greater WELLINGTON
REGIONAL COUNCIL

Greater Wellington Road Safety Investigation 2008

Transport Strategy Development

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Contents

Phase I

1 Introduction

The purpose of this project is to investigate crash rates in the greater Wellington region and to determine in the first phase, if the numbers have been increasing over the last ten years. If that should be the case, the causes are to be identified in phase two and areas for remedial action are to be determined in phase three.

2 Characteristics of the Study Area

2.1 Roading Network

The greater Wellington Region has eight territorial authorities (TAs), which are listed in the table below (see table 1).

Local Authorities	Road Length in km			Pop. In 2007	5 years Average VKT (2003-2007)	Injury Crashes 1998-2007				
	State high ways	Urban local Roads	Rural local Roads			Fatal	Serious	Minor	Total	Rate/ 1,000 Pop.
Wellington Region										
Carterton District	15	27	406	7,300	32,876	19	50	125	**194**	27
Kapiti Coast District	46	230	154	101,500	140,029	48	208	533	**789**	18
Hutt City	33	446	30	48,000	497,709	47	338	1,638	**2,023**	20
Masterton District	30	112	685	23,100	122,322	21	107	482	**610**	26
Porirua City	97	194	43	50,700	188,173	26	189	686	**901**	18
South Wairarapa District	45	54	560	9,140	44,290	18	82	175	**275**	30
Upper Hutt City	28	152	82	40,000	127,870	18	145	510	**673**	18
Wellington City	67	626	56	190,500	717,624	47	615	2,874	**3,536**	20
TOTAL	**2,522**	**4,404**	**16,652**	**470,240**	**1,870,893**	**244**	**1,751**	**7,041**	**9,036**	**22**
All New Zealand										**24**

Table 1: Characteristics of the road networks in the greater Wellington Region

The largest network of roads belongs to the Masterton District with more than 680 km of local rural roads followed by Wellington City with more than 600 km local urban roads. Between the years of 1998 and 2007 the highest numbers of fatal injury crashes were counted in the Kapiti Coast District with 48, followed by Wellington City and Hutt City with 47 fatal crashes each. The injury crash rate per 1,000 population in the districts of Carterton, Masterton and South Wairarapa are above the average crash rate of the region. Kapiti Coast, Porirua and Upper Hutt

have the lowest crash rate per 1,000 inhabitants of 18. The Wellington Region average crash rate per 1,000 Population of 22 is slightly below the national average of 24.

This report focuses on the injury crashes. Figure 1 shows the crash sites of fatal and serious injuries for 2005-2007 in the south west part of the Wellington Region. Most of these crashes occurred along the state highways and the main traffic arteries as well as in the urban areas.

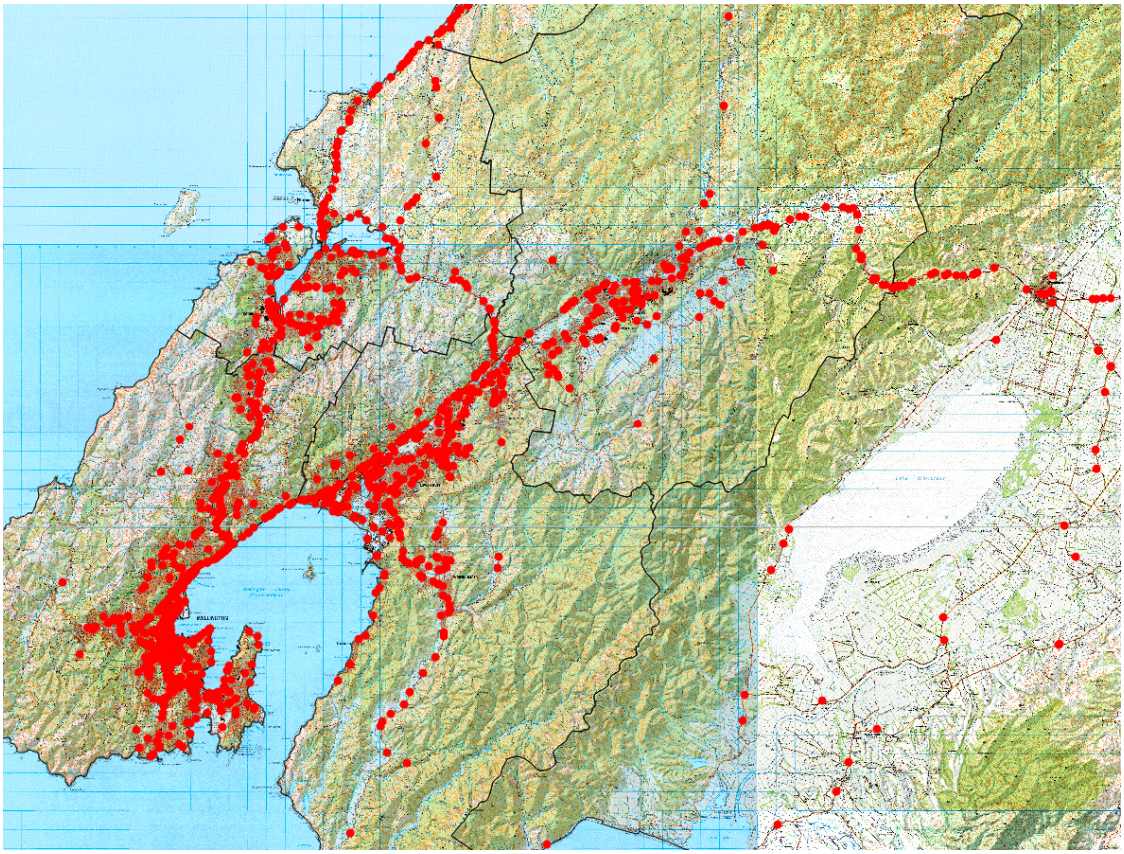

Figure1: All fatal and serious injury crashes in the Wellington Region 1998-2007

2.2 Population

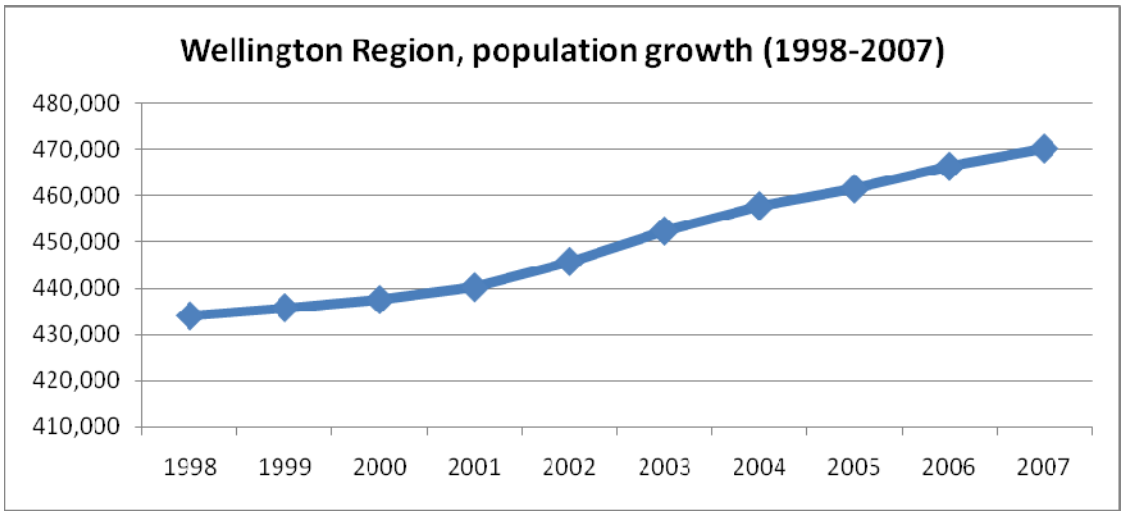

Figure 2: Population of the Wellington Region 1998-2007

The population in the region between 1998 and 2007 has been steadily increasing. There has been a total increase of 8 per cent for the period. The population of the Wellington Region is 11% of the New Zealand total.

2.3 Vehicle Accessibility

New Zealand's vehicle fleet composition shows an overall growth rate for the last few years (see figure 3). In particularly the motor cycle fleet shows a significant increase over the last three years, followed by an increasing number of buses.

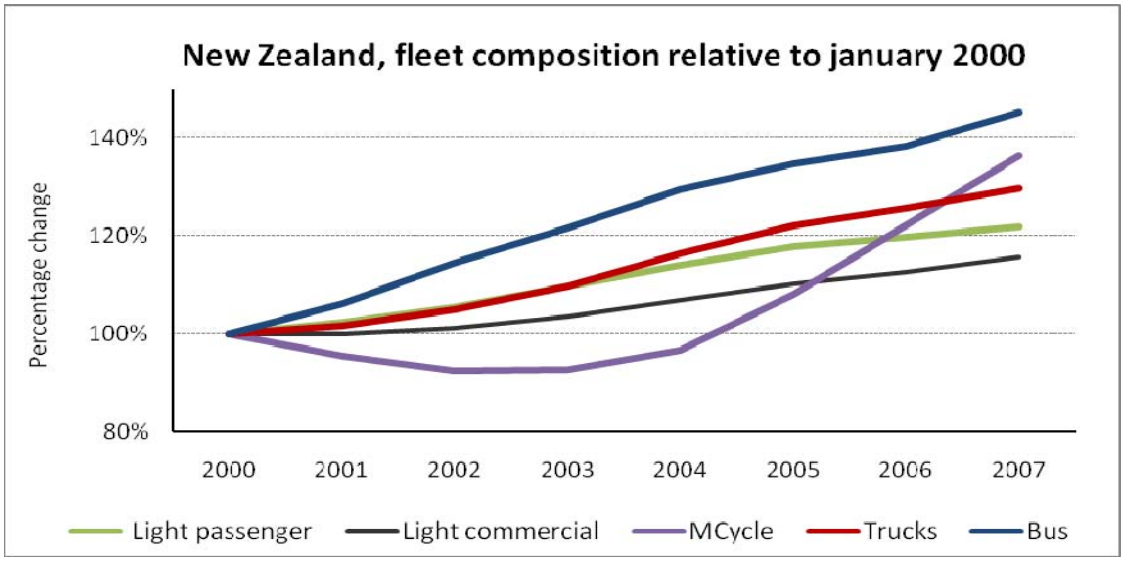

Figure 3: Development of vehicle fleet composition in New Zealand relative to January 2000

The light fleet ownership has been increasing over the last seven years as well and matches the trend with more than 50 vehicles plus per 1,000 Population between 2001 and 2007.

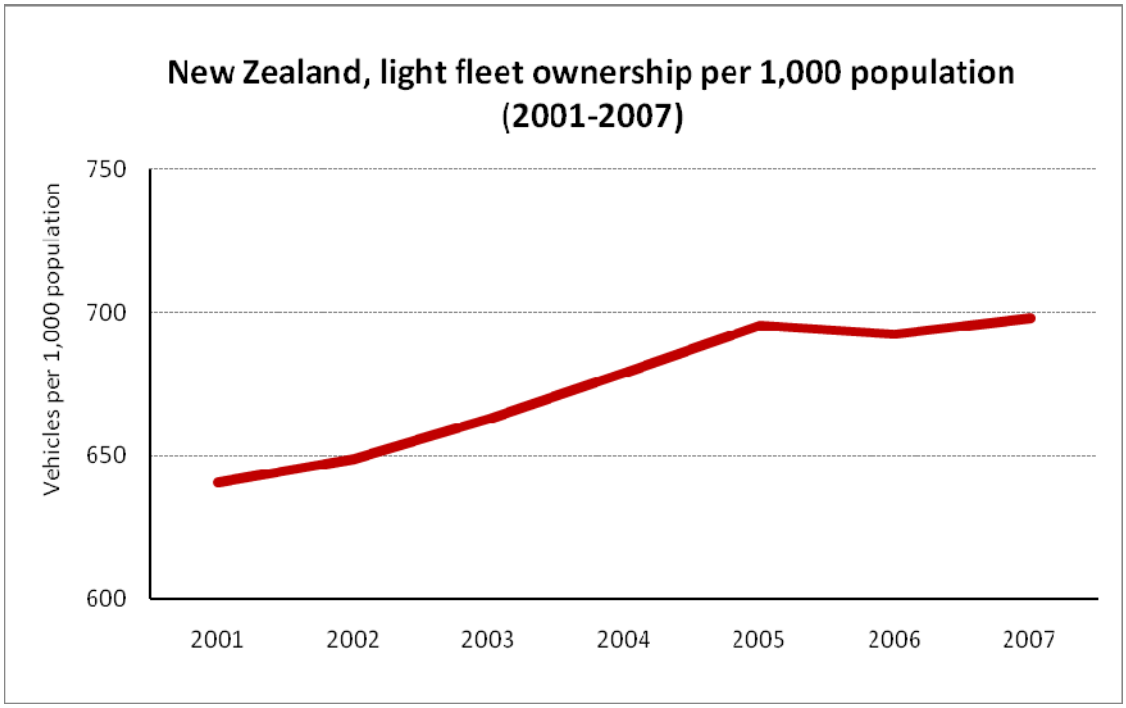

Figure 4: New Zealand light fleet ownership per 1,000 Population

3 Road Crashes

3.1 Social Cost

In 2007, the numbers of road crashes in the Wellington Region have resulted in social costs of around $394 million.[1] The figure below explains the distribution of the social cost for local urban and open roads and for state highways each with open and urban roads as well as the different injury-severity. The highest number of social costs in 2007 resulted for the local urban roads in the category of serious injury (see figure 5).

[1] "The social cost of road crashes and injuries is a measure of the total cost of road crashes to the nation. It includes loss of life and life quality, loss of productivity, medical, legal and court and property damage costs" (see definition of MoT: www.transport.govt.nz/socialcost/). The social cost is based on industry standard values per reported crash for each year. In 2007 the social cost per crash for fatal crashes was: $3,881,000; for serious $680,000; for minor injuries $83,000 and $2,300 for a non-injury crash

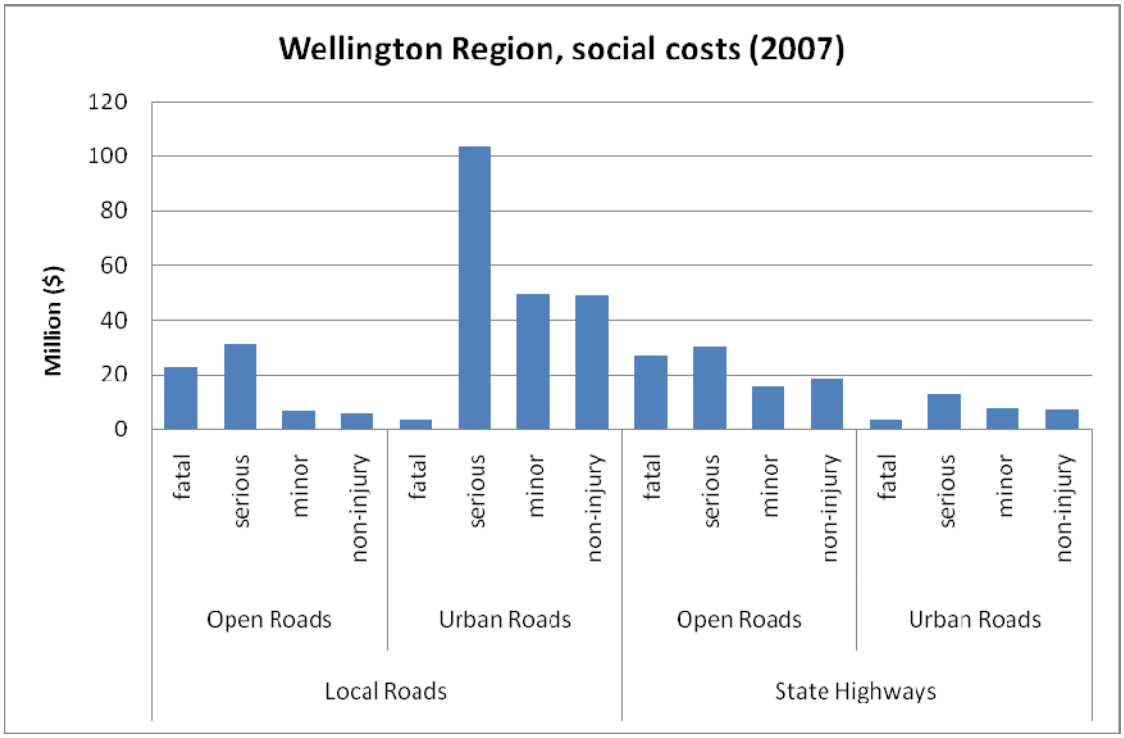

Figure 5: Social Costs in the Wellington Region in 2007 distributed for the different authorities and injury severity

The social costs of crashes in New Zealand add up to $4,357.5 million, of which the greater Wellington region accounts for 9%.

3.2 Crash Rates

To identify the crash trends for the region as a whole and for the individual TAs, an overall picture is needed. Figure 6 shows that over the last four years the total crash numbers have increased after several years of declining.

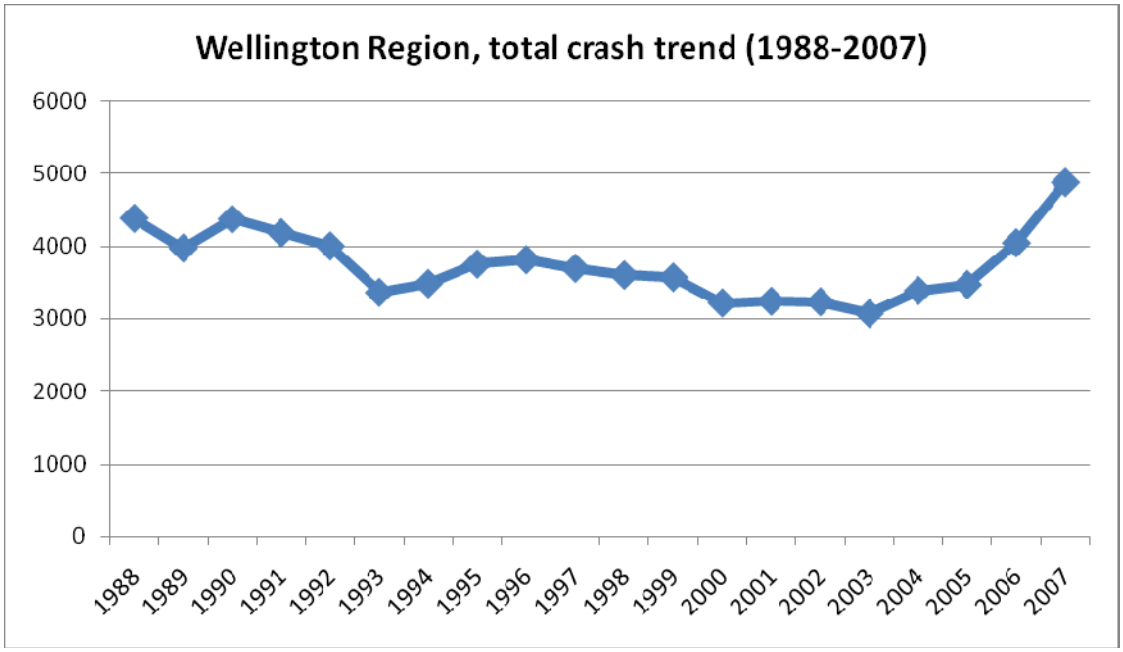

Figure 6: Total crash number of the Wellington Region 1988-2007

When these numbers are divided into injury and non-injury crashes (figure 7) the numbers of non-injury crashes have a faster growth rate during the last three years (2005-2007) than the correlating numbers of injury crashes in the region. Much of the increase in non-injury crashes seems to be attributed to an increase in reporting of such incidents, which needs further investigation in Phase II.

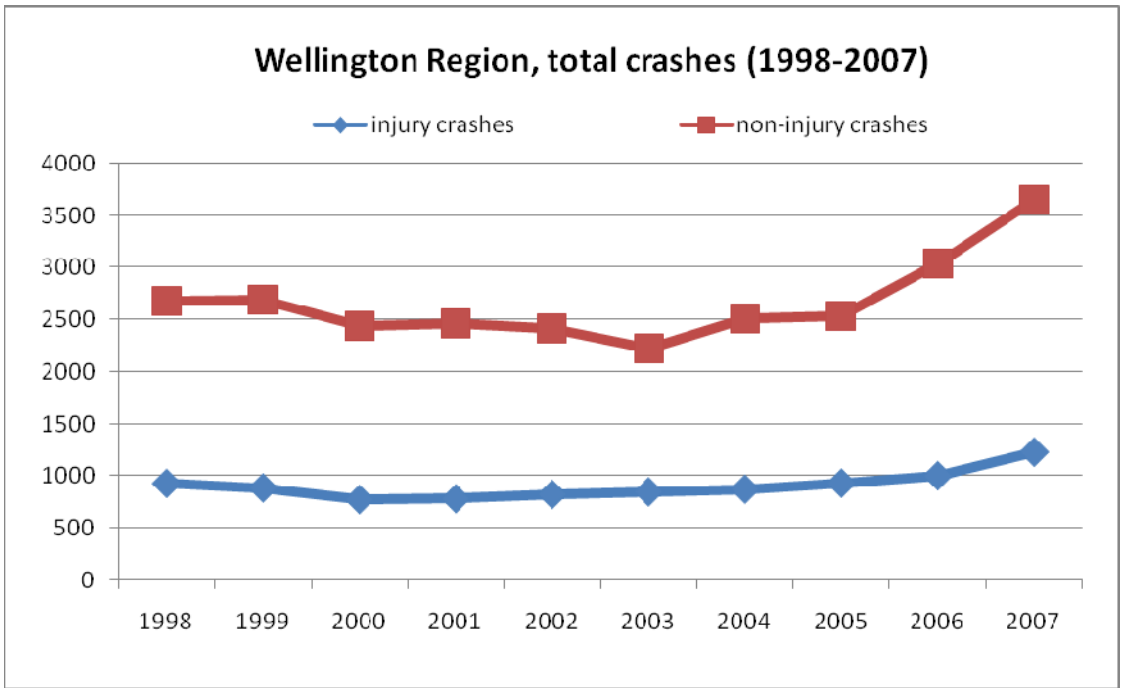

Figure 7: Total number of injury and non-injury crashes in the Wellington Region 1998-2007

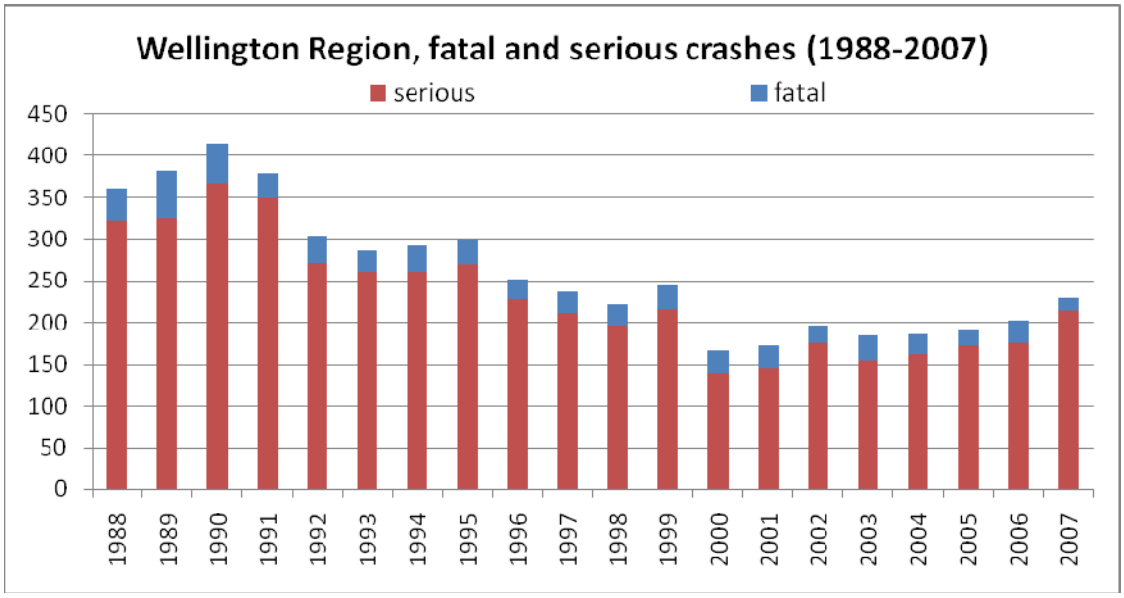

Figure 8: Serious and fatal crashes in the Wellington Region 1988-2007

Figure 8 shows a significant rise in serious and fatal crashes since 2005, a trend consistent with the overall increase in crashes shown throughout this report.
Wellington City dominates the overall crash trend for the region due to the sheer numbers. It is therefore necessary to review the numbers accordingly for each district. Figure 9 shows that the crash rate per 1,000 inhabitants has increased over the years with the exception of Hutt and Upper Hutt Cities.

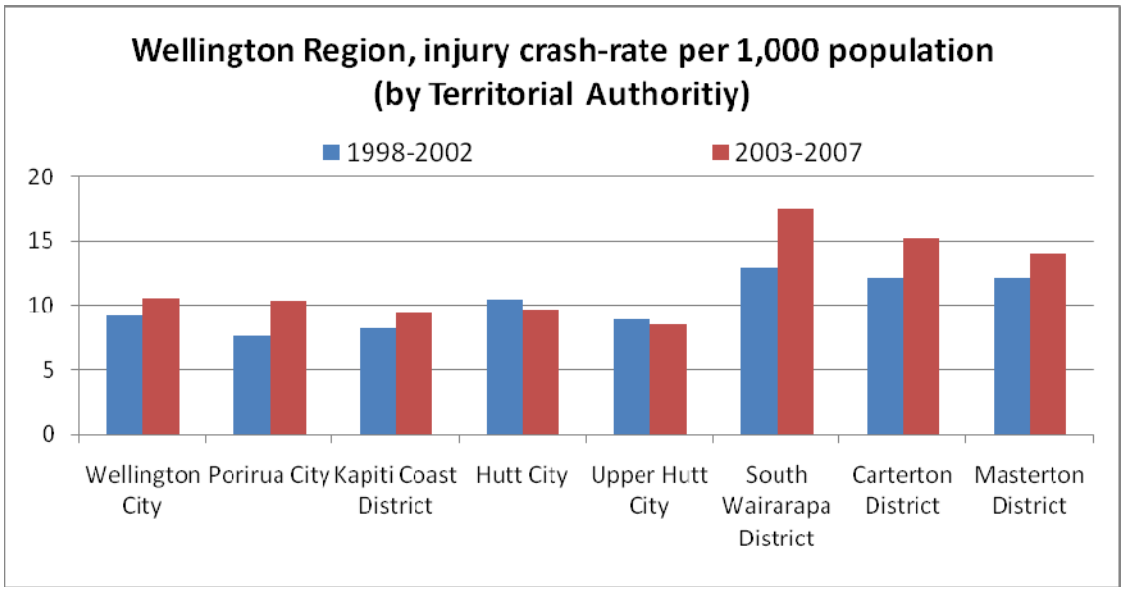

Figure 9: Crash rate per TA in the Wellington Region summed up for the periods of 1989-2002 and 2003-2007

Figure 10 points out the numbers of crashes per 1,000 vehicle kilometres travelled (VKT) on local roads for each TA area. In four of the eight TAs, the crash rate increased.

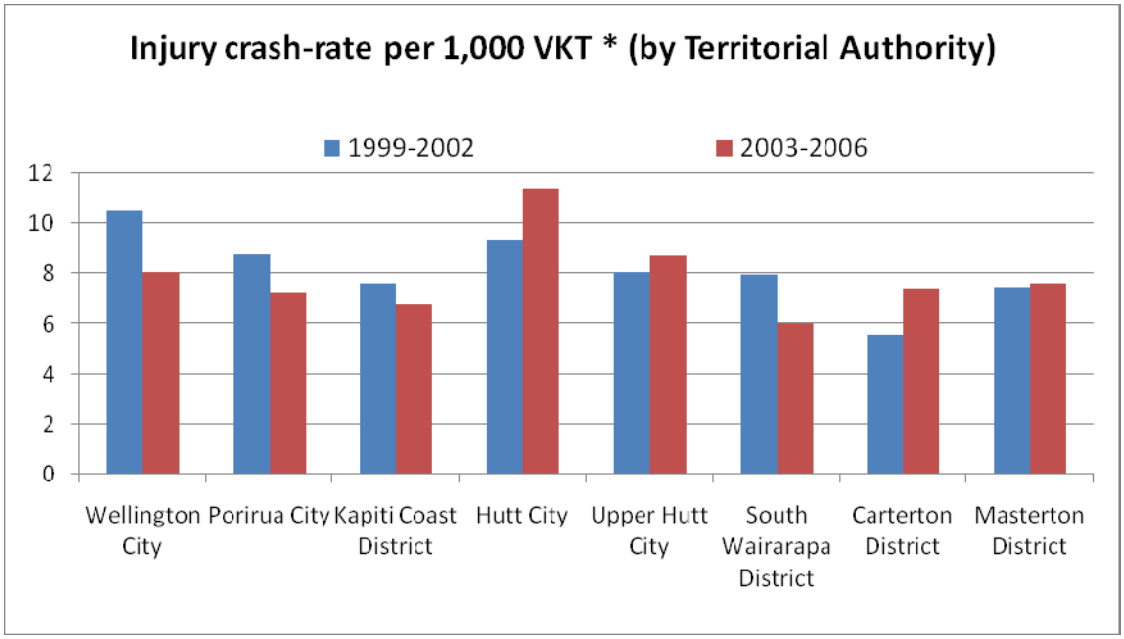

Figure 10: Crash rate per 1,000 VKT summed up for the periods of 1999-2002 and 2003-2006
**VKT for local roads only*

To be able to see whether the upward trend in crash numbers is a temporary or a one-off occurrence, other related indicators are compared (see figure 11).

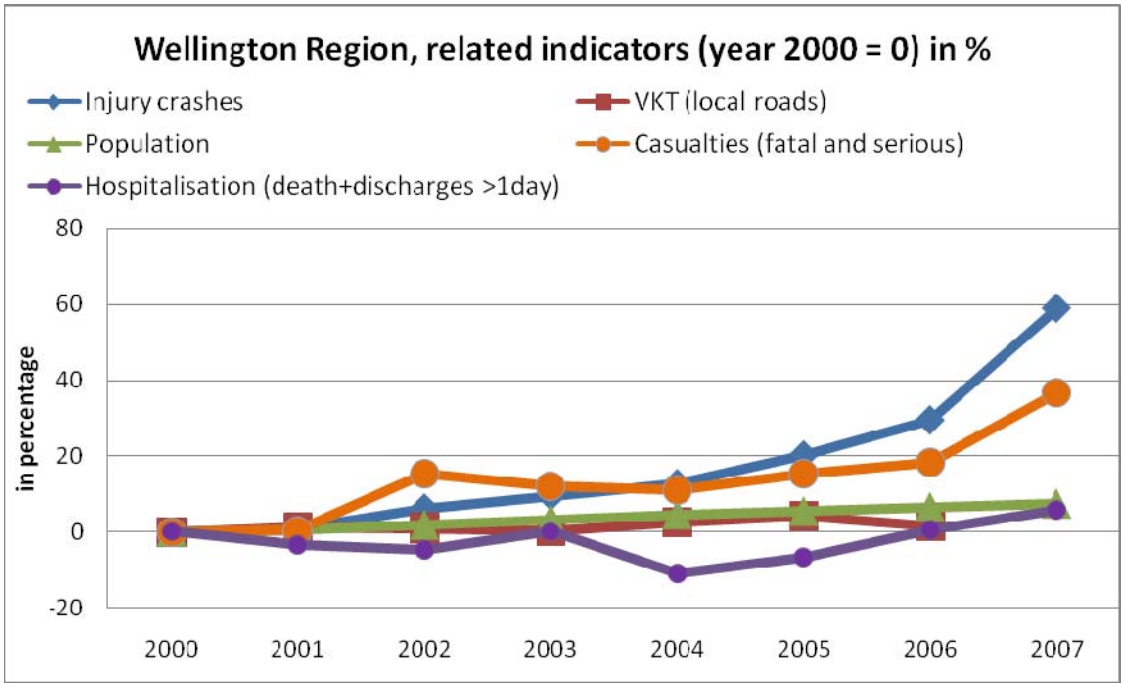

Figure 11: Related indicators in percentage change to the year 2000 for the Wellington Region

The basic indicators contrasted and indexed to the year 2000 show a common upward trend, except for the VKT percentage growth between 2005 and 2006.

In 2007 a strong increase for the total injury crashes and for the fatal/serious casualties is noted. The increase in the hospitalisation numbers is similarly strong during the last years. The population has been slightly but steadily increasing.

3.3 Latest Trends

For an impression of the latest trends, the numbers of the first six months of 2008 were compared to the equivalent numbers for the previous two year's data.

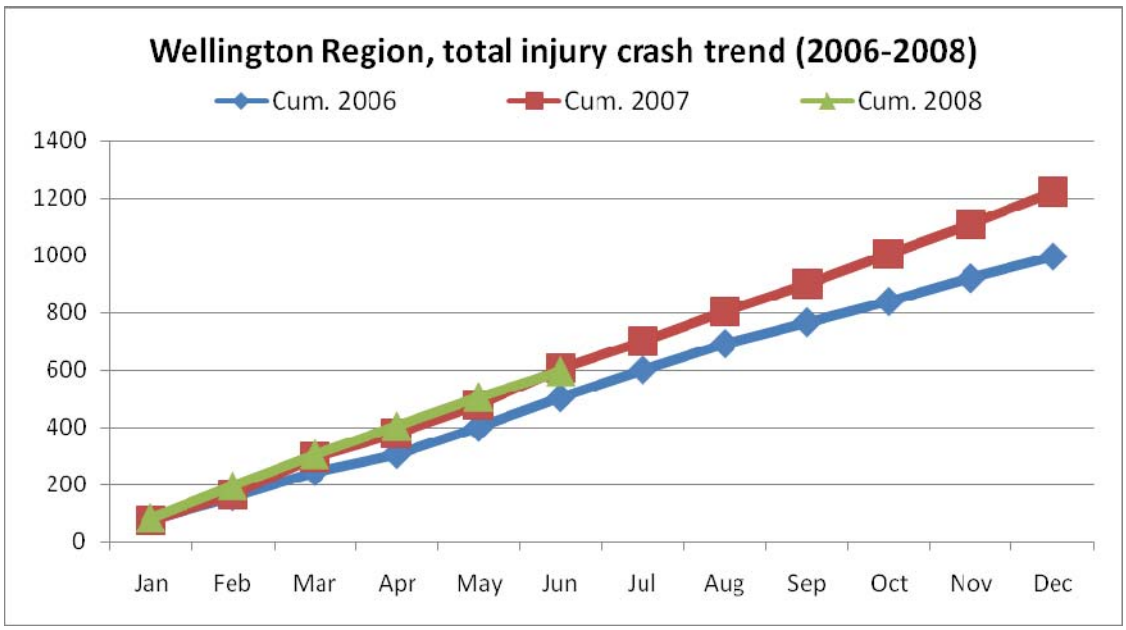

Figure 12: Cumulated injury crash numbers for 2006-2008

The figure shows that in 2007 there were more injury crashes than in the previous year. The first six months of 2008 are very similar to the numbers of 2007.

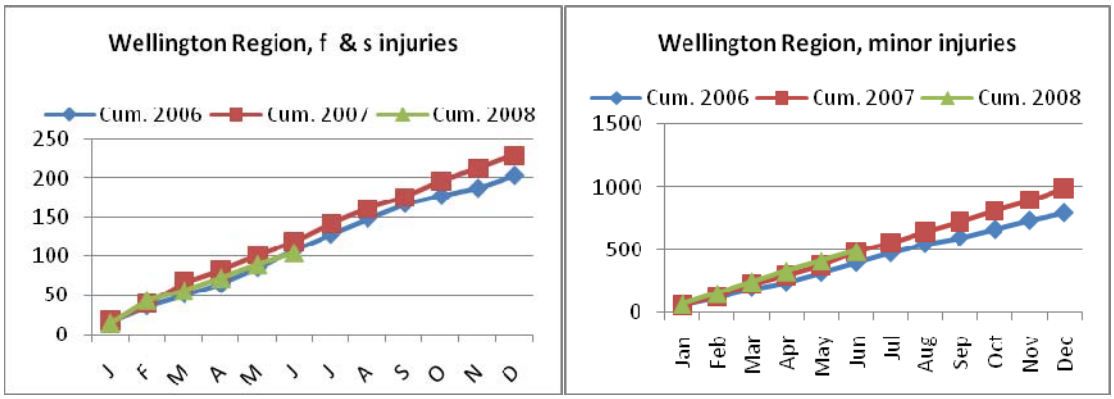

Figure 13/14: Cumulated injury crash numbers 2006-2008 divided by severity (fatal (f), serious (s) and minor(m))

Figures 13 and 14 show, that the numbers of fatal and serious injury crashes for the first half of 2008 are aligned with those in 2006. This is a slight improvement compared to 2007. The minor injury crashes resemble those in 2007 which maintains the upward trend.

3.4 Crash Trend by Severity

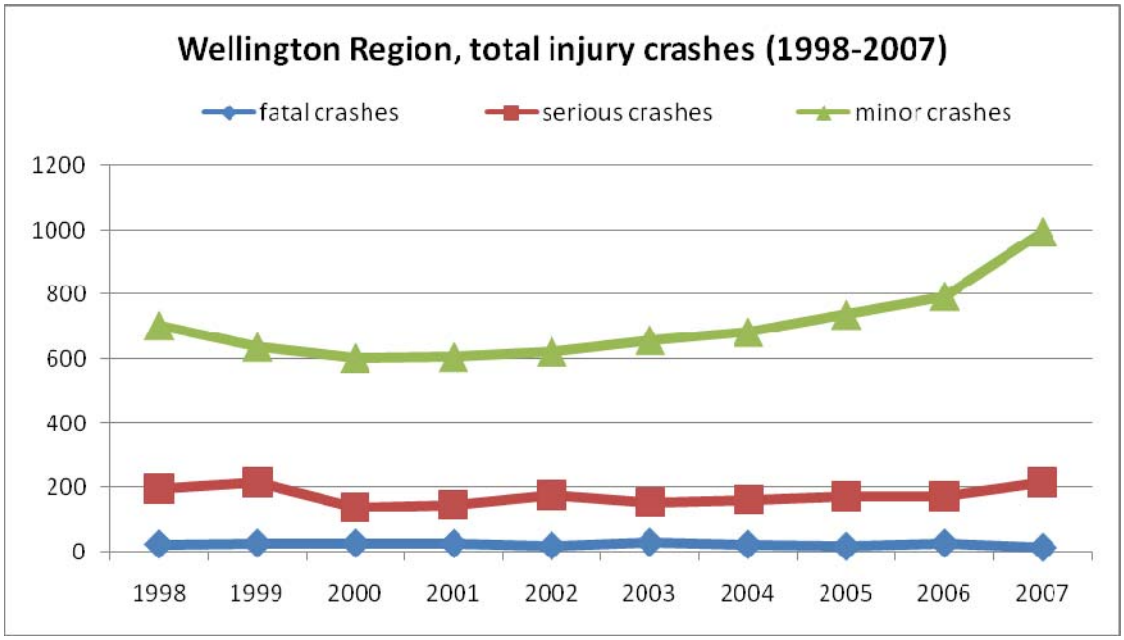

Figure 15: Total of injury crash numbers for 1998-2007 for the Wellington Region

If the numbers of all injury crashes in the region are examined by severity, it is clear that the number of minor crashes has steadily increased since 2001, with a strong rise in the last three years. The serious injury crashes display a smaller increase and the fatal crashes are slightly decreasing.

The distribution of total injury crashes by the individual TAs for the year 2007 is displayed in figure 16.

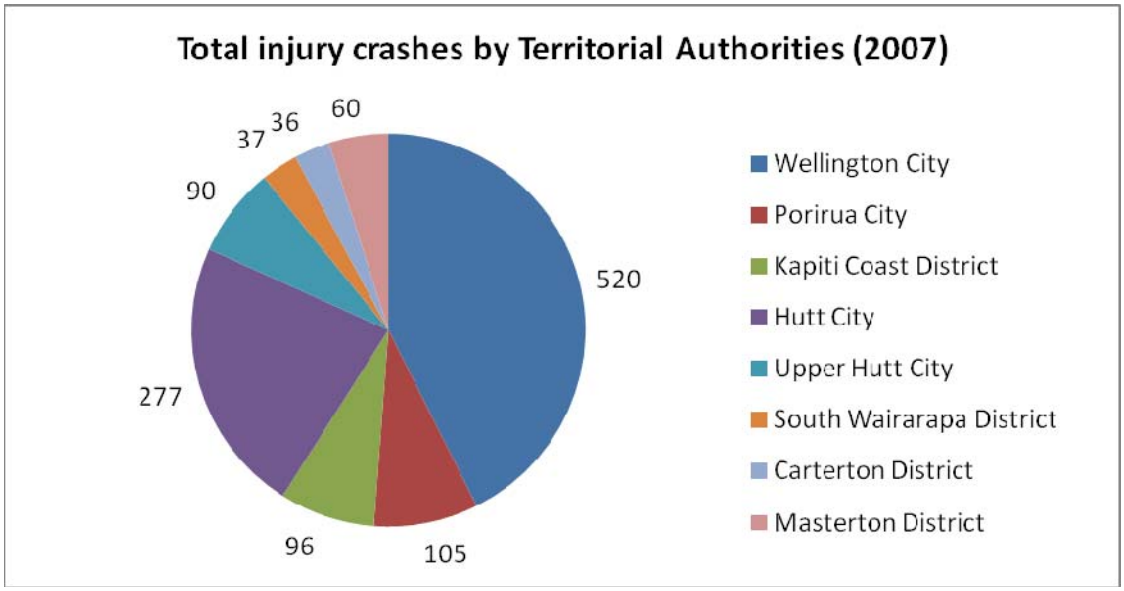

Figure 16: Injury crash numbers for the TAs in the year 2007

The most crashes occurred in Wellington City with 520 injury crashes, followed by Hutt City with 277. The TAs with less population have accordingly smaller numbers like Carterton District with 36 injury crashes for the year but altogether more per 1,000 population (see table 1). For a better picture on that point, the numbers for each TA are shown below.

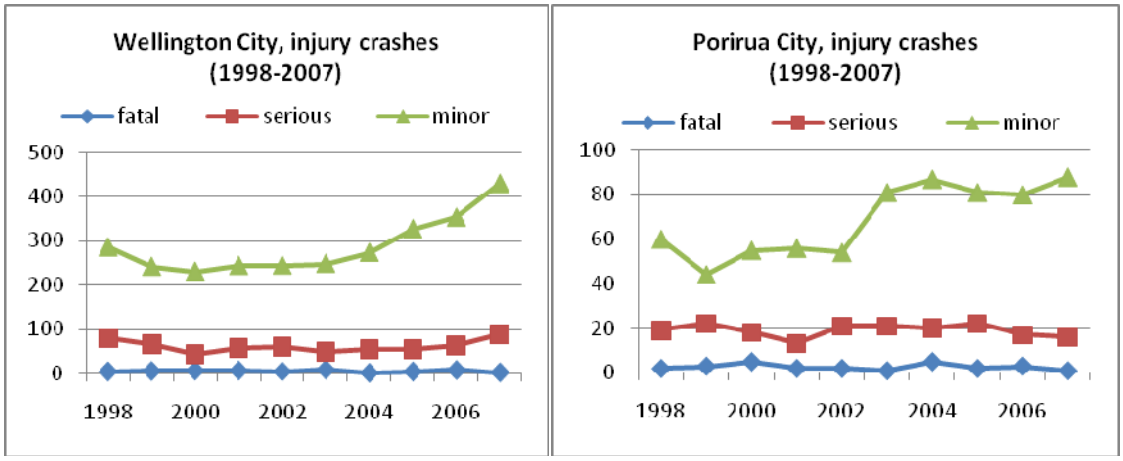

Figure 17/18: Injury crash numbers for Wellington City and Porirua City between 1998 and 2007

It is noticeable that Porirua City has a strong increase of minor injury crashes over the last five years. The fatal and serious ones are decreasing since 2005.

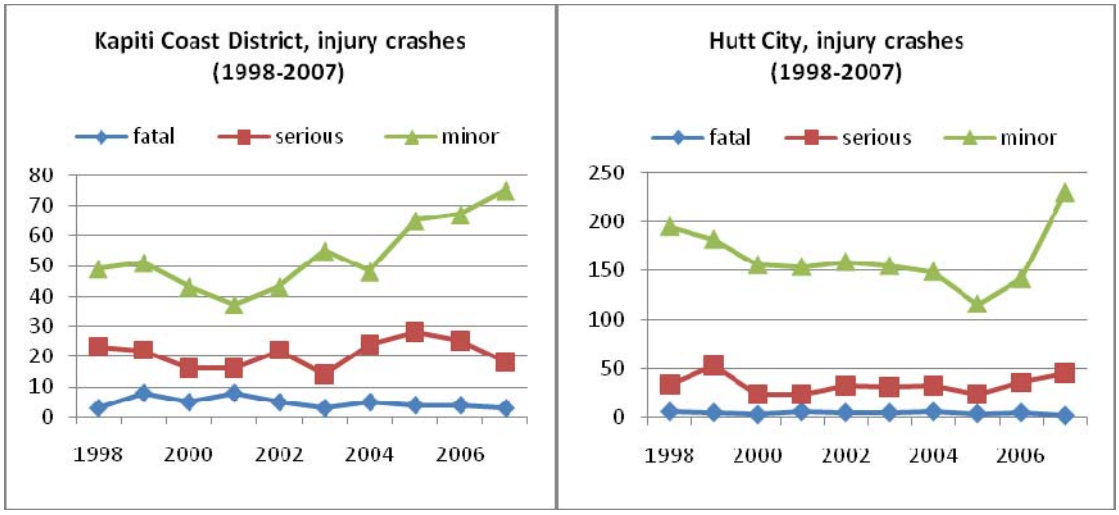

Figure 19/20: Injury crash numbers for Kapiti Coast District and Hutt City between 1998 and 2007

In the Kapiti District the numbers of minor and serious injury crashes are diverging since 2005. The minor ones increased as well as in Hutt City where the numbers in that category nearly doubled over the last two years.

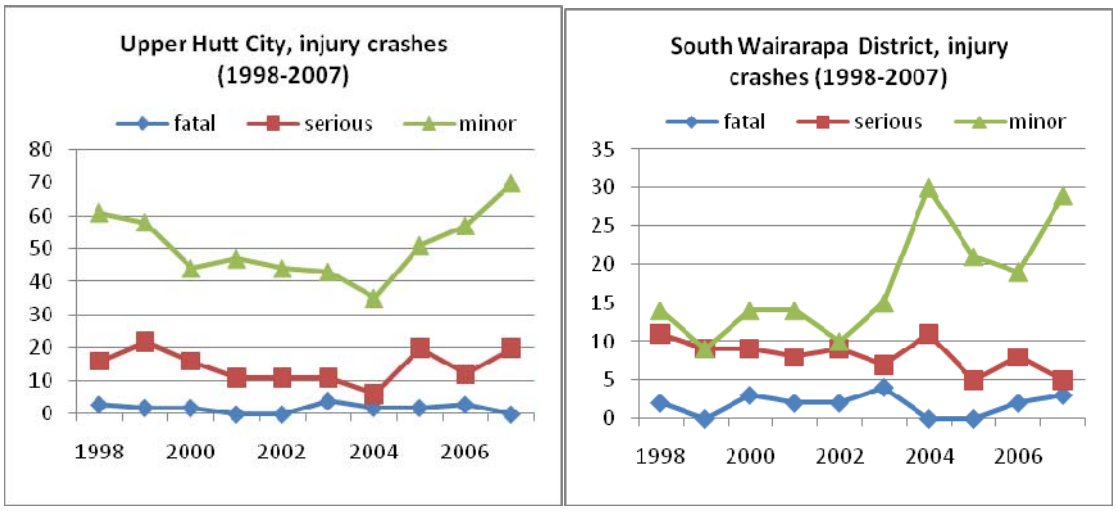

Figure 21/22: Injury crash numbers for Upper Hutt City and South Wairarapa District between 1998 and 2007

Where Upper Hutt City shows similarity in the numbers to the Kapiti Coast District, South Wairarapa displays a more up-and-down trend of minor injuries over the last five years.

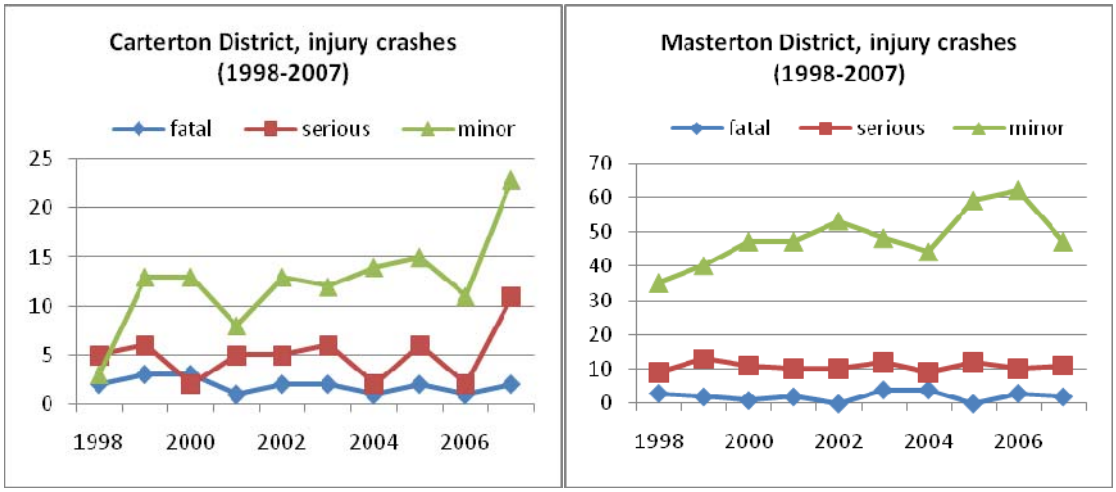

Figure 23/24: Injury crash numbers for Kapiti Coast and Masterton District between 1998 and 2007

Carterton has a small number of injury crashes overall but between 2006 and 2007 an increase in the serious and minor category is visible. Masterton shows as the only district a downward trend in the minor injury crashes for 2007.

3.5 Crash Trends by Road Type

After displaying the numbers for the total injury crashes in the region and the individual TAs, relating them to the numbers of inhabitants and reviewing the latest trends for each severity category it is also of interest where the crashes happen. Therefore the next part focuses on the different categories of roads.

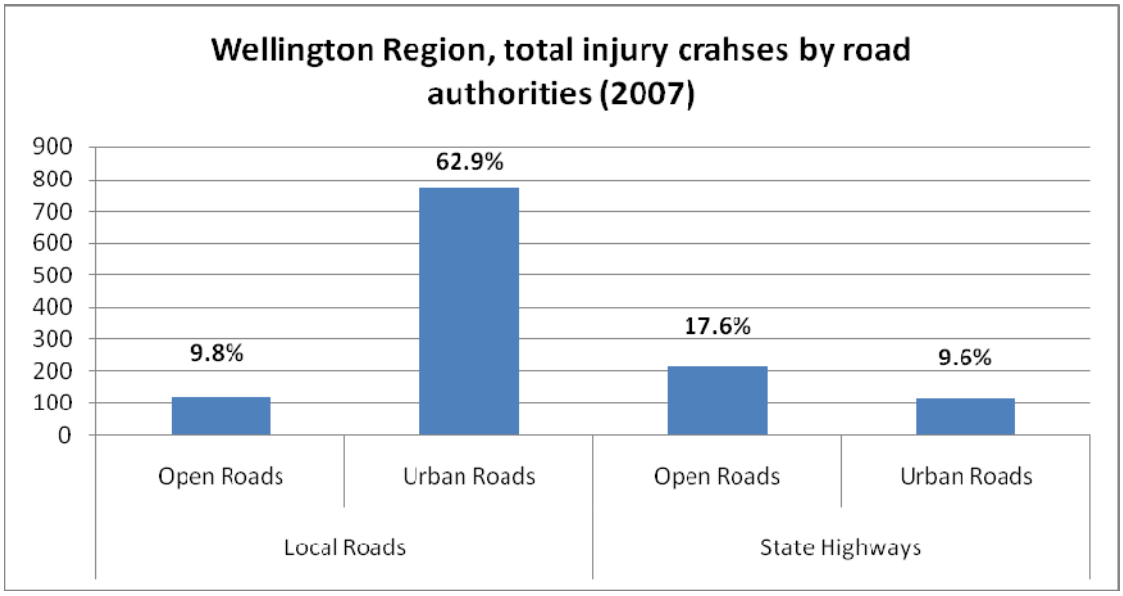

Figure 25: Total injury crashes in the Wellington Region by road type for 2007

Most crashes happen on local urban roads which accounts for 63% of the total injury crashes. Considering only the state highways, most accidents happen on the open state highway roads which account for 18% (see figure 25 and 26).

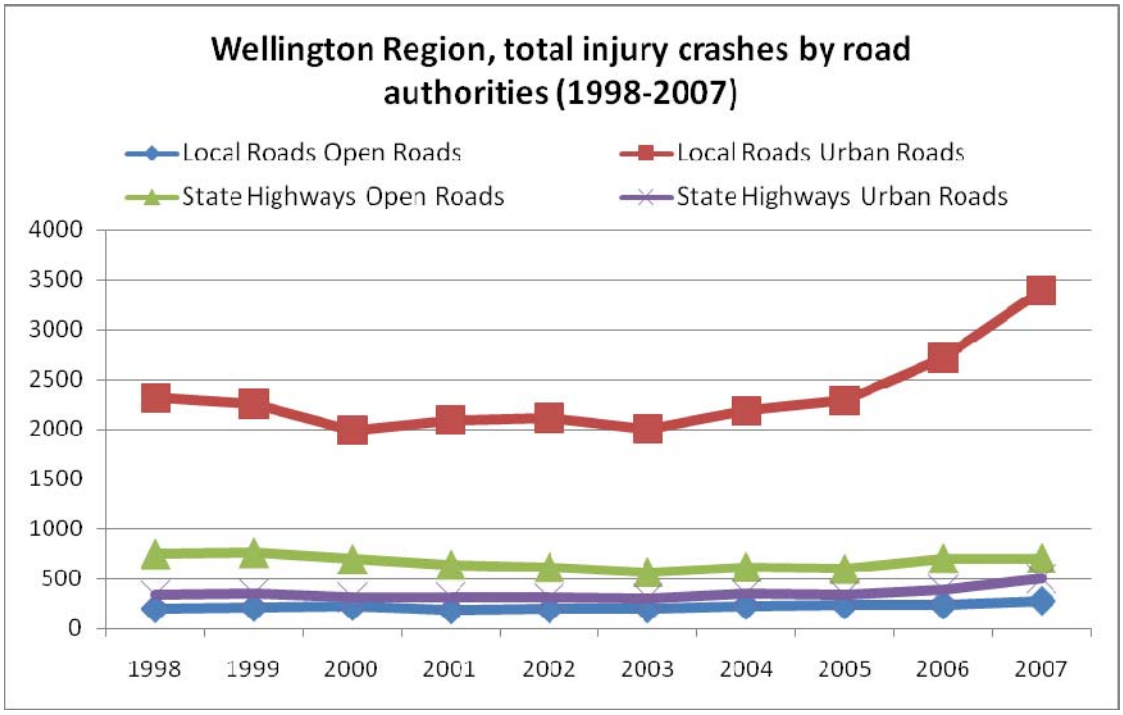

Figure 26: Total injury crashes in the Wellington Region by road type between 1998 and 2007

Over the last ten years the local urban roads show an increase of injury crash numbers since 2003. The urban state highways have a slight increase as well over the last three years whereas the numbers of the open state highways and the open local roads almost remained static.

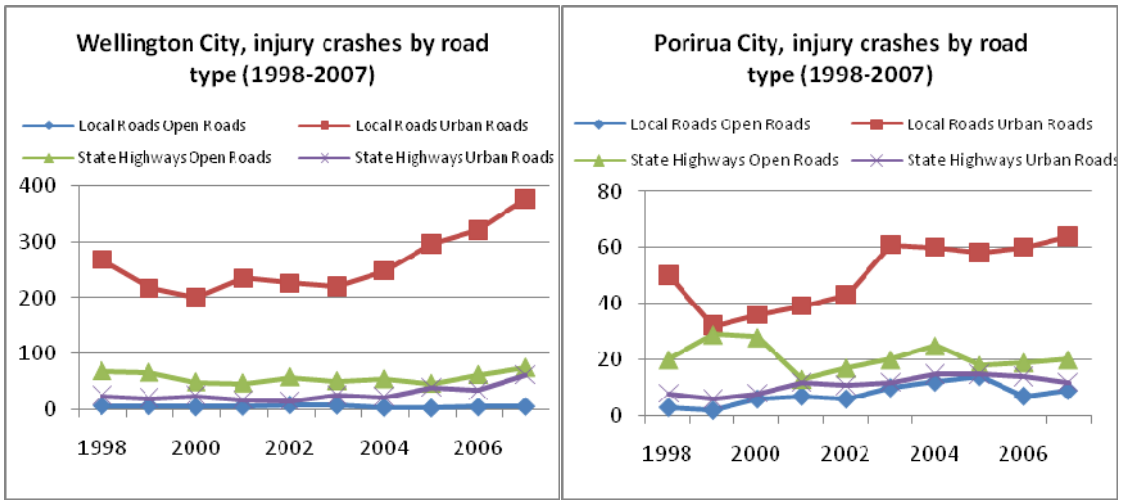

Figure 27/28: Injury crash numbers by road type for Wellington and Porirua City between 1998 and 2007

Over the last five years Wellington City displays a strong rise in the injury crash numbers on local urban roads, which matches the trend in Porirua City and the last two years of Hutt City. Kapiti Coast District shows an upward trend for urban local roads. The crash numbers for its open state highways decreased between 2006 and 2007.

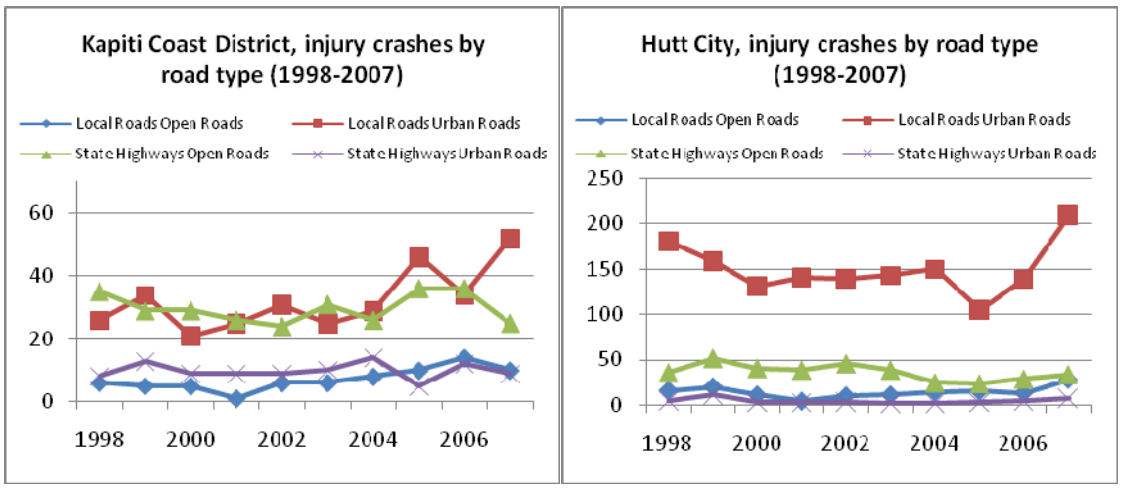

Figure 29/30: Injury crash numbers by road type for Kapiti Coast District and Hutt City between 1998 and 2007

Upper Hutt City shows a strong rise in the injury crash numbers for open state highways which are, by 2007, almost as high as the numbers for local urban roads where most injury crashes happen.

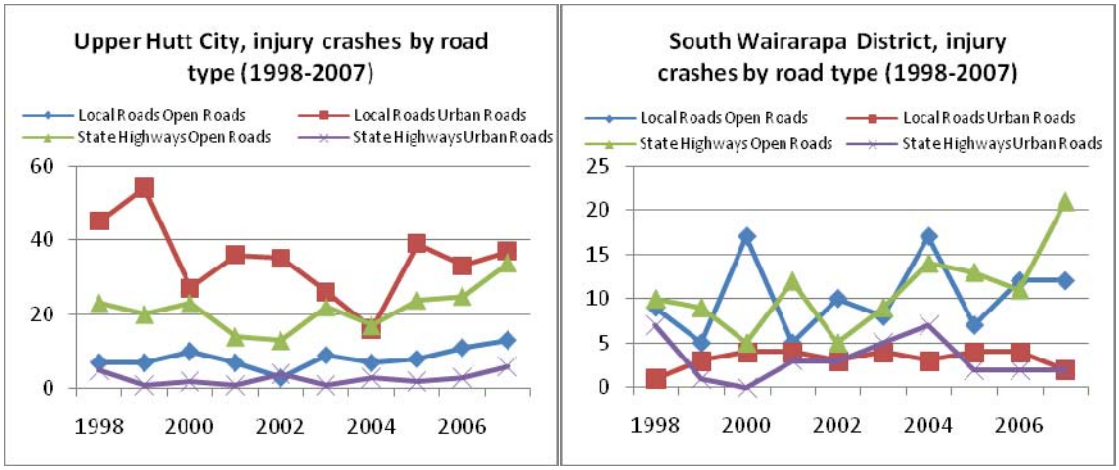

Figure 31/32: Injury crash numbers by road type for Upper Hutt City and South Wairarpa District between 1998 and 2007

The overall small numbers of injury crashes in South Wairarapa show an increase of crashes on open state highways, which in 2007 account for the main injury crash sites.
Masterton and Carterton District have small numbers of injury crashes too. Notable is an overall decreasing trend for injury crashes in Masterton on all road types except for local urban roads.

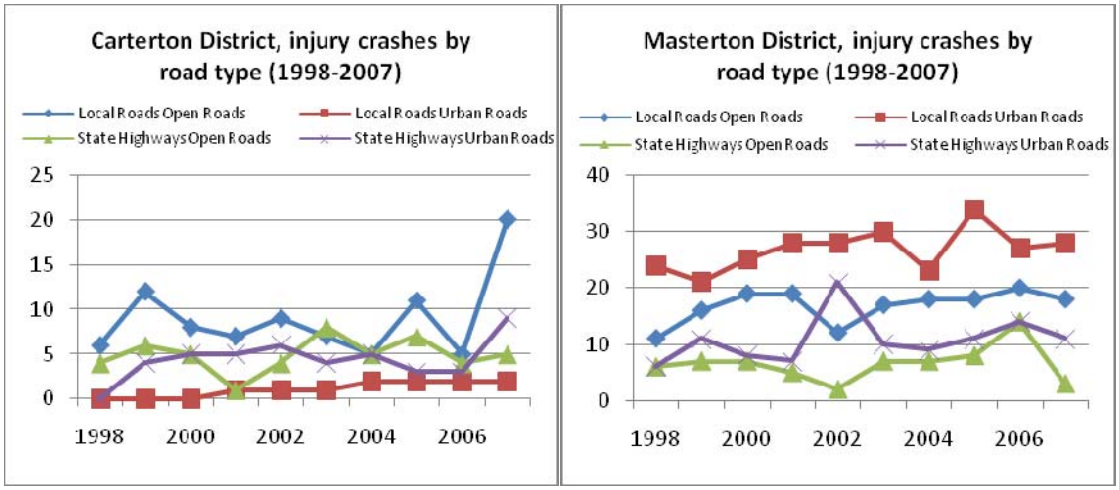

Figure 33/34: Injury crash numbers by road type for Carterton and Masterton District between 1998 and 2007

4. Road Users

4.1 Distribution

The following figure displays the number of injured road users in percent for 2007 for the Wellington Region.

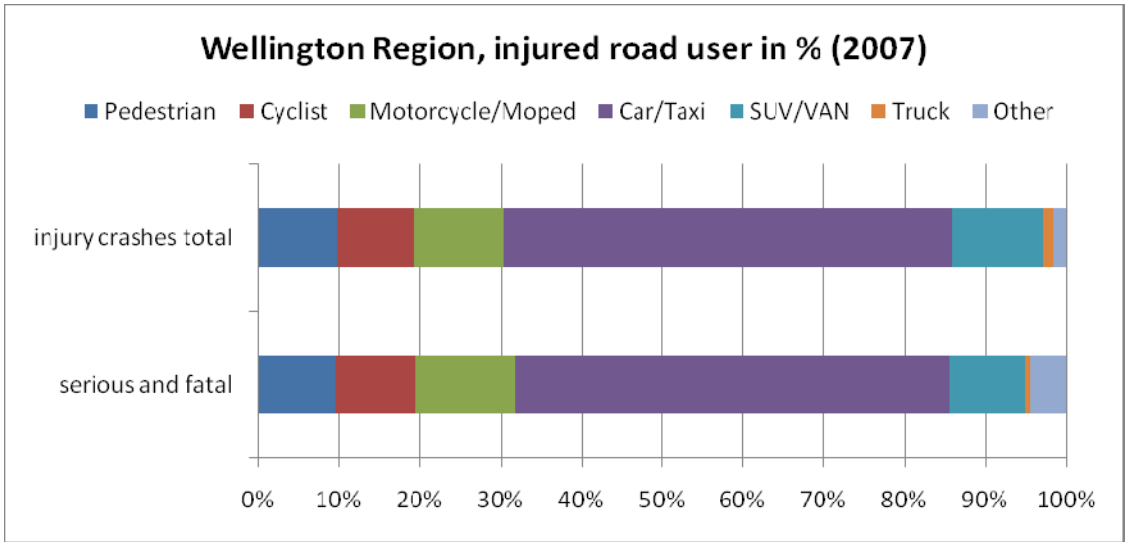

Figure 35: Injured road users in % for the Wellington Region in 2007

Car and Taxi occupants dominate the numbers of a proportion of injured road users, followed by an almost even distribution of 'Motor Cycle/Moped', 'Pedestrian', 'Cyclists' and 'SUV/VAN' with about 10% each. The closer examination of the serious and fatal crashes shows a greater percentage of 'Motorcycle/Moped' as well as 'Others'. Therefore the proportions of 'Car/Taxi', 'SUV/VAN' and 'Truck' are accordingly smaller.

The number of casualties (=number of all injured people involved in one single crash) over the period of 2003-2007 for all New Zealand shows that Motor Cyclists have the highest number of injuries by time spent travelling (figure 36).

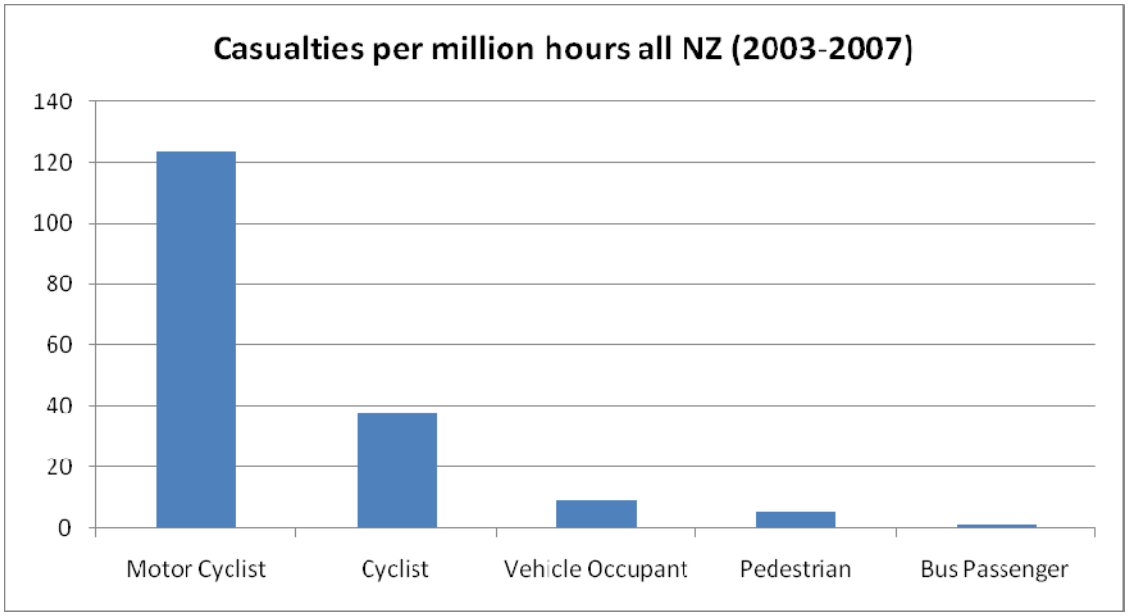

Figure 36: Casualties per million hours for all New Zealand (2003-2007)

Figure 37 shows that the Wellington region compared to all New Zealand, has a much higher number of injured cyclists per million km. The numbers for injured vehicle occupants and pedestrians in the Wellington Region are smaller.

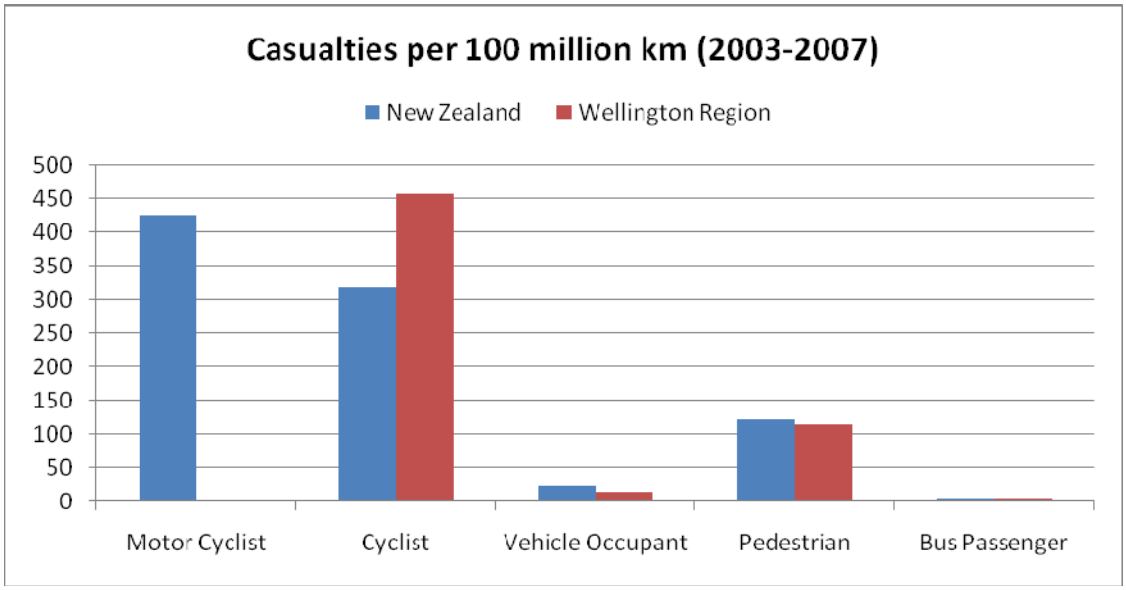

Figure 37: Casualties per 100 million km for all New Zealand and the Wellington Region (2003-2007)

4.2 Vulnerable Road Users

The injury crash numbers of vulnerable road users have increased over the last few years (see figure 38).

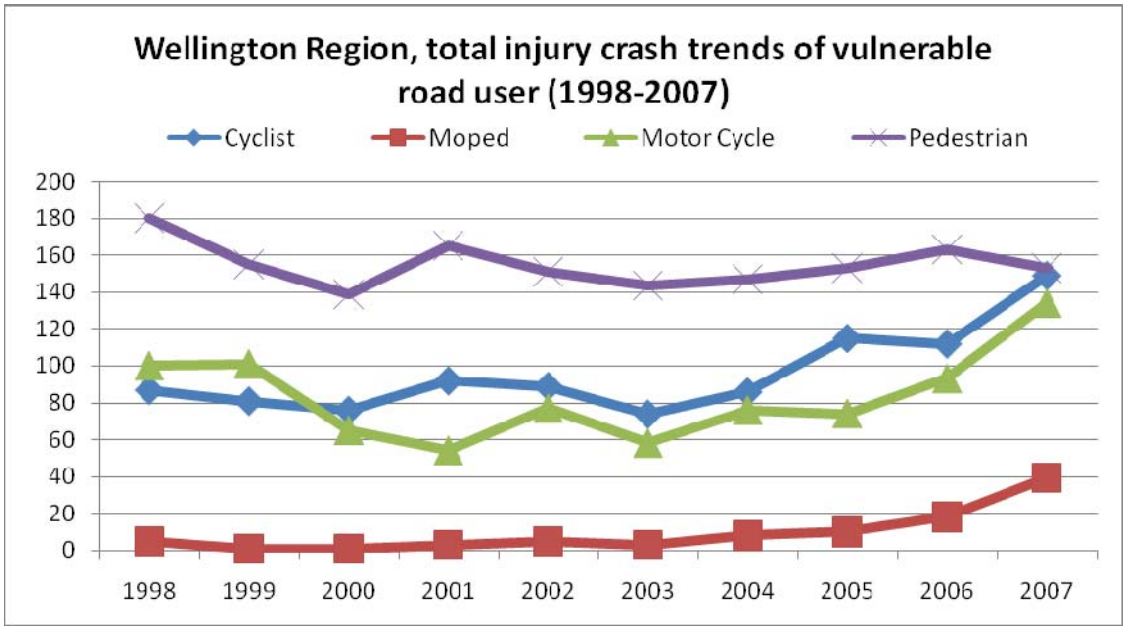

Figure 38: Injured vulnerable road users in % for the Wellington Region between 1998 and 2007

Only the number of injured pedestrians has decreased slightly between 2006 and 2007. The numbers of injured Cyclists, Motor Cyclists/Moped drivers has increased sharply since 2003. How the trend is backed by the different TAs is shown in the figures below.

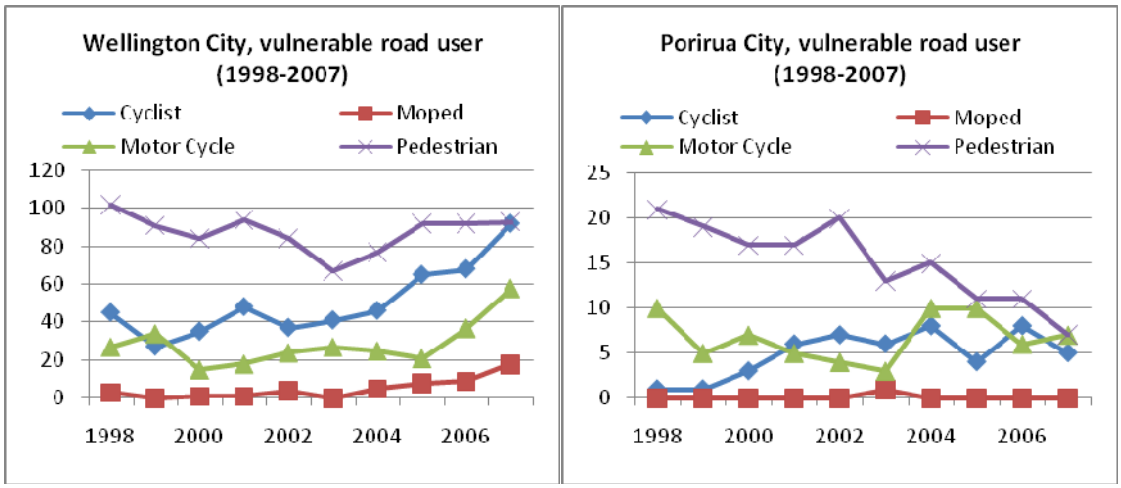

Figure 39/40: Injury crash numbers by road type for Wellington and Porirua City between 1998 and 2007

The Porirua, Carterton and South Wairarapa figures show the numbers of pedestrian injury crashes decreasing.

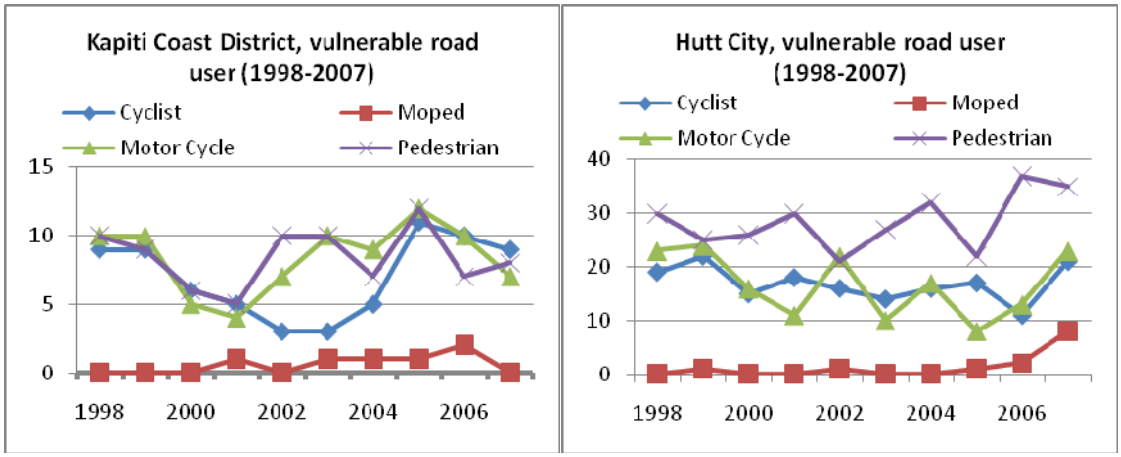

Figure 41/42: Injury crash numbers by road type for Kapiti Coast District and Hutt City between 1998 and 2007

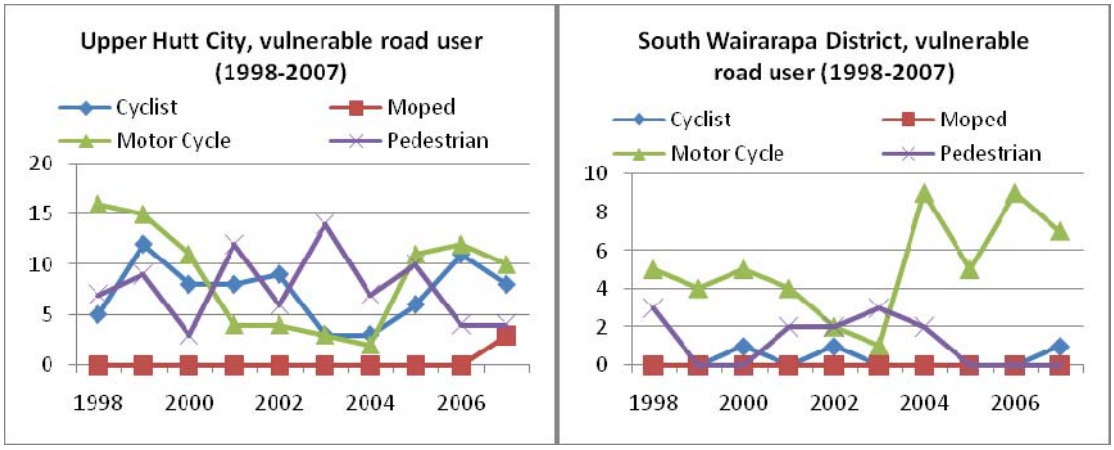

Figure 43/44: Injury crash numbers by road type for Upper Hutt City and South Wairarapa District between 1998 and 2007

Though the numbers of Motor Cycles/Mopeds involved in injury crashes are quite small, they increased rapidly in Masterton and Carterton District compared to the other groups of vulnerable road users in these areas. In South Wairarapa the number of Motor Cyclist injury crashes had a very strong increase in 2004 and remained since then on a higher level.

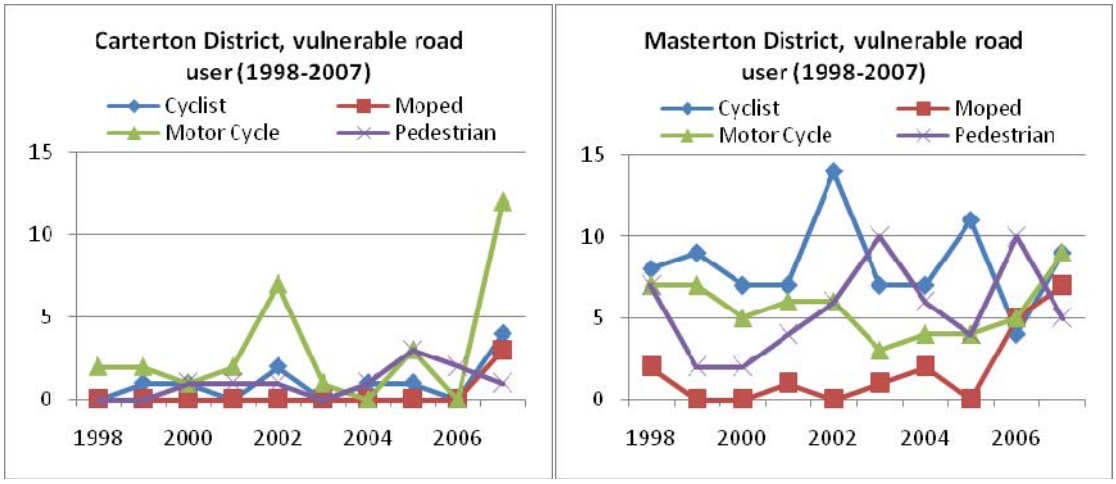

Figure 45/46: Injury crash numbers by road type for Carterton and Masterton District between 1998 and 2007

While most numbers are too small to be of statistical significance, they should not be neglected in the second phase when the reasons for the increasing injury crash numbers are to be examined.

5. Causal Factors

An important part of examining the injury crashes are the causal factors.

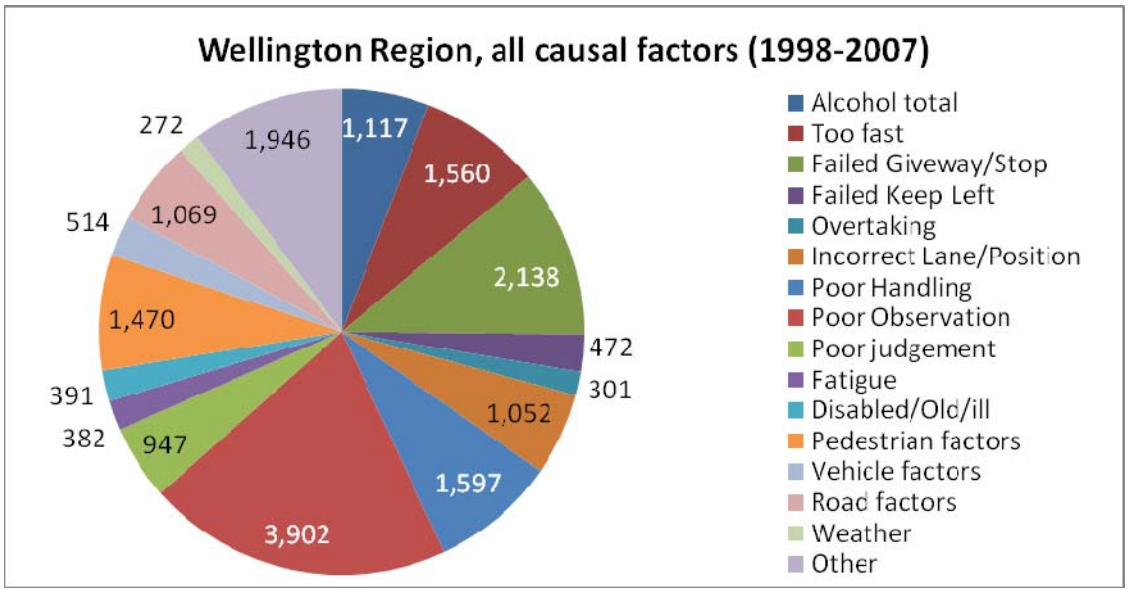

Figure 47: The various crash factors for the Wellington Region for all injury crashes 1998-2007

There are usually many factors that contribute to a single injury crash. The numbers therefore do not display the main factor causing the crash but all the factors which led to the crash according to the police report.

When summed up into four categories of causal factors, human/driver factors[2] are the most significant cause of crashes (see figure 48).

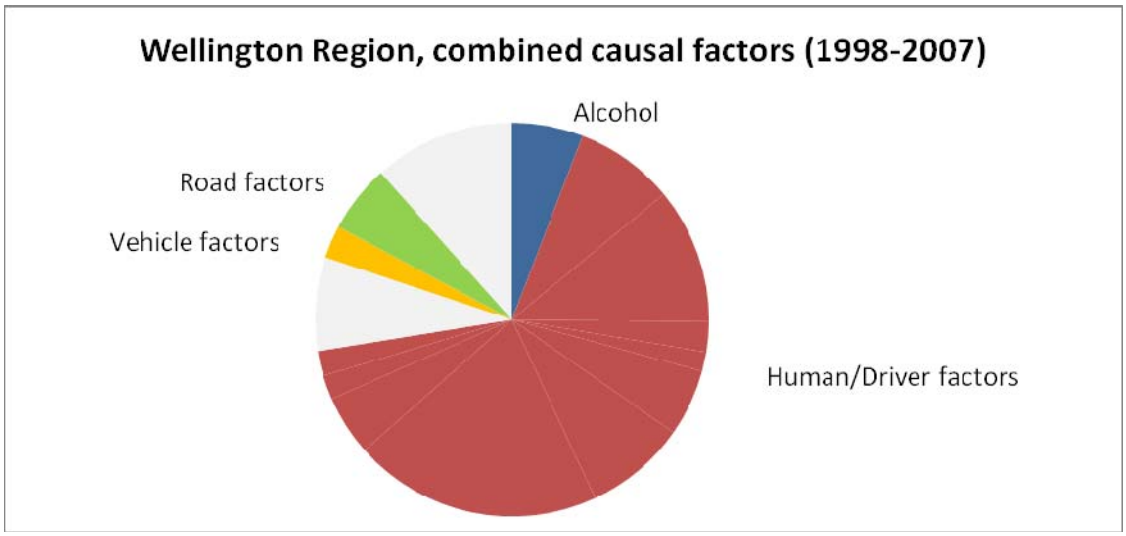

Figure 48: The various crash factors grouped into 4 main categories for the Wellington Region for all injury crashes 1998-2007

6. Trends over 20 years

If the numbers in the region for the decade of 1988-1997 are compared to the ones covering the next ten years and the same numbers for all New Zealand in the latter period, it is clear that the causal factor distribution remains steady overall.

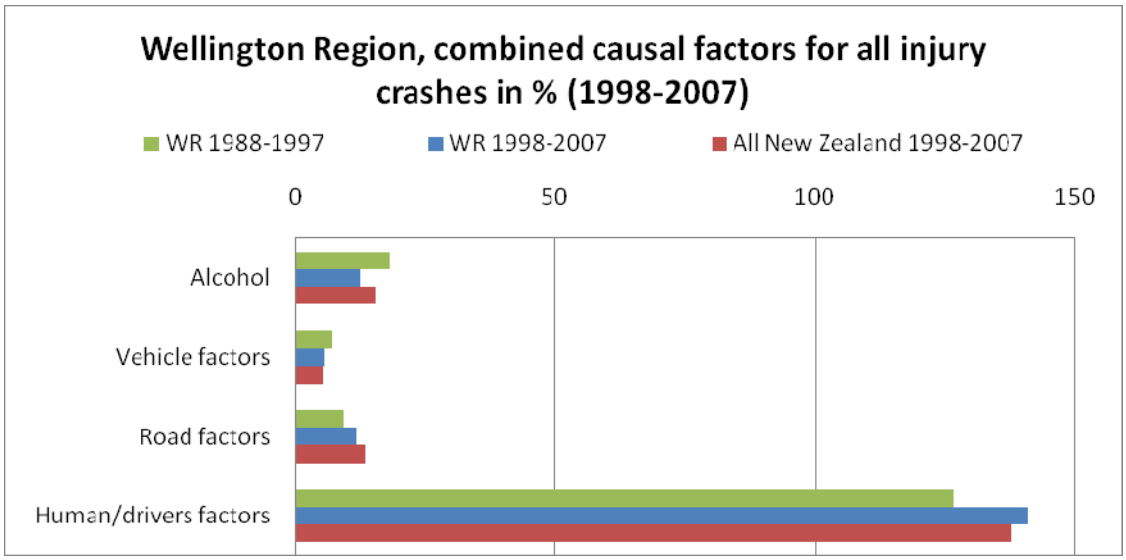

Figure 49: Combined causal factors for the Wellington Region 1988-2007 and all New Zealand 1998-2007

[2] In the 'Human/Driver' causal factor are the ten numbers of causal factors merged which range from 'too fast', 'Failed to give way/stop' to 'Disabled/old/ill' (see figure 46).

When the numbers for the latest period for the region are divided into local roads and state highways, the local roads show the highest percentage numbers for all four categories. This is not surprising due to the fact that most crashes occur on that type of road. There is not a significant difference between the proportion of the causal factors for local roads and state highways.

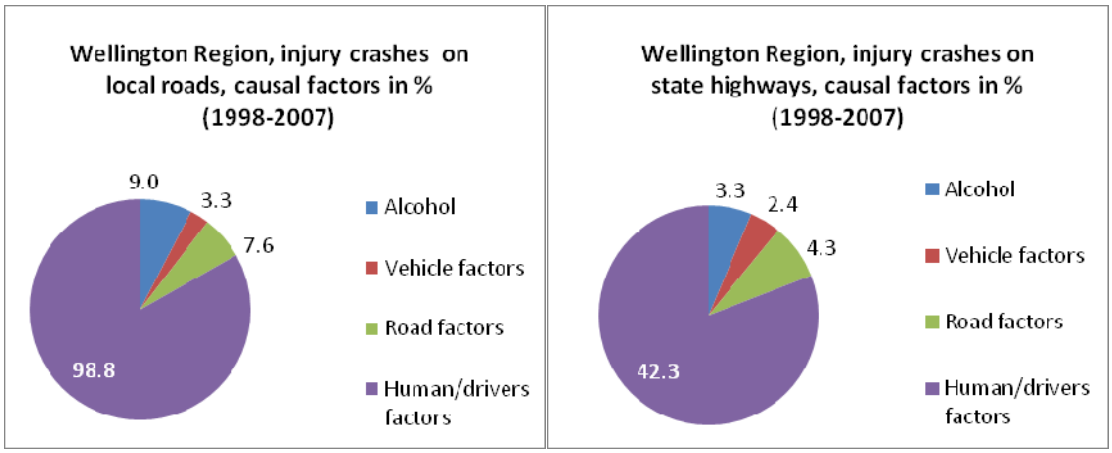

Figure 50/51: The four main categories of causal factors for the Wellington Region 1998-2007 by road authorities

The comparison of the Police Crash List Report over the decades 1988-1997 and 1998-2007, relating to the Driver/Vehicle factors, shows that the percentage of the causal factors has changed comparably in few of the listed factors (see figure 52 and 53). Notable exceptions are “alcohol”, which has fallen from 18% to 12%, and “poor observation” which has increased from 31% to 38%. The other crash factors show a quite constant number over the last two decades.

NZ TRANSPORT AGENCY
WAKA KOTAHI

POLICE CRASH LIST REPORT
1988-1997 Crashes
Run on: 14 Nov 2008

Crash List: Greater Wellington Region all crashes 1988-1997

Total Injury Crashes:	13144
Total Non-Injury Crashes:	25871

Deaths	381
Serious Injuries	3433
Minor Injuries	14440

Crash Movement	Number	%
Overtaking Crashes	2938	8
Straight Road Lost Control/Head On	2436	6
Bend - Lost Control/Head On	8054	21
Rear End/Obstruction	13367	34
Crossing/Turning	9992	26
Pedestrian Crashes	1750	4
Miscellaneous Crashes	477	1
Total	39014	100 %

Crash Type	Single Party	Multiple Party	Total
Intersection	2040	15127	17167
MidBlock	6605	15243	21848
Total	8645	30370	39015

Injury Crash Driver/Vehicle factors	No.Inj.Crashes	% Inj.Crashes
Alcohol	2329	18
Too fast	2854	22
Failed Giveway/Stop	3199	24
Failed Keep Left	805	6
Overtaking	502	4
Incorrect Lane/posn	1554	12
Poor handling	1031	8
Poor Observation	4019	31
Poor judgement	1353	10
Fatigue	399	3
Disabled/old/ill	295	2
Pedestrian factors	1352	10
Vehicle factors	919	7
Other	2456	19
Total	23067	176 %

Figure 52: Police Crash List Report 1988-1997

NZ TRANSPORT AGENCY
WAKA KOTAHI

POLICE CRASH LIST REPORT
1998-2007 Crashes
Run on: 17 Nov 2008

Crash List: Greater Wellington Region 1998-2007 all

Total Injury Crashes:	9036
Total Non-Injury Crashes:	26663

Deaths	277
Serious Injuries	2043
Minor Injuries	9640

Crash Movement	Number	%
Overtaking Crashes	2624	7
Straight Road Lost Control/Head On	2509	7
Bend - Lost Control/Head On	7869	22
Rear End/Obstruction	13516	38
Crossing/Turning	7177	20
Pedestrian Crashes	1537	4
Miscellaneous Crashes	467	1
Total	35699	100 %

Crash Type	Single Party	Multiple Party	Total
Intersection	1897	12142	14039
MidBlock	6432	15228	21660
Total	8329	27370	35699

Injury Crash Driver/Vehicle factors	No.Inj.Crashes	% Inj.Crashes
Alcohol	1080	12
Too fast	1475	16
Failed Giveway/Stop	2097	23
Failed Keep Left	439	5
Overtaking	286	3
Incorrect Lane/posn	987	11
Poor handling	1504	17
Poor Observation	3406	38
Poor judgement	905	10
Fatigue	381	4
Disabled/old/ill	387	4
Pedestrian factors	1059	12
Vehicle factors	431	5
Other	1808	20
Total	16245	180 %

Figure 53: Police Crash List Report 1998-2007

It is pleasing to note that total crash numbers decreased by 31%, deaths and serious injuries fell by 27% and 40% between 1988/97 and 1998/07. The total number of crashes at intersection decreased by about 3,000 and accounts therefore for almost the complete drop in crash numbers in those ten years compared to the previous decade.
With the focus on the fatal and serious injury crashes between 2005 and 2007 (see figure 54) it is notable that the crashes occour in a similar pattern like the plotted crashes for the whole decade (see figure 1).

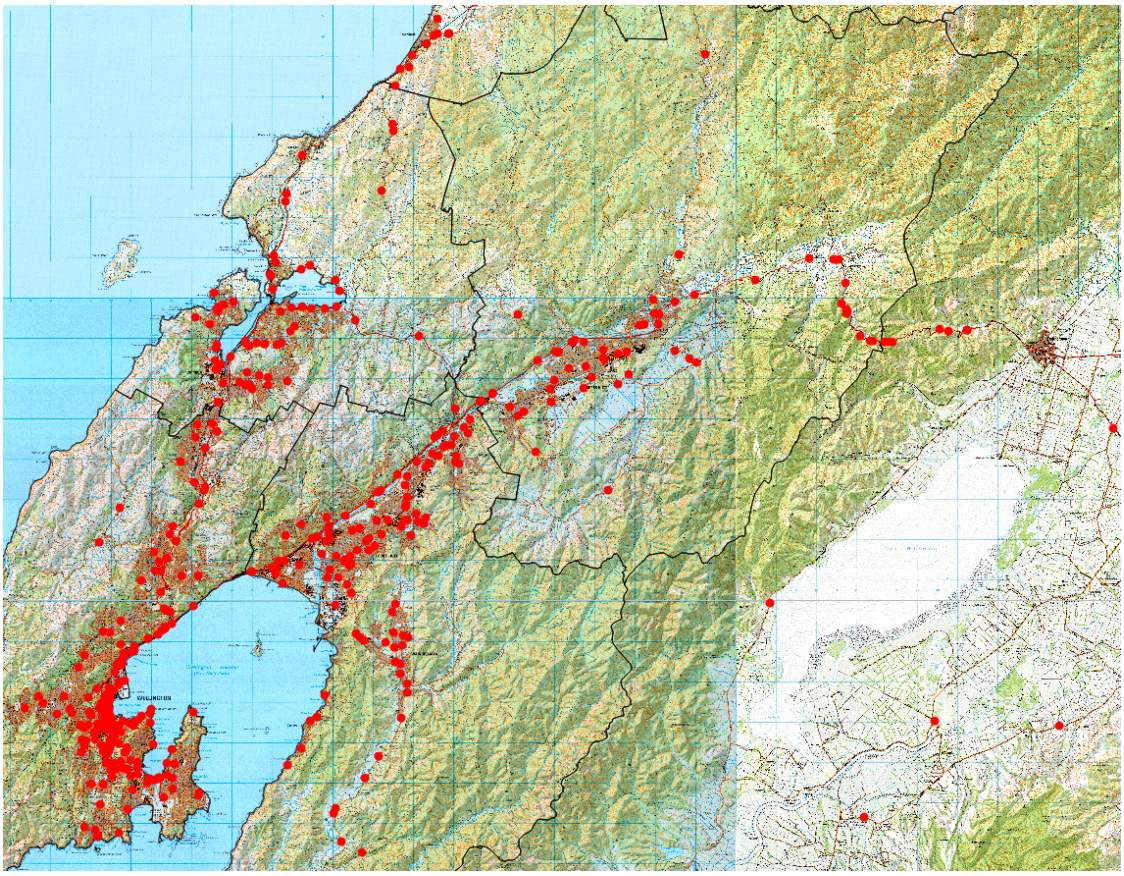

Figure 54: All fatal and serious injury crashes in the Wellington Region 2005-2007

The Police Crash List Report for those three years is compared with the one for the period of 2002-2004 to detect changes that might be characteristic for the last three years, pointing out facts that might relate to the rising crash numbers.

NZ TRANSPORT AGENCY
WAKA KOTAHI

POLICE CRASH LIST REPORT
2002-2004 Crashes
Run on: 26 Nov 2008

Crash List: GWR all crashes 2002-2004

Total Injury Crashes:	2532
Total Non-Injury Crashes:	7154

Deaths	89
Serious Injuries	575
Minor Injuries	2730

Crash Movement	Number	%
Overtaking Crashes	676	7
Straight Road Lost Control/Head On	728	8
Bend - Lost Control/Head On	2233	23
Rear End/Obstruction	3503	36
Crossing/Turning	1993	21
Pedestrian Crashes	434	4
Miscellaneous Crashes	119	1
Total	9686	100 %

Crash Type	Single Party	Multiple Party	Total
Intersection	568	3239	3807
MidBlock	1817	4062	5879
Total	2385	7301	9686

Injury Crash Driver/Vehicle factors	No.Inj.Crashes	% Inj.Crashes
Alcohol	304	12
Too fast	381	15
Failed Giveway/Stop	575	23
Failed Keep Left	136	5
Overtaking	67	3
Incorrect Lane/posn	310	12
Poor handling	432	17
Poor Observation	994	39
Poor judgement	243	10
Fatigue	111	4
Disabled/old/ill	129	5
Pedestrian factors	292	12
Vehicle factors	121	5
Other	476	19
Total	4571	181 %

Figure 55: Police Crash List Report 2002-2004

NZ TRANSPORT AGENCY
WAKA KOTAHI

POLICE CRASH LIST REPORT
2005-2007 Crashes
Run on: 26 Nov 2008

Crash List: GWR all crashes 2005-2007

Total Injury Crashes:	3155
Total Non-Injury Crashes:	9241

Deaths	67
Serious Injuries	660
Minor Injuries	3285

Crash Movement	Number	%
Overtaking Crashes	976	8
Straight Road Lost Control/Head On	869	7
Bend - Lost Control/Head On	2646	21
Rear End/Obstruction	5094	41
Crossing/Turning	2195	18
Pedestrian Crashes	474	4
Miscellaneous Crashes	142	1
Total	12396	100 %

Crash Type	Single Party	Multiple Party	Total
Intersection	635	4142	4777
MidBlock	2111	5508	7619
Total	2746	9650	12396

Injury Crash Driver/Vehicle factors	No.Inj.Crashes	% Inj.Crashes
Alcohol	394	12
Too fast	540	17
Failed Giveway/Stop	746	24
Failed Keep Left	165	5
Overtaking	107	3
Incorrect Lane/posn	357	11
Poor handling	596	19
Poor Observation	1287	41
Poor judgement	328	10
Fatigue	123	4
Disabled/old/ill	101	3
Pedestrian factors	332	11
Vehicle factors	140	4
Other	666	21
Total	5882	185 %

Figure 56: Police Crash List Report 2005-2007

The injury crash Driver/Vehicle factors between 2005 and 2007 show a shift in the percentages which ranges, compared to the period of 2002 and 2004, between -2% and +2%. The factors that increased by two percent are i.e. 'Too fast', 'Poor handling' and 'Poor observation'. The Crash type shows an increase during those periods of about 2,000 crashes in the MidBlock Type and about 1,000 crashes for the intersections. Those approximately 3,000 crashes account for the overall rise in the last period.

When the Crash Movement categories are compared, the major shift is noted for 'Rear End/Obstruction' which increased by 5%. Second is 'Crossing/Turning' which decreased by 3% followed by 'Bend-Lost Control/Head On' with 2% decrease.

7. Conclusions

So far the increasing crash numbers appear to be genuine and not just a result of an increase in the reported police data. The abrupt rise in the injury crash numbers is mainly caused by the minor-injury crashes. Furthermore, the current injury crash numbers of the first half of 2008 follow the trend of the last two years. That suggests the numbers for the whole year 2008 are likely to be very high again.

Most of the injury crashes happen on local urban roads (63%), which vary by the different districts and their share in the specific types of roads.

Human/drivers factors are the most common causal factors attributed to the reported crashes, which include the most dominant ones 'Poor observation', 'Failed to give way/stop', 'Too fast' and 'Poor handling'.

Overall, the general pattern of causal factors and crash types has remained fairly constant over the last 20 years suggesting that a fresh approach to improving safety is necessary if significant improvements are to be gained.

The focus in phase two will be on further comparisons of the last two decades. A time line will be developed to examine what part, if any, systemic changes have played in contributing to the current upward crash trend.

Phase II

Phase II of the investigation looks at the crash numbers in more detail particularly with a focus on fatal (f) and serious (s) injury crash/casualty numbers of the whole region. Information is presented about organisational changes in the different agencies over 20 years.

The small numbers in some TAs do not allow robust statistical analysis, therefore the emphasis is on the whole Wellington Region rather than on the different TAs.

8 Road Crashes

8.1 Population and VKT

The contrast of the fatal and serious (f & s) injury crash numbers with the population over the last 10 years shows, that the inhabitants of the Wellington Region are steadily increasing, whereas the f and s crashes decrease until 2000 and start increasing again thereafter (see figure 57). The percentage growth clearly shows that the increase of the f and s crash numbers in the recent years was much higher than the rise of the population.

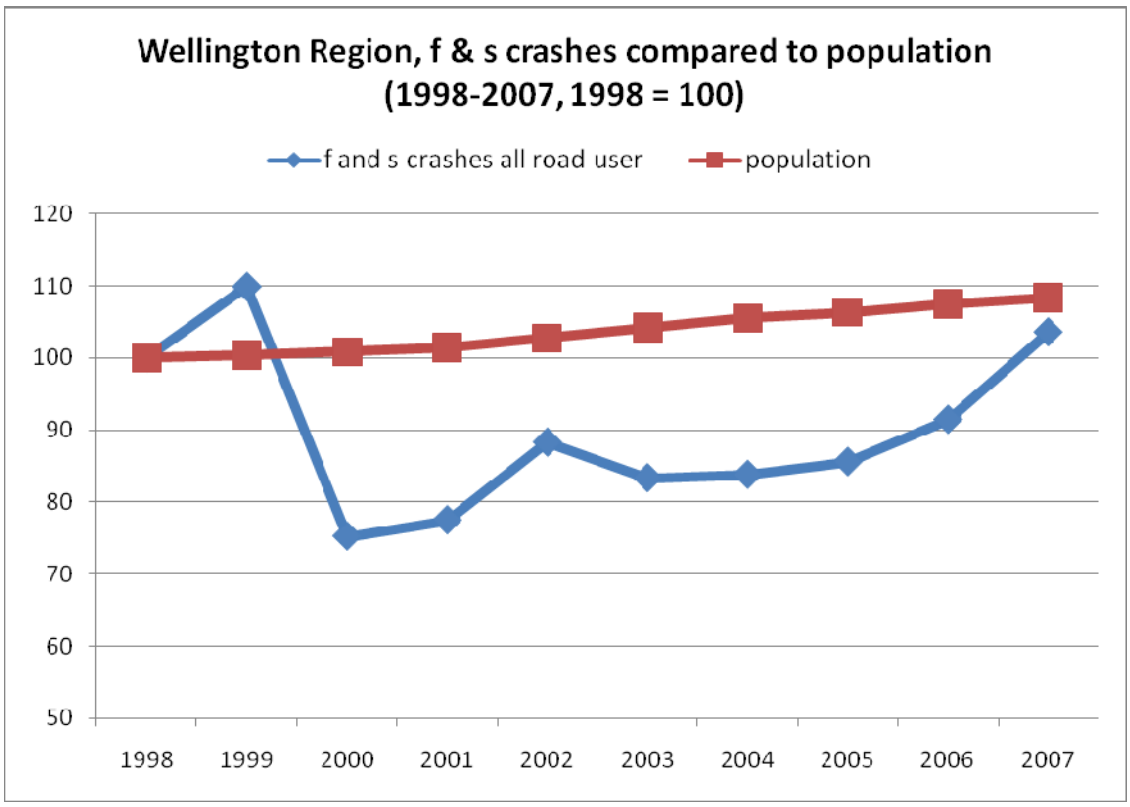

Figure 57: Wellington Region, fatal and serious injury crash numbers compared to the population growth (1998-2007)

The Vehicle Kilometres Travelled (VKT) in m km show a different development over the last seven years. Since 2005 the VKT numbers were going down, whereas the fatal and serious crash numbers are steadily increasing (see figure 58). People might therefore drive shorter distances than in the previous years and/or rely on public transport services more often. The petrol prices displayed a strong upward trend during the last years, which might relate to the decrease in VKT as well (see figure 59).

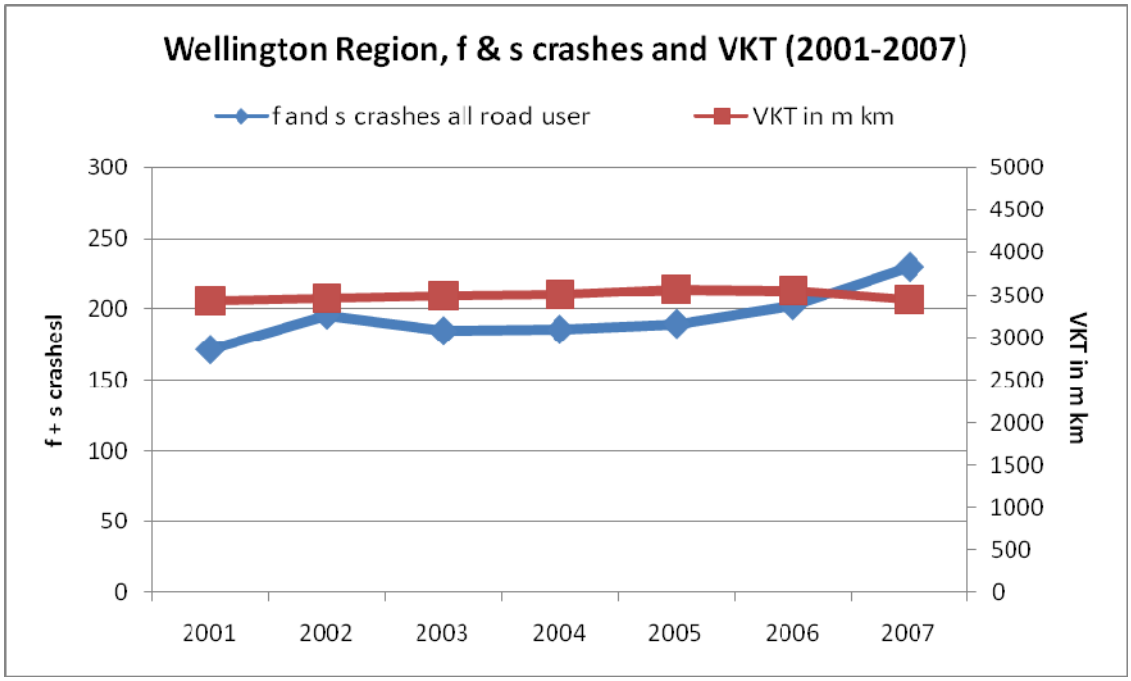

Figure 58: Wellington Region, fatal and serious injury crash numbers compared to the VKT[3] in m km (2001-2007)

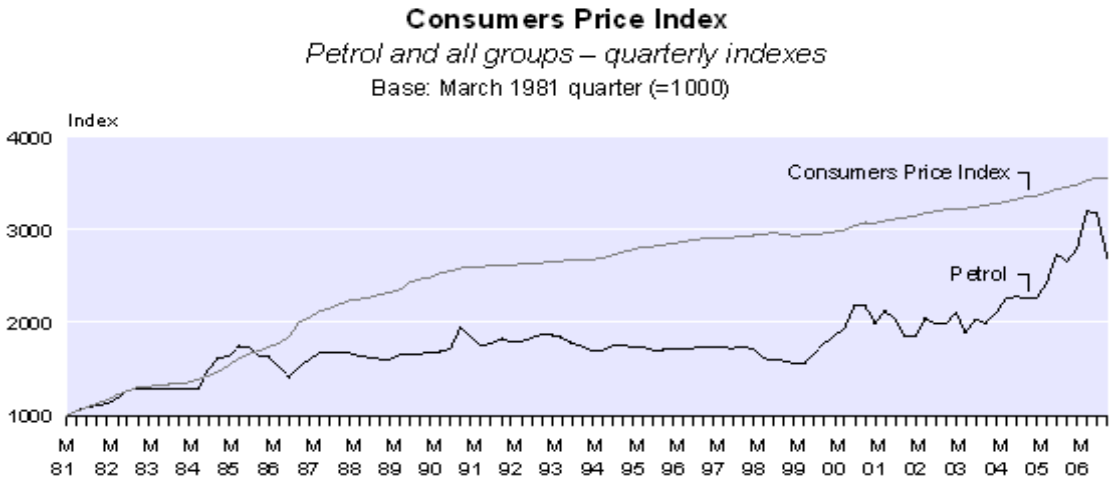

Figure 59: Octane Petrol prices over the years related to the CPI in New Zealand (1981-2006) (source: statistics online)

[3] VKT numbers for Local Roads and State Highways in the Wellington Region

8.2 Hospitalisation and CARD data

The next figure shows the f and s casualties and the hospitalisation numbers for the deaths and discharges after >1 and >3 days. It is notable that both curves are quite similarly in curvature for the last 10 years (see figure 60).

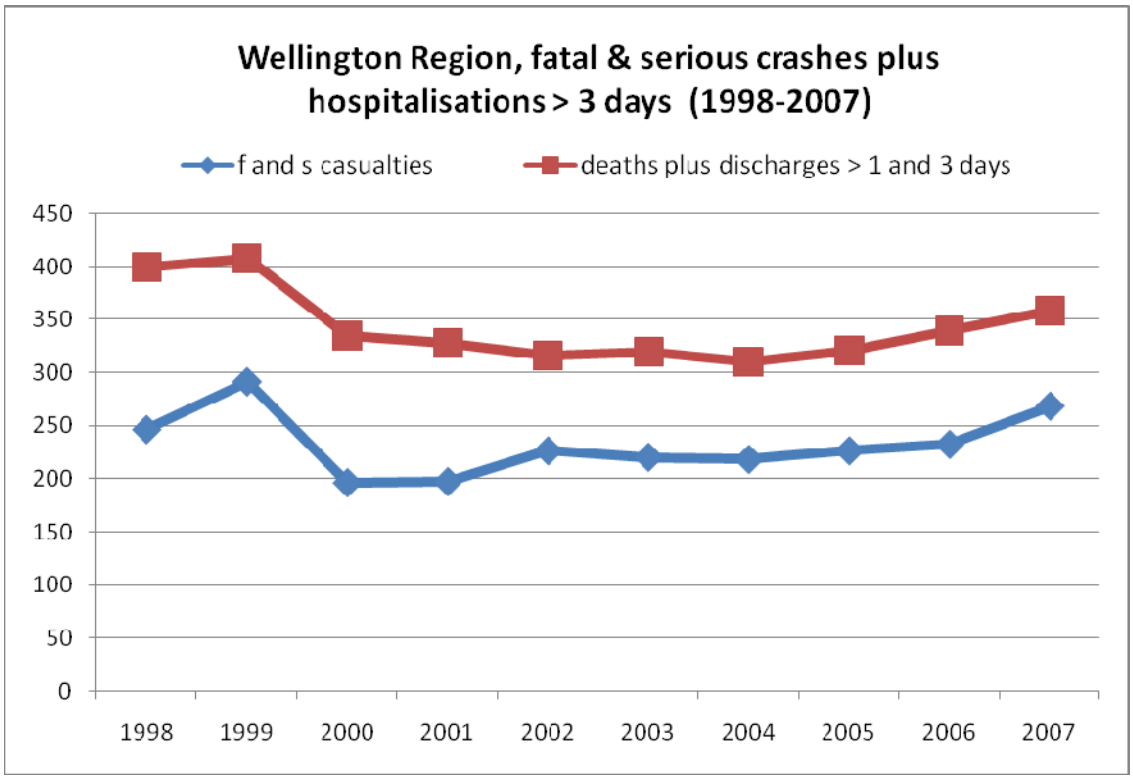

Figure 60: Wellington Region, fatal and serious casualties compared to the hospitalisations > 1 and >3 days (1998-2007)

Hospital records confirm the trend displayed by the f and s injury casualties. Those casualties account for approximately 70 % of the hospitalisation data. Figure 5 shows the split of deaths and discharges in the Wellington Region for >1 day and >3 days. The graph supports the conclusion of the phase I report there is a real increase in numbers of reported crashes since 2004.

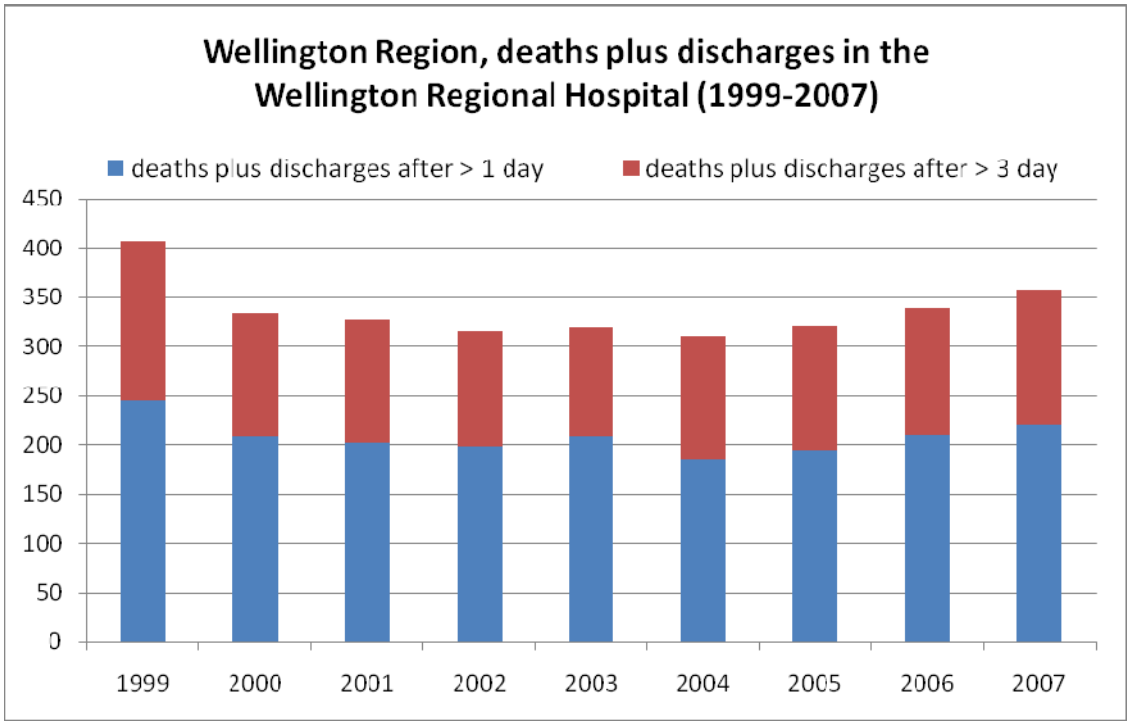

Figure 61: Wellington Region, deaths plus discharges, hospitalisation data (1999-2007)

When the numbers are related to the reported crashes by the New Zealand Police Communications and Resource Deployment (CARD) system and the Crash Analysis (CAS) system, some more differences can be observed (see figures 61, 62 and 63).

The reported crashes of the CARD system in 2003 are significantly higher than the corresponding CAS data in the year 2003. The number of crashes reported to CAS was much smaller than the number of crashes reported by CARD or by the hospitals. The glitch is caused by the reporting rate of filed Traffic Crash Reports (TCRs) entered into CAS which was comparatively lower in that particular year.

Nonetheless an increase of incidents can be found in all three data bases between 2005 and 2007.

Between 2005 and 2006 about 500 more vehicle incidents were reported by the police. This accounts for a rise in the total number of crashes, especially for those cases where a TCR was written. The number of K6 and K9 (reported cases in CARD which require a TCR) increased between 2006 and 2007, whereas K1 and K3[4] at the same time show a decrease. The overall number of reports in both years remains quite steady on a high level. That shift is explained by the Police having been urged during 2006 to increase their overall reporting rate on TCRs which get into the CAS data base. Since CAS reports do not result from the categories K1 and K3, the shift to more K6 cases is explained. The steep increase in the CAS data in minor and non-injury crashes is caused by the increased reporting rate of the police. Severe crashes like fatal and serious ones have been reported previously to a good extent.

[4] See appendix C for priority numbers and code explanation

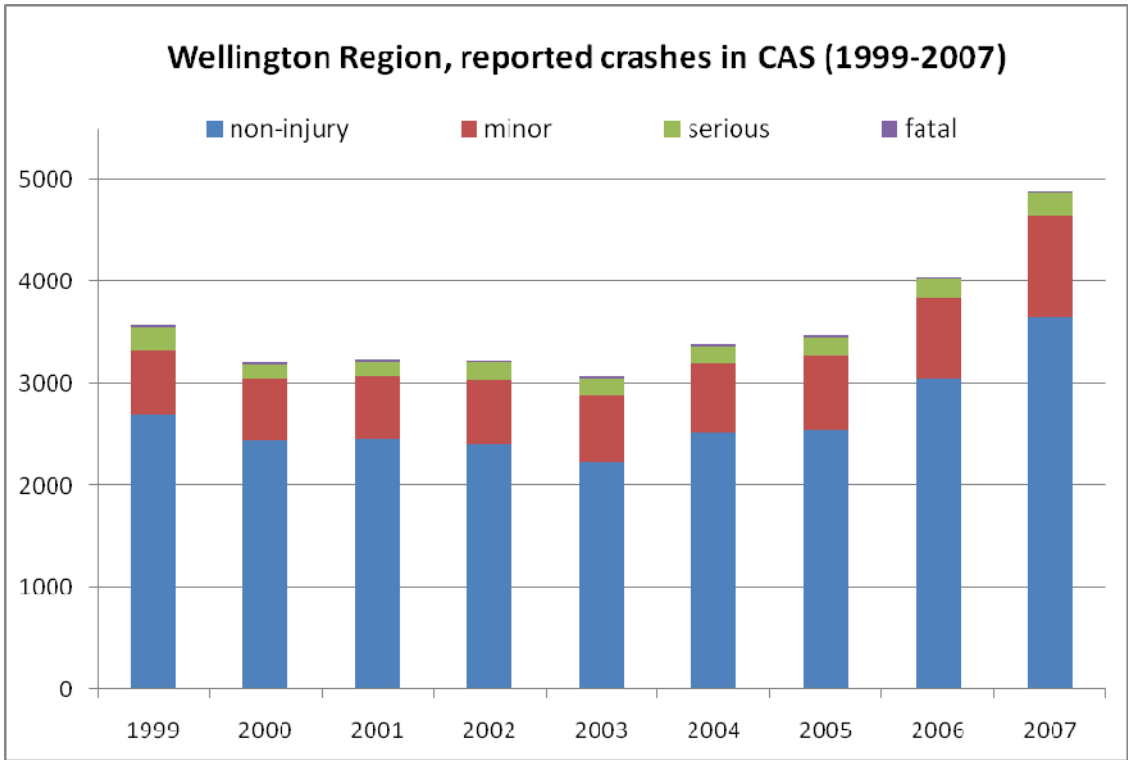

Figure 62: Wellington Region, police reported crashes in the CAS system (1999-2007)

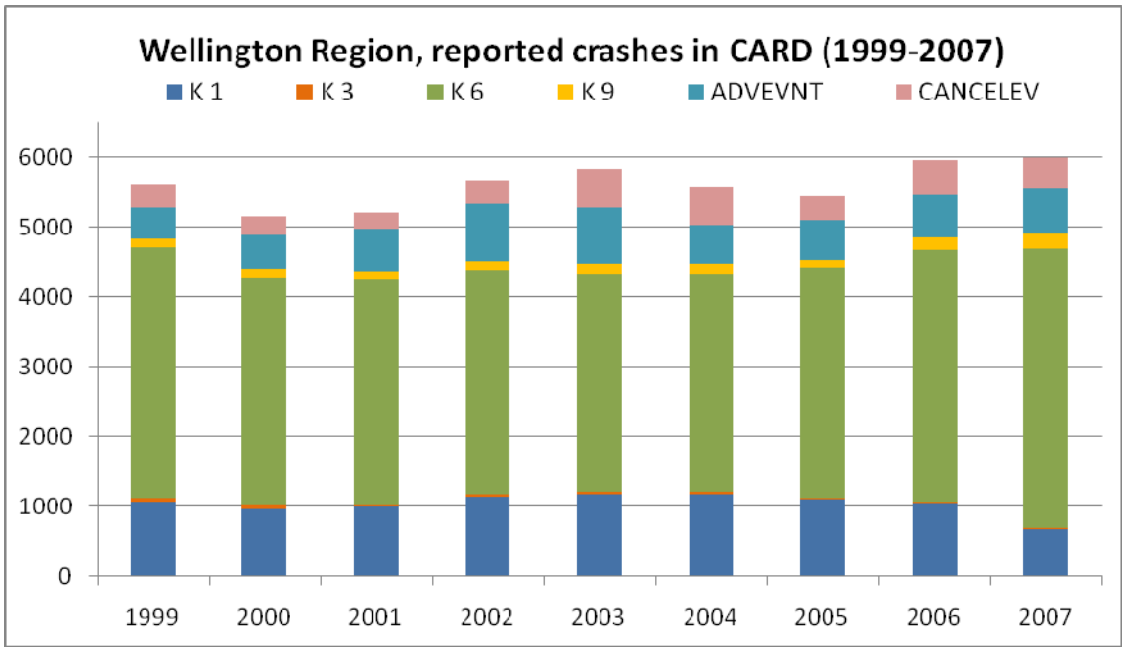

Figure 63: Wellington Region, police reported crashes in the CARD system (1999-2007)[5]

Overall, this further examination of recent f and s data confirms the increase in crashes is real and not explained by a change in reporting rates.

[5] See appendix C for priority numbers and code explanation

9 Investigation of Dominant Issues and Road User Groups

This chapter focuses on the present main target areas concerning road safety (alcohol and speed) and on the different types of road users.

9.1 Focus on Alcohol and Speed

For several years the focus of police enforcement has been on speed and alcohol. The following figures show:

- crashes caused by alcohol intake (figure 64),
- crashes caused by speed (figure 65)
- crashes caused by speed and alcohol intake (figure 66).

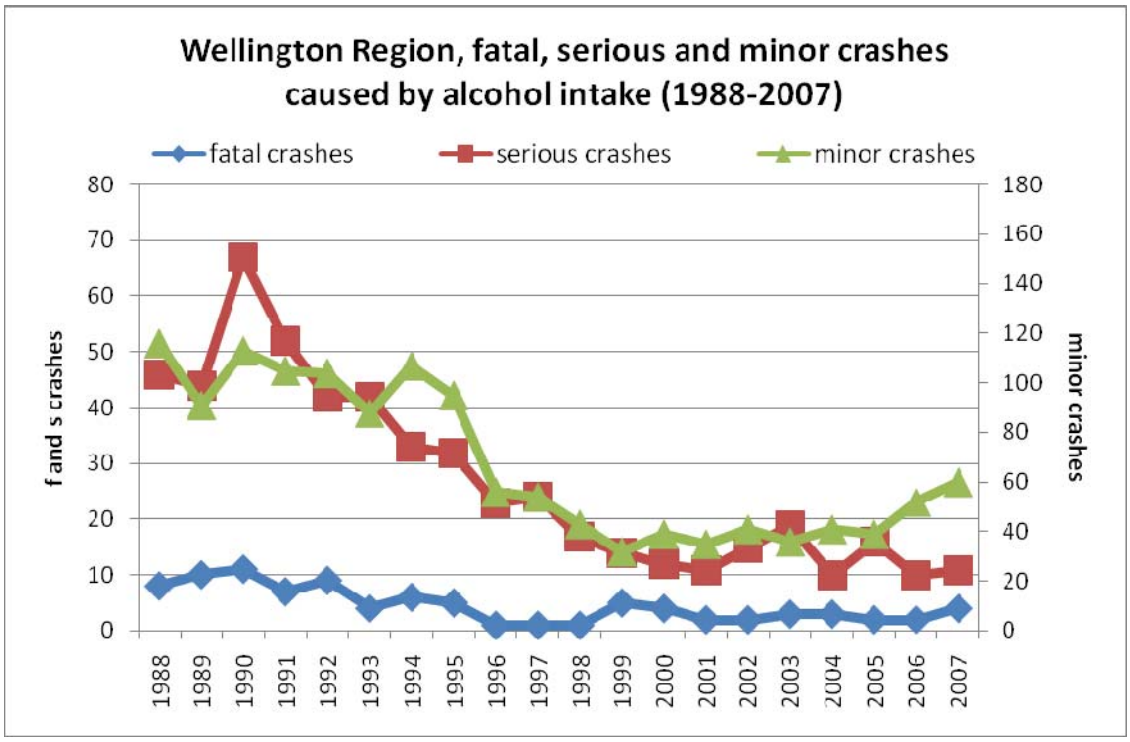

Figure 64: Wellington Region, alcohol involved in injury crashes by severity (1988-2007)

Figure 64 shows the trend of minor injury crashes resembles the one of the serious crashes until the year 2003. Since 2005 minor injury crashes have increased markedly. The numbers of crashes caused by alcohol intake have reduced significantly but have reached a plateau for much of the past decade.

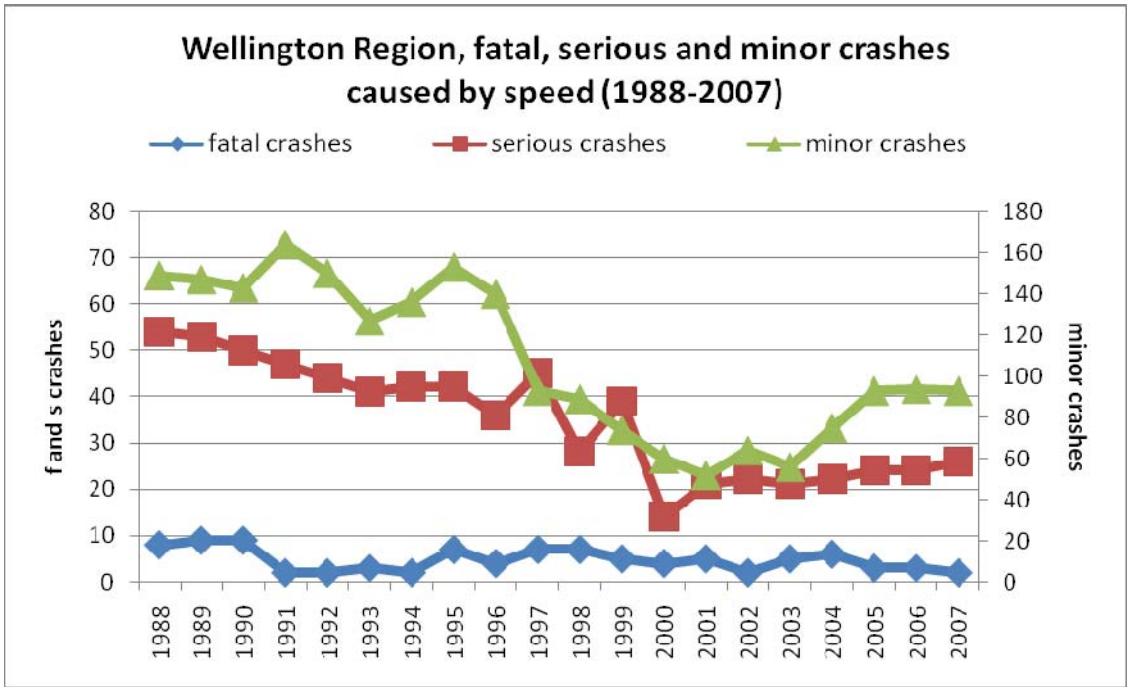

Figure 65: Wellington Region, speed involved in injury crashes by severity (1988-2007)

The f and s crashes caused by speed show a lesser decrease since 1988 compared to crashes involving alcohol. Again, minor and serious crashes went up over the last five years.

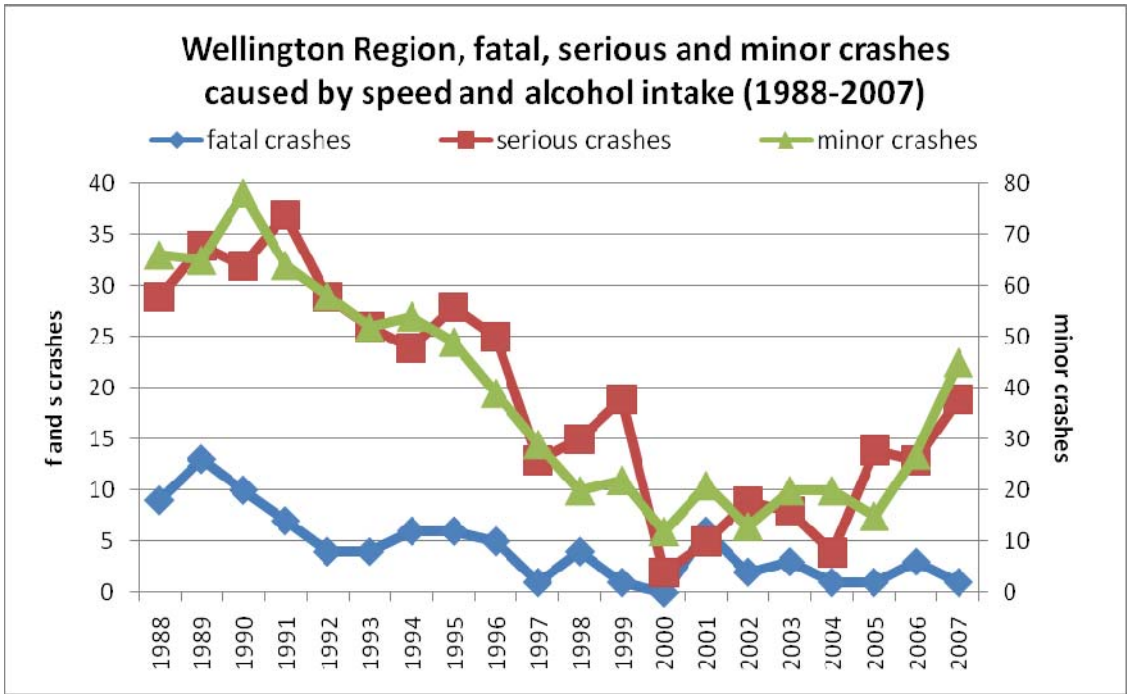

Figure 66: Wellington Region, speed and alcohol involved in injury crashes by severity (1988-2007)

The number of crashes related to speed and alcohol intake is relatively low over the years in general, but shows a strong increase over the last five years, similar to the serious and minor crashes related to only one of the causal factors.

The following figures show the fatal and serious crashes over the years, which were related to alcohol and/or speed by age group for the drivers under the age of 40 years (see figure 67, 68 and 69).

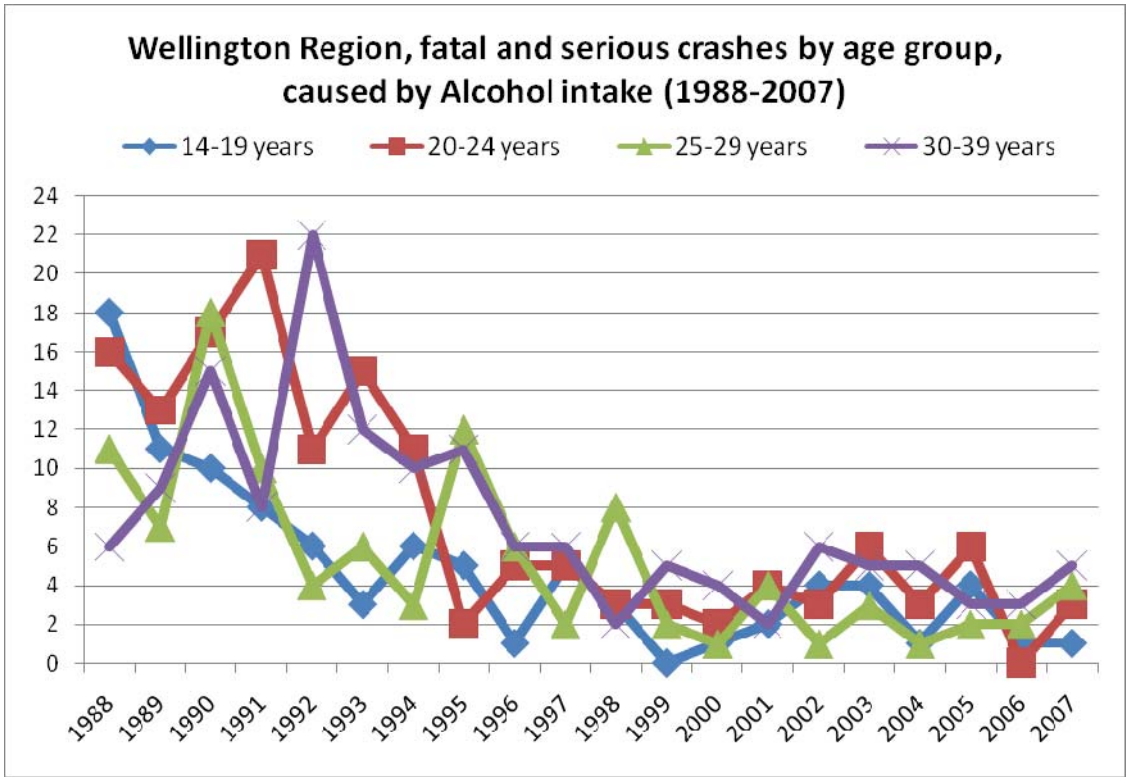

Figure 67: Wellington Region, alcohol involved in fatal and serious crashes by age group (1988-2007)

Between 1988 and the end of the 1990s, a huge decrease is visible in every age group concerning the crashes related to alcohol influence. During these years younger drivers had more fatal and serious crashes than the age groups over 40 years in age. But for the last ten years the number of crashes related to alcohol was relatively steady on a lower level. This coincides with the tough advertising introduced from 1995. The actions taken to lower the numbers of crashes related to alcohol and intoxicated drivers were effective.

Of the injury crashes related to 'Speed', younger people dominate the trend before and after 1995 when the speed cameras were introduced. The number of total f and s injury crashes in this category dropped. However, there is an increase of f and s injury crashes of people between 20 and 25 years of age over the last five years.

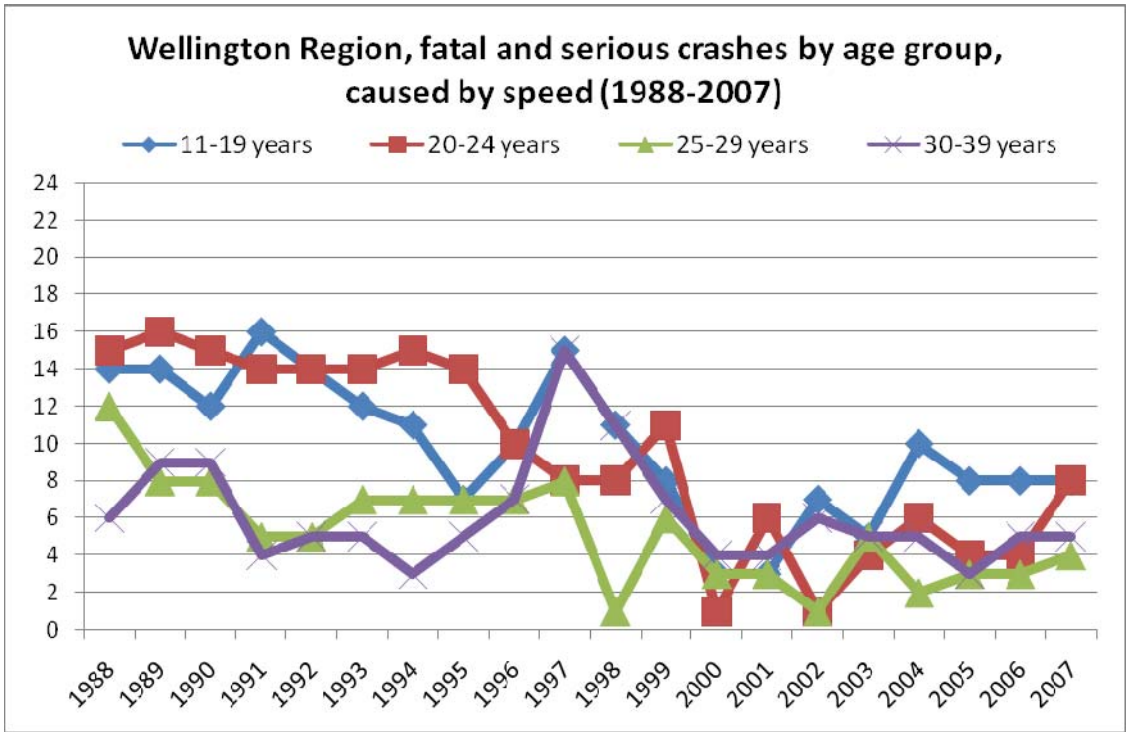

Figure 68: Wellington Region, speed involved in fatal and serious crashes by age group (1988-2007)

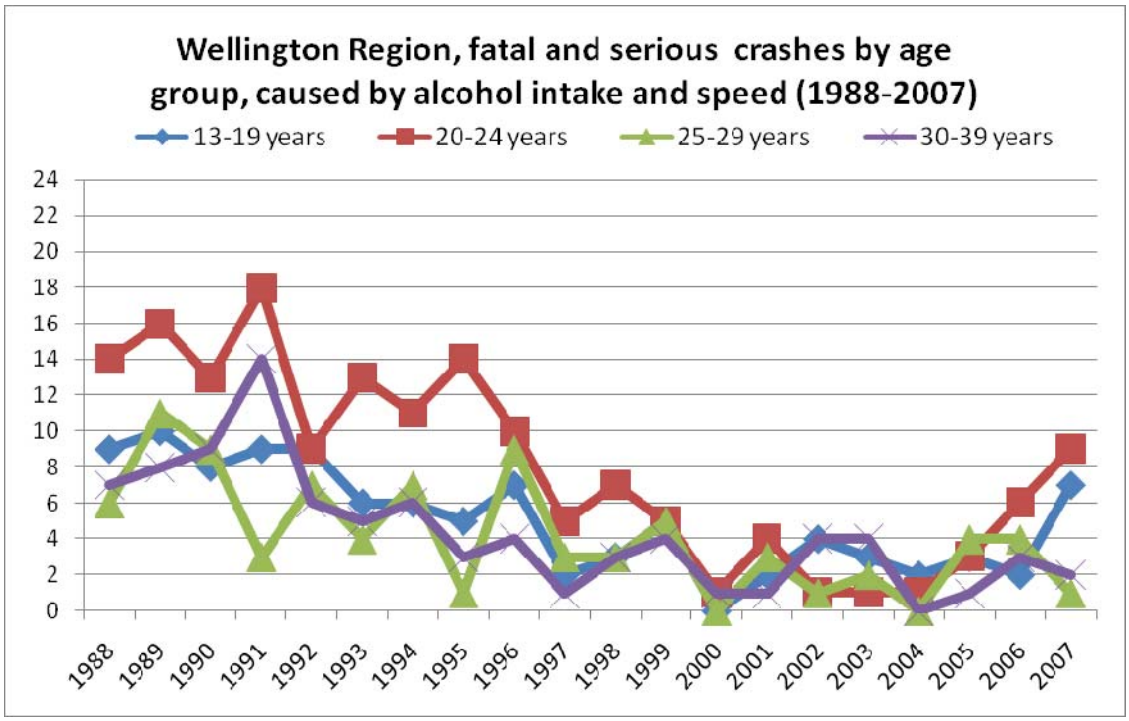

Figure 69: Wellington Region, alcohol and speed involved in fatal and serious crashes by age group (1988-2007)

There is a notable increase in the last four years of drivers between the age of 13 and 25 for fatal and serious crashes related to 'Alcohol' and 'Speed'.

9.2 Road Users

This section takes a closer look at the f and s injury crashes by road user. The trend of the total serious and fatal crash numbers is dominated by car drivers.

9.2.1 Cars

The 20 year curve is quite similar to the one of the total injury crashes (see figure 70).

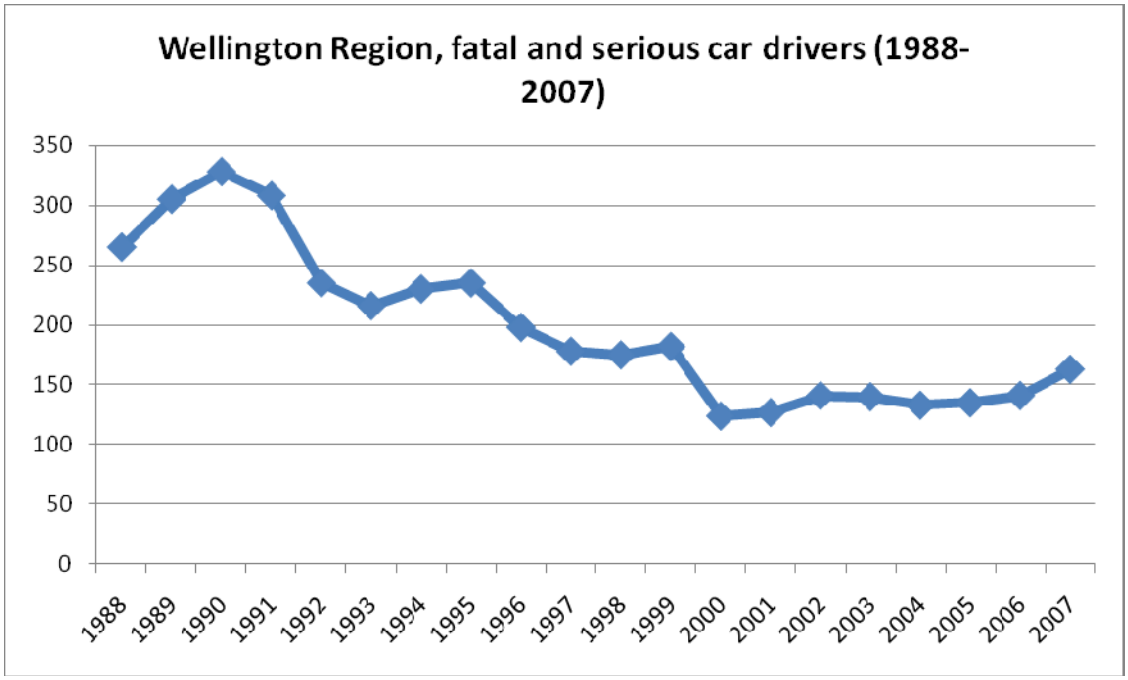

Figure 70: Wellington Region, fatal and serious crashes of car drivers (1988-2007)

The next figure shows the registration of new cars per year for all New Zealand as well as the total number of registered cars in the whole Wellington Region, combined with the f and s injury crashes (see figure 71).

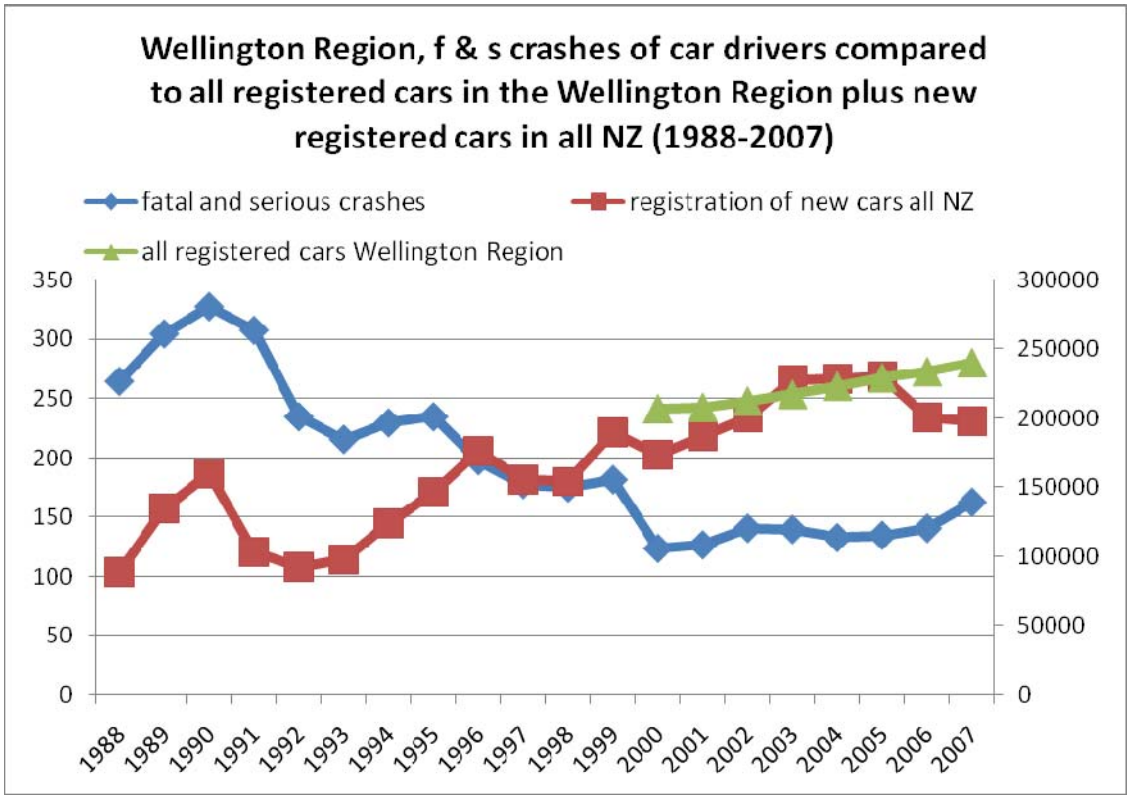

Figure 71: f and s injury car crashes and numbers of all registered cars in the Wellington Region compared to the registration of new cars in all New Zealand (1988-2007)

Over the last 10 years the number of registered cars in NZ has grown steadily. In 2007 there were approximately 40,000 new cars more registered compared to the year 2000. It is notable that the growth of new registered cars is steadier than the increase of fatal and serious injury crashes concerning car drivers, especially in the last two years. In the Wellington Region the total number of registered cars shows a steady increase especially in the last two years whereas the number of new car registrations in all NZ declined.

Other factors that influence the annual crash statistics include the increased enforcement since 1995 and improved vehicle standards and engineering achievements, which make vehicles and roads safer. The latter, no doubt, also contribute to the reduced severity of crashes. The safety features of a vehicle largely depend on its age as well as the engine size and therefore the power of the vehicle. Figure 72 shows the mean age of cars in New Zealand, which has been steadily increasing.

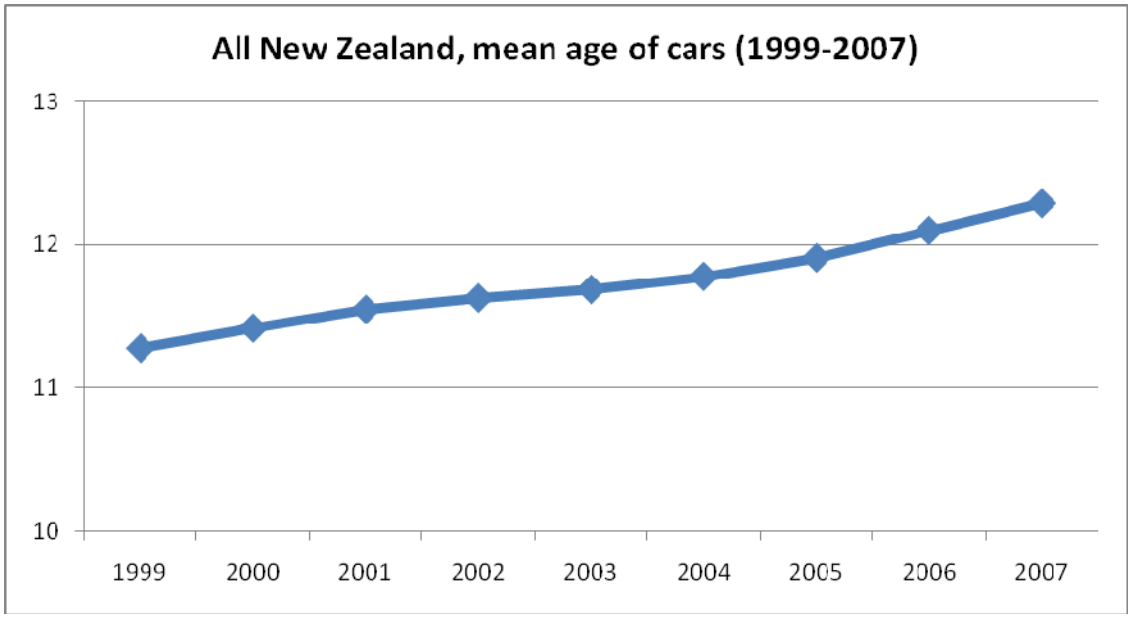

Figure 72: Mean age in years of the cars in New Zealand (1999-2007)

The mean age has risen over the last years. The average age of a car in NZ is 12.29 years which is comparatively high and increases the probability of fatal and serious crashes due to inferior safety equipment. The average age of a car in the USA and Germany in 2005 was less than 8 years and in the EU15 States an average of 8.8 years. Many vehicle engineering improvements have been made for vehicles during the last 20 years, but the adoption of this safer technology is relatively slow.

Since the fatal and serious injury crashes for cars have risen since the year 2000, the next figures focus on the time frame between 2000 and 2007.
The main causal factors for fatal and serious crashes with cars are shown in the figure below (see figure 73). The most important factor to mention is 'Poor observation'. This indicator rose significantly between 2006 and 2007, as well as 'Failed give way/Stop' and 'Too fast'. The factors 'Alcohol' and 'Poor handling' decreased, but are still on a higher level.

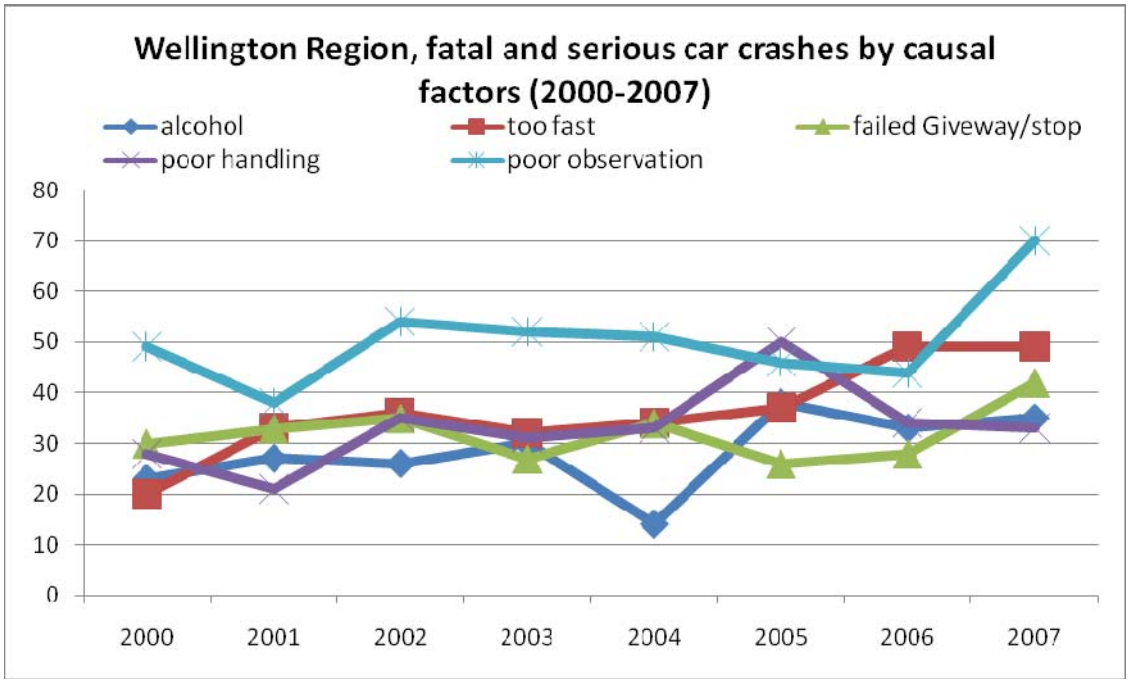

Figure73: Wellington Region, some selected causal factors for f and s injury car crashes (2000-2007)

The following figure shows the car drivers by age group and sex. It is interesting to note, that male drivers are generally more likely to be involved in f and s crashes, especially at a younger age, whereas female drivers are more represented in the older age groups (see figure 74).

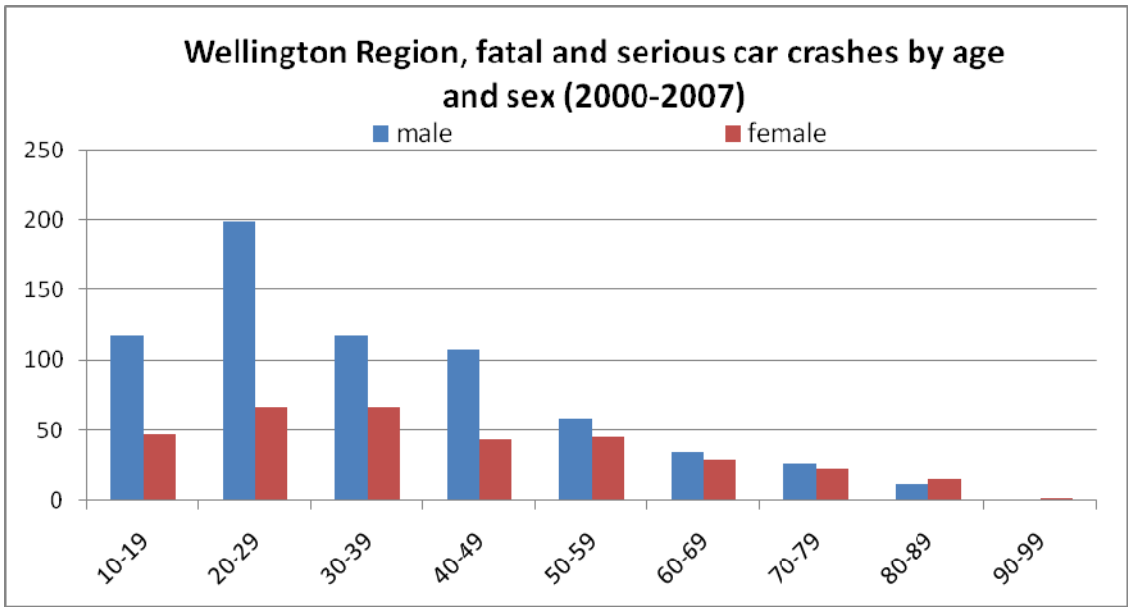

Figure 74: Wellington Region, f and s injury crashes by car drivers, age group and sex (sum 2000-2007)

The next three figures focus on alcohol and speed and show differences by age group or/and sex (see figure 75, 76 and 77).

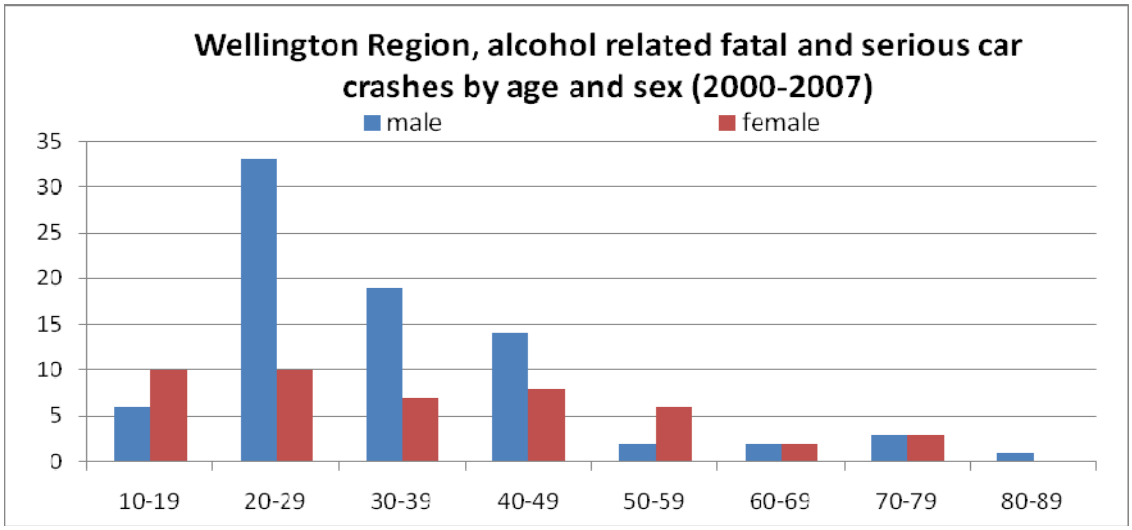

Figure 75: Wellington Region, alcohol related f and s injury car crashes by age group and sex (sum 2000-2007)

Alcohol and speed separately play a role for car drivers of both sexes involved in injury crashes. Interesting to note is the fact that fatal and serious crashes caused either by alcohol or speed, were more numerous among older women than older men. Also the fact, that female drivers involved in f and s injury crashes rarely combined the two factors alcohol and speed – in contrast to the younger men having a fatal or serious injury crash. For male drivers 'Speed' is often a cause for fatal and serious car crashes.

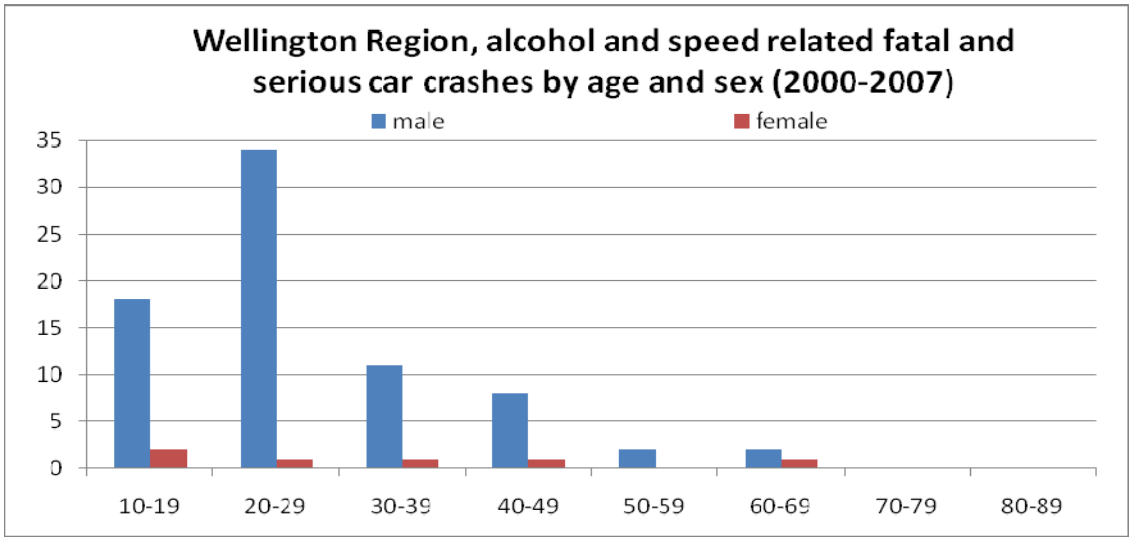

Figure 76: Wellington Region, alcohol and speed related f and s injury car crashes by age group and sex (sum 2000-2007)

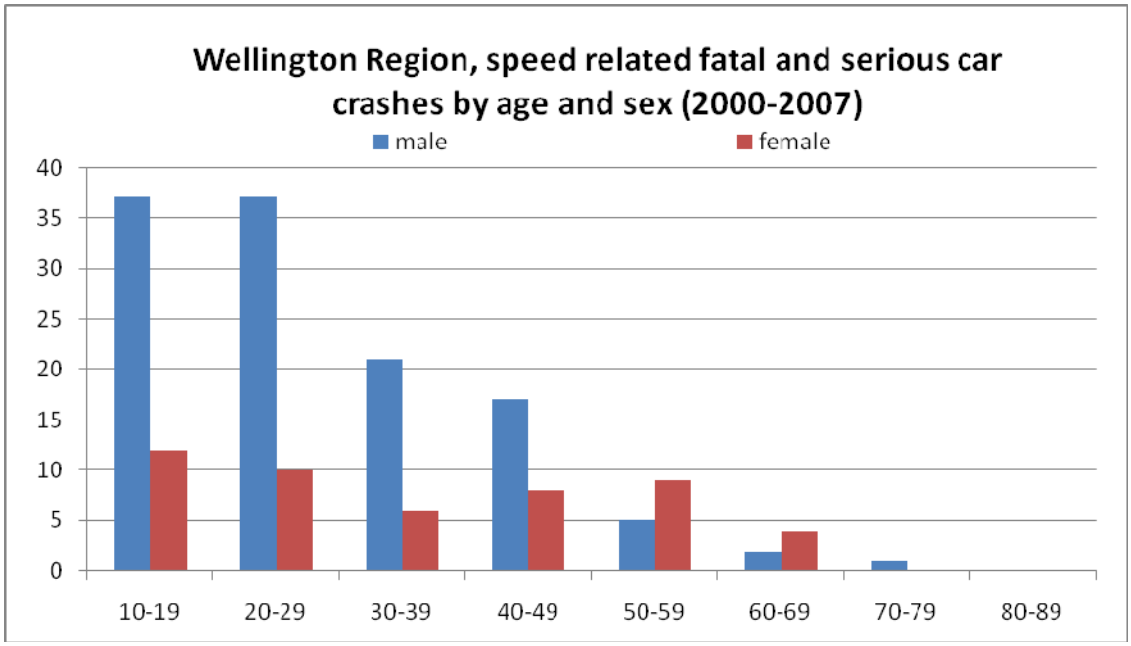

Figure 77: Wellington Region, speed related f and s car injury crashes by age group and sex (sum 2000-2007)

9.2.2 Children

In the years 1994 and 1995 the government made the child restraints for 0-2 and 3-5 year olds mandatory. Fatal and serious crashes, where young children were involved, show a downward trend since the year 1994 (see figure 78).

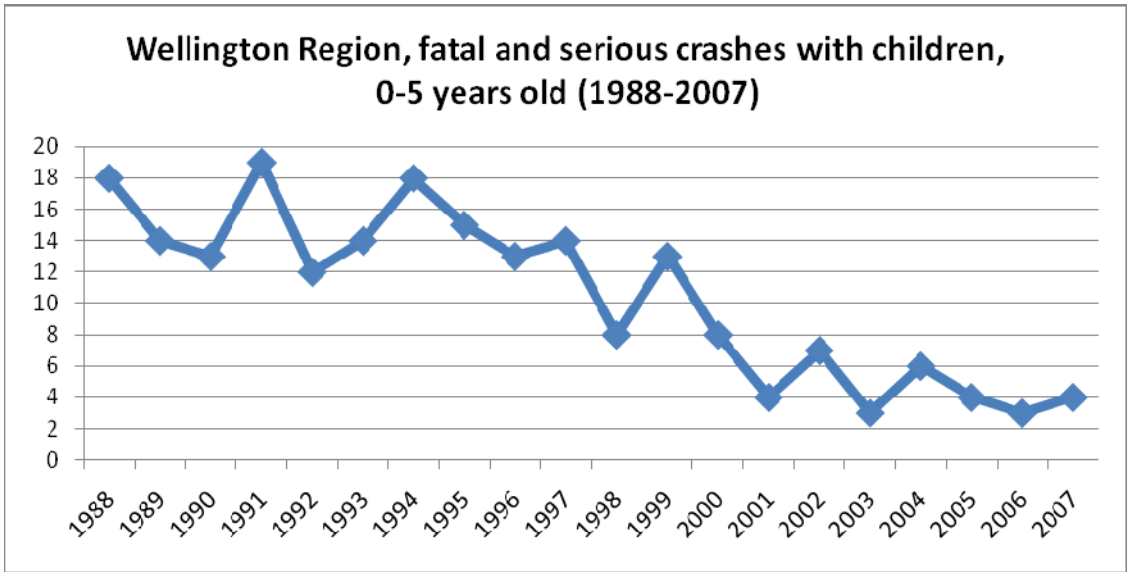

Figure 78: Wellington Region, f and s injury crashes with children between 0 and 5 years old involved (1988-2007)

9.2.3 Vulnerable Road Users

Fatal and serious crashes for vulnerable road users are examined in this section. There is a tendency for single vehicle motorcycle incidents not to be reported or reported as non injury when they may involve minor injury. This is also true for cyclist and pedestrian incidents where minor injury is involved and the parties go their separate ways.

Motorcyclists

The number of severely injured motorcyclists in crashes decreased continually between 1988 and 1996 but increased again in 1997, alternating on a lower level with a stagnation between 2006 and 2007 (see figure 79).

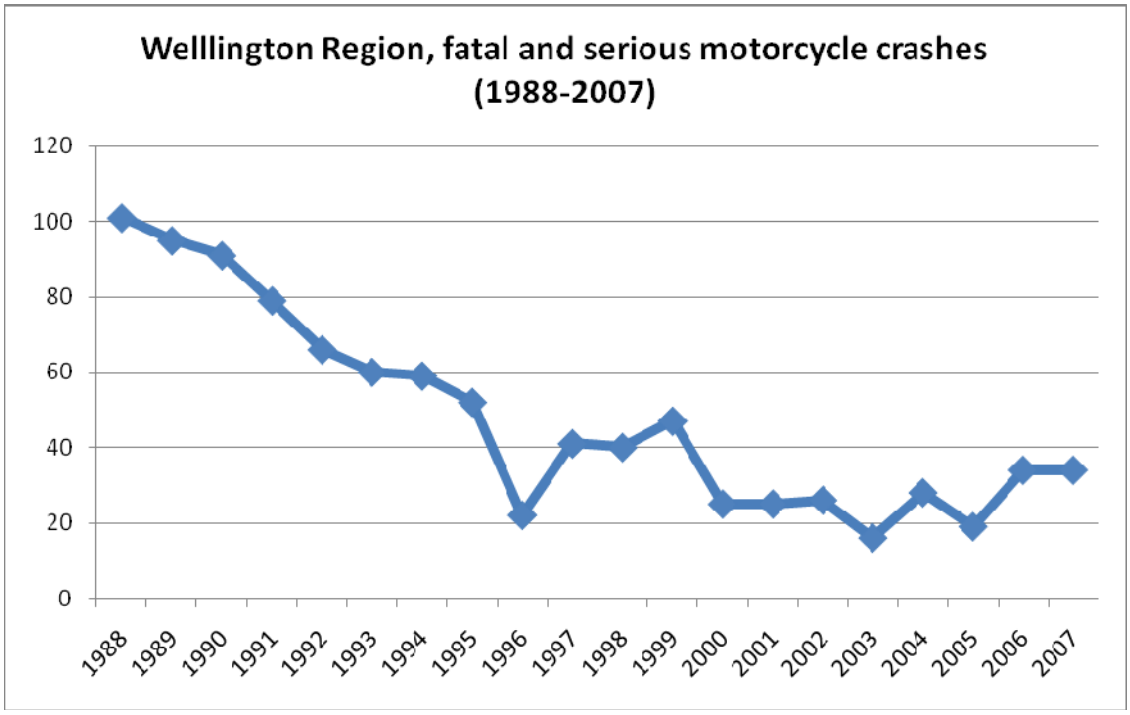

Figure 79: Wellington Region, f and s injury motorcyclist crashes (1988-2007)

In the following figure the motorcyclist f and s injury crash numbers are compared with the registration of new motorcycles (see figure 80). There is a huge increase (approx. nearly 50%) in the registration numbers in the Wellington Region since 2003. The increase of fatal and serious injury crashes has risen by a similar proportion.

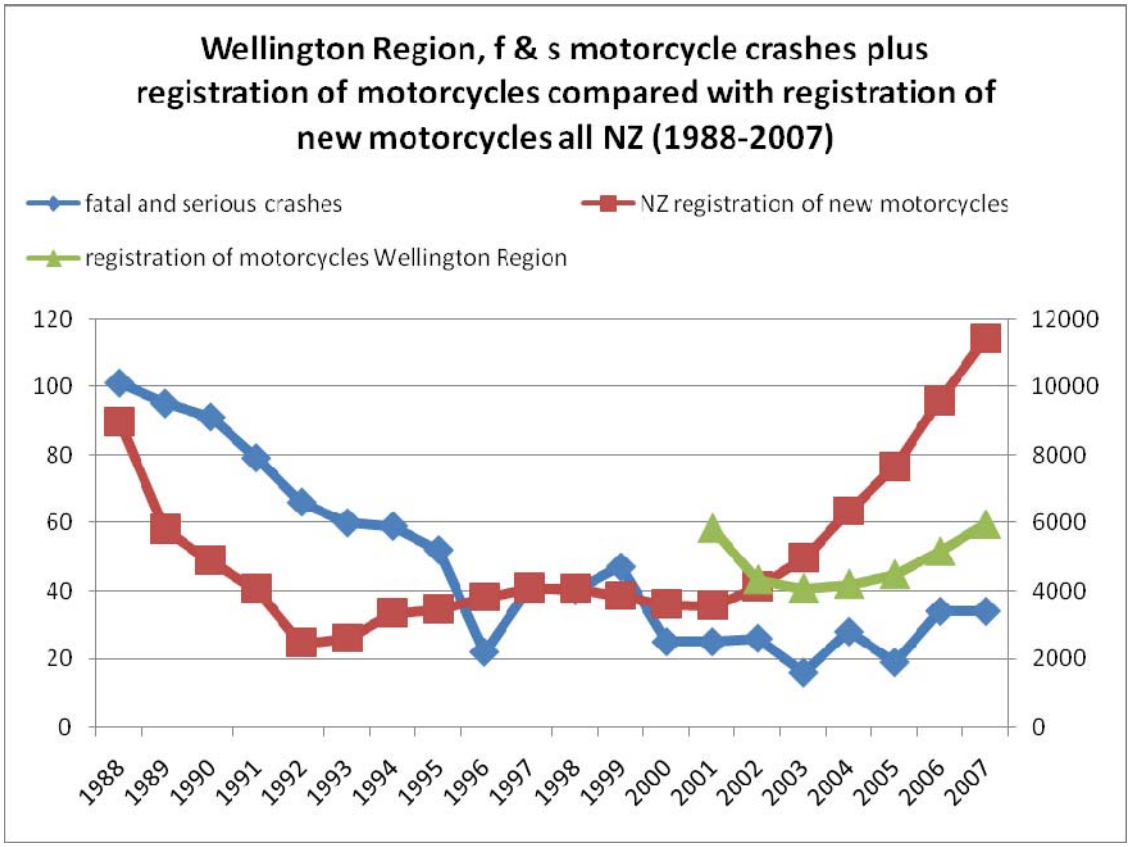

Figure 80: f and s motorcyclist injury crashes and registration of motorcycles in the Wellington Region compared with the registration of new motorcycles in all New Zealand (1988-2007)

The number of registered motorcycles in the Wellington Region rose steadily since 2003. It follows the general trend for all NZ.

It is not surprising that most of the severe motorcycle crashes happen during the weekends on local, urban roads since the Motorbikes are commonly used as a recreational vehicle (see figure 81 and 82).

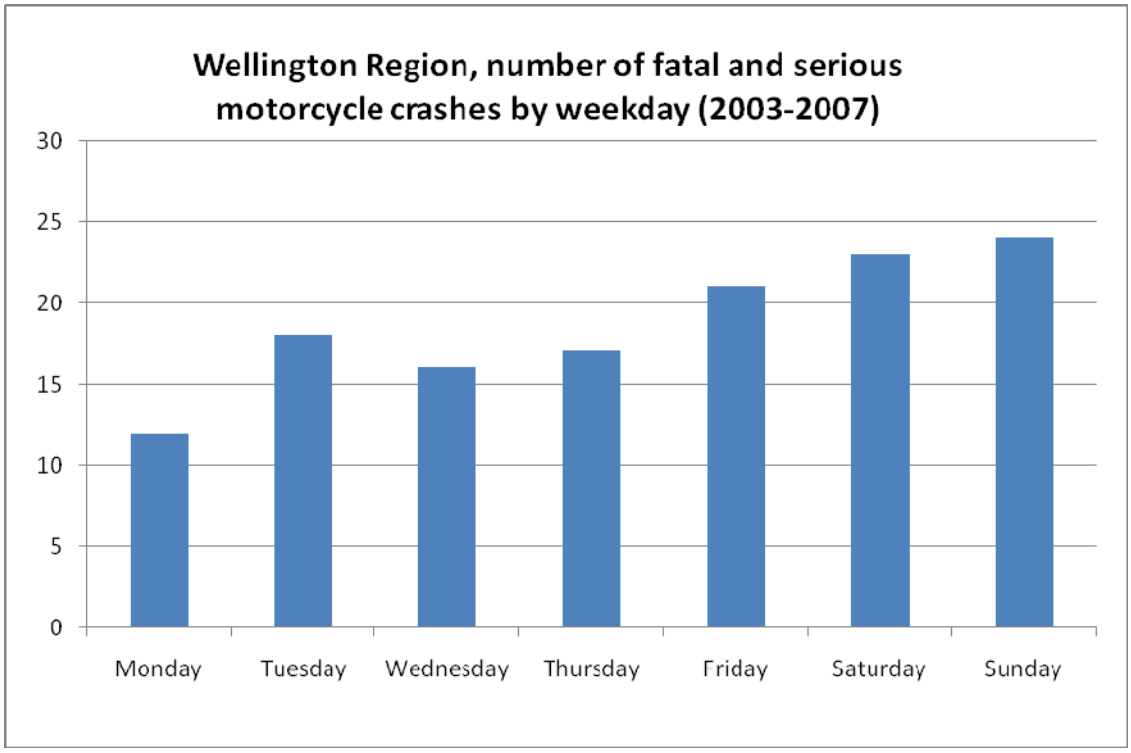

Figure 81: Wellington Region, f and s motorcyclist injury crashes by weekday (sum 2003-2007)

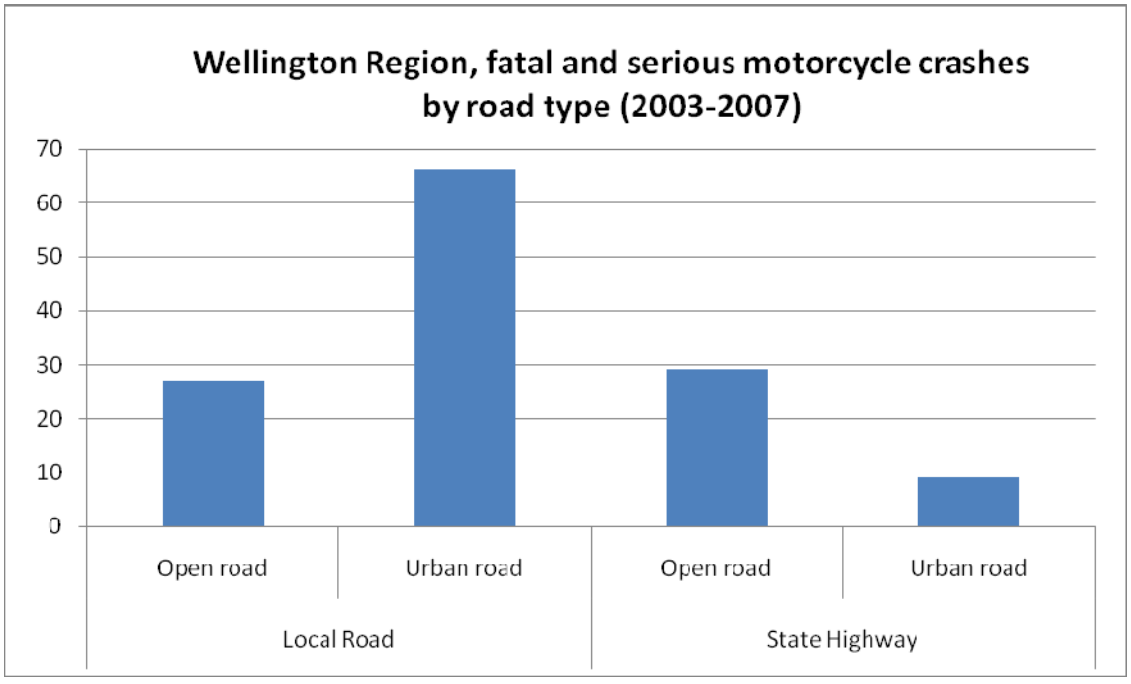

Figure 82: Wellington Region, f and s motorcyclist injury crashes by road type (sum 2003-2007)

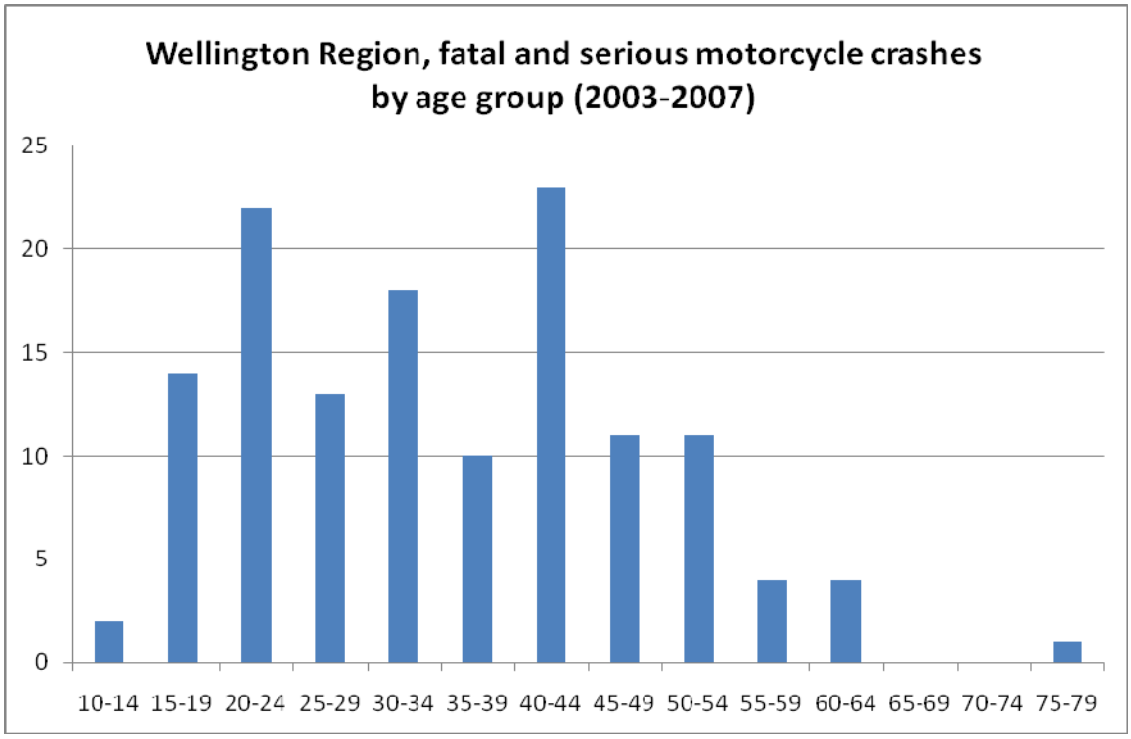

Figure 83: Wellington Region, f and s injury motorcycle crashes by age group (sum 2003-2007)

Between 2003 and 2007 the most fatal and serious motorcycle crashes occurred within the age group of 20-24 years and the 40-44 year old motorcyclists (see figure 83).

Cyclists

In the last two years the number of cyclists has grown while cycling was promoted for the Wellington Region and especially for Wellington City. Over the last six years cyclist crashes show a strong increase and displays the highest rise in comparison to the other vulnerable road users. The fatal and serious crashes rose over this period from 10 to over 35 (see figure 84). In January 1994 the government established the compulsory cycle helmet wearing, but the effect of this law on the severe injury crash numbers cannot be identified.

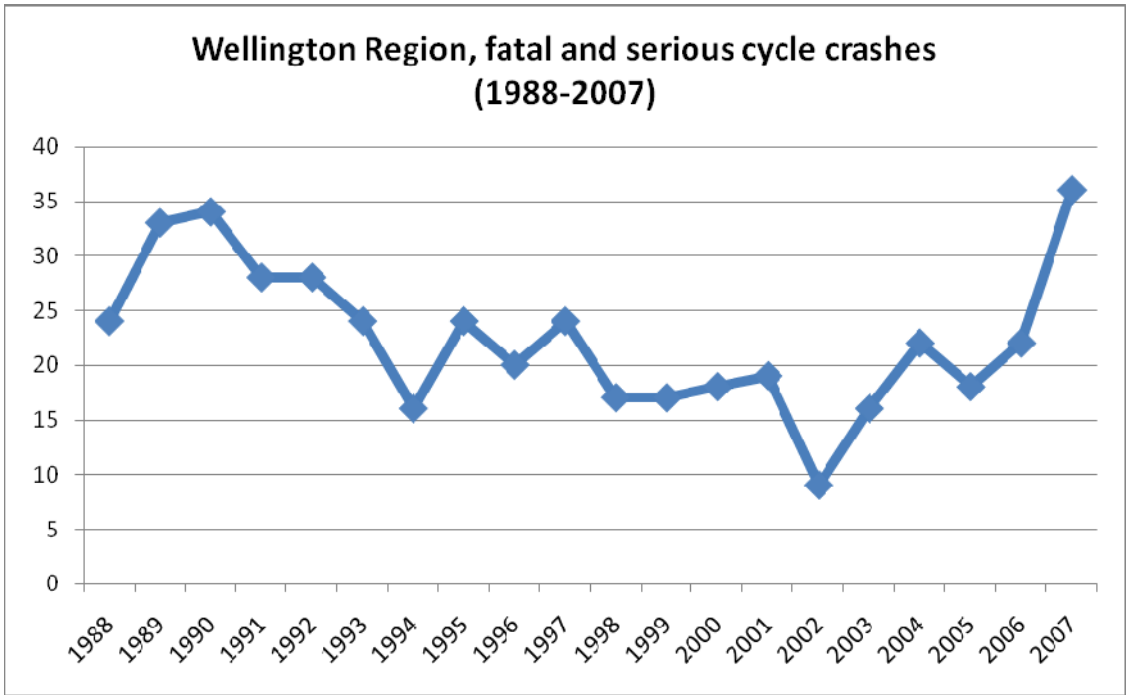

Figure 84: Wellington Region, fatal and serious injury cycle crashes (1988-2007)

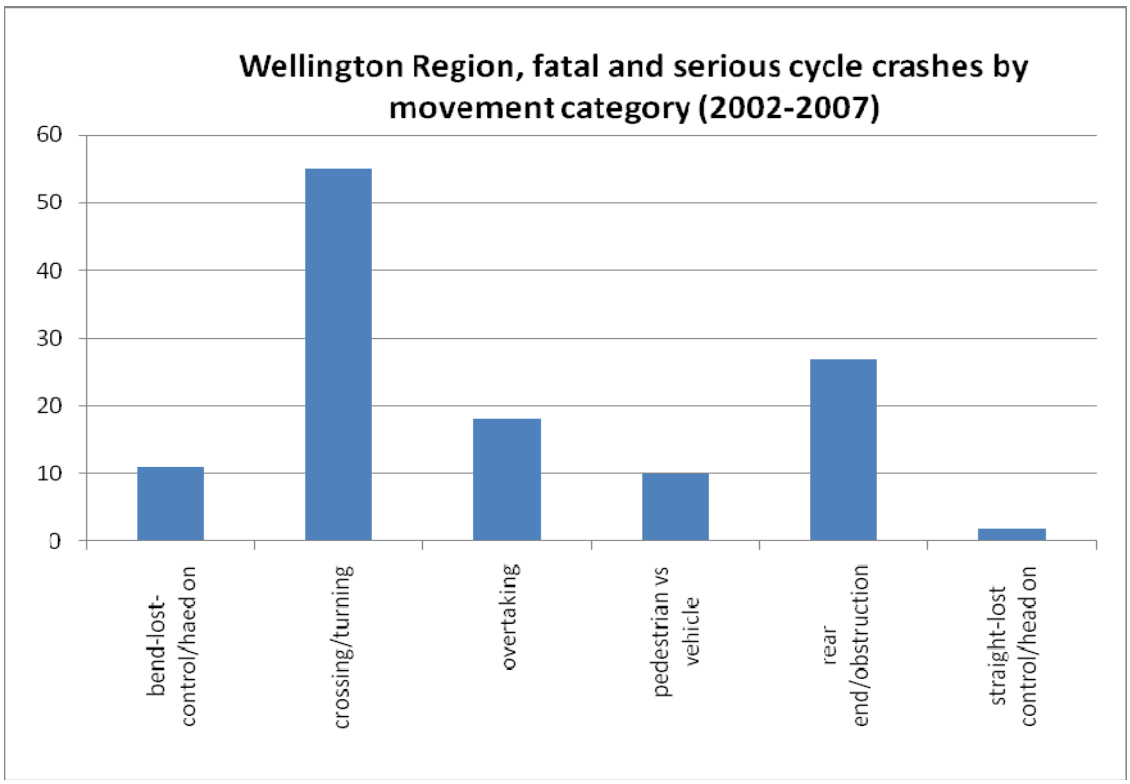

Figure 85: Wellington Region, f and s injury cycle crashes by movement category (sum 2002-2007)

The more in-depth investigation of the period between 2002 and 2007 shows, that most crashes with cycles fall into the movement category 'Crossing and turning', followed by 'Rear end/Obstruction' (see figure 85), and the main causal factors are 'Failed to give way/Stop' and 'Poor observation'. In 2/3 of the accidents, the car driver is at fault (see Regional Cycling Strategy 2004).

Pedestrians

Fatal and serious pedestrian injury crashes occur mainly in urban areas. The pattern alternates over the last 20 years with a slight downward trend (see figure 86).

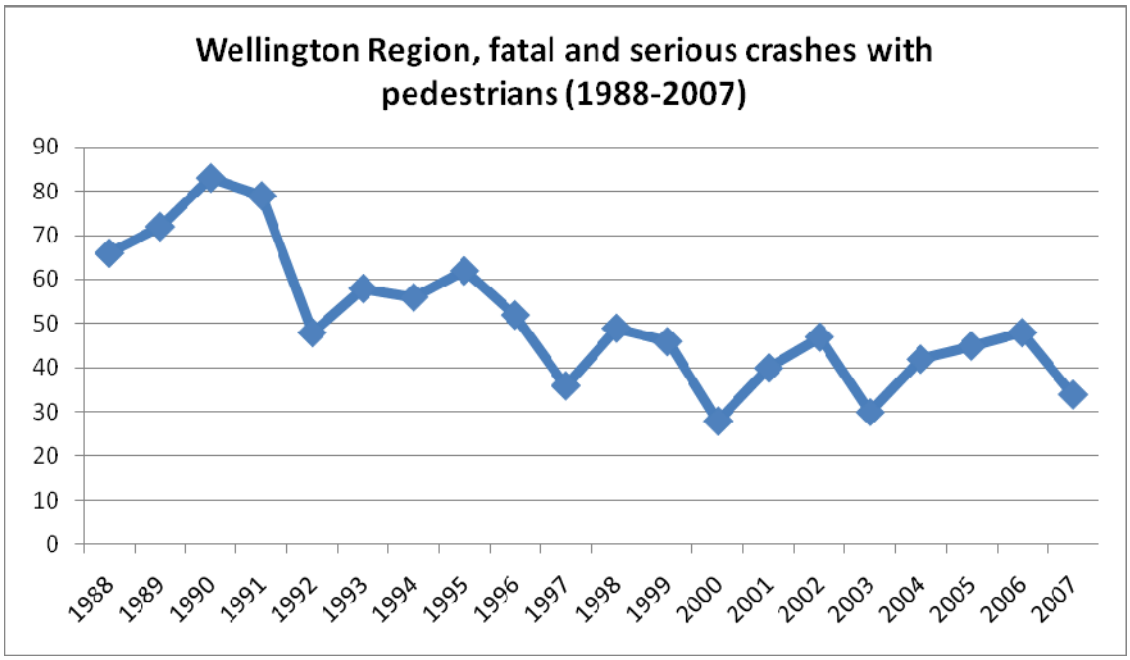

Figure 86: Wellington Region, fatal and serious injury crashes with pedestrians (1988-2007)

Nearly all of these crashes are caused by a collision with a vehicle, but the crash trend is influenced by the behaviour of the people. For example many people go out for celebrating in pubs or restaurants after work or on the weekend. That is why a lot of fatal and serious crashes with pedestrians occur between Thursdays and Saturdays, with a peak on Fridays (see figure 87). Alcohol is involved in a lot of crashes occurring on the weekends. Not only concerning injury crashes with pedestrians but in general. The numbers of intoxicated pedestrians involved in injury crashes is not exact, because when the driver is positively tested for alcohol, the test for the other party may sometimes be omitted.

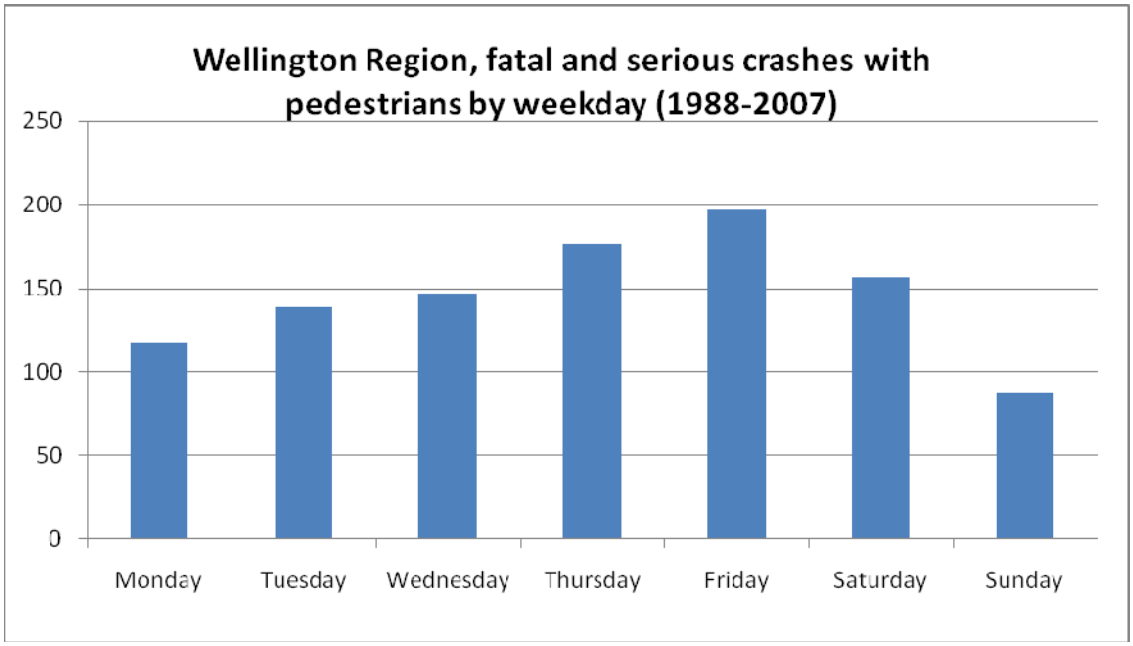

Figure 87: Wellington Region, f and s injury crashes with pedestrian by weekday (sum 1988-2007)

Figure 88 shows that a higher number of those crashes happen mid block. On the other hand the crashes at intersections have been increasing since 2003.

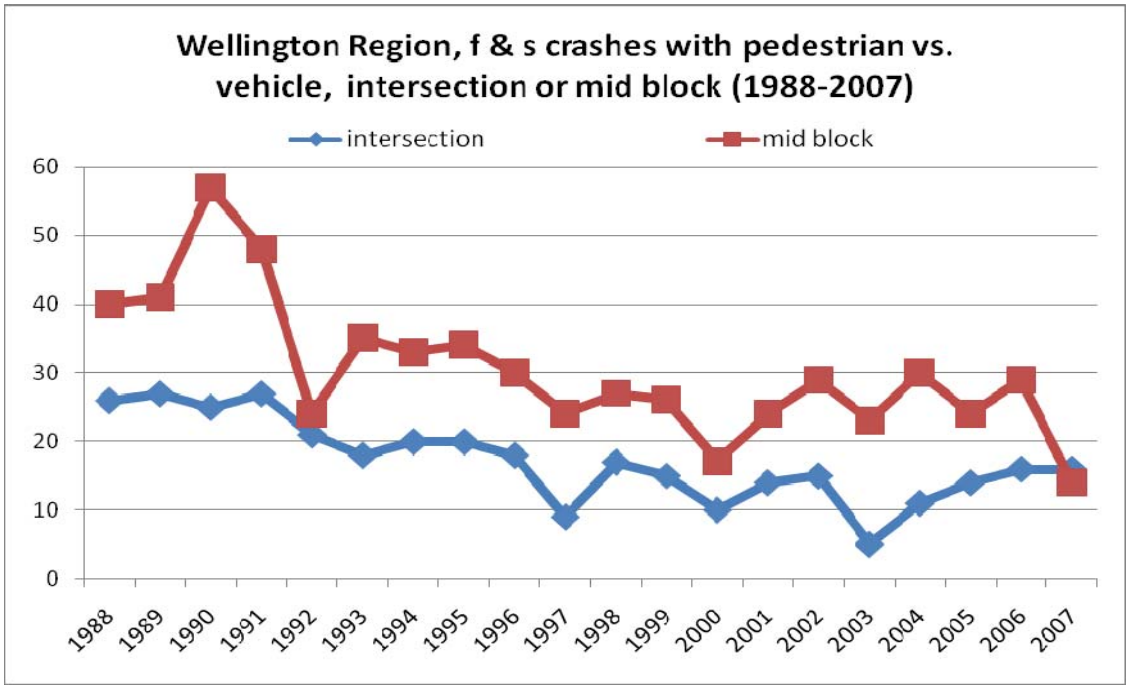

Figure 88: Wellington Region, f and s injury crashes by movement category 'pedestrian vs. vehicle' on intersections or mid block (1988-2007)

10 Road Safety

10.1 Education

Over the years since 1995 there have been several advertising campaigns as well as a budget for each year to spend on road safety. In the different Territorial Authorities (TAs), road safety campaigns were held in schools, targeting children of different age groups, training for Motorcyclists and various campaigns throughout the nation, targeting driver behaviour and raising awareness for certain crash causal factors. In 2006 the drivers test for older people was introduced to ensure their ability to drive safely.

The current advertising campaign NZTA (formerly Land Transport NZ/Transit) is called The Road Safety Campaign and is run in partnership with the New Zealand Police. It uses the successful campaign in Victoria, Australia as a blueprint and is part of the New Zealand road safety strategy. The focus is on the five major problem areas: Speed, Drink driving, Failure to give way, Fatigue and Safety belts. Main realistic road safety adverts aimed at encouraging a culture shift. The Government provides funding of approximately $12.5 million per year. This funding supports a $255 million Police strategic enforcement programme. The alcohol-campaign now has a focus on the younger generation.
There is another campaign which is part of the New Zealand Transport Strategy, the Sustainable Transport Campaign. It focuses on two areas: travel choice and emissions. The Government provides funding of approximately $1.5 million per year.
Other advertising is concerned with vehicle safety. Currently a series of television advertisements are run that promote the Australian New Car Assessment Programme (ANCAP). People are to be pointed to the `Rightcar´ website so they can look up the safety ratings of vehicles. There is also a campaign that specifically looks at side curtain airbags and electronic stability control. People are encouraged to consider these safety features as a priority in their next vehicles.

There are also regional road safety education campaigns, which focus on cyclists, like ‘Don´t Burst My Bubble’ (Driver/cyclist share the road campaign) or ‘Be Bright on your Bike’ (Cyclist visibility campaign).

10.2 Enforcement

The most important changes in Enforcement occurred more than ten years ago. The level of blood alcohol was decreased, speeding fees increased and speeding cameras were installed. Together with the enforcement of restraints and cycle helmets those measures combined within a relatively short period of time and the introduction of a Highway Patrol had a certain impact on driver behaviour and the severity of crashes.

To try to measure the output of Police performance, the numbers of reported Police hours are compared. It must be pointed out that in the financial year 2006/2007 the system of reported police hours was transformed into numbers of full time equivalent staff (FTE)[6]. Each police

[6] From the fiscal year 2006/2007 onward the numbers are projected FTEs multiplied by 1,500

position was assigned a work scheme, which accounted for the approximate proportion of each possible activity in that particular position over one year (e.g. percentage split of speed controls, office work, educational programmes etc.). That means that currently the system accounts for 'expected' input and not for the output value. In practice it has become more difficult to monitor the exact number of hours spent on certain policing actions. Every police station for instance is supposed to deliver the same share of hours for a certain position, where in fact they might not be able to, for various reasons. But this shift in actual hours spent on each policing action would not be visible, due to the previously assumed percentages for the different policing actions. When it comes to an efficiency question, it is now harder to match the money spent for the policing actions with the FTE numbers.

In figure 89 the annual hours/FTEs for selected Police Road Policing and Community engagement are shown between 2001/2002 and 2008/2009.

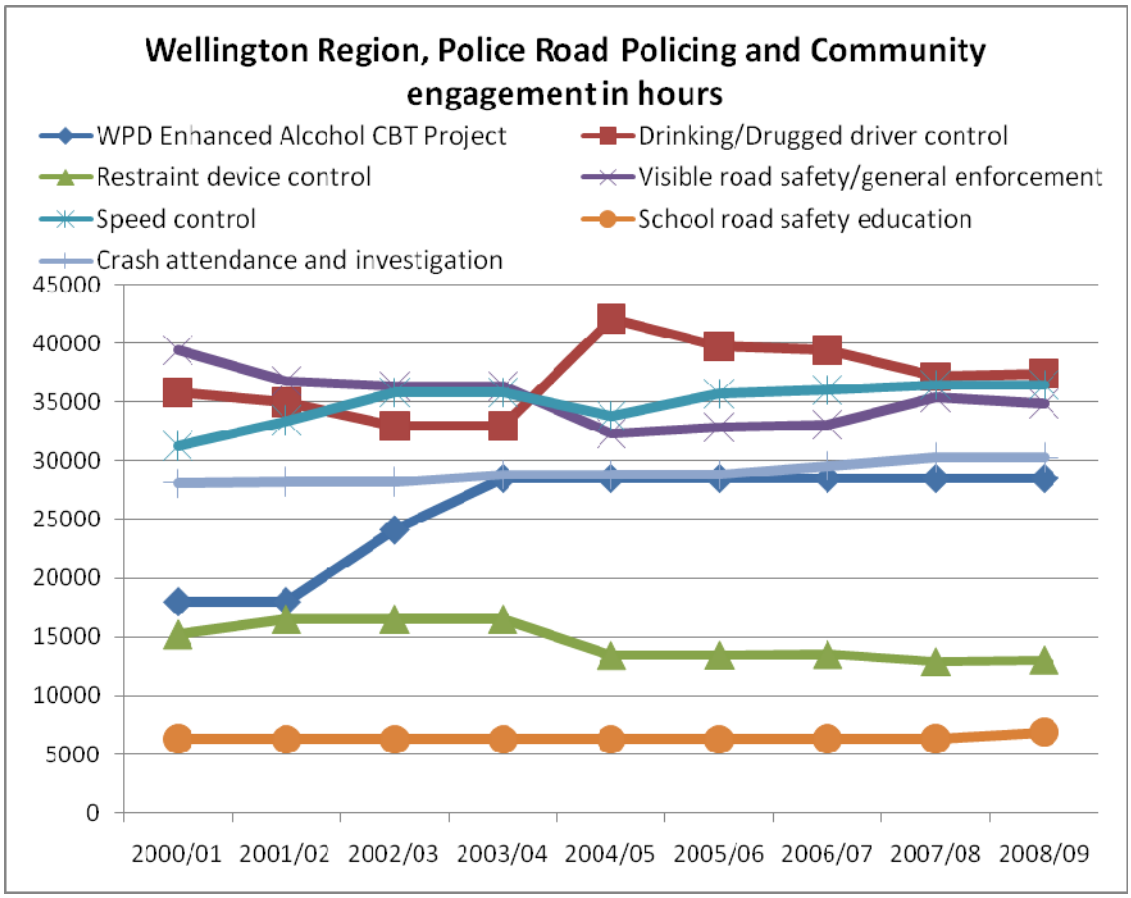

Figure 89: Wellington Region hours/FTEs for Police Road Policing and Community engagement (2000/01-2008/09)

It is notable that the most important changes over the nine years occurred in the `Enhanced Alcohol CBT[7] Project´ and in the hours for the `Drinking/Drugged driver control´. The former increased between 2001/2002 and 2003/2004 by approximately 10,000 hours. The latter

[7] CBT= Compulsory Breath Test

increased one year later (between 2003/2004 and 2004/2005) by almost the same number of hours but decreased again over the following years.

Without the hours for the national CBT-Project, the total number of police hours increased over the last nine years for the Wellington Region by 2,910 hours which are 1.94 FTE. The total number of FTE for the Wellington Region is 156.6.

The number of hours spent on national programmes (see figure 90) was mainly steady for the Highway Patrol (once completely launched in 2001/2002) and the Traffic Camera operations, which have been increasing over the last two fiscal years. The number of hours for the CBT-Project increased strongly between the fiscal year 2001/2002 and 2003/2004, then decreased a little and remained static for some years before there was an increase in the number of hours over the last two years.

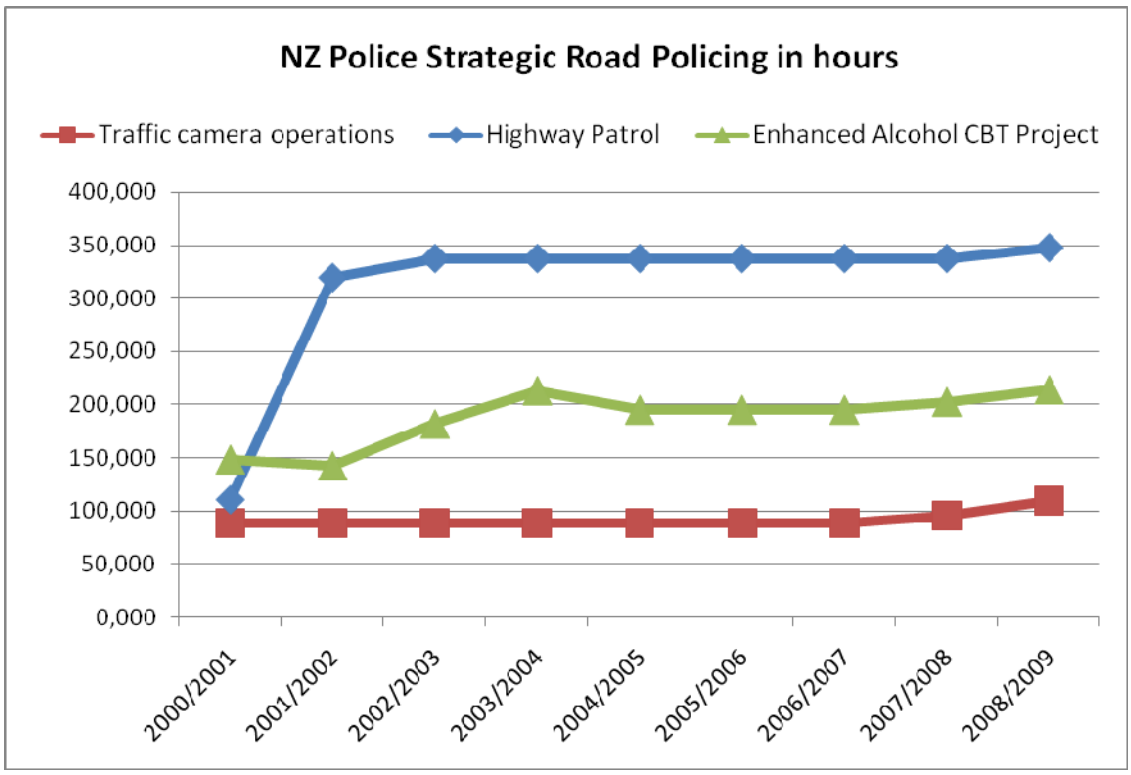

Figure 90: New Zealand Police Strategic Road Policing in hours/EFT (2001-2009)

10.3 Vehicle Engineering

Over the period of 20 years vehicles became safer for occupants. Anti-lock braking systems and airbags were introduced for most cars by the end of the 1980s/beginning of the 1990s. Ten years later, crumple zones were made a feature of every car by law and the repair rules for vehicles became stricter. The protection for the driver made huge steps together with the increased average engine size and power of the vehicles available. Those major improvements and changes occurred mainly in the first half of the surveyed 20 years. In the last couple of years mainly improvements of the existing standards were made.

10.4 Road Engineering

We were able to obtain any useful data on the investment made in road safety engineering works over the period. Anecdotally road maintenance appears to be adequate and road controlling authorities generally report a continuous programme of safety works.

For example the Wellington City Council´s Safer Road Programme, which focuses on Kerb extensions and Black Spots (single spots where engineering measures will improve the safety for the road users considerably).

The NZTA has continuously undertaken Highway safety works, such as median barriers, which are installed all over the region.

11 Structural Changes

11.1 Systemic Changes over 20 years

This chapter examines the developments and systemic changes over the last 20 years. The changes are displayed as ‘Education’, ‘Coordination’, ‘Engineering’, ‘Enforcement’ and ‘Organisation Structure’ (see figure 91 and Table of events, Appendix B). Some had more influence than others and it can take one or more years for some changes to be implemented and become fully effective.
On closer examination, some of the changes in the crash numbers since 1988 might be linked to the different influences. The developments in vehicle engineering in the 1980s and 1990s are notable, e.g. the fitting of ABS, Airbags, Crumple zones or the stricter rules of repair and other vehicle standards. The advancement of educational efforts and trainings also play an important role. The multitude of mergers in the New Zealand transport organisations during the last 20 years is also shown, but it is not possible to relate these to changes in the crash numbers. The NZ Police monitoring and surveillance, combined with other enforcement rules set by the government, are likely to have caused some changes in the crash numbers as well. However, it is difficult to measure the influence of campaigns or controls. The installation of speed cameras may have more effect on the crash numbers than the amendments of vehicle standards, but it is not possible to identify by how much. Investments made on road safety engineering over the

last decade were not reviewed for their effectiveness as this would need to be done on a site by site basis.

The changes in the organisation structures led necessarily to new tools and coordination across all levels of administration (e.g. new community programmes as well as Road Safety Action Plans for each TA) to maintain and accelerate the efficiency of the structures. However, such changes need some time to be fully effective and established.

Other factors have changed as well, like the higher fuel prices and the greater awareness of climate changes or health issues, which affect people´s behaviour. Overall it has not been possible to identify the influence of any of these changes on the reported crash numbers.

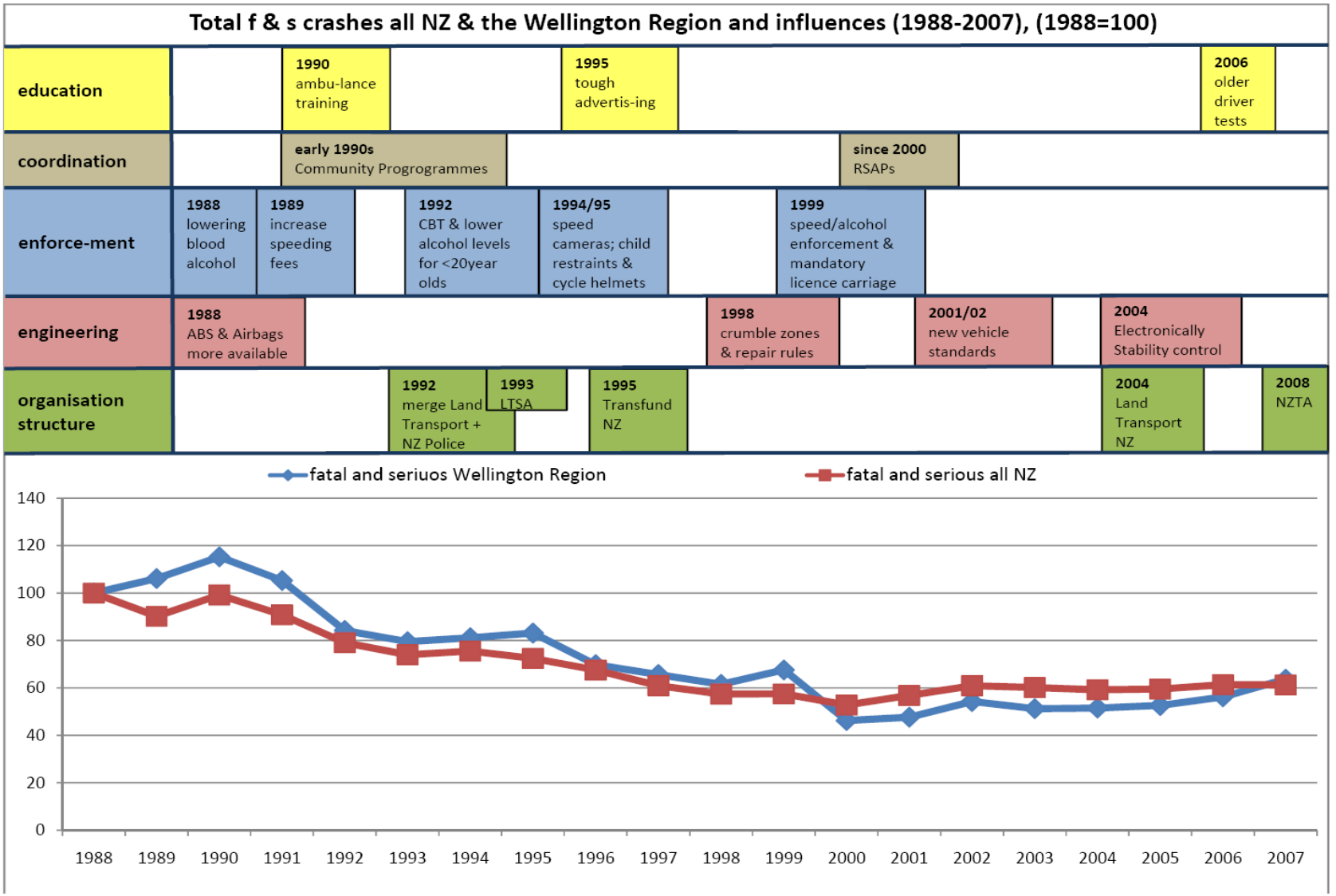

Figure 91: Total fatal and serious injury crash numbers of all NZ and Wellington Region with different influences over the years (1988-2007)

11.2 LTSA, LTNZ and NZTA

The first major structural changes occurred in the mid 1990s when the staff of the Ministry of Transport (MOT) was downsized and partly redistributed to other governing bodies. 4,000 members of staff were reduced to a number of 40, concerned with the essence of the ministerial work for the MOT. That had an impact on the affected institutions, the different projects and the focus of the road safety educational programmes of the Land Transport Safety Authority (LTSA).

Until 2005 the LTSA had their own engineers working together with the different road controlling engineers on the safety reports. Crash reduction studies (CRS) were done annually for some districts and in longer intervals for others.

Usually low cost improvement measures were implemented in response to each report and if obvious markers were found, i.e. a higher alcohol factor, the TAs would consider working with the police or other concerned authorities on that issue. Now each TA is completely in charge of conducting CRS.

When the LTSA became Land Transport New Zealand (LTNZ) by merging with Transfund NZ in December 2004, the focus was shifted from sole safety to a broader range of priorities. There was no specific outline considering the road safety work for the engineers from LTSA or outlines concerning their new role in the organisation. The staff changed due to the merger and no specific parameters how the prior safety focus in the new organisation could be maintained on a comparatively high level were specified. Other employees joining LTNZ did not have an engineering background like most of the former LTSA employees concerned with road safety.

In August 2008 the LTNZ merged with Transit NZ and became the New Zealand Transport Agency (NZTA).

Each TA should provide a Road Safety Action Plan (RSAP), which states the different issues and the actions taken to ensure safe roads for the TAs. The basic idea of RSAP came up about 10 years ago back from the LTSA.

The success of the road safety programmes and action plans depends on the dedication and commitment of the different TAs (especially the person assigned) and where they put the emphasis. As for the role of LTNZ and now NZTA, providing assistance, encouragement and advice to the TAs is the main focus. The Ministry is now trying to get the focus a little more back on the road safety and made it a NZ Transport Strategy target. There is also a deficiency data base since 2007 which the road controlling authorities can use to identify the best actions for road safety improvements and use as a contribution to the RSAPs. We have been able to determine the use of this database for the region.

11.3 NZ Police and Traffic Safety Service (TSS)

The merger of the TSS branch of MOT Road Transport Division and the New Zealand Police in 1992 had significant impacts. The most important changes are noted in the way that all policing duties are carried out now, the funding and recording of police time and the attitude of the public toward the police.
A very important point is the funding arrangement between the MOT, ACC, LTSA as well as the police. The agencies wanted to make sure that they get the services or outputs they purchased. Hence the police has to deliver a certain number of hours of traffic output, which is measured by contacts each hour and a certain number of expected tickets for a certain number of contacts.

In the past, New Zealand had separate organisations policing the transport laws and the criminal law, which both had different policing styles. The police itself relied on a quiet style, necessary for solving crimes and keeping order and opposite to the TSS. That was one of the reasons why the police had much better public relations than the MOT (later TSS). Being absorbed into the general police and being used to a certain style of policing made it difficult for the former members of the TSS to adjust to the required degree of public cooperation by the police.
In the years after the merger these different styles were mostly ignored and some people see in that fact as a reason for the increase of the road toll in the following years.

12 Conclusions

The overall trend when analysing fatal and serious road crash statistics over the past 20 years is a decrease in crash numbers until around 2000, followed by a steady increase in crash numbers thereafter.

A number of important road safety initiatives across the three E's (Education, Enforcement and Engineering) have been implemented over this period. For example: national campaigns focusing on speed, drink driving, give way, fatigue, and safety belts; regional campaigns; increased speeding fines, lower blood alcohol levels, speed cameras, child restraints and cycle helmets; vehicle safety improvements such as airbags and ABS brakes, new vehicle safety standards, electronic stability control, and road infrastructure improvements in the Wellington region such as the safer routes to schools programme, wire rope median barrier installation, and lowering of speed limits through the Wellington City CBD and other parts of the network.

However, despite all of these improvements, the available data suggests a steady increase in crash numbers over more recent years since 2000. It is likely that road safety gains achieved by the various initiatives have been off-set somewhat by a number of factors identified in this report.

Vehicle ownership has been steadily increasing along with an increasing number of drivers in the 20-29 year old age group (the age group that features most predominantly in crash numbers).

While steep increases in petrol prices during 2007/08 resulted in some reduction in vehicle kilometres travelled and mode shift to public transport, active modes, car-pooling or motorcycling, the wider trend for the Wellington region has been a steady growth in car travel demand and this is likely to continue. Growing traffic volumes on our roads are almost certainly linked with an increasing crash numbers as it increases the potential for conflict between cars themselves, and between cars and other road users such as cyclists and pedestrians.

New Zealand has an aging vehicle fleet, the average age currently around 12.29 years. While a proportion of the population can afford new vehicles with the latest safety equipment, there is a large proportion of the population that keep their vehicles for as long as possible because a new car is often more expensive than repairing an existing car or because the insurance is more expensive for a new vehicle than for the old one.

Examination of the causal factors for fatal and serious crashes shows that while some patterns can be identified in relation to predominant causes, locations and age/gender associated with crashes, it is not possible to identify one or two specific factors influencing the increasing number of crashes in our region. Therefore any future approach to road safety in our region will need to continue to address a range of causal factors. These are likely to include alcohol, speed (particularly those in the 20 – 24 age group), failing to give way/stop and poor observation. There was a very significant increase in 'poor observation' as the causal factor in 2007.

A concerning trend highlighted in this paper is the threefold increase in fatal and serious cycle crashes since 2002. Given the targets in the Government Policy Statement and the Wellington RLTS to increase numbers of walking and cycling trips, there is a need for greater focus on improving safety for these modes. Crashes involving pedestrians and cyclists are most common in urban areas where traffic volumes are generally higher. This suggests the need for improved infrastructure in urban areas, such as cycle lanes that provide dedicated road space for this mode. Travel demand management measures which seek to reduce traffic volumes are also likely to have safety benefits for active mode users. The causal data shows that while vehicles are almost always involved in serious and fatal pedestrian and cyclist crashes, fault does not lie with the car driver in every case and therefore there is need to continue education campaigns aimed at both driver and pedestrians/cyclists.

13 Possible Approaches for the Future

If we are to reverse the worsening road safety trend of recent years and achieve the road safety targets set out in the Wellington RLTS, it is clear that a different approach is needed going forward.

Ministry of Transport officials have signalled the intention to develop and adopt a new *Road Safety to 2020* strategy before the expiry of the current *Road Safety to 2010* strategy. Officials working on the new national strategy for road safety have indicated that it may to follow a similar philosophy to the Swedish 'Vision Zero' approach. This is a safe system approach that focuses on 4 key elements: safe roads, safe vehicles, safe road users and safer speeds. The

philosophy likely to be adopted in the 2020 strategy is that moving towards virtually no deaths and serious injuries, when using the road network, is a reasonable long term target. While accepting that crashes will occur, a safe system should limit the likelihood of death or serious injury. The Wellington region could focus on its contribution to each of the elements of a safer system to complement or support national level initiatives.

An additional approach might be to focus efforts on some of the wider influences of road safety, as identified in this report. For example, reducing car traffic volumes and vehicle kilometres travelled, encouraging the use of safer modes such as public transport and walking for more trips, and investigating measures to reduce the vehicle fleet age. This approach will also have benefits across a number of other desired outcomes of the New Zealand Transport Strategy such as reducing greenhouse gas emissions.

The following lists a number of potential measures to address road safety in our region that could be considered going forward:

<u>National level (need to advocate for these)</u>

1. More visible police officers on the road, especially in urban areas - Increase overall FTEs

2. Improve road safety data by combining the CAS and CARD system (CARD reported crashes with TCR get automatically transferred into CAS) - Faster access for the police on the latest crash data, better targeting of speed and alcohol issues

3. Strengthen road safety education in schools and colleges to ensure the philosophy is adopted at an early age in our culture and messages passed on to parents

4. Faster adaption of safer vehicle technology

<u>Regional and local levels</u>

5. Ensure adequate investment in road safety in our region – through Annual Plans, LTCCPs, and the Regional Transport Programme – may need a road safety champion to raise profile

6. Ensure adequate focus on vulnerable road users (Pedestrians and Cyclists)
    - Pedestrian and cycling improvements in urban areas, particularly on routes most frequently used by pedestrians and/or cyclists – eg. Dedicated cycle lanes and ‘Green Wave’ at traffic signals
    - Continue raising awareness for cyclists among other road users (particularly vehicle drivers)
    - Continue programmes to improve safety around schools and on key walking/cycling routes to school

7. Continue promoting alternative means of transportation to car travel such buses, trains or carpooling

    - Safety benefits by increased use of safer modes (PT, walking) and reduced car traffic volumes (reduced conflict for all road users)
    - many other benefits – emissions reductions, health and fitness improvements, affordability and resilience to petrol price volatility

Improvements can also be achieved by faster and more accurate data analysis and reporting. The CAS data takes several months to be processed before it can give valuable feedback to the Police and road controlling authorities about recent developments. Improvements to the Police data collection process and the data entry system to improve accuracy and accelerate the output will make CAS a more valuable tool.

Appendix

A The Data bases

I Crash Analysis System (CAS)

CAS was introduced to the road controlling authorities in the year 2000 and other road safety partners have been able to use the system since 2003. It is also used by the traffic engineering consultants and the New Zealand Police.
The data CAS comes from the police Traffic Crash Reports (TCRs). TCRs are paper forms filled in by police officers responding to K6 and K9[8] calls. That means that there are a certain number of crashes which do not get into the system, such as some non-injury and minor injury crashes which are not necessarily attended by the police and do not always get reported at a police station. The paper form also leaves a certain amount of interpretation over to the CAS data entry operators.
The focus of this investigation is on the serious and fatal injury crashes which are being reported and recorded in the system.

There are also slight variations in the classifications of the crashes. The category of the crash is determined by the police officer or the communication centre and their understanding of the present severity. A serious injury crash sometimes turns out as a minor injury and vice versa. The lines between those categories are subjectively biased to a small degree.
Confidence in data prior to the early 1990s is moderate. A smaller percentage of the reported crashes is presumed to be available in CAS prior to those years.
Changes in reporting and the different categories over the years cause slight variations in the database and the numbers in general.
Other marginal factors, which contribute to the number of reported crashes for certain periods, like the number of police officers on duty and the number of crashes at the different times of the day and days per week can increase or decrease the total numbers of crashes the police are able to attend and report.

II Hospitalisation Data

In the hospitalisation data are those patient states listed, which were involved in a motor vehicle crash. So the data is used for the investigation accounts basically for everyone involved in an injury crash and being treated at the hospital for more than one, or more than three days (including fatal injuries, death occurring within the hospitalisation period). There is high confidence in this data. However, there are a number of casualties, which account for people with serious injuries, who are able to leave the hospital on the same day and some injured people might see their general practitioner rather than visit the hospital. The number of fatal injuries that do not survive the crash is also not covered by the hospital data.
Not all injuries are taken care of by the hospital. Some of the serious ones go to their general physician or a private practice after the crash. But the numbers of those with a hospital stay over 1 and 3 days are mainly serious casualties so that a comparison between fatal and serious casualties and the hospitalisation data is quite accurate.

[8] See appendix C for priority numbers and code explanation

III Communications and Resource Deployment (CARD) system

The New Zealand Police launched a centralized Communications and Resource Deployment (CARD) system in 1996. Prior to that year a Computer-Assisted Dispatch system (CAD) was used. When people call the Police, the three Communications Centers in Auckland, Wellington and Christchurch record, coordinate and direct the police operations, assign the Priorities and codes (e.g. K1, K3, K6, K9)[9].

To match or compare the CARD with the CAS data is not simple. The CAS data consists of the written Traffic Crash Reports (TCR), which is only a proportion of the K6 and K9 police codes (see figure 7), which are not divided into fatal, serious, minor and non-injury crashes like in the CAS data base. Therefore you can only compare the total number of the reported crashes in CARD and the total number of TCR in CAS.

[9] See appendix C for priority numbers and code explanation

B Table of Events

1988	Enforcement	lowing the legal alcohol level from 500 to 400 µg/l
1988	Engineering	ABS and air bags more available
1988	Enforcement	revised maximum weights for heavy motor vehicles
1988	Enforcement	increased powers for enforcement officers dealing with offenders who fail to stop

1989	Enforcement	Introduction for the Transit New Zealand Act
1989	Enforcement	Introduction of the Transport Services Licensing Act
1989	Enforcement	increased fees for speeding infringements
1989	Enforcement	traffic enforcement officers given power of entry onto private property for the purposes of undertaking drink driving procedures
1989	Enforcement	Introduction of new regulations covering the transport of hazardous substances
1989	Enforcement	assumption of national traffic enforcement control by the MOT

1990	Education	Ambulance training and emergency department reforms
1990	Enforcement	Introduction of the Transport (Vehicles Standards) Regulations

1991	Enforcement	change in the driver license regulation: 'scratch' driver licence testing forms

1992	Organisation structure	merger of the TSS branch of Land Transport with the NZ Police (July)
1992	Enforcement	Amendments made to the Transport Services Licensing Act (taxi driver)
1992	Enforcement	Amendments made to the local Government Act to simplify procedures for removing abandoned vehicles

1993	Enforcement	compulsory breath testing
1993	Enforcement	compulsory reduced alcohol limits for under 20 year olds
1993	Enforcement	compulsory extended owner liability regime
1993	Enforcement	compulsory reduced driving hours regime
1993	Enforcement	speed cameras operational (October)
1993	Enforcement	Introduction of VIN system for vehicles identification purposes
1993	Enforcement	Changes to demerit point system: application form date of offence and graduated points for speeding offences
1993	Organisation structure	Creation of the Land Transport Safety Authority

1994	Enforcement	Compulsory cycle helmet wearing (January)
1994	Enforcement	Compulsory child restraints for 0-2 year olds (April)

1995	Enforcement	compulsory child restraints for 3-5 year olds (April)
1995	Enforcement	National Land Transport Strategy and Regional Land Transport Strategy (July 1996)
1995	Organisation structure	Transfund New Zealand as a new road funding body
1995	Enforcement	Safety (Administration) and Roading Programmes regime (July 1996)
1995	Enforcement	Clarification of vehicle inspection certificate regime's application to registration, licensing and change of ownership of motor vehicles
1995	Enforcement	Police enforcement powers in respect of heavy vehicles and Road User Charges
1995	Enforcement	Speed cameras
1995		Patrols increase
1995	Education	Tough advertising

1996	Engineering	Glazing Rule, minimum standards to ensure safe levels of visibility and structural strength for automotive glazing

1998	Enforcement	Land Transport Act. 1998 --> substantive changes to parts of transport law such as driver licensing, including provision for photographic licences
1998	Engineering	Crumple zones in cars become standard
1998	Engineering	Vehicle Compliance and repair rules were signed into law (came into effect in January 1999)

1999	Enforcement	Conversion to photographic licences began in May
1999	Enforcement	Vehicle impoundment for driving while disqualified, suspended or revoked or for driving while forbidden
1999	Enforcement	Roadside licence suspension for driving over 50 km/h above the posted speed limit, for driving with a blood alcohol level above 160 mg/100 ml or a breath alcohol level above 800 µg/l or for refusing a blood test
1999	Enforcement	Mandatory licence carriage
1999	Enforcement	Passenger Service Vehicles (PSV) rule (September)

2001	Engineering	Head Restraints (revised)
2001	Engineering	Tyres and Wheels (new)
2001	Engineering	Frontal Impact (revised)
2001	Engineering	External Projections (revised)
2001	Engineering	Interior Impact (revised)
2001	Engineering	Steering Systems (revised)
2001	Enforcement	Land Transport (Road Safety Enforcement) Amendment Act 2001 → stronger blood and breath test measures of the police (28 days suspended driver license)

2002	Engineering	Vehicle Standard compliance (revised)
2002	Engineering	Seats and Seat Anchorages (new)
2002	Engineering	Seatbelts and Seatbelt Anchorages (new)
2002	Engineering	Light Vehicle Brakes (new)
2002	Engineering	Vehicle Dimension and Mass (new)

2003	Enforcement	Land Transport (unauthorised Street and Drag Racing) Amendment Act → offences for street racing, wheel spinning and pouring slippery substances on the road to allow wheel spinning; offenders can have their vehicles impounded for 28 days
2003	Enforcement	Stetting of Speed Limits Rule was signed on 25th February

2004	Enforcement	Heavy Vehicle Rule (effect April 2005)
2004	Enforcement	Vehicle Equipment Rule (effect February 2005)
2004	Enforcement	Vehicle Lighting Rule (effect February 2005)
2004	Enforcement	Road User Rule (effect February 2005)
2004	Engineering	Electronic stability control more common
2004	Organisation structure	Land Transport Management Act came into effect 1st December → dealing with road construction and maintenance and safety funding → bringing together the bulk of the functions of Transfund and LTSA into one body (Land Transport NZ)

2006	Enforcement	Several provisions of the Land Transport Amendment Bill 2005 came into effect: included enhanced targeting of serious and repeat drink drive offenders
2006	Enforcement	Driver Licensing Amendment Rule: Changes for older drivers, overseas drivers and commercial drivers
2006	Education	Removal of periodic, age badges practical driving test for older drivers

C Police codes

- "ADVEVNT" (otherwise known as an "Advised Event"): An incident (e.g. a crash) which the Communications Centre was told about, but which didn't require any more action than just logging the call (although the caller might have been asked to visit the nearest Police Station, when it was convenient, and formally report the incident there);

- "CANCELEV" (otherwise known as a "Cancelled Event"): A minor incident which Police think should possibly have been attended, but which ultimately didn't get attended because there wasn't a free Police unit available to attend at that time, and Police attendance wasn't absolutely necessary anyway;

- "1" (often referred to as "K1"): An incident which was attended by Police, for which no further Police action was intended (or required) - not even a written report, or TCR;

- "3" (often referred to as "K3"): An incident which was attended by Police, for which no offence had been found and no further Police action was intended (or required) - not even a written report, or TCR;

- "6" (often referred to as "K6"): An incident which was attended by Police, for which some further Police action was intended (or required) - in particular, a written report, or TCR;

- "9" (often referred to as "K9"): An incident which was attended by Police, for which some further Police action was intended (or required) - in particular, an arrest and a written report, or TCR.