

## Review of South Australia's fixed and mobile speed camera programs

Phoebe Maxwell

Traffic Intelligence & Planning Section, South Australia Police, 2 Duncan Court, Ottoway SA 5013

### Abstract

The use of mobile and fixed speed detection devices has long been a contentious issue. Traffic Intelligence and Planning Section of South Australia Police has conducted a review of the value of South Australia's mobile and fixed speed camera programs. As part of the review, the following factors were taken into consideration: the potential under-reporting of speed as a contributor to fatal crashes; the number of serious injury and fatal crashes excessive speed has caused or contributed to over the last 14 years; the rate of motorist compliance with speed limits over the last six years; demographics of fatal speeders; speed detection hours worked and differences in legislation across the States and Territories. The review compared the rate of speed detection across the speed detection devices used by South Australia Police. A comparison of crash and casualty data pre and post-fixed speed camera installation was conducted across six sites.

There are multiple confounding factors which interact to influence driver behaviour. Nonetheless, one of the key findings of this review is speed detection deployments increase driver speed compliance and reduce the incidence of speed-related fatalities and serious injuries.

### Introduction

There are a variety of methods used to detect speeding motorists. Each method has unique benefits and limitations. The purpose of the fixed safety camera network is to ensure speed limit compliance at black spots. The purpose of mobile speed cameras is to detect speeding motorists and to create a general speeding deterrent across the entire road network. **South Australia Police (SAPOL)** has been using mobile speed cameras since 1990. Advanced speed camera technology was introduced in 1999. In 2001, South Australia introduced fixed dual speed and red light cameras to the road network. Although these dual purpose cameras were rolled out in 2001, they were not used for speed enforcement until 15/12/2003 (Kloeden, Edwards, & McLean, 2009).

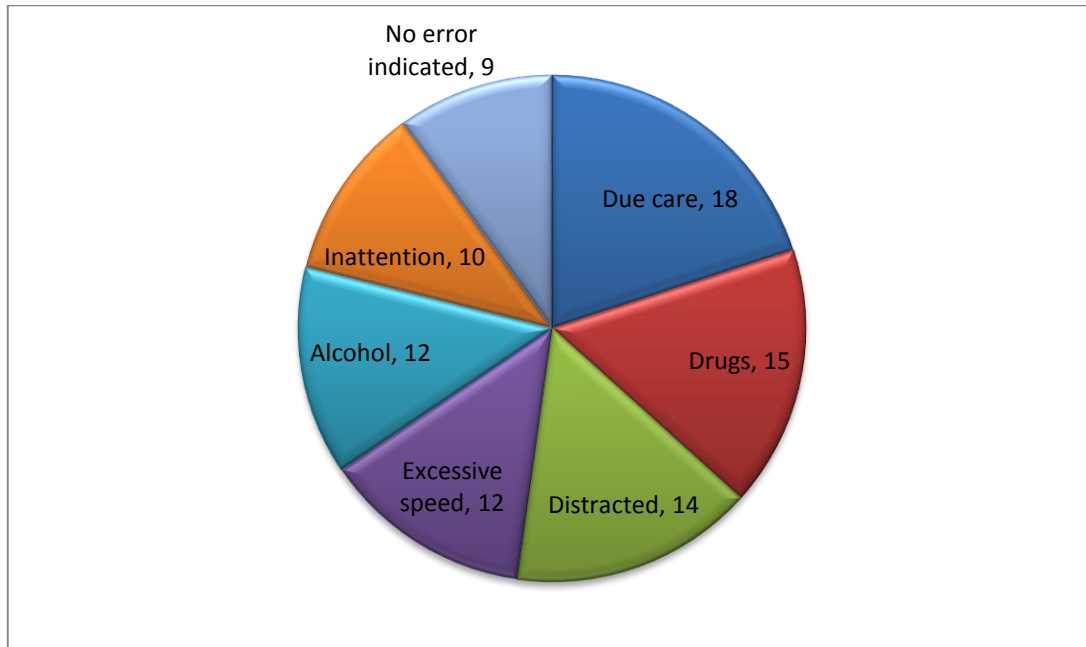
**Point-to-point (P2P)** speed cameras measure the time vehicles take to travel between two sites on a road and calculate the average travelling speed over the length of road to see if the motorist was speeding. Fixed P2P cameras have been activated on the Dukes Highway, Port Wakefield Road and Victor Harbor Road over the last year. Additional point-to-point cameras will soon be operational on the Sturt Highway, South Eastern Freeway and the Northern Expressway.

This paper examines the effect speed detection systems have on the road toll, which devices are most effective and puts forward issues for future planning and consideration.

### Impact of speed on the road toll

SA Government website [mylicence.sa.gov.au](http://mylicence.sa.gov.au) states that speeding and inappropriate travel speeds are estimated to directly contribute to at least 35% of deaths on SA's roads each year (Department of Planning, Transport and Infrastructure, 2015). **Traffic Intelligence and Planning Section (TIPS)** data indicates that excessive speed was the joint fourth (with alcohol) police nominated cause of 2014's fatal crashes. While excessive speed contributed to a notable portion (19%) of last year's fatal crashes, TIPS data indicates due care (29%), drugs (24%) and distraction (23%) were

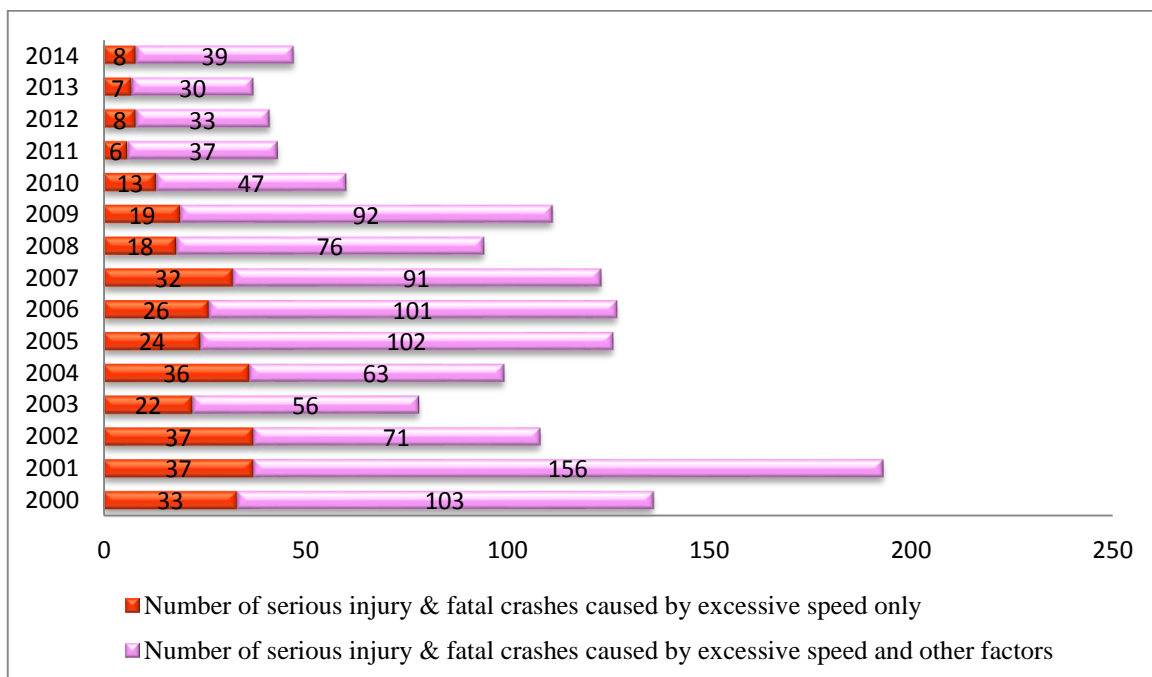
the leading causes of fatal crashes in 2014. Driver error ‘due care’ includes collisions that occurred at inappropriate travel speeds for the driving conditions. For example, a driver who crashes whilst travelling at the speed limit when there is strong wind and heavy rain would be classified as driving without due care rather than speeding. It should be noted that the cause of a crash is sometimes difficult to assess. In many cases, speeding may be a contributing factor but not formally acknowledged. It is therefore likely speeding as a cause is underestimated.



**Figure 1: Driver errors that contributed to fatal crashes in 2014**

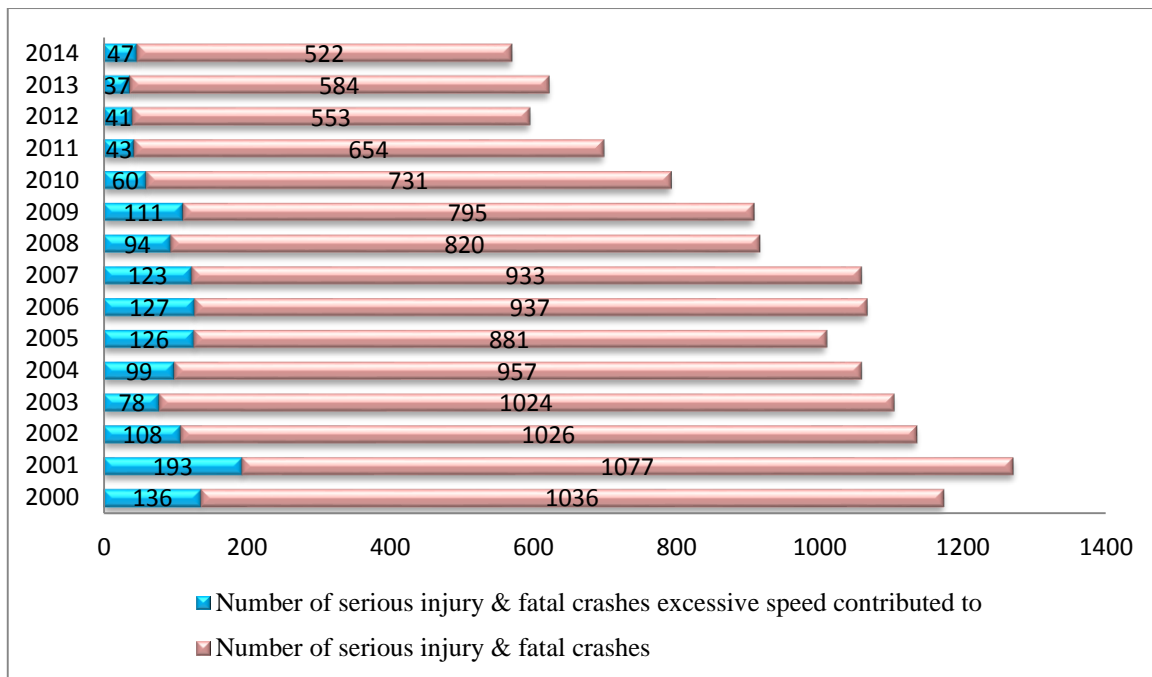
Data from 13/03/2015 Business Objects report

Figure 2 shows the downward trend in crashes resulting in fatalities and serious injuries that had excessive speed as a driver error.



**Figure 2: Serious injury & fatal crashes caused by excessive speed**

Data from 13/03/2015 Business Objects report



**Figure 3: Speed as a contributor to serious injury & fatal crashes**

Data from 13/03/2015 Business Objects report

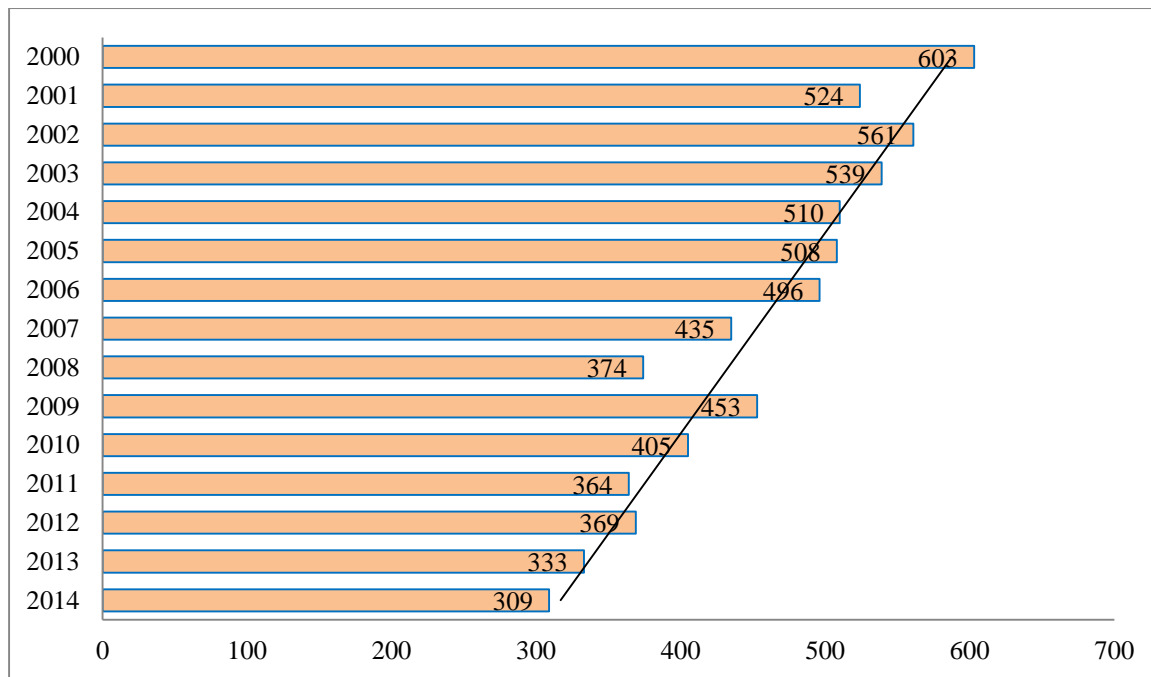
The reduced number of serious injury and fatal crashes to which speed contributed between 2011 and 2013 coincides with an increase in speed detection hours and a corresponding increase in driver speed compliance (see Figures 3 and 8).

Notwithstanding enhancements in vehicular safety and road design, this demonstrates that SAPOL speed detection deployments increase driver speed compliance and reduce speed-related fatalities and serious injuries.

**Mobile speed camera use in NSW**

In 2008, road crash fatalities in NSW had declined for six consecutive years. In December 2008, NSW phased out the use of its ageing wet film mobile speed cameras and became the only state or territory in Australia to no longer use mobile speed cameras. Between 2008 and 2009, NSW’s road toll jumped from 374 to 453 – an increase of 21%. As shown in Figure 4, the 2008 road toll was well below the linear trend line. When mobile speed cameras ceased operation, the road toll did more than regress to the mean – it shot well above the mean. This indicates that the removal of mobile speed cameras from NSW’s road safety initiatives directly contributed to an increase in crash fatalities.

On 19/7/2010, in response to the soaring road toll, the NSW Government Roads and Maritime Services (then the Roads and Traffic Authority) began operation of six digital mobile speed cameras. Since then, the NSW road toll has more closely followed the downward trend line.



**Figure 4: NSW Crash Fatalities**

Source: NSW Government Centre for Road Safety

### Centre for Automotive Safety Research evaluation of the SA default 50 km/h speed limit

On 1 March 2003, the default urban speed limit in South Australia was reduced from 60 km/h to 50 km/h. In the year following the change in the default speed limit, the **Centre for Automotive Safety Research (CASR)** found that on roads where the speed limit was reduced from 60 km/h to 50 km/h:

- The average travelling speed fell by 2.3 km/h
- The average free travelling speed<sup>1</sup> fell by 2.2 km/h
- The number of casualty crashes fell by 20% (330 fewer casualty crashes)
- The number of people injured in crashes fell by 24% (495 fewer casualties)
- The number of people needing treatment by a private doctor fell by 16% (103 fewer cases)
- The number of people needing treatment at a hospital fell by 29% (352 fewer cases)
- The number of people needing admission to hospital fell by 13% (34 fewer cases)
- The number of people fatally injured fell from 14 to 8 (Kloeden et al, 2009).

The reduction in casualties in the year after the default urban speed limit changed is estimated to have saved the South Australian community at least \$39,384,282 (\$30 million in 2004 dollars)<sup>2</sup> (Kloeden et al, 2009).

<sup>1</sup> Free travelling speed = the speed of vehicles that are travelling at least 4 seconds behind the vehicle in front of them.

<sup>2</sup> Calculated using the Bureau of Transport Economics (2000) human capital method updated to 2004 dollars.

On roads where the speed limit remained at 60 km/h:

- The average travelling speed fell by 0.9 km/h
- The average free travelling speed fell by 0.7 km/h
- The number of casualty crashes fell by 5% (165 fewer casualty crashes)
- The number of people injured in crashes fell by 7% (327 fewer casualties)
- The number of people needing treatment by a private doctor fell by 3% (48 fewer cases)
- The number of people needing treatment at a hospital fell by 10% (240 fewer cases)
- The number of people needing admission to hospital fell by 6% (30 fewer cases)
- The number of people fatally injured fell from 35 to 26 (Kloeden et al, 2009).

This further reduction in casualties in the year after the default urban speed limit changed is estimated to have saved the South Australian community at least \$42,009,901 (\$32 million in 2004 dollars) (Kloeden et al, 2009).

For this study, CASR compared vehicle on-road speeds just before the default limit was introduced with speeds one year after the introduction of the default speed limit. CASR's data shows the reduced default speed limit contributed to a reduction in casualty crashes, injuries and fatalities. It also created a diffusion of benefit to other roads.

### **The impact of fixed speed cameras on crash frequency and severity**

For the purposes of this review, TIPS has assessed the performance of a sample of six fixed speed cameras at various locations in Adelaide:

- Glover Ave, ADELAIDE. Fixed mid-block camera installed 25/5/2010.
- Glynburn Rd and Kensington Rd intersection, ERINDALE/KENSINGTON GDNS/KENSINGTON PK/LEABROOK. Fixed camera installed 25/3/2009.
- North Tce and Frome Rd intersection (Botanic Rd and Frome St also analysed), ADELAIDE. Fixed camera installed 11/3/2009.
- Montefiore Rd and War Memorial Drive intersection, NORTH ADELAIDE. Fixed camera installed 20/1/2009.
- Marion Rd and Sturt Rd, BEDFORD PARK/MARION/MITCHELL PARK/STURT. Fixed camera installed 20/1/2009.
- Anzac Hwy and Cross Rd, PLYMPTON. Fixed camera installed 24/11/2008.

Five years' crash and casualty data from immediately before and immediately after camera installation were taken for five of the sites, and four years and eleven months' data for the more recently installed Glover Avenue site. Data sets were analysed for the roads and suburbs the speed cameras are located in, which is the closest possible crash location parameter to the speed cameras. Crash and casualty data for both roads were analysed for fixed speed cameras located at intersections.

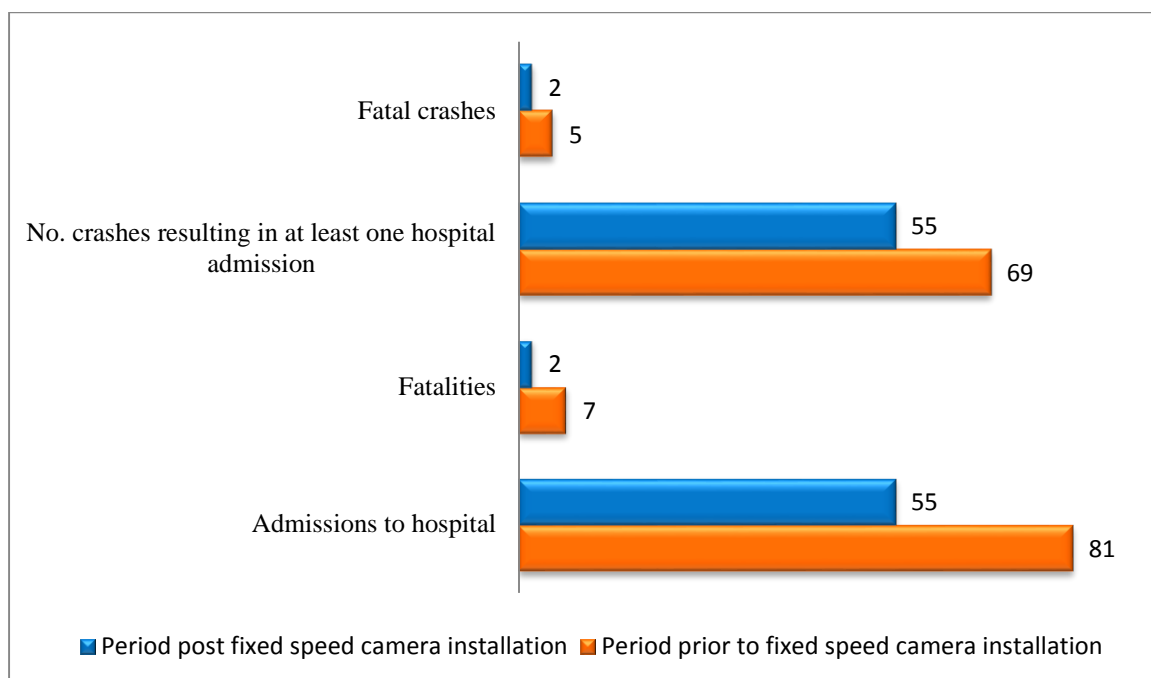
It is beyond the scope of this paper to directly compare statistics between sites with fixed speed cameras with equivalent sites without permanent cameras. Such a comparison would require matching sites based on factors such as the width of the road shoulder, the number of lanes in the road or any designated overtaking lanes, road condition and alignment, the traffic flow, and speed limits.

The range of variables precludes making valid direct comparisons between specific sites. However, more general inferences can be drawn and trends have been identified.

When comparing data from before and after fixed speed camera installation at the six random sites analysed by TIPS there was an overall:

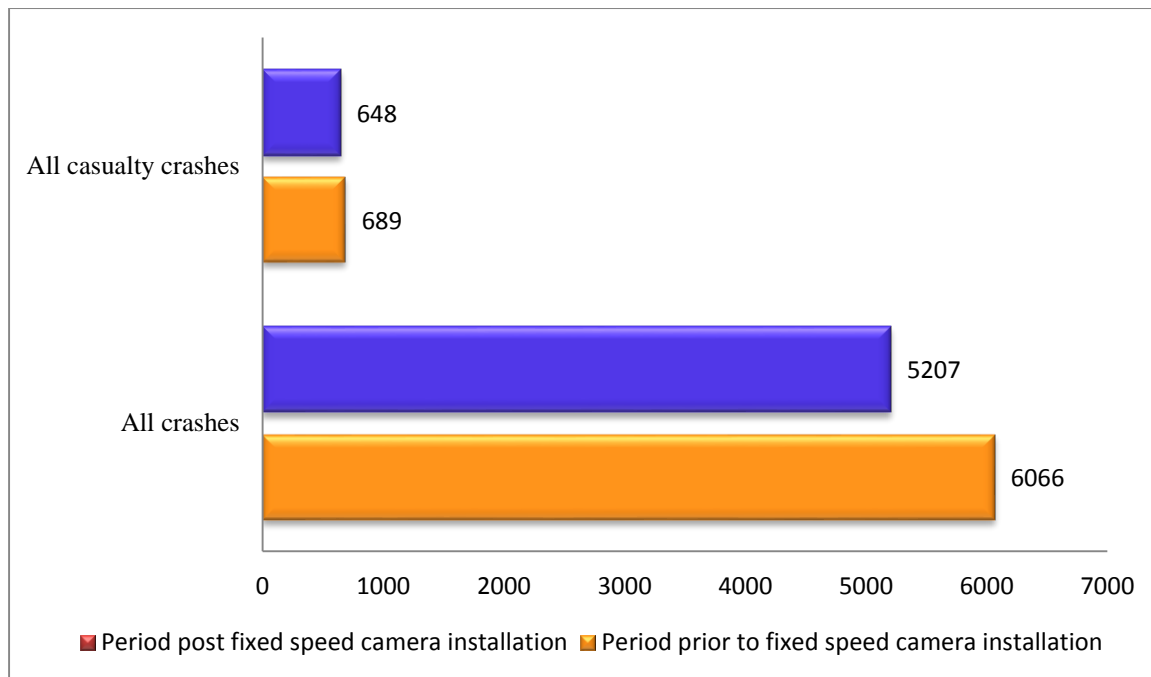
- 60% decrease in fatal crashes (from 5 to 2)
- 71% reduction in fatalities (from 7 to 2)
- 20% reduction in crashes resulting in at least one person being admitted to hospital (from 69 to 55)
- 32% reduction in admissions to hospital (from 81 to 55)
- 6% reduction in all casualty crashes (from 689 to 648)
- 14% reduction in all crashes (from 6066 to 5207).

The reduction in serious injuries and fatalities exceeds the reduction in overall serious injury and fatal crashes. In South Australia, a serious injury crash results in at least one person spending one or more nights in hospital. In the five year period post-fixed speed camera installation, the ratio of fatal crashes to fatalities was 1:1. The ratio of serious injury crashes to actual hospital admissions was also 1:1. Prior to speed camera installation, 1.17 people were admitted to hospital per serious injury crash and there were 1.4 deaths per fatal crash. Since the installation of fixed speed cameras on the six sites analysed for the purposes of this paper, there has been a significant reduction in serious injuries, fatalities and serious injury crashes on the roads in the suburbs where the cameras are located.



**Figure 5: Serious injury & fatal crash data before and after fixed speed camera installation across 6 sites**

Source: Business Objects crash and casualty reports



**Figure 6: All crash & casualty data before and after fixed speed camera installation across 6 sites**

### Speed cameras save lives and money

The **Bureau of Transport and Regional Economics (BTRE)** 2010 (most recent) estimated road crash costs are as follows.

Estimated losses by injury outcome:

- \$2.4 million for a road fatality
- \$214,000 for a hospitalised injury (including disability-related costs)
- \$2,100 for a non-hospitalised injury.

Estimated losses for each disability case:

- \$3.82 million for each case of profound impairment
- \$1.78 million for each case of severe impairment
- \$542,000 for each case of moderate impairment
- \$126,000 for each case of mild impairment.

The estimated costs on a crash basis were:

- \$2.67 million per fatal crash
- \$266,000 per crashes resulting in at least one hospitalised injury
- \$14,700 per crash resulting in at least one non-hospitalised injury
- \$9,950 per property damage only crash (Risbey, de Silva, & Cregan, 2010).

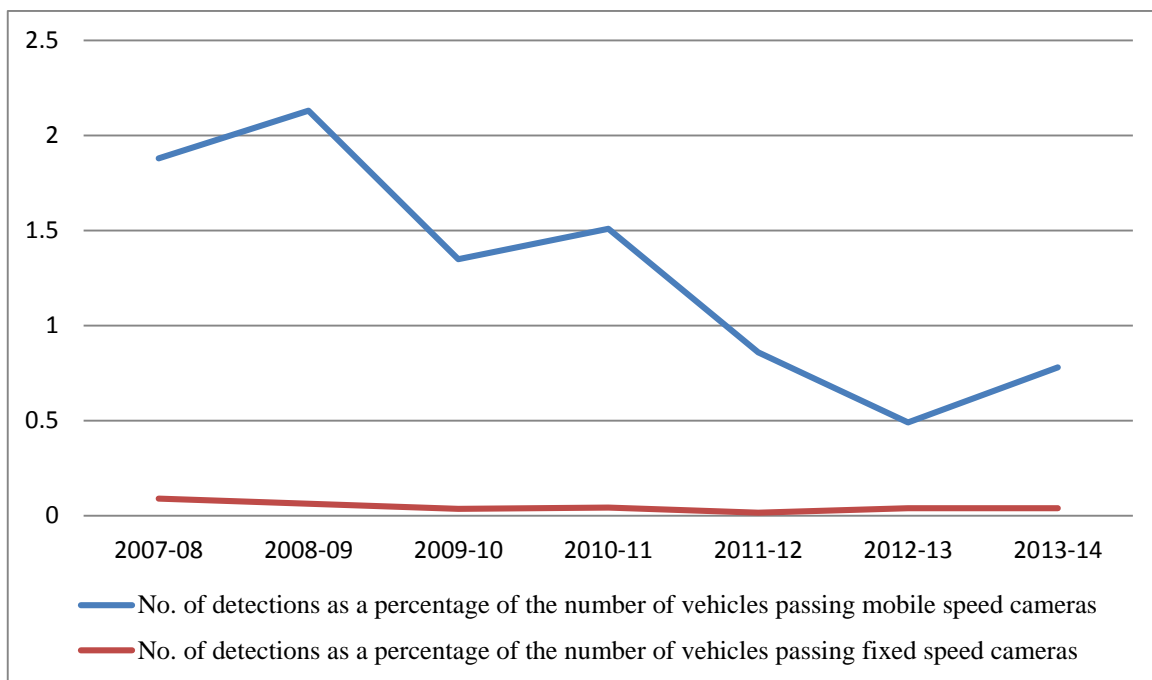
Based on the above estimates, the six fixed speed cameras analysed in this paper have contributed to saving the South Australian community at least \$19,387,109 (indexed for CPI: \$17,564,000 in 2010 dollars) (Reserve Bank of Australia, 2015):

- \$13,245,577 (\$12 million in 2010 dollars) over five years for the reduction in fatalities
- \$6,141,532 (\$5,564,000 in 2010 dollars) over five years for the reduction in hospital admissions.

Non-hospitalised injuries have not been considered for the purposes of this paper.

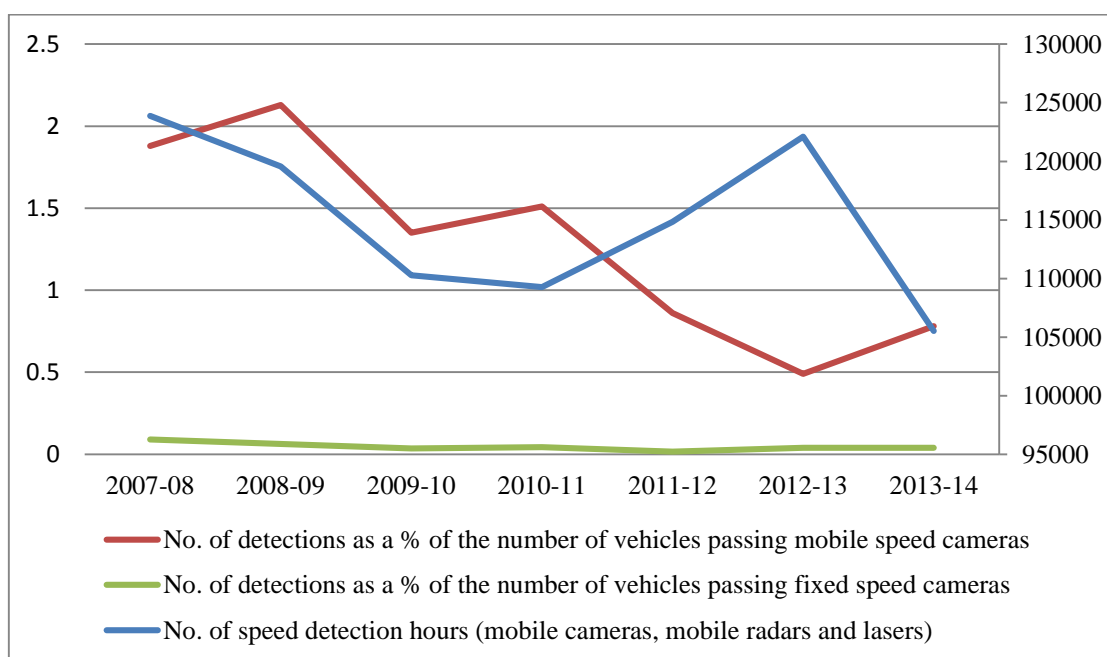
### Rate of non-compliance

Mobile speed cameras' speed detection rate as a percentage of passing vehicles for the 2013-14 financial year was almost 20 times greater than fixed cameras' (0.78% vs 0.04%). This indicates that motorists generally know where fixed speed cameras are and are more likely to obey the speed limit if they are aware their speed is being monitored. Nonetheless, Figure 7 shows the trend of an increasing percentage of motorists complying with speed limits across the road network. Data indicates that both fixed and mobile speed cameras have a positive impact on driver speed compliance.



**Figure 7: Speed detections as a percentage of all traffic**

Source: SA Government Portfolio Statements 2010-2014



**Figure 8: Impact of speed detection activity on rate of non-compliance**

Source: SA Government Portfolio Statements 2010-2014 and Business Objects deployment data



Figure 8 shows the interaction between the mobile speed camera rate of detection and number of speed detection hours from 1/7/2007 to 30/6/2014. In this seven year period:

- In the three years that the proportion of motorists caught speeding increased year on year (1/7/2007-30/6/2008, 1/7/2009-30/6/2010 and 1/7/2012-30/6/2013), there had been a corresponding reduction in speed detection hours worked.
- In the six years for which comparable data is available, the number of speed detection hours only increased year on year for the two year period 1/7/2010-30/6/2012. In the same period, the number of detections as a percentage of the number of vehicles passing mobile speed cameras decreased from 1.51% to 0.86% to 0.49%.
- 1/7/2008 – 30/6/2009 is the only period in which both speed detection hours and the proportion of motorists caught speeding decreased.

The above points demonstrate a relationship between speed detection hours worked and speed limit compliance. The more police are seen to be enforcing speed limits (deployment hours), the more motorists comply with speed limits.

### Demographics of fatal speeders

Of the 12 fatal crashes that had Excessive Speed listed as one of the driver errors in 2014 (see Appendix):

- 33% (4) were disqualified (3) or unlicensed (1) drivers
- 33% (4) of the fatalities were motorcyclists
- At least 38% (3) of the car fatalities were not wearing a seatbelt
- 92% (11) of the drivers / motorcyclists were male
- 67% (8) were aged between 26 and 35
- 67% (8) of the crashes occurred in rural areas
- 67% (8) had BAC  $\geq 0.105$  (4 category 2, 4 category 3)
- 58% (7) tested positive for illicit drugs. This number may rise as more forensic results are returned to SAPOL
  - 2 tested positive for methylamphetamine
  - 3 tested positive for **tetrahydrocannabinol (THC)**
  - 2 tested positive for THC and methylamphetamine.

SAPOL addresses the above listed driver behaviours, which are known to co-occur with speeding, through the use of **Mobile Automatic Number Plate Recognition (MANPR)** and various Operations on drink and drug driving, seatbelt use and motorcyclists. Ongoing partnerships with other road safety stakeholders will ensure best practice in approaching multi-faceted, problematic driving behaviours.

### Enforcement

TIPS data shows that mobile radar is the most frequently used speed detection device in country areas whereas mobile speed camera is the most frequently used device in metro areas. Mobile speed cameras result in more **General Expiation Notices (GENs)** issued per hour than any other speed detection device. Other speed detection devices are disadvantaged by a reduction in detection hours by police contact with drivers.

<b>Apparatus</b>	<b>Country hours</b>	<b>Metro hours</b>	<b>Total</b>
Handheld radar	390	96	<b>486</b>
Laser	9,922	6,429	<b>16,350</b>
Mobile radar	38,259	329	<b>38,588</b>
Mobile speed camera	15,509	29,526	<b>45,034</b>
<b>TOTAL</b>	<b>64,079</b>	<b>36,380</b>	<b>100,459</b>

**Table 1: Speed detection hours 2014**

Source: Business Objects report run 31/3/2015

\*Figures have been rounded off to the nearest whole number. This data is indicative only.

<b>Apparatus</b>	<b>Country</b>	<b>Metro</b>	<b>Overall</b>
Handheld radar	0.29	0.86	<b>0.41</b>
Laser	0.53	0.77	<b>0.62</b>
Mobile radar	0.24	0.35	<b>0.24</b>
Mobile speed camera	1.63	2.29	<b>2.06</b>
<b>Average</b>	<b>0.62</b>	<b>2.00</b>	<b>1.12</b>

**Table 2: GENs issued per hour - 2014**

Source: Business Objects report run 31/3/2015

\*Figures have been rounded off to two decimal points. This data is indicative only.

## Legislation

On 1/9/2012, penalties for low level speeding in South Australia changed to lower expiation fees and increased demerit points. Both demerit points and expiation fees were increased for higher level offences (Department of Planning, Transport and Infrastructure, nd).

The reduced expiation fee for low level offending coincides with a 59% rise in the proportion of motorists speeding between 2012-13 and 2013-14. This indicates that the increase in demerit points alone for low level speed offences is not an effective deterrent.

Victoria has the second lowest rate of annual fatalities per 100 million **vehicle kilometres travelled (VKT)**, after the Australian Capital Territory (**ACT**) (BITRE, 2014). Victoria also has the second lowest annual fatality rate per 100,000 population, again after the ACT (BITRE, 2014). The size of South Australia and length of its rural road network is more comparable to Victoria than the ACT. Victoria has three more speeding offence speed categories than South Australia. Victoria also introduces immediate licence disqualification for motorists caught exceeding the speed limit by  $\geq 25$  kph, or travelling at  $\geq 130$  kph in a 110 kph speed zone. New South Wales disqualifies drivers who are convicted of exceeding the speed limit by 30 kph. South Australia only has immediate loss of licence for six months for drivers caught travelling at 45 km/h or more above the speed limit.

The Bureau of Infrastructure, Transport and Regional Economics VKT and annual fatality rate data indicates South Australia would benefit from a realignment of its dangerous driving speed to more closely match Victoria's.

## Key facts

- The leading causes of 2014's fatal crashes were: due care (29%), drugs (24%), distraction (23%), speeding (19%) and alcohol (19%).
- NSW's annual road toll increased by 21% (from 374 to 453 fatalities) in the year following cessation of mobile speed camera deployments. Prior to that, there had been six successive years of declines in crash fatalities.
- When comparing data from before and after fixed speed camera installation at the six random sites analysed by TIPS there was an overall:
  - 60% decrease in fatal crashes (from 5 to 2)
  - 71% reduction in fatalities (from 7 to 2)
  - 20% reduction in crashes resulting in at least one hospital admission (from 69 to 55)
  - 32% reduction in admissions to hospital (from 81 to 55).

## Key findings

- Speed detection deployments increase driver speed compliance and reduce the incidence of speed-related fatalities and serious injuries.
- Lowering a road's speed limit increases driver speed compliance on other roads in the network.
- Fixed speed cameras have contributed to reducing the number of fatal crashes, fatalities, serious injury crashes and admissions to hospital across the locations analysed by TIPS.
- Mobile speed cameras have the highest detection rate of all speed detection devices due to their changes in location. They also benefit from no reduction in detection hours due to police contact with drivers.
- There is a demonstrated inverse relationship between speed detection hours worked and motorist rate of non-compliance.
- Mobile radar is the most frequently used speed detection device in country areas whereas mobile speed camera is the most frequently used device in metro areas.
- Victoria and New South Wales' threshold for instant loss of licence from speeding is lower than South Australia's. Both states have lower per capita and per VKT road fatality rates than South Australia.

## Recommendations

- SAPOL to petition for immediate licence disqualification for motorists caught exceeding the speed limit by  $\geq 30$ kph in SA.

## Conclusion

Fixed and mobile speed cameras make an important contribution to increasing motorist speed-limit compliance, reducing serious injury crashes and saving lives. Speeding fatalities frequently go hand in hand with drink driving, drug driving, not wearing a seatbelt and riding a motorcycle. One third of 2014's fatalities that had excessive speed as a driver error were disqualified or unlicensed drivers. This demographic requires further targeting.

There has been an increase in the proportion of motorists speeding since the 1/9/2012 reduction in lesser speeding fine amounts. This indicates the rise in demerit points for lower level speeding offences is not sufficient incentive to comply with the posted speed limit.

## Appendix

## 2014 fatal crashes that had excessive speed as a driver error

Collision type	Driver demographic	LSA	Driver error 1	Driver error 2	Driver error 3	Driver error 4	Seatbelt worn?
Car hit tree	30 yo male	BALSA	Excessive speed	Due care	Alcohol 0.105	Drugs - THC	N
Car hit tree	28 yo male	HFLSA	Excessive speed	Alcohol 0.101	Drugs THC & meth	-	Y
Motorcycle hit tree	28 yo male <b>disqualified driver</b>	EHLA	Excessive speed	Alcohol 0.133	Drugs meth	-	Helmet worn
Car hit tree	20 yo male	HFLSA	Excessive speed	Alcohol 0.154			Uk
Motorcycle vs Utility	35 yo male	EHLA	Excessive speed	Disobey traffic lights			Helmet worn
Left road out of control	34 yo <b>unlicensed male</b>	BALSA	Dangerous driving	Excessive speed	Alcohol 0.299		N
Left road out of control	28 yo female	MMLSA	Due care	Excessive speed	Alcohol 0.129		Uk
Left road out of control	32 yo <b>disqualified male</b>	SRLSA	Alcohol 0.259	Excessive speed	Drugs THC	-	Uk
Head on	26 yo <b>disqualified male</b>	HFLSA	Change lanes to danger	Excessive speed	Drugs meth	-	Y
Left road out of control	57 yo male	MMLSA	Distracted	Excessive speed	Drugs meth, THC		N
Motorcycle hit parked vehicle	40 yo male	SRLSA	Alcohol 0.201	Excessive speed	Inattention		Helmet worn
Right angle	19 yo male	YMNLSA	Due care	Inattention	Excessive speed	Drugs - THC	Helmet worn

Data from 13/03/2015 Business Objects Report

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