

THE EXPERIENCE OF SPEED CAMERA OPERATIONS IN AUSTRALIA AND NEW ZEALAND

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ABSTRACT

This paper attempts to integrate the experiences of different jurisdictions in Australia and New Zealand with speed enforcement by moveable speed camera. Different jurisdictions have run camera programs with different levels of intensity, and increased the intensity by differing amounts over time, creating a 'natural experiment' which it was hoped would give insights into the relationship between the extent of camera programs and vehicle speeds. Police in the different jurisdictions provided operational statistics on camera hours, numbers of vehicles checked, numbers of vehicles exceeding prosecution threshold and number of Traffic Infringement Notices (TINs) issued for the period July 1998-July 2003. Analysis is limited to a consideration of the descriptive statistics. The key findings of the study were that the average number of camera speed checks per vehicle per year is between ten and sixteen, depending upon jurisdiction, that the level of offences appeared to stabilise when the camera programs are consistent and that major changes in programs were required to produce changes in speed behaviour. It is proposed that habitual speed choice is determined by a 'comfort level', a state of equilibrium which balances influences which tend to lower speed, particularly enforcement, against influences which will tend to maintain existing speeds, such as the inconvenience of changing established driving patterns.

INTRODUCTION

Speed cameras have been part of the enforcement scene in Australia for the past fourteen years or so, beginning with the first Victorian speed camera program in 1990, and are now an important part of the speed enforcement programs in all states and territories, and in New Zealand. Although evaluation studies have been carried out examining the relationship between speed camera deployment, vehicles speeding and crash outcomes for individual jurisdictions, there has been no attempt so far to integrate the experiences of the different jurisdictions in Australia and New Zealand. This report attempts to draw together the data available from speed camera operations in different jurisdictions in order to determine whether there is any relationship between the amount of camera activity and the extent of speeding offences.

Different jurisdictions have introduced speed cameras at different times, with different levels of intensity, providing a 'natural experiment'. This 'natural experiment' provides an opportunity to find out what effects these different levels of program have had on speeds at active camera sites and numbers of TINs issued. The investigation is most appropriately considered to be at the level of policy analysis rather than that

of a controlled experiment. It must be stressed that there are limitations on these methods and therefore, on the strength of the conclusions which can be drawn. The 'natural experiment' was not planned, so any the comparisons are fortuitous rather than deliberate, and statistical testing of results was not possible. In only one State are independent surveys of speed behaviour over an extended period available, and these do not cover a the entire period and are not discussed here. With this exception, the only data available in relation to speeding is in terms of numbers of vehicles exceeding prosecution thresholds when travelling past the cameras and numbers of TINs issued. Not all jurisdictions provided information on the number of vehicles checked by the cameras, which imposes some limits on the analysis.

METHOD

All Police organisations in Australia and New Zealand were asked to provide data on camera operations. All jurisdictions responded. Unfortunately, NSW was able to provide only raw data on a site by site basis. Although the team attempted to analyse these data, large fluctuations in the annual totals of camera hours, vehicles checked and TINs issued suggested that the data provided may not be complete, and they have not been included in the analysis.

The data available for the analysis were camera hours, vehicles checked, vehicles exceeding prosecution threshold, total TINs issued, percent of vehicles attracting a TIN and TINs per camera hour. Western Australia and New Zealand did not provide the number of vehicles checked, which precludes calculation of proportion of vehicles exceeding the prosecution threshold, or of the proportion of vehicles attracting a TIN. Data on vehicles on register were obtained from Australian Bureau of Statistics (ABS) sources or from the Land Transport Safety Authority in the case of New Zealand.

The following points need to be considered in relation to the variables analysed:

- Camera hours may be considered as an indicator of the level of resources being allocated to the program.
- Vehicles checked is the most direct measure of the impact of a speed enforcement program on the driver as it reflects the probability of encountering a speed camera.
- The percentage of vehicles checked which exceed the prosecution threshold is an indicator of the program's effectiveness in reducing speeds, as it is a measure of vehicle speeds at an approved enforcement site. However, it will inevitably be affected to some extent by drivers who are aware of enforcement sites, or who have become skilled at recognising when speed cameras are in operation at enforcement sites.
- The percentage of vehicles passing the camera which attract a TIN is also a measure of the program's effectiveness, similar to the proportion of vehicles exceeding the prosecution threshold. However, it will be a smaller percentage as it will not be possible to proceed with issuing a TIN in a proportion of cases due to

factors such as unidentifiable vehicles, more than one vehicle in the image and so on.

- The number of TINs per 100,000 registered vehicles is a measure of the overall impact of the program, although it may be affected to some degree by speed enforcement activities other than camera operations. Offences detected by these other activities are not included in the total, but these other activities may reduce the number of speeding drivers and so reduce the total number of speeding offences detected by cameras.

RESULTS

Background

There are differences in current status of the programs in different jurisdictions. The programs in South Australia, Tasmania and New Zealand are mature programs which have been running at about the same level for a number of years, apparently with little change. The Western Australian program is similar, but has been more intensive and more variable than the others. The Queensland program has been steadily increasing over the years covered by the data. The ACT program began in late 1999 at a level which has been maintained ever since. The Victorian program was subject to a thorough review from mid-2000 to mid-2001, resulting in an increase in camera hours between August 2001 and March 2002, and a progressive reduction of the tolerance from 9 km/h to 3 km/h in 60 km/h zones between May and September 2002 (Howard 2004).

Extent of programs

The extent of camera programs is shown in Figure 1. Tasmania, ACT, South Australia, Western Australia and New Zealand have all run programs with a consistent number of camera hours over the period for which data has been supplied, although with some fluctuations from month to month. For Queensland, camera hours have steadily increased year by year over the period, rising steadily from under 2,000 per month to just over 6,000 per month. Victoria's program consistently involved approximately 4,000 camera hours between January 2000 and July 2001, with one exception, rising steadily to plateau at just below 6,000 per month by March 2002.

Programs currently range between 1,000 hours per month to just over 6,000 hours per month. Although these figures give an indication of the extent of the input into each program, characterising the impact of the program requires an examination of the numbers of vehicles checked and numbers of vehicles issued with TINs.

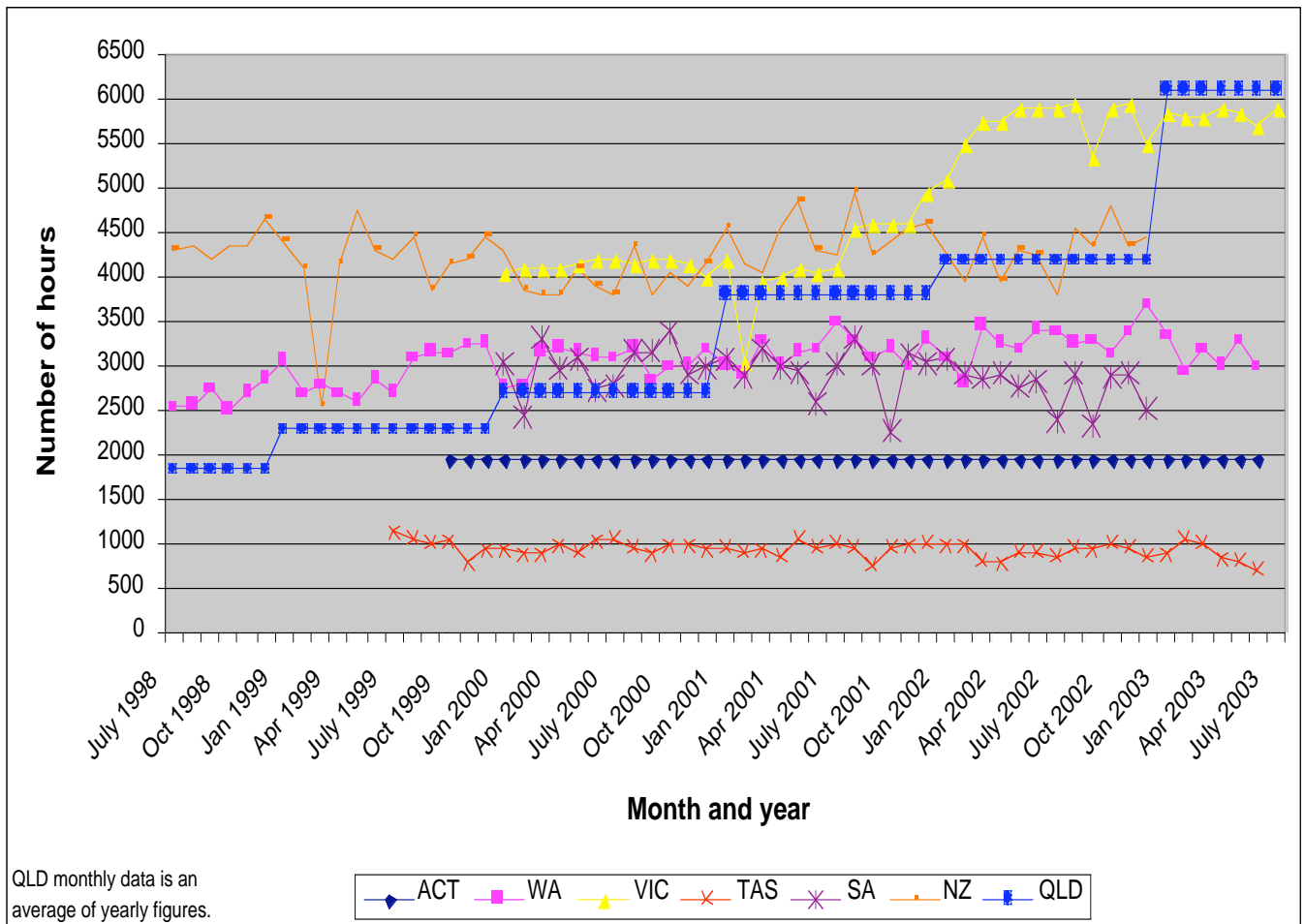


Figure 1 – Speed camera hours by jurisdiction

Proportion of vehicles checked

Figure 2 shows the number of vehicles checked per month per 100,000 registered vehicles. The ACT shows increasing numbers from October 1999 to approximately October 2000 as their camera program gathered momentum, and has fluctuated since. Victoria’s program has increased slightly over the period, but remains low in relation to other jurisdictions. Only annual figures were available for Queensland, which shows a steady increase over the period. Levels are highest in Tasmania and South Australia, both of which show quite large reductions towards the end of the period. Nevertheless, they remain high in comparison to other jurisdictions. For each jurisdiction where the data was available, the number of vehicles checked by the cameras was calculated. The monthly percentages and the average number of times per year that a vehicle’s speed was checked are shown in Table 1.

Although there are fluctuations from month to month for each jurisdiction, the overall pattern of differences among jurisdictions appears to be fairly constant. The monthly percentage of vehicles checked ranges from a low of 82% in Victoria to a high of 138% in Tasmania. These figures equate to an average number of speed checks per vehicle per year of almost ten in Victoria and over sixteen in Tasmania.

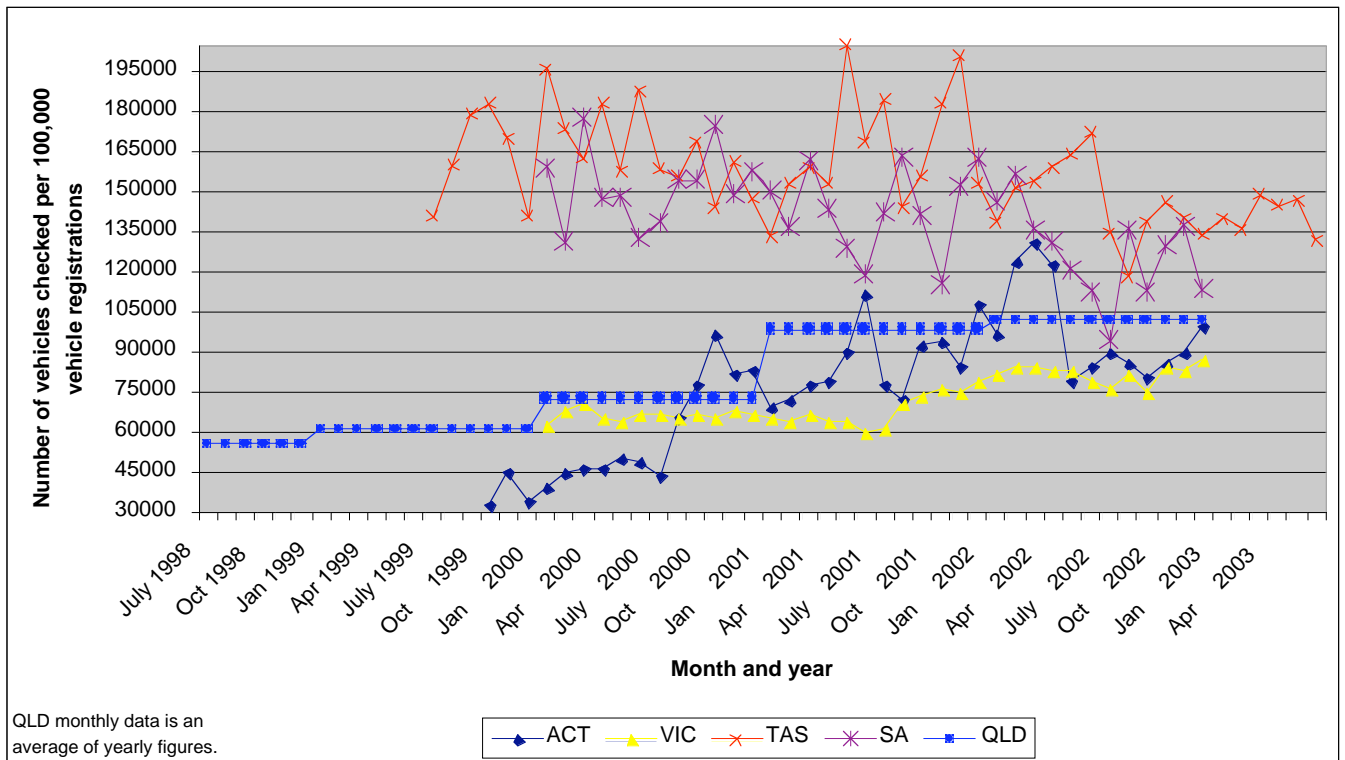


Figure 2 – Vehicles checked per 100,000 registrations

Table 1 – Percent vehicles checked each month and average camera speed checks per vehicle per year

Jurisdiction	% vehicles checked each month*	Average camera speed checks per vehicle per year
Victoria	82%	9.8
ACT	97%	11.7
Queensland	102%	12.2
South Australia	127%	15.3
Tasmania	138%	16.6

*This percentage is calculated from the total number of vehicles checked for the last complete year for which data was available, divided by 12 and again by the number of registered vehicles in the jurisdiction. A percentage of over 100% means that the number of vehicles checked is greater than the number of vehicles in the fleet: it does not mean that every vehicle has been checked that month, as some vehicles will be subject to multiple checks and many to none at all.

Proportion of vehicles speeding past the camera and proportion of TINs issued

The percentage of vehicles passing the camera which were exceeding the enforcement threshold is shown in Figure 3. These data need to be interpreted with caution, as the percent of vehicles exceeding the prosecution threshold depends on the distribution of vehicle speeds on the one hand, and the threshold or tolerance accepted by different police forces on the other. The Queensland data shows a gradual decline from 1.6% to 1.0% over the period. The ACT data shows a rise in the first months of the program, followed by an uneven decline to a consistent 0.4% for the last few months for which data are available. Tasmania's results are

consistent over the entire period for which data is available, fluctuating around 1.0%. Victoria's rates are higher than those elsewhere, especially since August 2001, and characterised by some large fluctuations. The effect of increasing the extent of the camera program from August 2001 appears to be an initial increase in the percentage of vehicles passing the camera which exceed the prosecution threshold, followed by a steady decline over the next few months. The effect of reducing the enforcement tolerances in May-September 2002 appears to be another increase in the proportion of vehicles passing the camera which now exceed the enforcement threshold, from 2.0% to 3.6%. The last six months of data available show no marked trend upwards or downwards.

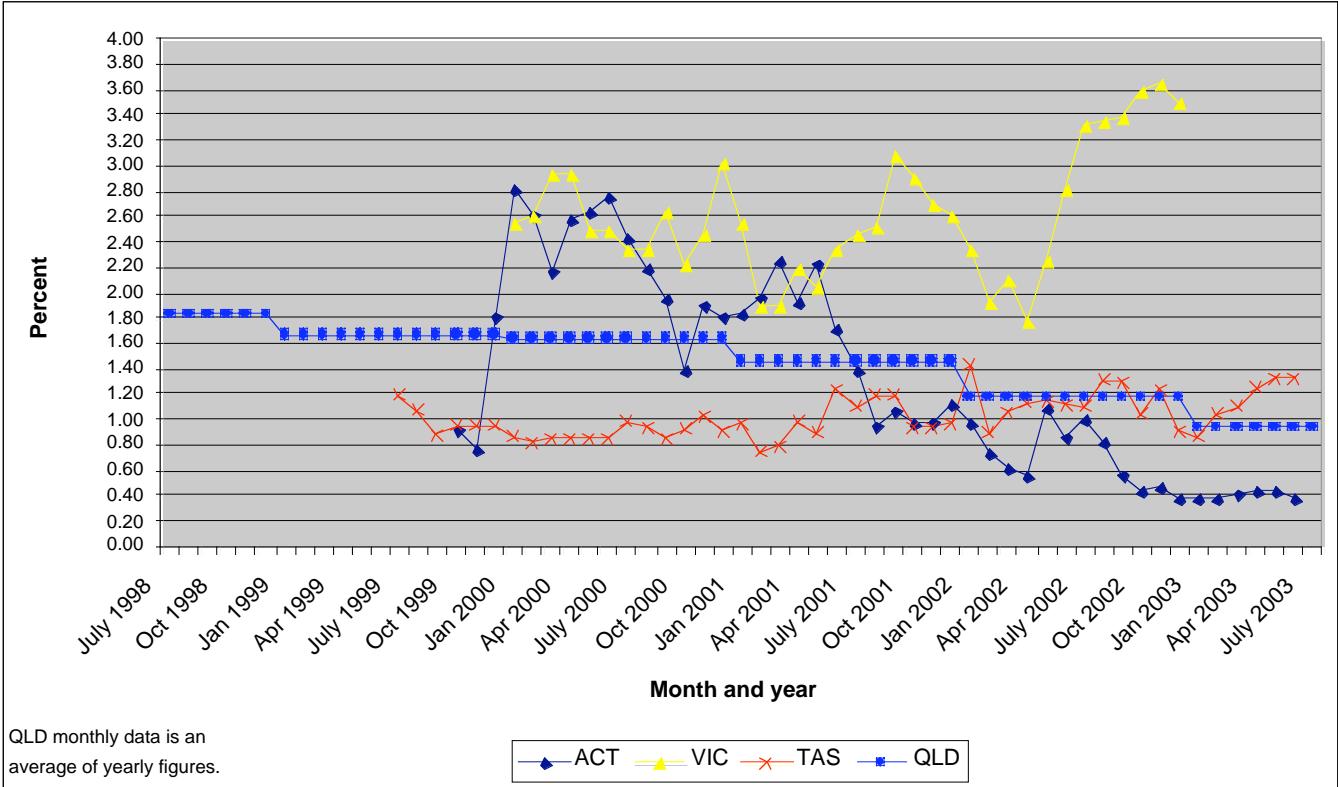


Figure 3 – Percent vehicles passing the speed camera which exceeded the prosecution threshold

For jurisdictions for which both speeding past the camera and percentage of vehicles passing the camera attracting TINS are available a similar pattern for these two variables is evident. (See Figure 4). A TIN is not issued in all cases where a vehicle has been detected exceeding the enforcement threshold for reasons such as the photographic image of the offending vehicle showing a second vehicle, or inability to identify the registration plate. The percentage of vehicles issued with TINs therefore closely follows the percentage of vehicles speeding, but at lower levels.

For South Australia, the percentage of vehicles passing the camera which attracted a TIN was available, but data on vehicles exceeding the threshold was not. In the case of South Australia, TINs appear to have been fairly stable at just over 1.0% of vehicles for much of 2000, but have fluctuated around 1.2% during 2001 and 2002. (See Figure 4).

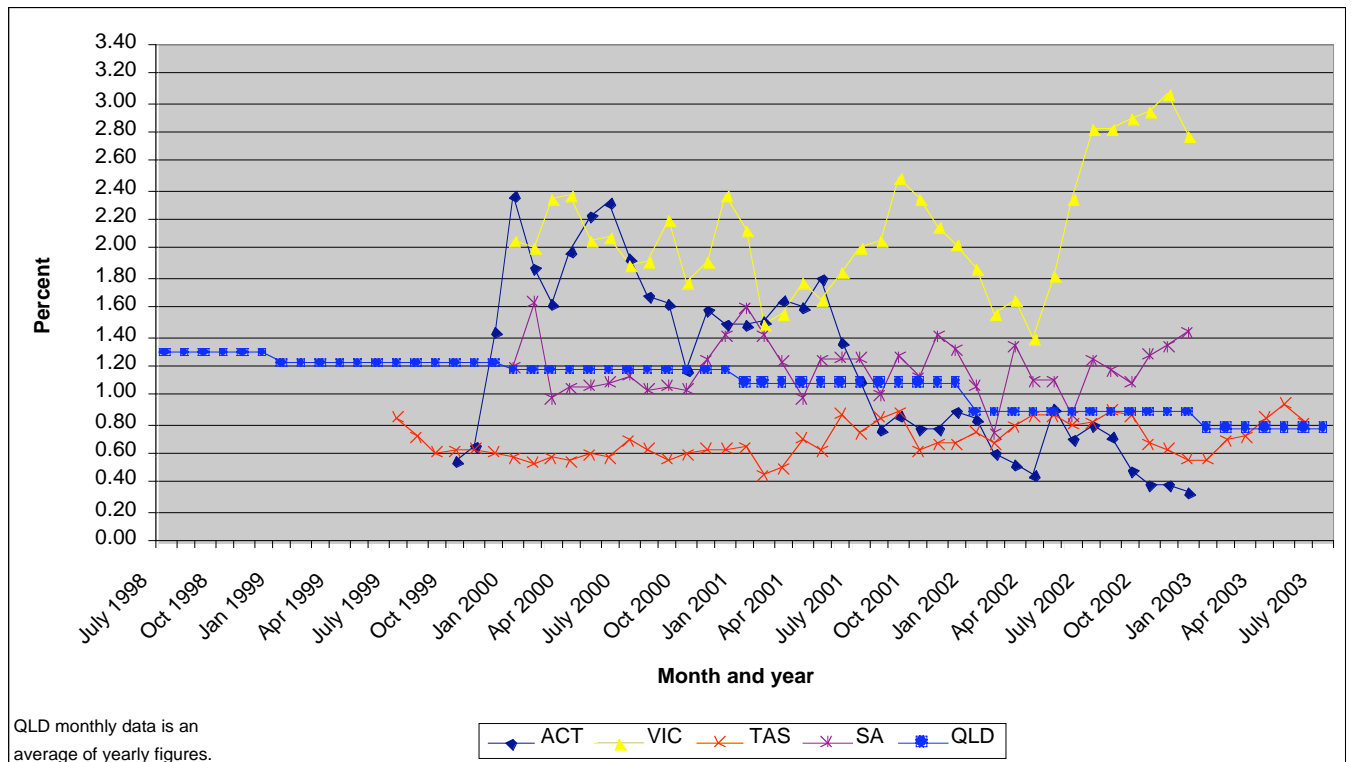


Figure 4 – Percent vehicles passing the speed camera which received a TIN

TINs per 100,000 vehicles

The most direct impact speed cameras are having on the driving community is the number of infringements per 100,000 vehicles. (See Figure 5). This represents the monthly numbers of drivers in the community who receive a TIN, and is therefore a direct measure of those who experience negative consequences for exceeding the speed limit.

Most of the data on the graph lie between 1,000 and 1,500 TINs per 100,000 vehicles per month, equivalent to between 1% and 1.5% per month. The exceptions to this are:

- the ACT which has lower levels at the beginning of its program and in the most recent months
- South Australia, which has infringement rates generally between 1,500 and 2,000 per 100,000 vehicles per month, except for a period during 2000
- Victoria, which shows a consistent rise since April 2002, levelling off only in the last few months
- Western Australia, which is consistently much higher than other jurisdictions, except for a brief period in 2002. For two months in 2001, the rate in Western Australia was over 4,000 per 100,000 vehicles per month, i.e. over 4% per month, equivalent to almost 50% of vehicles receiving a TIN during the year.

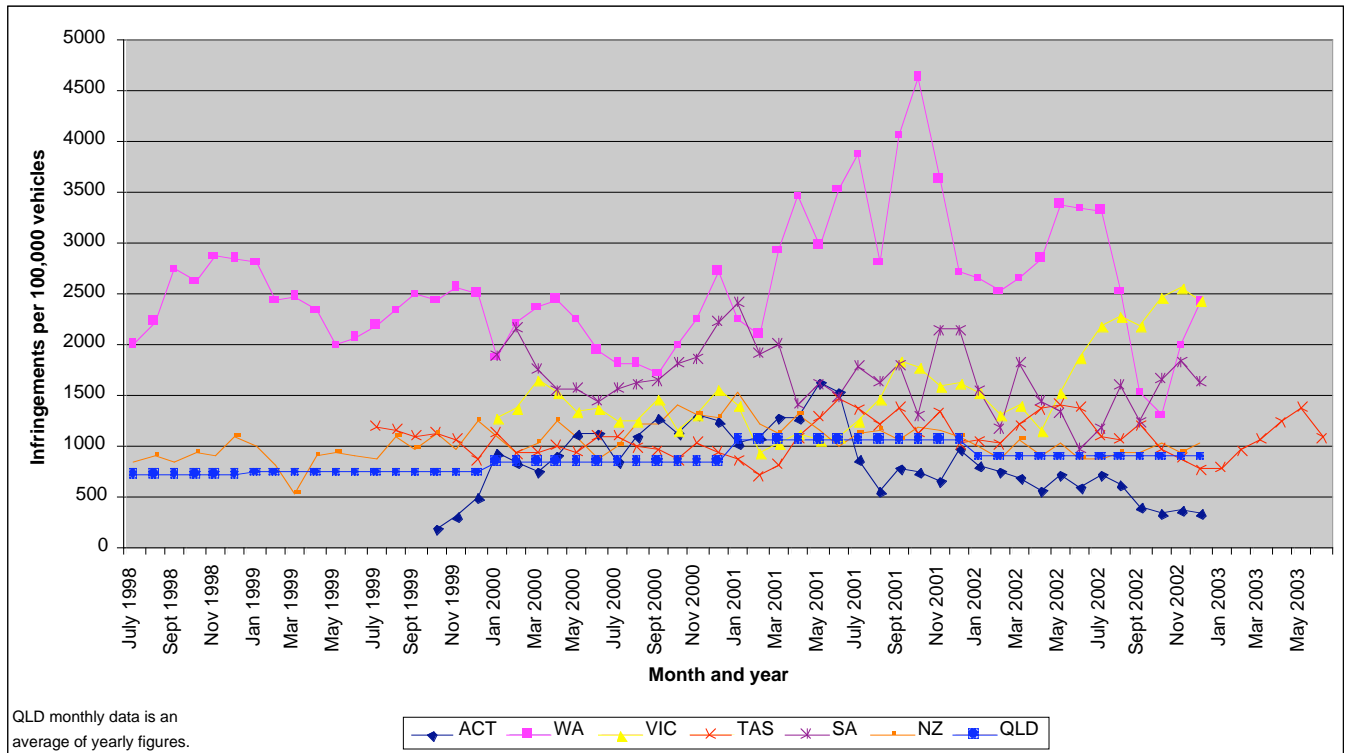


Figure 5 – Camera speeding TINS per 100,000 vehicles

TINS issued per hour of camera operation

As illustrated in Figure 6 Western Australia and Victoria achieve much higher infringement rates per camera hour than do other jurisdictions. South Australia and New Zealand have similar rates per camera hour, while the other jurisdictions are considerably lower.

The number of TINS per camera hour needs to be interpreted with care as it can be interpreted in at least two ways. One view is that it is a measure of how effectively the cameras are deployed to detect offences, and hence to maximise specific deterrence. The other interpretation of TINS per camera hour is the extent to which the cameras are deployed widely to maximise general deterrence. A low hourly TIN rate indicates that cameras are not being concentrated at locations with high levels of speeding. On this interpretation, Queensland, Tasmania and the ACT appear to have the widest-based programs aimed at general deterrence, while WA and Victoria have programs that are targeted at locations where speeding is prevalent.

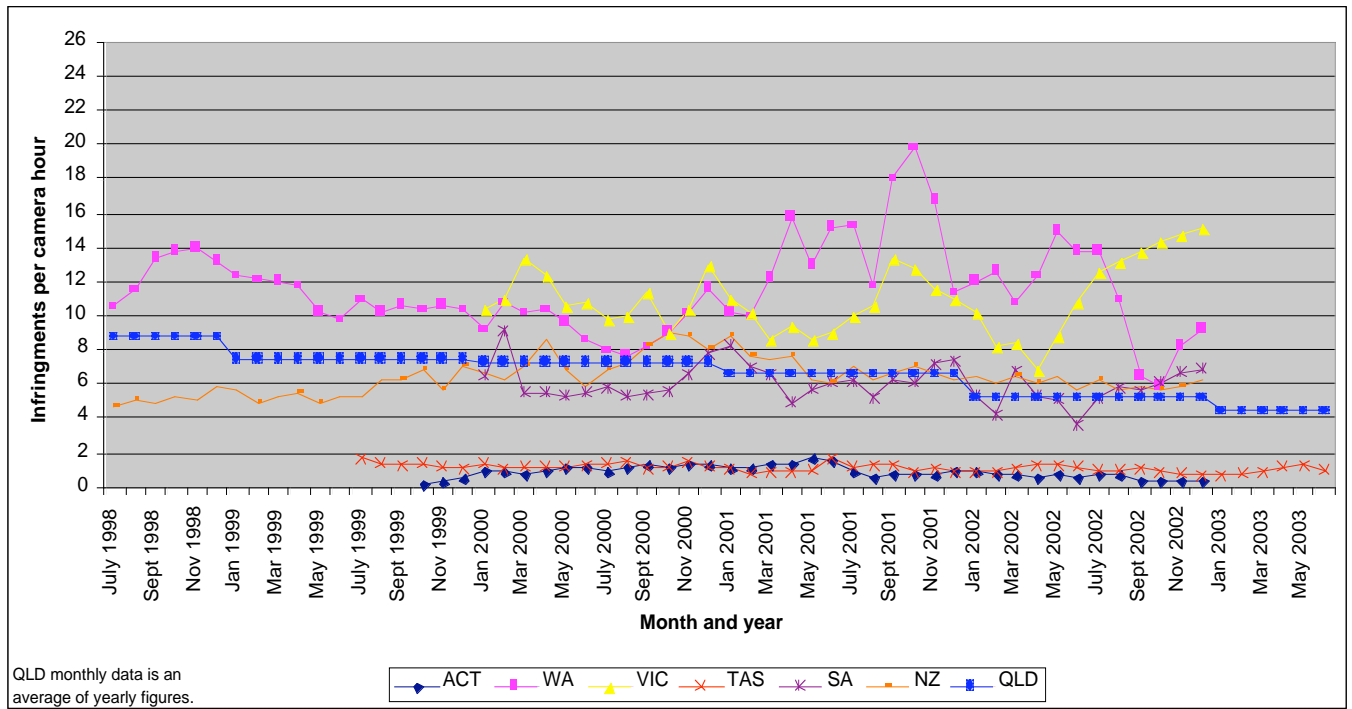


Figure 6 – Camera speeding TINS per camera hour

Relationship between indices relating to speed enforcement

The last complete year for which data was available for each jurisdiction was used to calculate:

- the average number of times a vehicle would be checked by a speed camera each year
- the percentage of vehicles passing cameras which attracted a TIN
- speed camera TINs issued as a percentage of the vehicle fleet.

These results are presented in Table 2.

Table 2 – Relationship between average yearly speed checks, percentage of vehicles passing cameras attracting TINs and annual speed camera TINs as a percentage of the vehicle fleet

Jurisdiction	Average speed camera checks per vehicle per year	Percentage of vehicles passing speed cameras which attract a TIN	Annual speed camera TINs as a percentage of the vehicle fleet
ACT	11.7	0.6%	6.9
Victoria	9.8	2.3%	22.9
Tasmania	16.6	0.8%	12.4
South Australia	15.3	1.2%	17.4
Queensland	12.2	0.9%	10.7
Western Australia			30.4
New Zealand			11.4

Column 2 of the table refers only to vehicles passing the cameras, while column 3 refers to the vehicle fleet as a whole. Column 3 is the product of Column 1 and Column 2, although the figures do not exactly tally due to rounding errors.

DISCUSSION AND CONCLUSION

Enforcement levels in all jurisdictions are at high levels. Depending on jurisdiction, each vehicle will have its speed checked between ten and sixteen times per year on average at any of a number of approved enforcement sites, ranging from hundreds up to several thousand. This is in addition to the vehicles checked by fixed speed cameras in jurisdictions which have this type of enforcement, and the more traditional interception methods which, these days, typically involve either laser speed guns or mobile radar. The overall enforcement levels would seem to greatly exceed the enforcement levels prior to the advent of cameras.

Where the number of camera hours and other features of the camera programs are reasonably consistent, the level of speed offences appears to stabilise, gauged by the proportion of the vehicle fleet or the proportion of vehicles passing the camera which attract TINs.

From the results examined, it appears that the levels of speeding and TINs stabilises in the long term. This entire process can be traced, if imperfectly so far, from the ACT data where speeds past the camera and TINs fell over the life of the program, and appeared to stabilise at a low level compared to the peak times after some three years of operation. The change in camera hours in Victoria would seem to have brought about an initial rise in the percentage of vehicles passing the camera which received TINs, followed by a steady decline over the period August 2001 to March 2002. The change in the enforcement thresholds appear to be responsible for the doubling of TINs issued to vehicles passing the camera in the period May to September 2003, followed by a levelling off.

REFERENCES

Howard, E 2004, *Presentation given to an Australian College of Road Safety Seminar to mark World Health Day*, Parliament of Victoria, 7th April 2004 (unpublished).