' So we used that crossover to actually switch the locations of the fence so that if, say, there was an impact of a water body being a resource that was accessed on one side of the road and the roadside vegetation providing a preferred thoroughfare to where the fence was or where the fence was not, we eliminated that variation by swapping them over for an entire year and once again tracking all of that seasonal variation throughout that year. Our study design accounted for that as well, without actually directly measuring the roadside vegetation. That said, I would think that it is something that is significant in influencing road-crossing behaviour, and there has been other work on the island. There was a PhD candidate, Manuela Fischer, who wrote her thesis about these sorts of things, who explored the influence of roadside vegetation on crossing behaviour and found that it was significant.

Richard WELCH: Right, so it is an avenue for investigation.

Christine CONNELLY: Absolutely. Yes. But in terms of trialling a technological intervention, I think it is, once again, study design and designing a study, a trial, well from the beginning is what needs to happen. I am going to keep repeating that because it is my –

Richard WELCH: Isolate your variables –

Christine CONNELLY: That is right.

Richard WELCH: ambiguity, et cetera.

Christine CONNELLY: Exactly, exactly – absolutely critical.

Ron DAY: If you just want a sample of the volume of traffic on that road, I have a three-month window of November–December 2019 and January 2020, the number of vehicles and the speeds recorded of those vehicles. Over that three-month period we had 188,496 vehicles recorded, that is in both directions. Speeds were between 80 and 95 kilometres an hour, 37 per cent were exceeding the speed limit, and a further 6 per cent, 10,554, were exceeding 95 kilometres an hour on that section of road.

Christine CONNELLY: Yes, speed limit is clearly an issue on our stretch of road. Well, in fact the non-observation of speed limits, but anyway.

Richard WELCH: I guess, then, the general question – because having worked with a technology, you would then I guess become more conscious of the limitations of any technology, that there are some things that technology cannot grasp, cannot do. Do you think this has disproven the concept regardless of technology, or do you think there are still possibly technologies that could do it, or do you think it would be very difficult for them?

Christine CONNELLY: I do not feel that I can answer that question, but what I can answer, or perhaps put forward, is that this experience – and indeed others that I have had throughout my research time – indicates to me that we need trials, and that is before-market trials as well as aftermarket trials, to investigate the efficacy of any mitigation measure that relies on technology. In fact for any mitigation measure – I mean, I am being a scientist here – we need that rigour in trials to help us to tease apart whether or not any mitigation measure is –

Richard WELCH: But you would now have a better appreciation of the challenges any technology has to overcome –

Christine CONNELLY: Absolutely, in terms of, as I have already explained, ensuring that there is a match of the technology to the biology of the species that we are targeting, you know, before we release it into the wild, so to speak – making sure that the behavioural responses in particular have been tested, which are notoriously challenging to test, and then testing it in situ, as we have, with the rigour that we have applied.

The CHAIR: Just one more if that is all right, Mr Welch.

Richard WELCH: Very, very, very quickly. It may not be in the scope of what you did, but did you do any – at the end of the day this is what the cost of this or an equivalent technology might be, what its return on investment might be?

Christine CONNELLY: Yes. This is more Ron's domain.

Ron DAY: Well, I am quite keen on two speeds on that road, a day speed and night speed. I have discussed this with a Sydney company, a Sydney road sign company, and indications are that supply of four of these signs, just four signs, would be in the vicinity of $60,000. By the time you add in transport and installation costs, you are probably looking at $100,000 or a bit over $100,000 for an installation on that road.

Christine CONNELLY: I guess, speaking to return on investment, we have an extraordinarily high roadkill rate on this road; in terms of the per-kilometre roadkill rate, over eight individuals are dying per month per kilometre. If we were to then extrapolate that out as a return on investment –

Richard WELCH: You would have to look at insurance costs as well as –

Christine CONNELLY: Of course. There are a lot of associated costs, and the adjacent costs are important to consider. But where we have areas of road – and this is where that community data will come to the fore, where the community has enabled us to understand that we have extraordinarily high roadkill rates – I think it is worth investigating those solutions that might be more costly and might be appropriate in those instances.

Richard WELCH: I will leave it there. Thank you, Chair. Thank you, Dr Connelly. Thank you, Ron.

The CHAIR: Thanks, Mr Welch. We will go to Ms Copsey.

Katherine COPSEY: Thank you. Thanks so much for your submission and for all the work that has gone into it. And particularly to Ron, I just wanted to open by saying thank you. It is a very difficult task that you took on, and I am sorry that this technology has not delivered the hoped-for result. But thank you for your determination to keep working towards a solution and for presenting to the inquiry.

To follow on from one question Mr Welch just asked and what you referred to, Dr Connelly, before about species-specific interventions that suit our country and our animals, one thing that I have been considering is the growing use of collision detection and avoidance technology in private vehicles, particularly as electric vehicles start to become more and more a feature of our private car fleet. I just wonder if you see that that can have potential, but it will probably require companies to consider the species that people are likely to hit on Australian roads.

Christine CONNELLY: Yes, that is right, and to understand the nuances around how to identify those before they enter the carriageway and those sorts of things. When I was referring to Georgie's question earlier, referring to other technological solutions, that is exactly what I was referring to. There is a group, I cannot remember where they were, but they were trialling something like that. It was more of a detection and driver-alert system. I would have to get back to you with information about that solution. I am not sure if you have had anything submitted to the inquiry yet regarding that, but I was made aware by a colleague in WA, I think it was, relating to that sort of technology being trialled. They were looking at it in a very limited spatial area, I suppose, because I think it was on an island, from memory, so the applicability of what they are looking at Australia or Victoria wide, again, it needs further – I come back to everything needing that rigour behind testing before we can adopt it as a solution. It may be that it does well with some of the larger animals, the macropods, but does not do quite so well with – for example, we have had an eastern barred bandicoot killed on one of our roads, so it might be much harder for them to detect those smaller species. I cannot speak to the specifics of it, but it does hold promise. That said, I thought the virtual fence held promise for our situation, and unfortunately it did not deliver on that promise. But it is worth investigating these things, I think.

Katherine COPSEY: Thank you. It is a great segue to my next question. I think what your submissions demonstrate is the importance, when government is looking at putting in place solutions, of monitoring the effectiveness of those. If you could just speak to the kind of quantum and rigour that needs to be applied by governments, in terms of funding and resourcing, to make sure that the solutions proposed are actually

working. Thinking of the sort of abandoned project that you have spoken to, Ron – that is a poor outcome, in my view. What kind of resources do you require in order to monitor effectiveness?

Christine CONNELLY: Yes, it is really hard, because not every project has someone as dedicated as Ron who can – I am not sure if it hit home as I was talking, but Ron goes out there nearly every day and monitors this stretch of road, and that means that we can be sure that we are not missing any roadkill. He has had good communication with council about their removal processes, with the local wildlife carers about their checking processes and the moving of carcasses and so on. I think there are ways that we could potentially pool more – we have had the luxury of having Ron and having him doing this very rigorous data collection. The rigour comes in two forms. One is the study design, and I have already I think – I hope – hit that one home. But the other form is in terms of the data collection process, and that is what I am talking to more now. And Ron, in terms of the sort of support – we tried at one point to have someone else work with Ron, but we could not seem to find someone who was quite as able to continue with the rigour that you have. So what –

Ron DAY: Well, I guess I am in probably a bit of an unusual situation in that I am retired and I am still reasonably fit and active. I will just give a little bit of history here if we have got the time. Being an ex-farmer and an ex-businessman, when I came to the island and saw the amount of roadkill taking place – and believe me, I am used to killing my own animals for consumption, and deaths do not worry me. But I was just astounded with what I saw on the island, and I felt that something had to be done about it. I made it my business to stick my nose in where it was possibly not welcome at first. As far as – well, I can only speak for myself. That is the situation I am in. I had the support of my wife for a number of years – very strong support – in what I was doing.

I could give you an idea of the process that I use to monitor the roads if you like. It will only take a few minutes. When I first started – well, you saw on the screen there the sign I would put on the back of the car: 'Wildlife survey'. Before I started I went to the police station and told them what I wanted to do and asked whether it was appropriate, because in doing the survey I travel at a very low speed, 30 kilometres an hour, and I travel with my hazard lights on. You are continually watching your mirrors for vehicles coming up behind you, and fortunately on this particular road we have wide verges and I am able to pull off the road and allow vehicles to pass by. Also, this road is 3.6 kilometres, it is near home and it actually has two runs. I go out, do a U-turn and come back, so it is actually inspected twice on the one trip that way. You would be surprised how many animals you pick up on the return trip that you did not see on the outward trip. Apart from that, I suppose there is an accumulation of mileage, which I am quite prepared to cover myself – I am not looking for any compensation at all – but I just do not know how many other volunteers would be in the same situation as me and have that particular road where you can safely pull off and allow vehicles to pass by. If you were doing that on a narrower road with very narrow verges, you would run into a lot of angry motorists.

Katherine COPSEY: Thank you.

Christine CONNELLY: Just to tie it into your question, I think critically, with funding support or anything that is coming out of government, I would encourage government to have a perspective of requiring funded projects to have a trial and making sure that within their funding applications they have adequate support for that trial and that that is something that government builds in to their expectations. That is just coming from me. I have always been on the other end of grants, not on the giving of grants. But yes, something along those lines I think would help to support others to do what Ron has done and to ensure that study design rigour as well.

Katherine COPSEY: Thank you. My very, very, quick last question is: Ron, you have obviously spoken about your preferred solution here, which is the dynamic speed controls, but you have also identified that there is an existing enforcement problem in terms of speed limits in this section of road.

Ron DAY: Sorry.

Katherine COPSEY: You have identified that there is an enforcement problem in this section of road with speed limits which you would like to see actioned – just confirming that.

Ron DAY: With these particular signs that I am talking about, it would not be difficult to fit cameras for detecting speeding motorists with a view to prosecution. That is something that could be extended on these signs. It would be quite easy to have point-to-point speed calculations, because already the signs have radar detection on them. These signs not only warn motorists, but they do road monitoring at the same time. They

count the vehicles, and they also determine the speed that these vehicles are doing, and that can be reported. This particular company monitors the signs 24/7 for operational function and also for battery capacity. So, yes.

Katherine COPSEY: Thank you.

The CHAIR: Great. Thanks so much, Ms Copsey. I just want to note that were meant to finish this session at 11:50 and the next witness is in the room. We have two more members to go with questions. So if we could try and keep answers just as tight as possible so we do not get too behind schedule, that would be amazing. I am so sorry to rush you.

Christine CONNELLY: No, that is fair.

The CHAIR: But we will go to Mr Berger.

John BERGER: Thank you. Chair. And thank you both for your appearance today. Ron, just a quick question for you. I notice on that Cowes–Rhyll Road where you did the survey it is heavily timbered on both sides. Mr Welch spoke about the roadside vegetation. If you were able to limit the roadside vegetation, what effect would that have?

Ron DAY: On the verges?

John BERGER: Yes.

Ron DAY: During the study the verges were widened probably by an extra metre, and to my way of thinking it only encouraged the animals more to the verges for the extra feed and the moisture available on the verges from the runoff from the roads after it rained. Even if it rained lightly, you still had water there available for the animals to come onto the verges. So to my way of thinking, although from a visibility point of view – of seeing animals on the verges and perhaps slowing down because you have seen them – my feeling is that the verges are encouraging more animals onto the roadside.

John BERGER: And how does that fit on the Rhyll–Newhaven Road – because there is no timber either side of it? Is road strike just as prevalent there?

Ron DAY: It is quite considerable. In fact, we had a road speed review which was implemented in December 2021. That road was originally 100 kilometres an hour. We managed to get that down to 80 kilometres an hour. And just a casual observation: along that road, which I travel quite frequently, there has been a reduction in roadkill. No, there is not a significant reduction, but I am not doing a proper survey. It is just a casual observation. And I believe there are less road kills there now than there were before.

Christine CONNELLY: Taking that 'casual' though with knowing that Ron is very aware of how to monitor these sorts of things.

John BERGER: I think that observation is fairly instructive as to your point about reducing the road speed. Thanks, Ron. Thanks, Doctor.

Ron DAY: Thank you.

The CHAIR: Thanks, Mr Berger. We love it. We will finish with Mrs Broad.

Gaelle BROAD: Thank you very much. And I agree with that: it is important to acknowledge, Ron, the work you have done, because seven years of doing it a couple of times a day, that is an impressive effort. So we really appreciate that and, Christine, your contribution today. I guess I am happy to put a few things on notice if we need to because of time. But I am just interested that the number of incidents, you said, seem to have increased from those dots that you were showing early on over the three years, but has there been any sort of tracking on animal population numbers in Phillip Island? Who monitors that?

Christine CONNELLY: There are estimates, but it is hard to directly track those population sizes. With regard to the dots on the graph, were you referring to the original ones where I was showing not the results of our study, but rather the changes in roadkill rates as a whole? Is that what you were referring to?

Gaelle BROAD: Yes. It was over a thousand incidents that you referred to. I am interested too in birds – how much of a percentage is that of the overall rate? Do they contribute? You had magpies in there as well, or different species.

Christine CONNELLY: By far wallabies are our highest – I am just trying to pull up the slide; I can reshare it if you like. Swamp wallabies are probably more than twice the count. Overall, 1127 – we had 447 swamp wallabies. From there the magpies ranked fifth, I think, and there were 61 of them over the total time of our study.

Gaelle BROAD: Okay. Would you think that there has been any increase in the overall animal population, or is it not something you have been able to monitor, as you said?

Christine CONNELLY: Once again, it is something that is well accounted for in our study design, because we are tracking unfenced and fenced sections that are independent of one another through time. So any increases in population are accounted for in the way that we designed our study. But that said, I mean, I am not sure. We have not specifically looked at that, so I cannot tell you. The only proxy measure that I have for that is if we see an increase in roadkill numbers. The numbers were quite all over the place – up here, a little bit down there – but nothing that was statistically significantly different, which is maybe not quite the answer to the question that you are asking. Certainly I would suggest that population fluctuations have not been at all influential in this study, but if we look at reflecting on a broader time period than our study, yes, we have seen an increase in the population in response to the removal of foxes from the island. Would that be fair to say, Ron?

Ron DAY: Nature Parks do carry out a survey-type of thing –

Christine CONNELLY: A census, yes.

Ron DAY: on the Cape Barren geese, for instance, and the populations have increased. From my own perspective, being a former farmer, there is an overpopulation situation on the island of some of these species, particularly wallabies and also Cape Barren geese and possums. I believe some sort of management control is required. That is all I will say on the subject, but I believe there is some control required.

Gaelle BROAD: I am happy for you to take that on notice because it does not relate to the study as such. It is just your insights.

Christine CONNELLY: I feel rather uncomfortable trying to comment.

Gaelle BROAD: That is totally fine, Christine. The other questions I have I am happy to put to you and you can take them on notice and contribute what you can, but they are more just speaking to your experience in this whole project. We have heard from other groups about the need for improved education – what happens when someone does experience that, who they contact, where they go. Have you got any insights into how that could be improved as far as the education aspect goes? I am interested in your thoughts too on a code of conduct. We had Field and Game here earlier talking about the need, and we have heard others as well talk about it, for a code of conduct to have a more unified framework, because there are lots of different groups that are involved in this space. Also, speed limits – you are talking about a reduction potentially. How do you think that would impact other areas? Even on my way down here there were 12 animals that I passed on the side of the road. There are many trucks – these are transport corridors. Do you think that reduction is something more for Phillip Island? How would that apply further afield?

Also, data collection – we have heard a bit about the need for consistency with that and more targeted data collection. Do you have any insights? Ron, you have been doing a lot of that work, but there any programs? I think Canada was mentioned earlier as having a useful program. If you have any insights into what we could look at as a committee for improving that data collection, that would be helpful. I am happy to put them on notice and let you guys respond when time permits.

Christine CONNELLY: Yes, there is a lot in those questions, and probably some points of clarification that I feel I might need as well to answer all of those questions – for example, the scope of the code of conduct, I am not clear on. Is there a process for us to take questions on notice?

The CHAIR: Yes. Why don't we get committee members to submit questions on notice through to committee staff, and they can reach out to you. If you need any further clarification, you can come back to us.

Christine CONNELLY: Excellent. That sounds like a very good process.

The CHAIR: Great.

Christine CONNELLY: Terrific questions – it might take us a while to answer them, I think.

The CHAIR: Great. Thank you so much, Christine and Ron, for taking the time to appear before us today, and again, Ron, I just want to say thank you for your particularly great work as a volunteer. That is all we have time for, though, so we will have to leave it there. Thanks once again for coming along.

Witnesses withdrew.