

Smart Signs, Smart Messages: A Driver Change Behaviour Project

Interim Report



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Introduction

Koala populations throughout south-east Queensland (SEQ) are rapidly declining, with Rhodes et al. (2015) suggesting an approximately 80.3% decline of the population in the koala coast region between 1996 and 2014. Vehicle strike (koalas being struck by vehicles on roads) is recognised as a major source of artificial koala mortality (Gonzalez-Astudillo et al. 2017; McAlpine et al. 2015; Niehaus and Wilson, 2018; Tisdell et al. 2017), yet few interventions are available for mitigation.

Wildlife signage is one of the most widely employed attempts at mitigating strikes and new signage technology has the potential to increase the effectiveness of such signs. This technology allows for real-time messaging to drivers that can be tailored and dynamic, providing useful feedback to drivers about their driving behaviour, particularly in relation to speed. Such dynamic signage has been consistently demonstrated to both reduce driver speed, and collisions, and can do so cost-effectively (Wu et al. 2020).

The Smart Signs, Smart Messages project continues to produce very positive and encouraging results in the Ormiston koala conservation safe neighbourhood. Trials began during the 2018 koala breeding season (Blacker et al. 2019) and in 2019 expanded to include a newer sign design. Most recently, Appleby et al. (2020) reviewed signage speed data and concluded that signs appeared to be beneficially reducing average driver speed in most cases, albeit by a modest degree. Importantly, no koala has been reported to have been struck on any of the trial roads during the study period, and although it is not possible to directly attribute this to the signs, this remains the most critical metric by which success can ultimately be measured. An absence of strikes is therefore reassuring.

Study Sites

Five roads were selected to display the wildlife warning signs. Three roads were those used in years one and two of this project: Sturgeon Street, Starkey Street, and Wellington Road in Redland's Ormiston koala safe neighbourhood. Two additional roads were included this year as part of the extension of two new koala safe neighbourhoods; Fitzroy Street, Thornlands and Old Cleveland Road East, Birkdale. The speed limit along Wellington Street and Fitzroy Street is 50 km/h, with all other roads being 60 km/h. Figure 1 is a map showing the positions for the eight Jenoptik and two ITS/Artcraft signs.

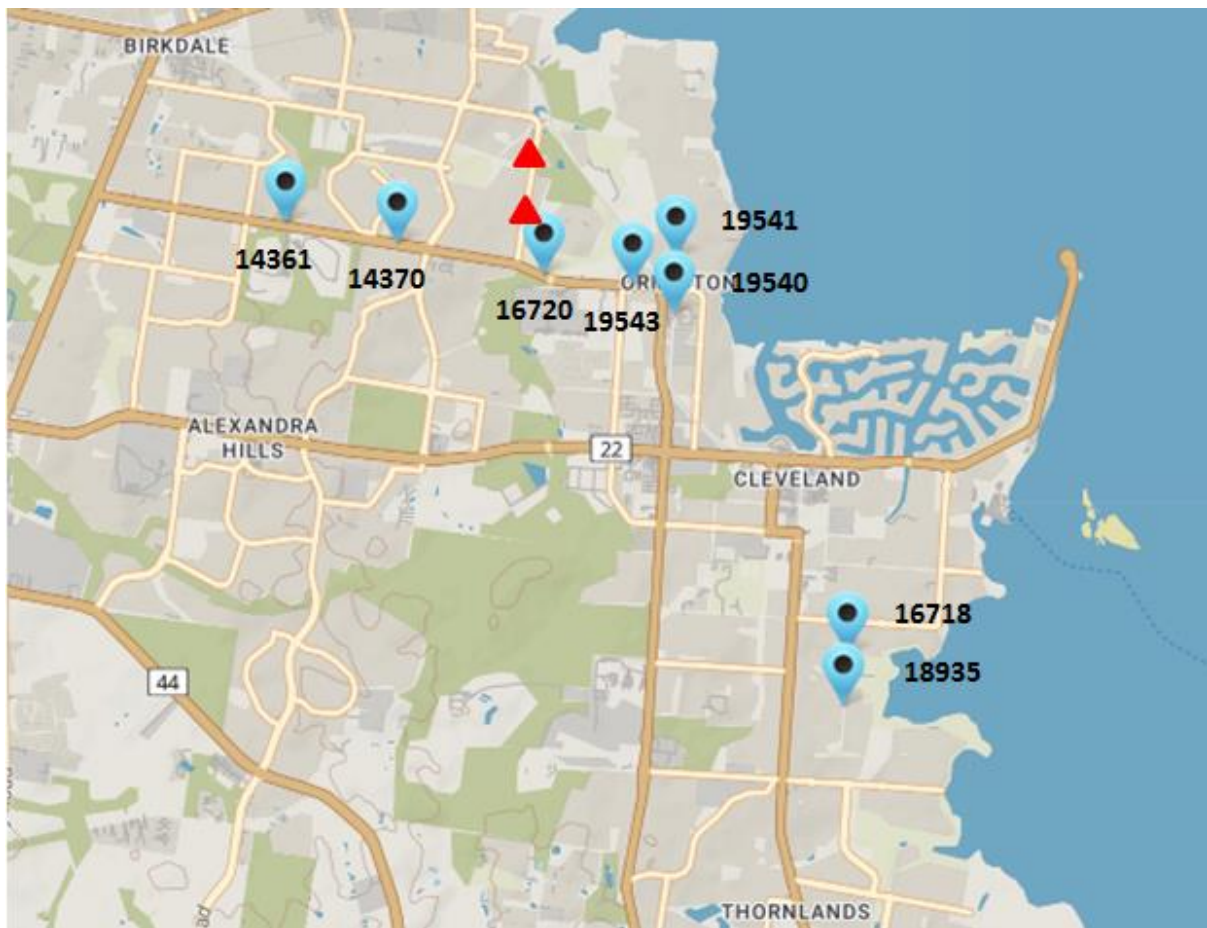


Figure 1. Jenoptik sign positions (blue ‘pin’ with black circle) in Redlands including sign numbers (black bold, read left-to-right), and two ITS/Artcraft signs (red triangles).

Wildlife Warning Signs

Three types of signs were trialed, from two different manufacturers/suppliers. Two were dynamic message signs (Jenoptik) that reported tailorable messages to drivers via an LED display panel. These signs record two speed measurements for vehicles travelling towards them: one as the vehicle enters the radar detection range, and another as the vehicle leaves it (passing the sign). This provides the opportunity to see whether vehicles are slowing down (or otherwise) as they approach the signs. A ‘generic’ version of the sign (named Jenoptik ‘smiley’) featured a high visibility border panel and the words: “DRIVE SAFELY”, whilst a koala-specific version (named Jenoptik ‘koala _smiley’) featured the image of a koala with the words: “KOALA CROSSING”. Figure 2 shows each version of the Jenoptik signs side-by-side for comparison. In each case, the variable message panel was the same, with the primary variation between the two types being the passive messaging displayed on each border panel. An example of the message displayed is shown in Figure 3, and this message flashed alternately with the vehicles’ speed. If the vehicle’s speed changed between message thresholds, the message changed accordingly.



Figure 2. Jenoptik brand named for this project as ‘smiley’ (left) and ‘koala_smiley’ (right) models of dynamic (variable) message signage



Figure 3. An example of the dynamic, variable sign messaging that greeted drivers given certain, measured vehicle speed thresholds, capable with the Jenoptik models. In this example, messaging was tailored to a 50km/hr posted speed limit zone. For a 60km/hr posted speed limit zone, each threshold was increased by 10km/hr. The green koala symbol which greeted drivers if they were recorded to be driving under 45km/hr (or under 55km/hr in a 60km/hr zone) was unique to the Jenoptik koala_smiley model (i.e. the generic Jenoptik smiley model featured a green, round ‘smiley’ face as pictured for the other speed thresholds).

The third sign type (ITS/Artcraft) featured two LED flasher lights that flashed on and off whenever a vehicle was detected exceeding a specifiable speed threshold. The posted speed limit was also displayed (and could be replaced depending on the speed limit of a given street) along with a smaller version of the same koala image and message featured in the Jenoptik koala smiley sign and a high visibility banner with the words: “WILDLIFE ZONE” (see Figure 4). The ITS signs were only capable of recording one speed measurement per vehicle.



Figure 4. ITS/Artcraft koala sign

The six Jenoptik koala smiley signs were positioned along Sturgeon St, Wellington St, and Fitzroy St; the two Jenoptik smiley signs were positioned along Old Cleveland Rd East; and the two ITS signs were positioned along Starkey St, with each road having one sign displaying to each traffic direction.

Preliminary Results

All signs are functional, but there are some issues currently being investigated that may impact on future results and/or interpretations.

As of 7/12/2020 one of the ITS/Artcraft signs (K001_02) had two non-critical faults (light sensor failure and partially open door) listed on the Web portal, but this does not appear to be impairing overall sign functionality. Also, a number of signs (e.g. 19540 - Wellington St south, 19543 - Sturgeon St east, 14370 - Old Cleveland Rd east), which are all currently meant to be covered (i.e. sign messaging should not be visible to the public) for recording pre-treatment data, have had temporary coverings come away following storms and high winds. This has, to a degree, compromised some potential analyses, as ideally, uninterrupted pre-treatment speed data would be available for comparison with treatment data. However, it is hoped that enough pre-treatment data have been collected for most signs to allow for a reasonable comparison.

Figure 5 is a plot showing the daily vehicle count and average speed for ITS/Artcraft sign K001_01 on Starkey St for the period 1/11/2020 to 7/12/2020. Axes are not provided on the Web portal graph but it is assumed that the Y-axis is vehicle number and speed, and the X-axis is time of day. Average speed appears to vary a little based upon time of day, but overall, average speed appears to level off at around 47.5km/hr, which is well below the posted speed limit (60km/hr).

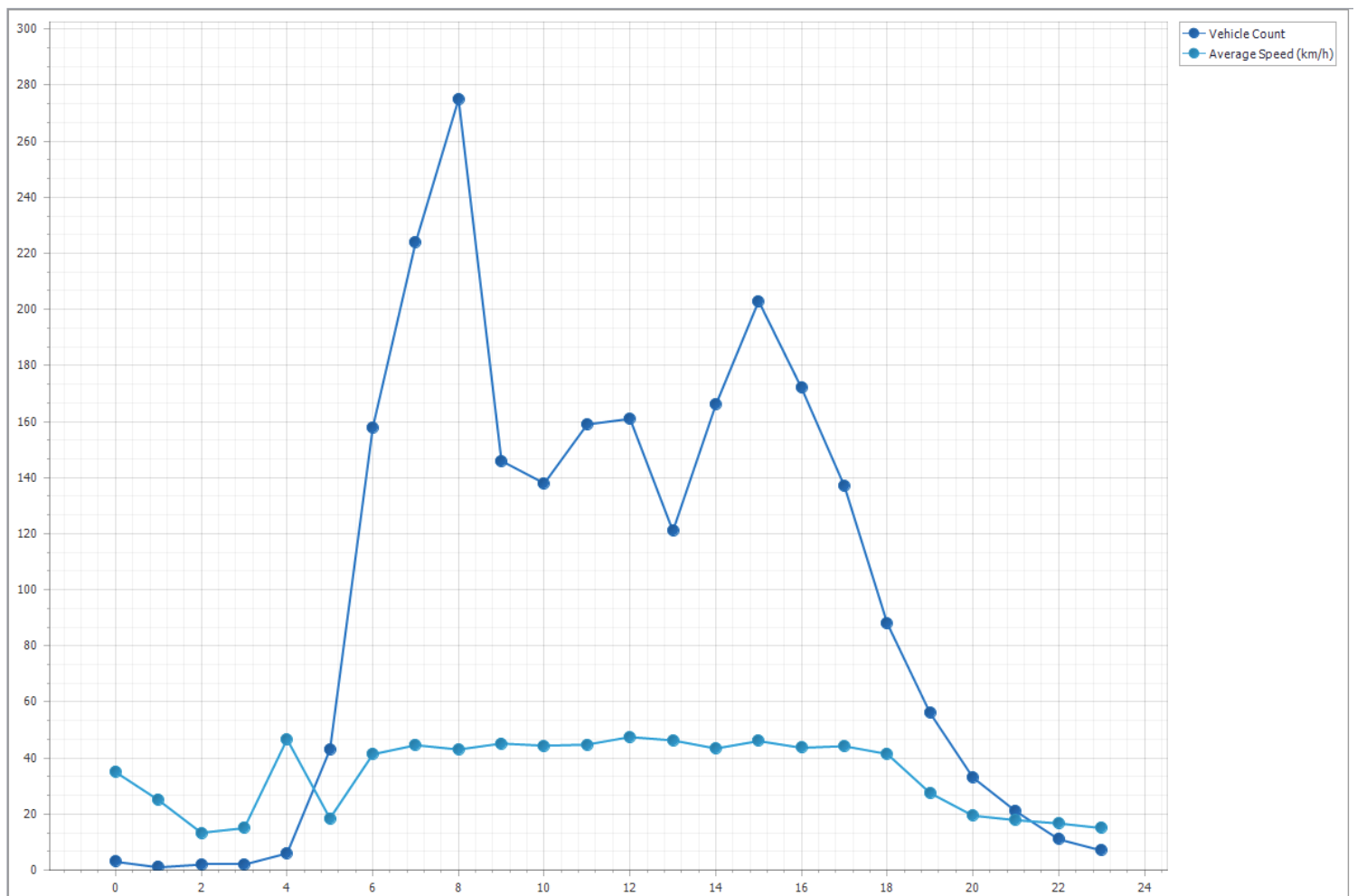


Figure 5. Average vehicle count and speeds at given times of day from ITS sign K001_01 located on Starkey St.

Figure 6 is a plot showing the daily vehicle count and average speed for ITS/Artcraft sign K001_02 on Starkey St for the period 1/11/2020 to 7/12/2020. Compared to the other ITS/Artcraft sign there is much less variability visible in the average speed, which appears to level out at or below 56km/hr, which is below the posted speed limit (60km/hr).

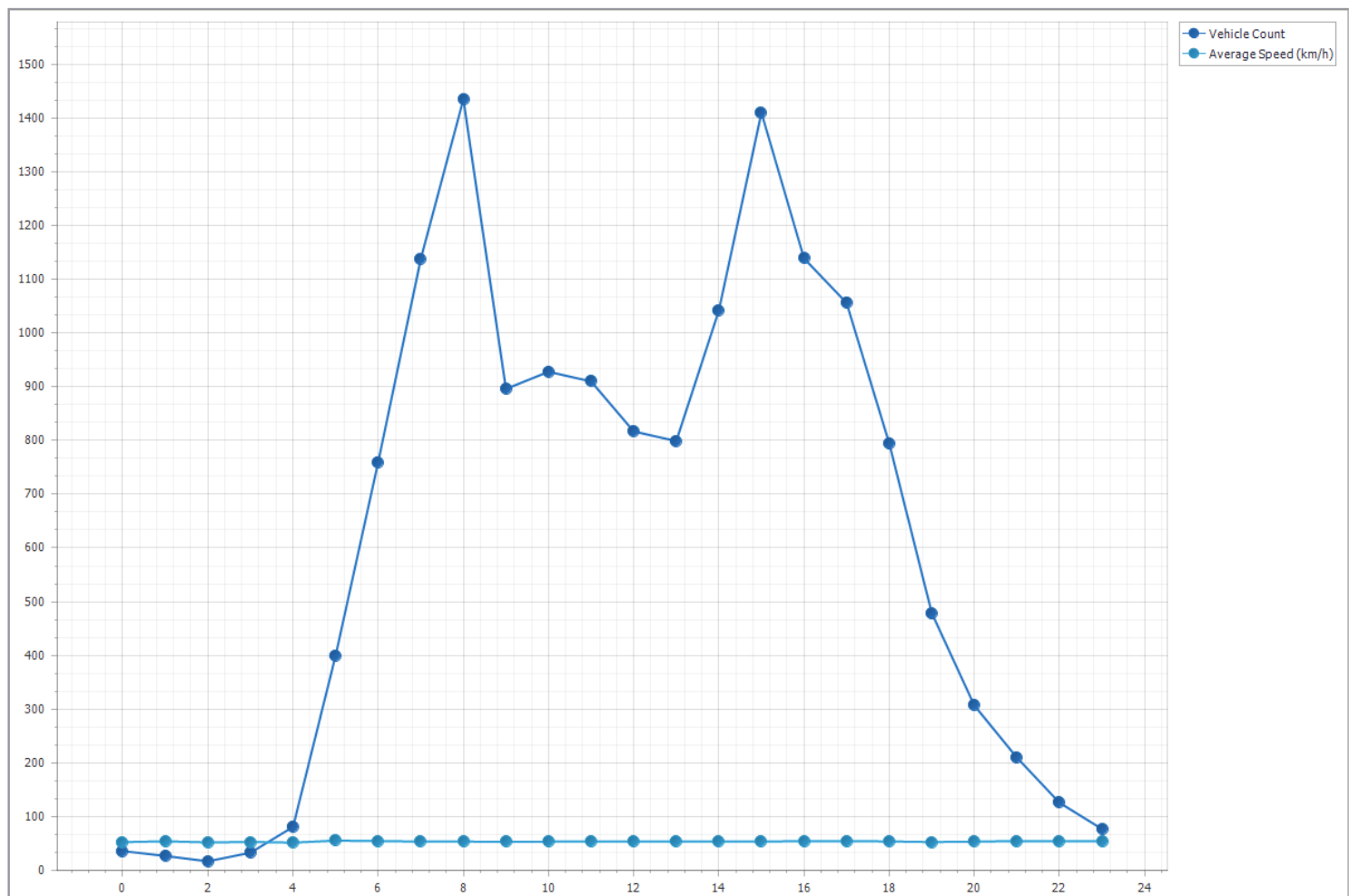


Figure 6. Average vehicle count and speeds at given times of day from ITS sign K001_02 located on Starkey St.

Figures 7-14 are screenshots taken directly from the Sierzega Web portal (where the data for the Jenoptik signs are stored), summarising speed and other relevant information for each Jenoptik sign during the period 1/11/2020 to 7/12/2020 (the latter up to 4am). Data under the column '+' are from vehicles approaching the sign from the display side (currently covered) and data under the column '-' are from vehicles travelling in the opposite direction. Therefore, only the data in the '+' column are relevant for the purposes of this study. Importantly, all signs appear to have between 80,521 and 334,455 records spanning the period, which is believed to accurately represent the numbers of vehicles passing by signs. In most cases, average speeds are at or below the given posted speed limit (shown bottom left of the screenshot) in the area the sign is located. Exceptions are sign 16718 (Fitzroy St north) where the average speed was 1km/hr over the posted speed limit and sign 14361 (Old Cleveland Rd East west) where the average speed is 2km/hr over the speed limit. At most sites, vehicles slowed slightly (between 1.8 and 3.4km/hr) as they approached the signs (the reduction in speed is 'Vred'). This is despite signs being covered (albeit with some levels of unintended exposure as noted above from high winds). Alarming, some of the listed maximum speed recordings were well in excess of double the speed limit. Vehicle speeds for the 85th percentile (listed as 'V85'), which represents the average speeds at which 85% of vehicles travelled, were also usually higher than

posted speed limits, and will be of particular interest during the treatment period. Sign 19543 (Sturgeon St east) was an exception.

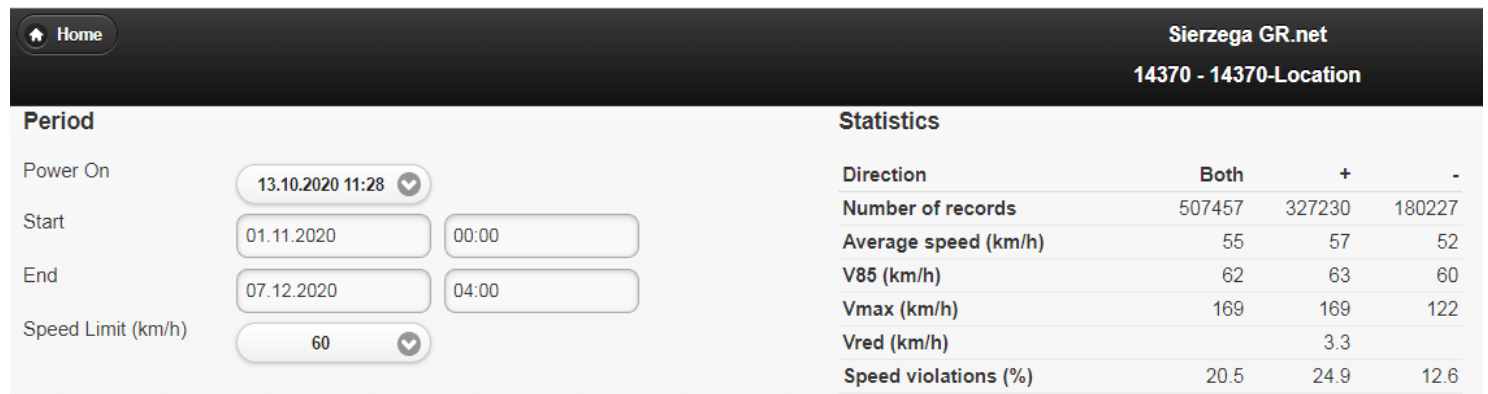


Figure 7. Summary statistics for Jenoptik smiley sign 14370 located at Old Cleveland Rd East east.

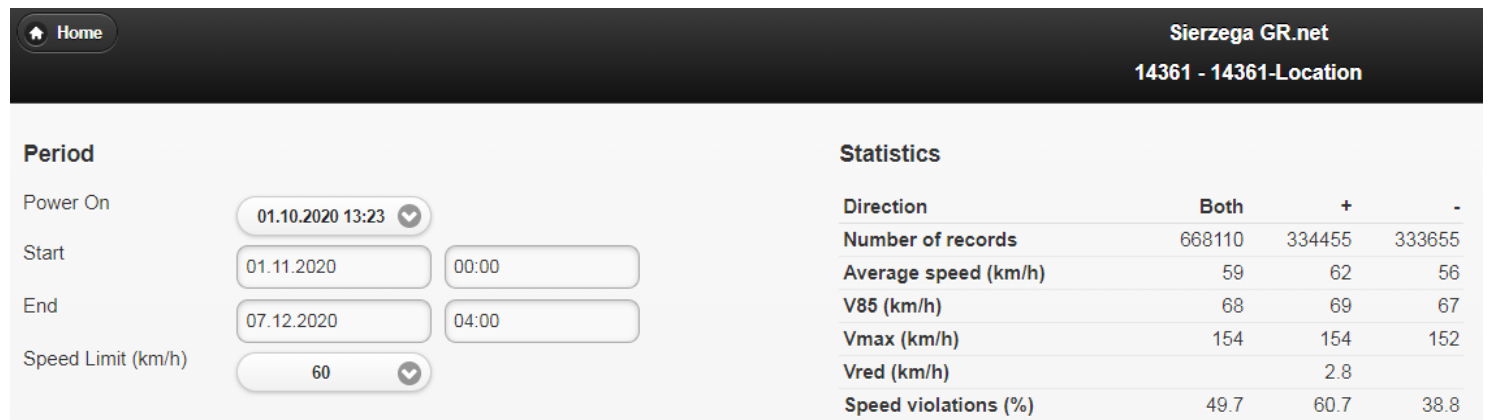


Figure 8. Summary statistics for Jenoptik smiley sign 14361 located at Old Cleveland Rd East west.

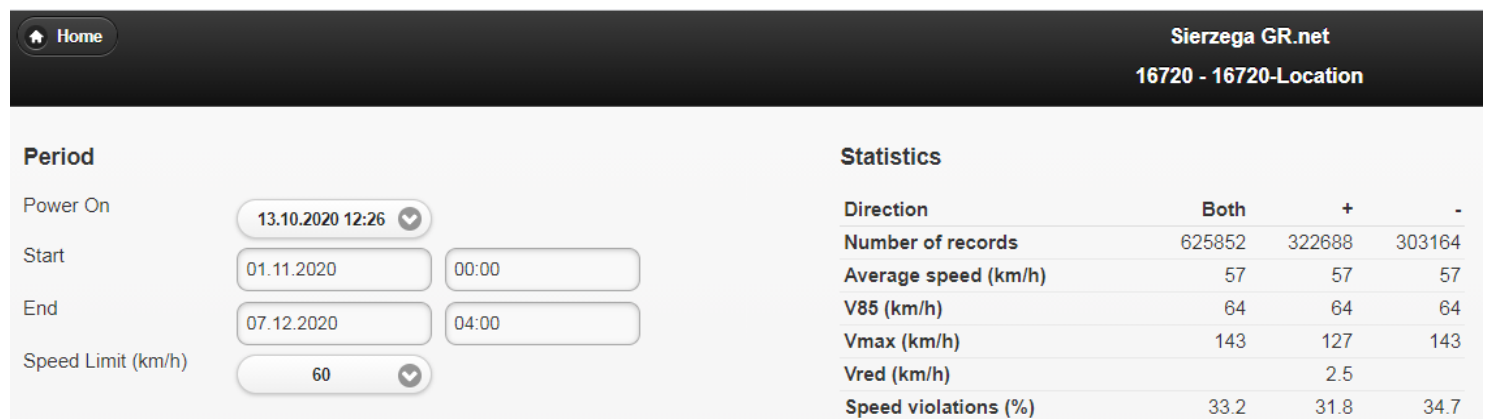


Figure 9. Summary statistics for Jenoptik koala smiley sign 16720 located at Sturgeon St west.

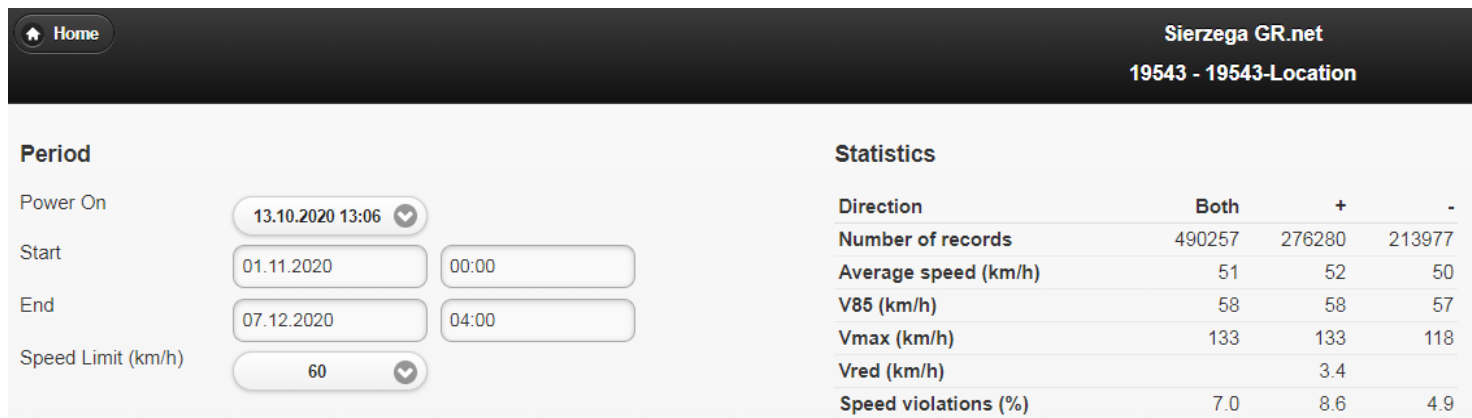


Figure 10. Summary statistics for Jenoptik koala smiley sign 19543 located at Sturgeon St east.

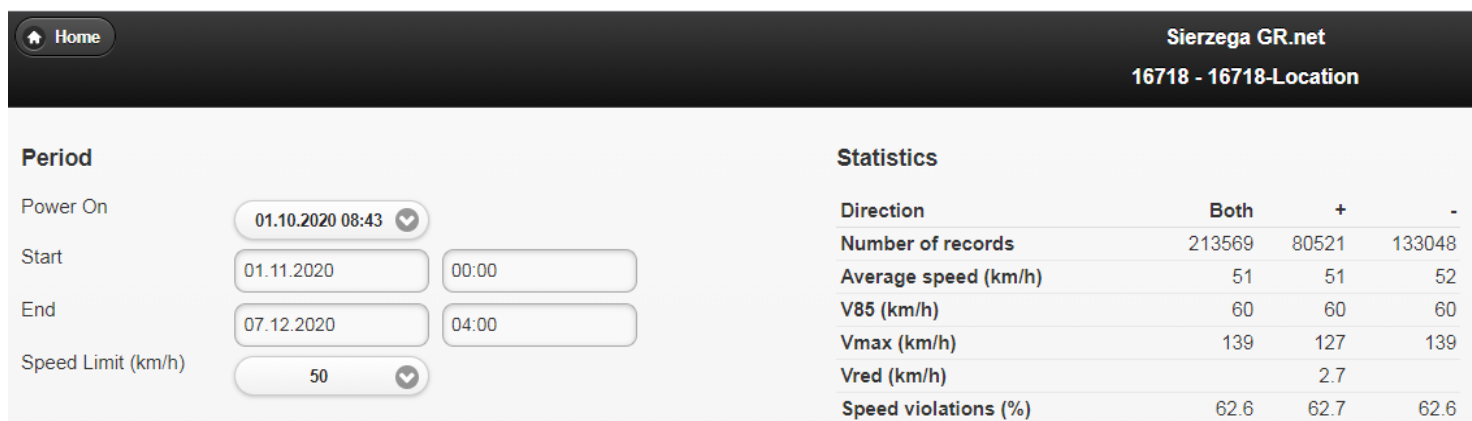


Figure 11. Summary statistics for Jenoptik koala smiley sign 16718 located at Fitzroy St north.

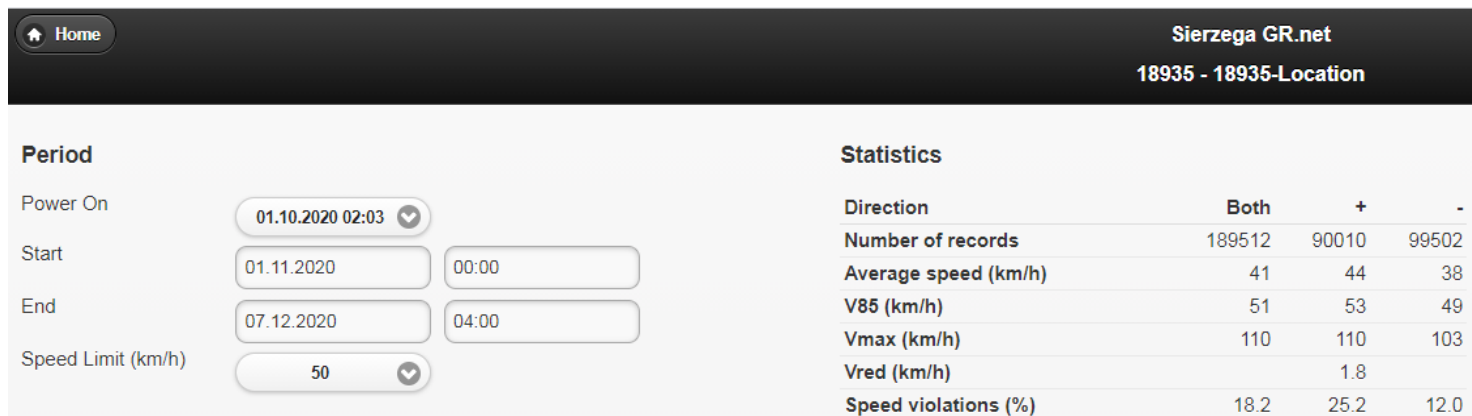


Figure 12. Summary statistics for Jenoptik koala smiley sign 18935 located at Fitzroy St south.

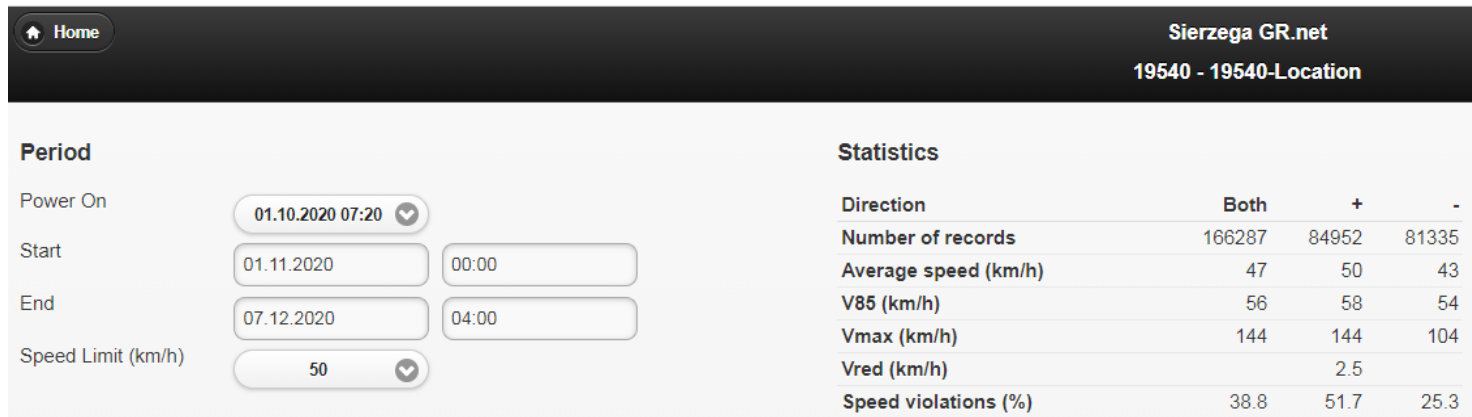


Figure 13. Summary statistics for Jenoptik koala smiley sign 19540 located at Wellington St south.

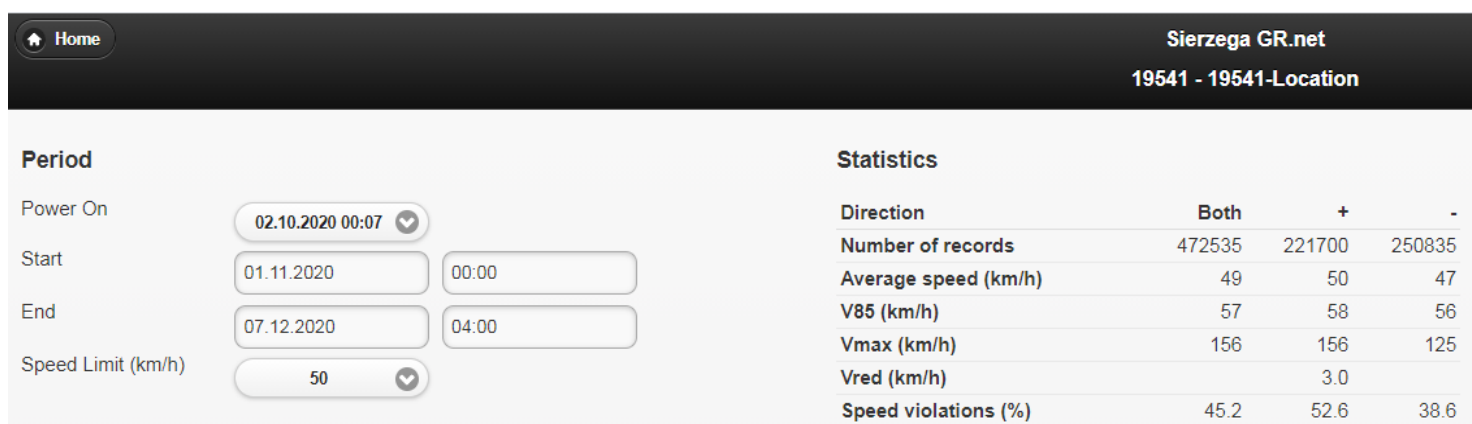


Figure 14. Summary statistics for Jenoptik koala smiley sign 19541 located at Wellington St north.

Concluding Comment

A primary interest in the current study relates to habituation, or a theorised process by which driver responses to signs gradually wanes over time. It is currently too soon to investigate this parameter, but it will be a major element of the final report due in May/June 2021.

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