Submission to Parliamentary Inquiry into Wildlife Roadstrike in Victoria: Virtual Fence Trial on Cowes-Rhyll Road, Phillip Island

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Summary Statement

This submission addresses the adoption of the roadside animal deterrent devices known as 'Virtual Fences' as a mitigation strategy for reducing wildlife road strikes in Victoria. Herein, I report on a trial carried out on Cowes-Rhyll Road, Phillip Island and provide our findings as part of the evidence-base for the Economy and Infrastructure Committee's inquiry into wildlife road strike in Victoria.

Our three-year study was conducted from 2019 to 2021 and was a collaborative effort between Dr. Christine Connelly of Victoria University, Dr. Duncan Sutherland of Phillip Island Nature Parks, and community member Ron Day, with support from Bass Coast Shire Council. Our rigorous study demonstrated that virtual fencing was not an effective mitigation strategy for reducing wildlife road strike.

Project Summary

Background

The roadkill rate on Cowes-Rhyll Road, which runs between Cowes and Rhyll on Phillip Island, is extraordinarily high, causing significant community concern regarding wildlife deaths. This road passes between important conservation reserves on either side, constituting a significant proportion of the remaining terrestrial habitat on Phillip Island. It intersects a critical wildlife corridor between the coast and the island's interior. The reserve on the north side includes a portion of the Western Port Ramsar Site.

Due to the significant nature of this area and the unacceptably high roadkill counts, Bass Coast Shire Council, Victoria University, Phillip Island Nature Parks, and the local community engaged in a trial of the Virtual Fence electronic alert system developed by Wildlife Safety Solutions as a roadkill mitigation strategy.

The Virtual Fence system explored in this study is a wildlife deterrent system that uses a combination of visual and auditory signals (flashing lights and a low volume siren) emitted by roadside bollards in response to an approaching vehicle, ostensibly designed to discourage animals from entering a road carriageway when a vehicle is approaching.

Methods

Our study was carried out on Cowes-Rhyll Rd, which is a 3.6 km, 80 km/hr carriageway on Phillip Island in Victoria. Approximately 1.2 km of the study site abuts reserved land on both the south and north road verges. A further 1.1 km of the road abuts a nature reserve in the south, with unreserved habitat contiguous to the north. The reserved land contains predominantly a Swamp Paperbark *Melaleuca ericifolia* dominated swamp woodland with some saltmarsh, wetlands and eucalypt dominant wooded fragments throughout. Abutting the remaining sections to the east and west (1.3 km) is privately managed land, cleared for agricultural purposes. Along the entire stretch, the impediments to wildlife movement are minimal, with open, wire farm fencing along parts of the road forming the only barrier.

We established fenced and unfenced sections approximately 450 m long, with buffers between each section (Figure 1). The buffers were critical to ensure that 'fence-end effects' did not influence our results – that is, where animals may move to the end of a fenced area to cross to avoid the perceived barrier. The appropriate minimum buffer size was determined to be 150 m, based on the movement ecology of the largest species occurring in the study area, Swamp Wallabies. This enabled the operational sections to be considered as independent.

We collected data for a full three years, from April 2019 to May 2021. During that period, the entire road was surveyed 3-4 times per week, and all instances of roadkill were recorded, photographed and geolocated.

Figure 1. Study site location and design, showing buffers and fenced/unfenced areas.

We utilised a combination of two gold-standard study designs for assessing intervention efficacy in ecological studies, 1) before-after-control-impact (BACI) – which requires data collection before an intervention to establish a baseline in addition to both treatment and control sites, and 2) crossover – which requires treatments to be

swapped with controls. We employed this rigorous design via data collection over a 12-month 'before' period (pre-installation of the Virtual Fence), a 12-month 'after' period (satisfying the BACI study design), and a further 12-month 'crossover' period, where the virtual fence position was 'crossed' (i.e., swapped) with unfenced areas.

A generalised additive mixed effects model (GAMM) was used to analyse the roadkill data in terms of (1) total roadkill, (2) wallabies only, and (3) possums (brush-tailed and ring-tailed combined). The BACI and Crossover time periods were analysed separately. For all six models, statistical significance was sought in the interaction term between treatment (fenced or unfenced) and time (year). This method, combined with the rigorous study design, enabled isolation of the Virtual Fence's effects from other factors causing fluctuations in roadkill numbers (e.g., seasonal variations, traffic volumes).

Results

A total of 1,127 roadkill instances, comprising 24 species, were recorded over the three-year period. This equates to a death rate of 8.24 per month per km. Our study recorded extraordinarily high rates of roadkill. A previous census by Rendall et al. (2021) on Phillip Island recorded roadkill rates of 1.59 per km per month in the 1990s, increasing to 2.39 per km per month in 2014. In comparison, our study recorded a much higher roadkill rate. Below is a summary of total roadkill by functional groups:

> **Marsupials:** 776 roadkill instances (included swamp wallaby, brush-tailed possum, ring-tailed possum). **Birds:** 178 roadkill instances (included purple swamphen, Australian magpie). **Non-native Species:** 105 roadkill instances (included rabbit, Cape Barren goose, European hare).

With regard to the efficacy of the Virtual Fence in our study, we found that most GAMM statistical tests were not significant (all $p > 0.1$), except for one instance related to wallaby roadkill, where a slight ***increase*** was observed in the fenced area ($p = 0.0025$) – this weakly indicates that there were more deaths of wallabies in the section that had the Virtual Fence.

Conclusion

Our study indicates two key findings:

1) The rate of roadkill on Cowes-Rhyll Road on Phillip Island is extraordinarily high and a management intervention is urgently required to reduce road strike.

2) The Virtual Fence did not decrease roadkill numbers by any statistically significant amount, indicating it was not effective as a roadkill mitigation tool in this trial.

While we cannot recommend the Virtual Fence as a roadkill mitigation strategy, we believe there is evidence in the scientific literature to support other methods of

reducing roadkill rates. A mitigation strategy with an evidence-base on Phillip Island is slowing vehicle speeds (Rendall et al. 2021). Thus, we recommend that trials across Victoria should be conducted to explore the effect of reduced vehicle speeds on wildlife vehicle strikes.

Ongoing Data Collection

Roadkill data collection at the site has resumed in 2025, with community member Ron Day visiting twice daily to record all instances of roadkill. Since January, a staggering 202 roadkill instances have been recorded, including 101 swamp wallabies and a total of 18 species.

Appraisal of Our Study

We have not yet submitted our study to be published in a peer-reviewed journal, but it has been scrutinised by many of our wildlife and road ecology peers through presentations of our findings at two well-attended forums: the Australasian Wildlife Management Society's *Conservation Amidst Conflict* Conference, 5–7 December 2023 (see: https://awms.org.au/conference/) and the recent symposium *Using Technology to Reduce Wildlife Vehicle Collisions* hosted by Transport for NSW, Environment Institute of Australia and New Zealand, the Australasian Network for Ecology and Transportation, and WSP, 21 May 2024 (for a recording of this presentation, see Session 5: https://www.transport.nsw.gov.au/about-us/sustainability/news-publications/wildlife-and-vehicle-collisions).

Our study has been promoted by other researchers, notably A/Prof Graeme Coulson, a leading macropod expert in Australia, as a gold-standard study design (see Session 4 of the Transport NSW symposium for A/Prof Coulson's comments on our study – link in previous paragraph). To our knowledge, ours is the most extensive study of the Virtual Fence technology's effectiveness in Australia.

Relevance to Terms of Reference

This submission addresses several key aspects of the Economy and Infrastructure Committee's inquiry into wildlife road strike in Victoria. It highlights the need for effective monitoring and mitigation strategies for wildlife road strike to inform legislative and regulatory improvements. While the study primarily focuses on wildlife, the high roadkill rates we recorded are likely to have implications for motor vehicle damage and potential trauma incidents.

Specifically, our study provides insights into the following Terms of Reference:

3. New and Emerging Technologies and Infrastructure: The trial of the Virtual Fence technology provides valuable insights into the effectiveness of emerging technologies in

preventing road strikes. We found that Virtual Fence technology was not an effective mitigation strategy.

6. International Best Practices: The rigorous study design and analysis methods used in this trial will contribute to developing international best practices for reducing wildlife road strike. We intend to publish our study in an international peer-reviewed journal to share our findings with the international community.

7. Data Collection Methods: To adequately determine effectiveness, all possible road strike intervention and mitigation strategies need to have suitable data and a rigorous study design. The detailed roadkill surveys and data analysis methods employed in this study, particularly our BACI and crossover study design, offer a model for effective data collection and monitoring of wildlife road strike.

References

Rendall, A. R., Webb, V., Sutherland, D. R., White, J. G., Renwick, L., & Cooke, R. (2021). Where wildlife and traffic collide: Roadkill rates change through time in a wildlife-tourism hotspot. Global Ecology and Conservation, e01530. https://doi.org/10.1016/j.gecco.2021.e01530