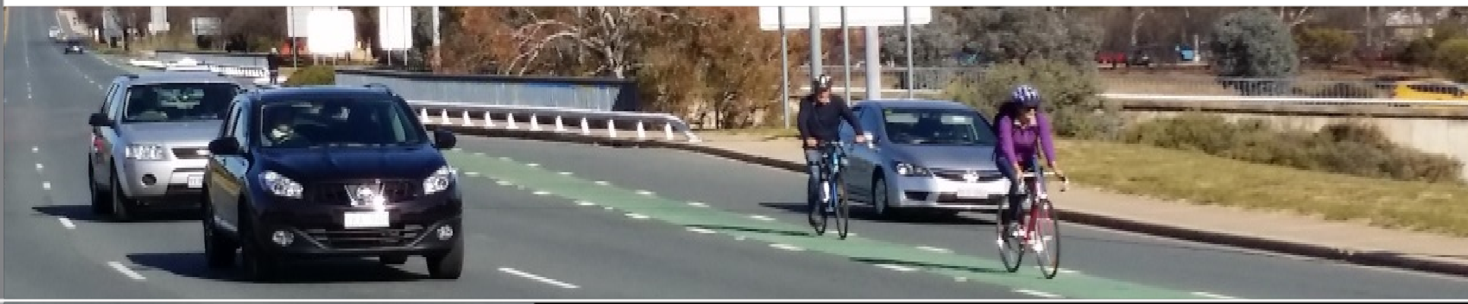
Australian Government
Department of Infrastructure and Regional Development
Bureau of Infrastructure, Transport and Regional Economics



Australian cycling safety: casualties, crash types and participation levels

At a glance

This paper presents an analysis of cycling safety in Australia. Topics included are

- analysis of casualties by demographics
- types of crash that result in cyclist injuries
- recent trends in cycling participation.

Cyclists comprise 3 per cent of all road fatalities and 15 per cent of all road hospitalisations. These proportions are higher today than five or ten years ago.

Children (0–16 years) have the highest population-standardised rate of cycling hospitalisations. This is in contrast to vehicle occupant hospitalisations, which peak in both the young adulthood ages and in the older (65+) ages.

Males are approximately four times more likely than females to be hospitalised following a cycling crash. For hospitalisations following any road crash, the male/female ratio is approximately 2:1.

Around 85 per cent of reported cyclist casualty crashes involve another vehicle (mostly a light vehicle).

Around 25 per cent of cyclist casualty crashes occur when two vehicles (including the cyclist) approach an intersection from perpendicular directions or from opposing directions. Other frequent crash types are side-swipes (14 per cent), collisions with vehicle doors (7 per cent) and rear-ends (6 per cent).

Cyclist casualty crashes are heavily skewed towards the lower posted speed zones (50km/h and 60 km/h).

Participation in cycling is increasing across many capital city commuting routes. However for overall cycling participation (transport and recreation), latest measures show flat or negative growth.

Introduction

Cycling is a popular and efficient mode of transport and a healthy recreation activity. The benefits of participation in cycling are promoted in Australia by strong community based associations and by policies and programs developed at all government levels through local to national. Infrastructure designed to meet the needs of cycling is being progressively built across Australia.

Cycling has associated safety risks, many of which are specific to the mode. Cyclists are considered vulnerable road users, whereby an error that might trigger a minor incident for a vehicle occupant could have major consequences for a cyclist. In this paper, several sources of bicycle crash data and exposure data are used to provide an overview of cycling safety and data sources in Australia. Recent trends are identified. The paper has three main sections. Section 1 presents latest casualty and fatality statistics, including tabulations by jurisdiction and age group. Section 2 presents analyses of crash type, vehicles-involved and location characteristics for crashes involving a cyclist casualty, and Section 3 explores recent Australian cycling exposure data.

Recent Australian research into cycling safety covers a wide field of topics—including exposure data and risk modelling, visibility, helmets, vehicle conflicts, injury, education and health. Many of the recent published papers provide much greater detail than is provided in the present broad study. See the References section.

Cycling is developing as a transport mode, and future studies to update safety statistics and model risk should be considered.

Definitions and data sources

The scope of the paper is traffic crash casualties (fatalities and injuries) of cyclists. 'Traffic' includes locations such as roads, road-related areas, bicycle paths and footpaths. Excluded are locations such as private land and roads not open to the public. A cyclist is a person riding or being carried as a passenger on a bicycle (also called a pedal cycle) — a vehicle with two or more wheels built to be propelled by human power (National Transport Commission 2012).

A fatality is a person who dies within 30 days from injuries in a traffic crash.

Two sources of injury data are used in this paper. A 'reported injury' is an injury that is recorded by police in a crash report. The road safety authorities in each state or territory validate and code this data into their individual databases, which contain all levels of crash severity. In this paper, national tabulations based on reported injury data do not separate minor injuries from serious or severe injuries.

The second source of injury data is 'hospitalised injury', or 'hospitalisation'. This is a hospital admission of an injured person, excluding those fatally injured. This data is sourced at hospitals and collated into the National Hospital Morbidity Database, which is managed by the Australian Institute of Health and Welfare (AIHW). BITRE receives annual extracts of this data.

The tables and figures are prefaced with the source/type of data used. The different sources of data necessitate that the tables show different years. Generally the latest available data are used.

1. Annual casualties

1.1 Australia

The first set of tables focus on counts of fatalities and injuries (hospitalised and police-reported), and on the proportions cyclists comprise of total road crash casualties.

Table 1: Cyclist casualties in traffic crashes — Australia

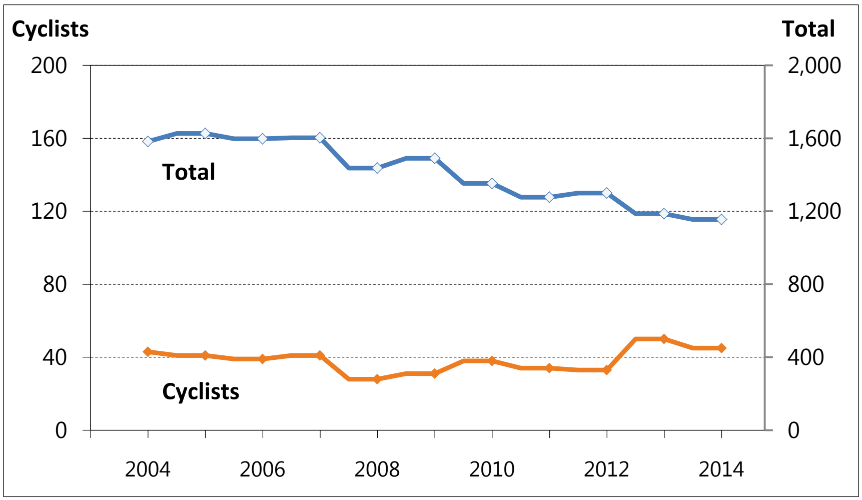
Year	Cyclists killed	Cyclists as % of all road fatalities	Year	Cyclists hospitalised	Cyclists as % of all road hospitalisations
2005	41	2.5%	2003-04	3,676	12.8%
2006	39	2.4%	2004-05	-	-
2007	41	2.6%	2005-06	4,370	14.0%
2008	28	1.9%	2006-07	4,789	14.6%
2009	31	2.1%	2007-08	4,814	14.8%
2010	38	2.8%	2008-09	5,264	15.4%
2011	34	2.7%	2009-10	5,330	16.2%
2012	33	2.5%	2010-11	5,168	15.5%
2013	50	4.2%	2011-12	5,527	16.0%
2014	45	3.9%	2012-13	-	-

- Data not available.

The two series of proportions in Table 1 have statistically significant increasing trends[1]. The annual series of hospitalised cyclists also has a significant trend of around 4 per cent increase per year[2]. There is no significant increase in the series of the annual fatality counts.

Figures 1 and 2 display the data in Table 1, adding lines for total road crash fatalities and total hospitalisations.

Figure 1: Fatalities: annual counts of killed cyclists and all road users



[1] Using a test for a linear trend in the log-odds (*prop.trend.test* in R).
[2] A *linear* model was fit and thus the annual per cent change varies — between 3% and 5%. Statistical significance was found at the size α <0.05.

Figure 2: Hospitalisations: annual counts of hospitalised cyclists and all road users

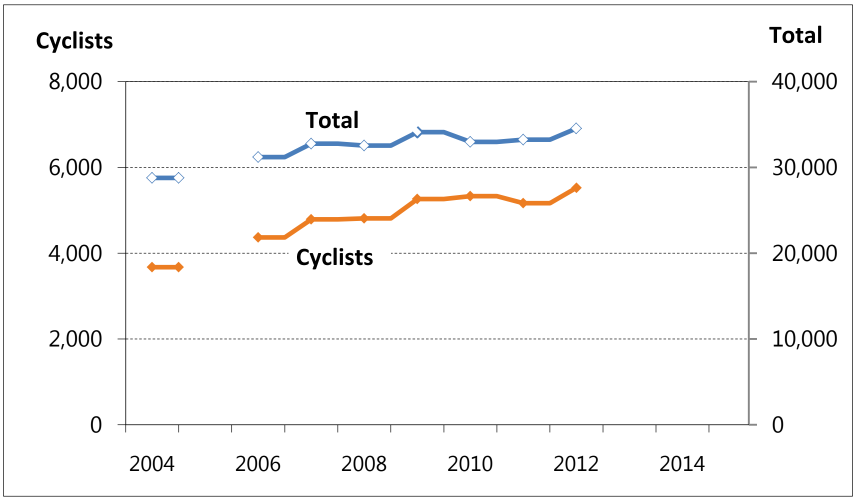


Table 2 compares cyclist fatalities as a proportion of all road fatalities, across jurisdictions and over time.

Table 2: Fatalities: cyclists as proportion of all traffic fatalities, by jurisdiction

5-year period	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
2005-2009	2.4%	2.6%	2.3%	2.5%	1.5%	3.6%	1.1%	2.5%	2.3%
2010-2014	3.0%	2.9%	3.7%	3.8%	2.8%	4.5%	1.8%	7.4%	3.2%

For all jurisdictions, the proportion of cyclists' fatalities out of total fatalities was higher during the latter half of the decade than that during the first half. Small numbers preclude significant statistical findings for these differences — with the exceptions of Queensland, Western Australia and whole of Australia, all of which did record significantly increased proportions.

Table 3 gives counts of cyclist hospitalisations by jurisdiction. Hospitalised injuries by jurisdiction are available for a restricted number of years.

Table 3: Hospitalisations: cyclists hospitalised in traffic crashes, by jurisdiction

Year	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
2005-06	1,362	1,212	824	323	328	111	61	101	4,370
2006-07	1,428	1,446	1,000	290	331	100	51	102	4,789
2007-08	1,297	1,402	999	353	410	115	70	119	4,814
Cyclists as % of all traffic hospitalisations	13.7%	15.8%	14.7%	13.4%	13.3%	14.9%	12.9%	20.1%	14.5%
2008-09	1,450	1,486	1,093	336	465	110	76	175	5,264
2009-10	-	-	-	-	-	-	-	-	5,330
2011*	1,487	1,688	955	379	531	73	np	np	5,393
Cyclists as % of all traffic hospitalisations	14.2%	17.5%	15.2%	14.7%	15.3%	14.4%	14.8%	28.5%	15.6%

* Calendar
\- not available
np not published

For all jurisdictions except Tasmania, the proportion of total hospitalisations comprised by cyclists has increased over time. Significant differences in the proportions over the two time periods occurred for Victoria, South Australia, Western Australia, Australian Capital Territory and Australia.

Police reported crashes (national only) are an alternative data source, shown in Table 4. These counts are of any reported injury, including minor injury.

Table 4: Reported injuries: cyclists injured in traffic crashes

Year	Australia[a]
2008	4,269
2009	4,510
2010	4,404
2011	4,363
2012	4,300
2013	4,400
Cyclists as % of all traffic injuries	4.4%

a Australia's totals in 2012 and 2013 includes estimates for Queensland.

Comparing Table 4 with Table 3, the counts of injured cyclists are similar in both, but the proportion is much lower in Table 4. The denominator (all reported road crash injuries) used for the proportion in Table 4 must be much higher. Around 80 per cent of reported injuries are of a vehicle driver or passenger. A significant number of these would have a minor injury rather than one requiring admission to hospital. Thus they will be included in the police reported injury data, but will likely be excluded from the hospital admission data. Johnson et al (2015) discuss crash reporting issues and data sources in a recent paper on Australian Capital Territory cycling.

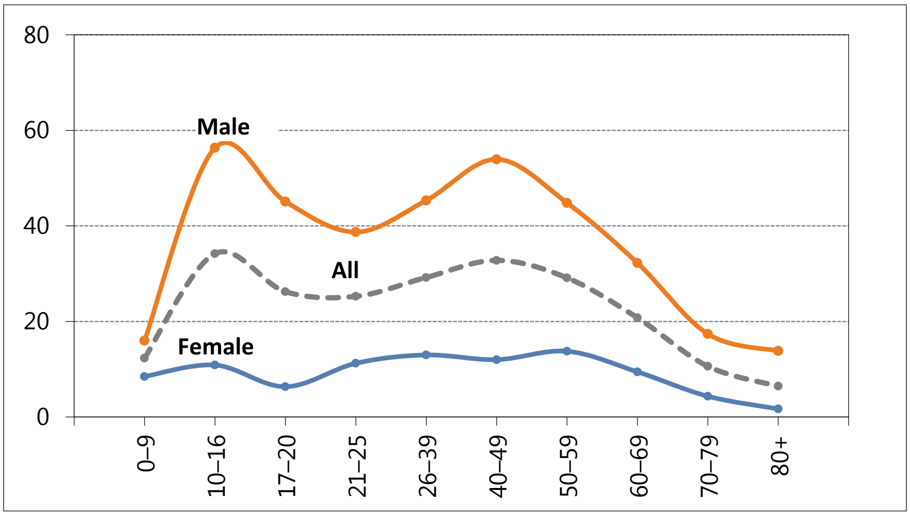
Table 5 gives cyclist hospitalisations by age groups. For children, approximately one third of all road crash hospitalisations are from cycling crashes.

Table 5: Hospitalisations: cyclists hospitalised in traffic crashes by age group

2012	Age group:	0-9	10-16	17-25	26-39	40-59	60-69	≥ 70	Total
	Gender								
	Male	239	567	603	1,025	1,488	360	158	4,440
	Female	120	104	128	292	393	107	39	1,183
	Ratio M/F	2.0	5.5	4.7	3.5	3.8	3.4	4.1	3.8

The overall number of annual hospitalisations of male cyclists is approximately four times higher than that of females. This is not explained solely by participation rates. For most ages, males have approximately twice the participation of females (see Section 3). Hospitalisation data by age group is standardised by population in Figure 3.

Figure 3: Cyclist hospitalisations per 100,000 population — age and sex distributions, Australia, 2012



The peak in the under 16 years group is not evident in hospitalisation rates for other road users (which are dominated by vehicle occupants). This highlights both higher exposure rates for younger people, and the vulnerability of cyclists. There is an increase in the male 40-49 demographic, which is also not seen in other road user groups, nor in female cyclists.

The next table presents greater-capital-city cyclist injuries standardised by population over six years. There is evidence that cyclist trips are increasing in capital cities (Section 3).

Table 6: Reported injuries: cyclists injured in traffic crashes per 100,000 population, for capital cities

	2008	2009	2010	2011	2012	2013
Sydney	16.4	17.3	16.9	15.1	14.5	14.7
Melbourne	28.7	30.3	30.8	32.0	27.6	29.6
Brisbane	19.0	19.5	19.0	17.6	-	-
Adelaide	35.8	33.6	37.0	38.0	38.9	39.0
Perth	16.2	17.8	16.7	17.1	15.3	14.6
Hobart	17.2	25.9	12.6	14.8	18.9	17.9
Darwin	29.7	30.3	25.8	19.4	16.6	24.0
Canberra	17.8	16.9	20.5	21.5	29.3	20.7
Australia – capital city[a]	22.1	23.0	23.0	22.7	21.9	22.2
Australia – outside capital city[a]	15.7	16.0	13.8	12.9	13.4	12.7

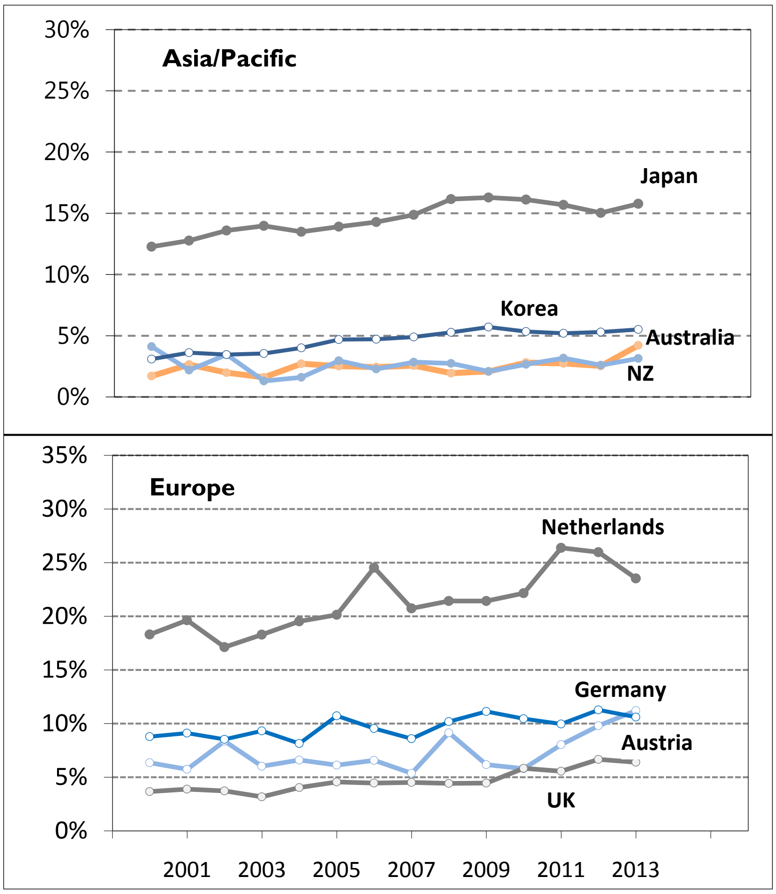
[a] Australia's rates for 2012 and 2013 use estimates for Queensland

Not shown in Table 6 is the corresponding rest-of-state rate. In all jurisdictions except Queensland and Tasmania, the capital city rate is higher than that rate. In Section 3, cycling participation levels are classified by Capital city and rest of state. Of note in the data above are the differences between the capital cities: the rates for Sydney and Perth are half of the rates for Melbourne and less still compared to Adelaide.

1.2 International

As a proportion of all road traffic crash casualties, cyclist casualties are increasing in Australia. Whilst this is also true for most OECD countries, the proportion varies significantly across countries. For the eight countries shown below, it varies between 3 per cent to 5 per cent for Australia and New Zealand to 25 per cent for the Netherlands.

Figure 4: Fatalities: cyclist fatalities as proportion of all road deaths — selected countries, 2000 to 2013



Source: International Road Traffic and Accident Database (IRTAD)

It is difficult to compare cycling participation rates across countries: surveys differ on size, date and other parameters. Pucher et al (2012) provides some data and analysis which shows that the Netherlands, Germany and Austria have much higher rates of cycling than either Australia or the United Kingdom. Similarly, in The European Commission's (2012) urban mobility survey, rates of recent bicycle use are reported to be approximately double that of Australia. Data for Japan was not available.

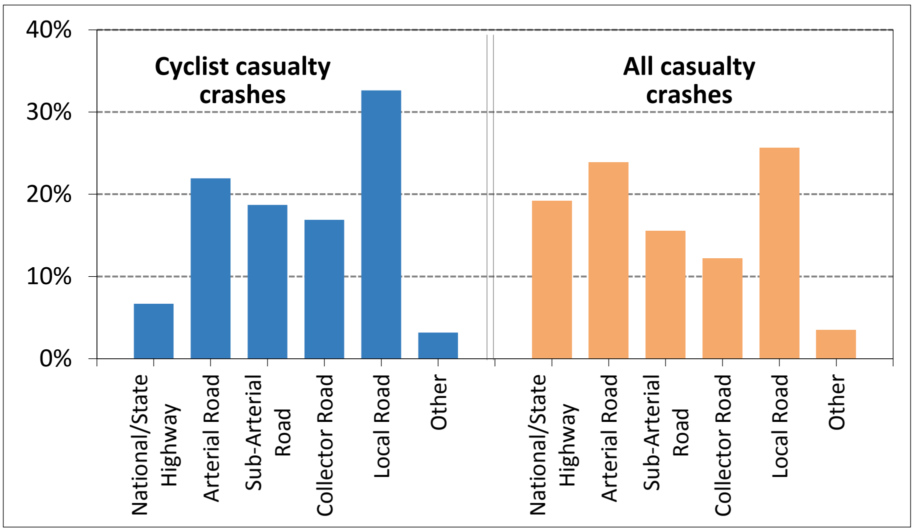
2. Casualty crash details

This section provides analysis of cyclist casualty crashes. Mostly, the data used is reported injury crashes. Three main areas are examined: the location and time-of-day characteristics of crashes; involvement of other vehicles by vehicle type for cyclist crashes; and analysis of crash type using the *Definitions for Classifying Accidents* (DCA) and *Road User Movements* (RUM) codes (Austroads 2009).

2.1 Location and Time-of Day

Part of the risk for cyclists is related to the number and speed of the other vehicles on the road. Larger roads offer more direct routes for longer trips, but necessarily involve greater interaction with other vehicles. Smaller local roads are less direct routes but have lower posted speed limits. Fatal cyclist crashes occur on all types of road. Highways and arterial roads account for around 29 per cent of all reported cyclist casualty crashes. For all fatal road crashes, (not just cyclists) highways and arterial roads account for around 43 per cent.

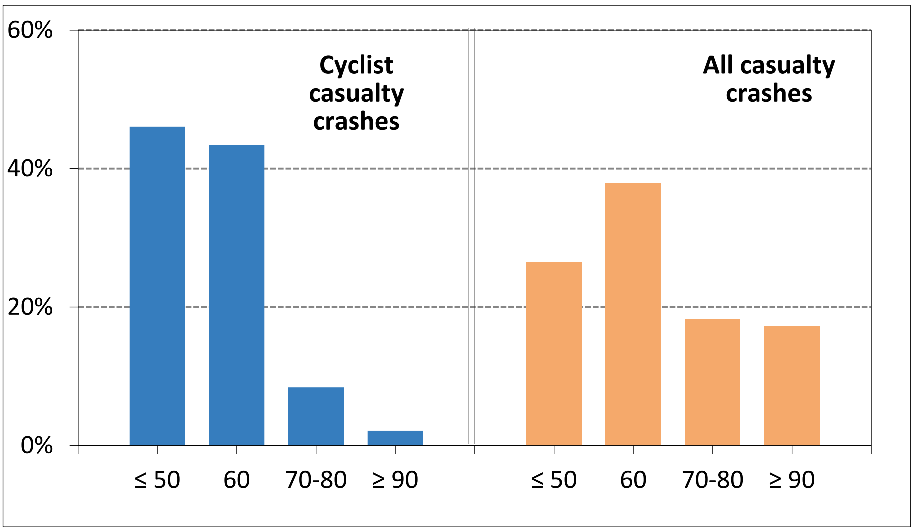
Figure 5: Reported casualty crashes by Road type — 2008-2013



Note: 'Other' includes Access roads, Busways, Paths and Unknown.

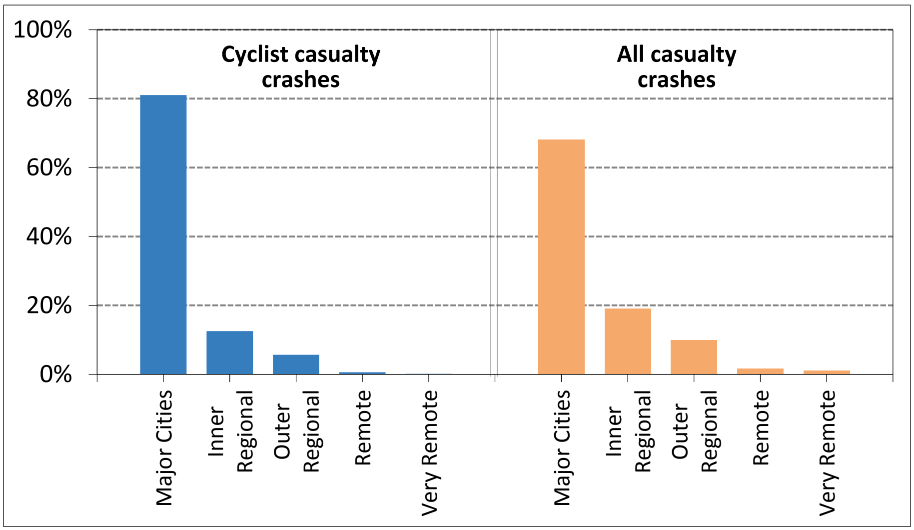
Related to the above is the posted speed limit on these roads. A significant proportion of all reported casualty crashes occur in zones of 70 km/h and above, whereas casualty cyclist crashes occur predominantly in lower speed zones (Figure 6).

Figure 6: Reported casualty crashes by posted speed limit (km/h) — 2008-2013



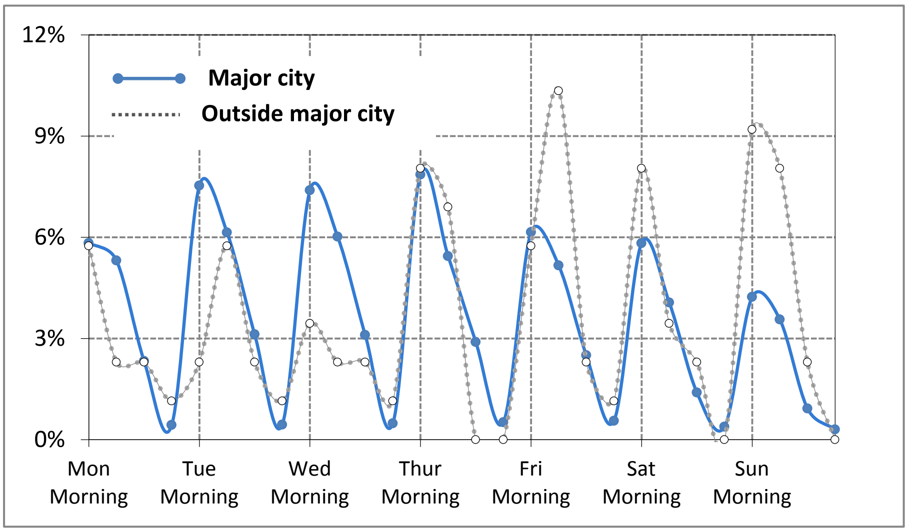
The risk implications of interactions between cyclists and other road users is highlighted in an analysis by Remoteness Region. Compared to all casualty crashes, those involving a cyclist injury/fatality are skewed towards a major city (81 per cent).

Figure 7: Reported casualty crashes by remoteness region — 2008-2013



The next analysis (Figure 8) classifies reported crashes involving a cyclist injury by time-of-day and by day-of-week. In the figure, the horizontal axis is divided into twenty eight 6-hour periods, where for ease of reading, only the morning period (6am to noon) is marked on the horizontal axis. As seen, the main peaks occur during this six-hour morning period. The data is also divided into Major city[3] regions and other regions. The former especially shows a regular daily cycle in crash times, peaking in the morning, falling in the afternoon and evening. The lowest points correspond to the period midnight to 6 am.

Figure 8: Reported cyclist casualty crashes by time[a] of crash — 2008 to 2013



[a] Morning (6am to noon), Afternoon (noon to 6pm), Evening (6pm to Midnight), Night/early (Midnight to 6am).

[3] 'Major city' refers to a category in the Australian Bureau of Statistics Remoteness Structure, ABS (2011)

2.2 Vehicles involved –fatal and injury traffic cyclist crashes

This section analyses the number and type of vehicles involved in cyclist casualty crashes. Two data sources are used: casualty crashes reported to police (both fatal and injury); and hospital admissions. Tables 7 and 8 utilise reported injury data.

Table 7: Reported casualty crashes: numbers of vehicles involved in crashes involving a cyclist casualty

	Fatal crashes			Injury crashes		
Year	One (cyclist only)	Two or more	Total crash count	One (cyclist only)	Two or more	Total crash count
2008-2010	21%	79%	99	10%	90%	12,915
2011-2013	24%	76%	120	10%	90%	12,005

The probability of non-reporting would probably be higher for single vehicle (cyclist only) crashes than for multiple vehicle crashes. If this was true, the figures of 10 per cent in the injury table would be under-estimates of the true proportions. Overall the proportions have not changed between the two time periods.

Crashes with three or more vehicles comprise approximately 3 per cent of all multi-vehicle crashes involving a cyclist casualty. The next table includes only two-vehicle crashes. It shows the type of vehicle with which the cyclist is colliding.

Table 8: Reported casualty crashes: type of other vehicle in reported two-vehicle crashes involving a cyclist casualty

	Fatal crashes				Injury crashes			
Year	Light vehicle	Heavy truck/Bus	Pedal cycle	Other	Light vehicle	Heavy truck/Bus	Pedal cycle	Other
2008-2010	63%	26%	3%	7%	86%	3%	4%	7%
2011-2013	66%	22%	5%	7%	84%	3%	4%	7%

Also not shown in Table 8 are approximately 60 casualty crashes per year (1.5 per cent) involving a cyclist and pedestrian. Of these, 45 per cent involve an injury to the pedestrian only, 13 per cent involve an injury to the cyclist only, and 40 per cent involve injuries to both. See de Rome et al (2011) for data analysis and discussion on cyclist crashes in the Australian Capital Territory.

Table 9 gives a a similar analysis to that shown in Table 8 but uses hospitalisation data. Counts of cyclists hospitalised with an injury are classified by type of other vehicle involved.

Table 9: Hospitalised injuries: counterpart[a] involved in crashes where a cyclist was hospitalised

	Colliding with another vehicle		
Year	Light vehicle	Heavy truck/Bus	Pedal cycle
2008-2010	80%	5%	16%
2011-2013	81%	3%	16%

[a] In collisions between a person's mode of transport and another vehicle or some other object, the other vehicle or object is called the 'counterpart'. (Henley 2012).

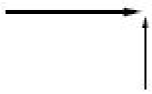
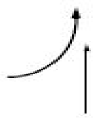
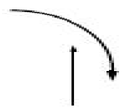
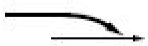
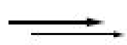
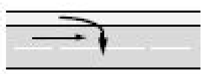
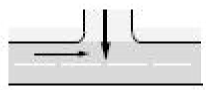
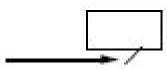
Table 9 is a summary of published and unpublished hospitalisation data. Approximately 25 per cent of cases record the counterpart as unknown, and there are another 25 per cent where the cyclist does not collide with any other vehicle. These categories are excluded from Table 9 to enable better comparison with Table 8. As such, the proportions shown are indicative only.

2.3 Analysis of crash types

'Crash type' as used here refers to a coding used by states and territories to summarise vehicle movements at the time of a crash. The coding is categorised into ten main groups and approximately 80 sub groups. A pictorial representation of the most common crash types for cyclist crashes is provided in Figure 9. See Austroads (2009) for more detail. The main groups are:

- Adjacent Directions (intersection only)
- Same Directions
- Overtaking
- Non-collision (straight)
- Non-collision (curve)
- Opposing Directions
- Manoeuvring
- On Path
- Miscellaneous
- Pedestrian

Figure 9: Common crash sub-groups for cyclist-involved casualty crashes

Main Crash Type	**Sub-group**		
Adjacent Directions [a] (Intersection only)	 Adjacent directions Cross traffic	 Adjacent directions Left Near	 Adjacent directions Right Near
Same Direction [a]	 Same direction Turning side swipe	Same direction Rear end	 Same direction Lane side swipe
Opposing Directions [a]	 Opposing directions Right thru		
Manoeuvring	 Manoeuvring From Footpath	 Manoeuvring From Driveway	
On Path	 On path Vehicle door		
Non-Collision(Straight)	 Non-collision (Straight) – Out of Control		

[a] Available data is crash-level and does not indicate which vehicle is the bicycle.

Tabulations of casualty crashes by main group and by sub-group are given in Tables 10 and 11 respectively. Single vehicle (cyclist only) and multi-vehicle casualty crashes are separately listed.

Table 10: Reported casualty crashes: crashtype (main groups) for crashes involving a cyclist casualty 2008-2013

Single-vehicle (cyclist only)		Multi-vehicle	
Main Crash type		Main Crash type	
Non-collision (Straight)	61%	Adjacent Directions	29%
Non-collision (Curve)	13%	Same Directions	22%
On Path	11%	Manoeuvring	22%
Pedestrian	5%	Opposing Directions	14%
Manoeuvring	5%	On Path	8%
Other	6%	Other	5%
Total	100%	Total	100%

Table 11: Reported casualty crashes: crashtype (sub-groups) for cyclist casualty crashes, 2008-2013

Single-vehicle (one cyclist only)		Multi-vehicle	
Crash type – Sub group		Crash type –Sub group	
Non-collision (Straight) – Out of Control	47%	Adjacent Directions – Cross Traffic	14%
Non-collision (Straight) – Off Left	10%	Opposing Directions – Right Thru	12%
Non-collision (Curve) – Out of control	8%	Manoeuvring – From Footway	10%
On Path – Object/Animal	5%	Same Directions – Side-Swipe	8%
Miscellaneous – Fell from vehicle	3%	On Path – Vehicle door	7%
Non-collision (Curve) – Off Carr/way at right bend	2%	Manoeuvring – Emerge from Driveway	6%
Pedestrian – Nearside	2%	Same Direction – Rear-end	6%
Other	20%	Same Direction – Turning Side-Swipe	6%
	100%	Adjacent Directions – Right Near	6%
Total case count	1,765	Adjacent Directions – Left Near	5%
		Other	20%
			100%
		Total case count	19,420

In their paper on risk factors in the ACT, Johnson et al (2015) found *Same Direction* interactions to be most frequent, followed by *Adjacent Directions*. See also Orsi et al (2013) for detail on some European cyclist crash configurations. Some of the behaviours of all the road users involved in cyclist crashes are analysed in Goode et al (2014).

The crash types for multi-vehicle crashes can be further analysed depending on the type of other vehicle involved.

Table 12: Reported casualty crashes: crashtype (sub-groups) for reported cyclist casualty crashes by vehicles involved (2008-2013)

Crash type (sub-groups)	Light vehicle	Heavy truck	Bus
Adjacent Direction – Cross Traffic	**15%**	7%	6%
Adjacent Direction – Right Near	6%	5%	1%
Adjacent Direction – Left Near	6%	4%	3%
Opposing Direction – Right Thru	**13%**	6%	4%
Manoeuvring – From Footway	**10%**	**11%**	**15%**
Manoeuvring – From Driveway	7%	**26%**	**32%**
Same Direction – Side-Swipe	7%	**26%**	**32%**
Same Direction – Turning Side-Swipe	7%	10%	7%
Same Direction – Read-end	5%	9%	10%
On Path – Vehicle door	7%	3%	1%
Other	17%	18%	19%
	100%	100%	100%
Total case count	16,329	354	242

The most common crashtype sub-groups in each column are in bold. Where a heavy vehicle is involved, side-swipes and Manoeuvring (from driveway or footway) are prevalent. When a light vehicle is involved, Adjacent direction and Opposing direction crashes are more common.

The final table in this section analyses crash type by the age of the injured cyclist.

Table 13: Reported casualties: crash types by age of the injured cyclist

Main crash type	Age 0-16	Age 25-60
Adjacent Direction – Cross Traffic	**13%**	**12%**
Adjacent Direction – Right Near	4%	6%
Adjacent Direction – Left Near	2%	6%
Opposing Direction – Right Thru	3%	**13%**
Manoeuvring – From Footway	**27%**	4%
Manoeuvring – From Driveway	**13%**	5%
Same Direction – Side-Swipe	4%	9%
Same Direction – Turning Side-Swipe	3%	8%
Same Direction – Rear-end	3%	6%
On Path – Vehicle door	2%	8%
Other		
	100%	100%
Total case count	3,242	14,344

For injured child cyclists, crashes involving manoeuvring vehicles are common. For older injured cyclists, cross traffic, opposing direction and side-swipe collisions are more prevalent. See Hutchinson et al (2010) for a longer term analysis of child cyclist casualties.

3 Exposure / Participation

3.1 Introduction

This section presents summaries of several diverse collections of recent data on cycling in Australia. Included are the National Cycling Participation Survey (Austroads 2013), ABS census data on Journey to work, and selected State/Territory cyclist count data. It is not a complete collection of relevant data, however it is sufficient to identify some common trends.

3.2 Australian Cycling Participation 2013

The Australian National Cycling Strategy 2011-2016 (Austroads 2010) has a goal of doubling cycling participation between 2011 and 2016. From the Strategy:

> *The overarching vision for this strategy is to realise a step-change in attitudes to cycling and in the numbers of riders in this country. In the short term, the goal is to double the number of people cycling over the next five years.* (page 5)
>
> … … …
>
> *This target should be structured as a composite indicator, reflecting cycling for the purpose of travelling to work/study, recreational cycling and bicycle ownership.* (page 25)

The biennial *National Cycling Participation Survey* (Austroads 2013) is the main tool used to monitor progress towards the Strategy's goals. Two surveys have been carried out to date, with the latest in 2013. The tables below summarise key results.

Table 14: Cycling participation as a proportion of resident population — Australia, 2011 and 2013

	Rode in last 7 days	Rode in last month	Road in last year
2013	16.6%	24.6%	37.4%
2011	17.8%	26.5%	39.6%

Nationally, reported participation fell marginally in 2013 over the 2011 survey. Of the eight jurisdictions, only the Australian Capital Territory and New South Wales reported increased participation. The ACT had the highest participation in 2013 (47 per cent) and SA had the lowest (32 per cent).

The following table reports on participation by capital city and rest of state/territory.

Table 15: Cycling participation — Region of State/Territory, 2011 and 2013

	NSW		Vic		Qld		SA		WA		Tas		NT		ACT	
	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013	2011	2013
Capital city	34%	39%	40%	37%	40%	37%	37%	31%	44%	40%	38%	39%	49%	47%	46%	47%
Other	40%	36%	46%	40%	35%	34%	43%	34%	47%	45%	42%	31%	55%	46%	-	-

Of the capital cities, only Sydney and the ACT reported increased participation.

Age groups and gender at the national level are shown in the next table.

Table 16: Cycling participation — Age groups and gender, 2011 and 2013

2011			2013		
Age (years)	Male	Female	Age (years)	Male	Female
0-9	51%	47%	2-9	48%	41%
10-17	42%	25%	10-17	41%	25%
18-19	17%	10%	18-29	14%	7%
40+	12%	5%	30-49	16%	8%
			50+	9%	3%

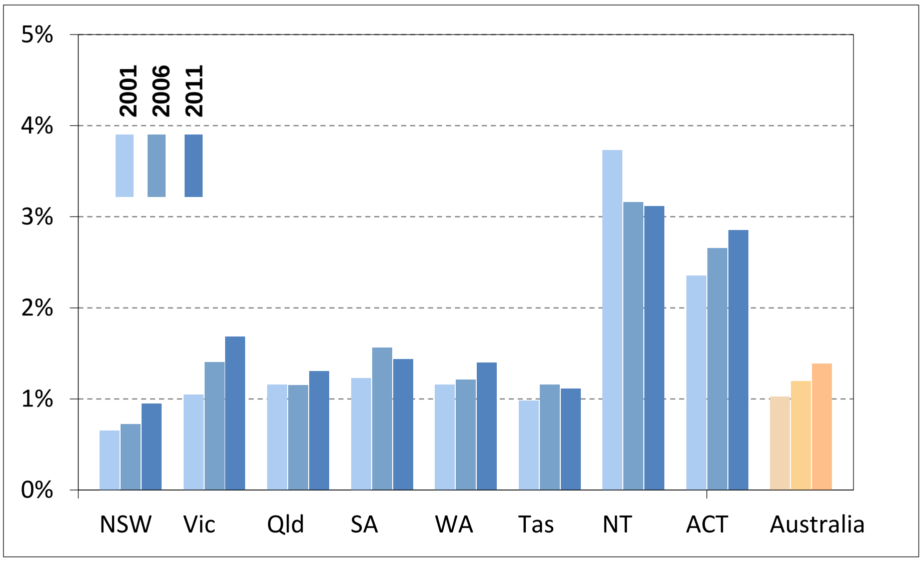
The reported age groups are not consistent across surveys, but in the 10-17 years group, participation is constant. Male participation is significantly higher in all age groups except the youngest (2 to 9 years).

It is clear from Tables 14, 15 and 16 above that reported participation is not generally increasing in Australia. Any changes between 2011 and 2013 are mostly non-significant in a statistical sense, although there are some exceptions to this. See the full reports for more details.

3.3 Australian Bureau of Statistics — Journey to Work

The data presented here is sourced from the censuses carried out in 2001, 2006 and 2011. The proportions shown are those undertaken by bicycle out of all single mode trips by persons aged over 15 years travelling to work. Capital city rates (Figure 10) increased over the three collections to around 1.4 per cent in 2011. Rest-of-state rates (not shown) fell over the three collections.

Figure 10: Journey to Work — proportion of single-mode trips made by bicycle, Capital cities



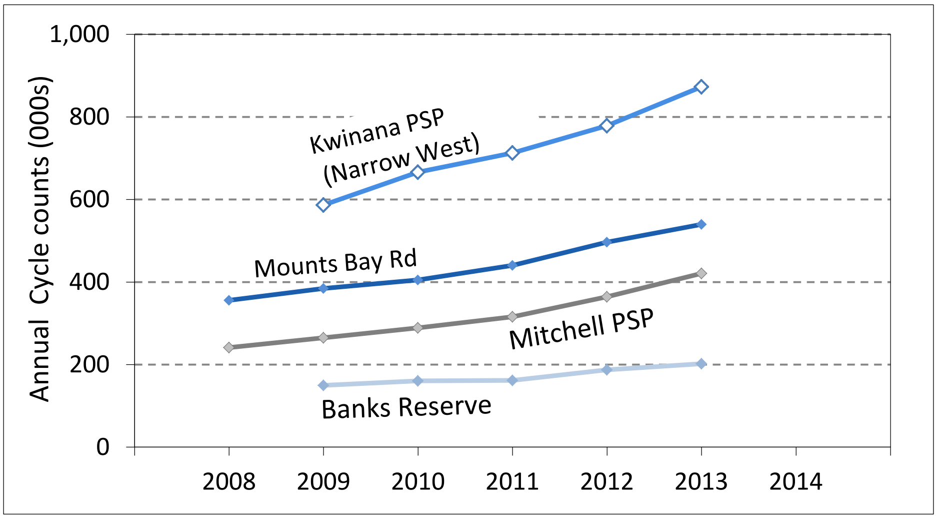
3.4 City traffic (bicycle) counts

A number of State and Territory transport agencies publish capital city vehicle traffic counts in map and chart form. The following cycling data is from Western Australia, Victoria and New South Wales.

3.4.1 Perth

The Western Australia Department of Transport publishes annual monitoring reports for its Bicycle network, and tabulated counts at each of its many traffic counter locations. Many of these have data for the last five years. A selection of annual counts for several widely separated locations are shown in Figure 11 below.

Figure 11: Annual cyclist counts — selected locations in Perth

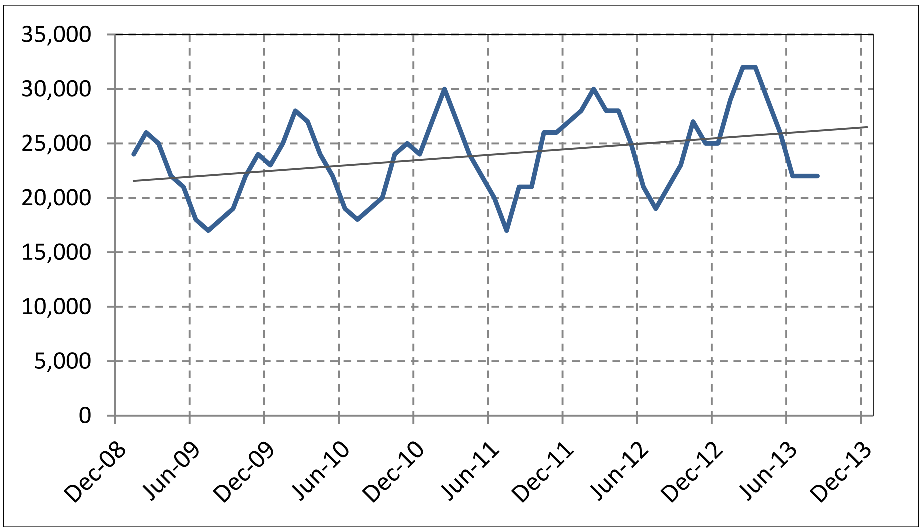


More detail is available at Transport's website:
http://www.transport.wa.gov.au/activetransport/25725.asp

3.4.2 Melbourne

Vicroads publishes summaries of bicycle count data, and has available more detailed datasets. The data presented here shows average daily bicycle counts across the total network of VicRoads' Group 1 sites.

Figure 12: Average Daily Bicycle counts — Total for Group 1 Sites in Melbourne



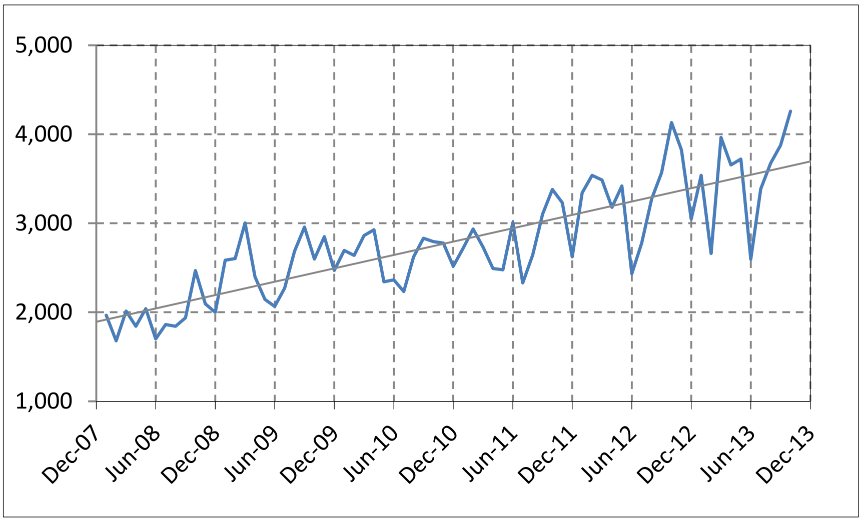
There is a strong seasonality (peaks in late summer and troughs in winter) and an increasing trend of approximately 4.5 per cent per year. More detail on the cycle volume data is available at the following VicRoads website:

https://www.vicroads.vic.gov.au/traffic-and-road-use/road-network-and-performance/road-use-and-performance.

3.4.3 Sydney

Roads and Maritime Services (RMS) publishes site-specific average annual daily traffic (AADT) counts for cyclists at a number of diverse locations throughout Sydney. Some data is also available on an hourly and daily basis enabling analysis of counts during morning and afternoon peak as well as for day of week. The following chart shows the total for five geographically diverse locations over the most recent five years.

Figure 13: Average Daily Bicycle counts — Total for five selected sites in Sydney



Note: The names of the five sites are (briefly) Bicycle path–The Rocks: Cycleway–Anzac Pde: Cycleway–Olympic Park; Cycleway–Baulkham Hills; and Cycleway–Captain Cook Bridge.

A linear fitted trend shows an increase of approximately 10 per cent per year. No analysis of seasonality was performed. Of the 20 site locations shown in the RMS Web tool — http://www.rms.nsw.gov.au/roads/using-roads/bicycles/statistics/index.html, eight show increasing trends, one is clearly decreasing, and for 11 sites, the time period is too short for a trend to be identified.

The increasing trends in cycle counts for the three cities above coincides with recent analysis published by BITRE (2014). See also Pucher et al (2010) for discussion and data on cycling exposure.

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Use of the Coat of Arms

Contact us

Department of Infrastructure and Regional Development
Bureau of Infrastructure, Transport and Regional Economics (BITRE)
GPO Box 501, Canberra ACT 2601, Australia

Phone: (international) +61 2 6274 7210
Fax: (international) +61 2 6274 6855
Email: bitre@infrastructure.gov.au
Website: www.bitre.gov.au