TRANSPORT

Statistical analysis of tourist crashes in southern New Zealand

Interim report

environment SOUTHLAND

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Overview

This report presents the results of a statistical analysis of road-trauma data that identifies issues associated with tourist driver crashes in southern New Zealand. Undertaken by Otago Regional Council (ORC) and Environment Southland, with funding assistance from NZ Transport Agency (NZTA)), this analysis is part of a wider body of work by these organisations, which examines the causes and characteristics of serious road trauma in Otago and Southland regions.

'Tourist' is a somewhat nebulous category, so the analysis is based around a comparison of injury crashes involving 'overseas-licence-holders', compared with injury crashes involving local New Zealanders (who are not overseas-licence-holders). Using 2010-2013 data from NZTA's Crash Analysis System (CAS) database, the report examines five areas in detail: Southland District, Queenstown Lakes District, Central Otago District, Clutha District and Waitaki District, these being the southern districts with a relatively high proportion of crashes involving overseas-licence-holders. Statistical analysis is used to determine the factors associated with crashes involving tourist drivers in each district. The Results section describes how crashes involving one or more tourist drivers differ from crashes where local drivers are involved.

The main body of the report documents the patterns that are common to all districts studied, those common to multiple districts studied, and those found only in a single district. In all southern districts examined, tourist driver crashes disproportionately involve unfamiliarity with New Zealand road rules/road conditions. In all the districts studied, except Central Otago, tourist crashes disproportionately involve young adults (25-34 year-old age group). In all the districts examined, the number of tourist crashes in 2010-2013 (inclusive) has remained stable, and tourist crashes are of the same severity, on average, as local crashes.

The conclusion lists three matters on which efforts to reduce serious road trauma involving tourist drivers in southern New Zealand should concentrate:

- improving tourist drivers' knowledge of New Zealand road conditions and road rules
- teaching tourist drivers how to drive on gravel roads: targeting drivers aged 25 to 34 years, in particular, and/or sealing roads commonly used by tourists
- improving safety along State Highway (SH) 94, which is a hot spot for serious tourist crashes. (Interventions should focus more widely than road engineering, and should aim to reduce driver fatigue and improve concentration, for example.)

Detailed results for each of the districts examined are appended, including the crash characteristics and factors where tourist crashes differed from non-tourist ones in each district examined. These details will assist in the design of an effective intervention programme.

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1. Introduction

1.1. The subject

In 2014 and 2015, the standard of driving being shown by tourist drivers became a matter of intense public interest. Throughout 2014 and early 2015, many media articles reported road crashes involving tourists, including some crashes that seriously injured or killed New Zealanders. In 2014, the New Zealand Transport Agency (NZTA) started a signature project under the umbrella of Safer Journeys, New Zealand's road safety strategy, looking at ways to improve road safety for visiting drivers and New Zealanders. Led by NZTA, the project involves representatives from the tourism and rental-vehicle industries, local government and central government, including Tourism New Zealand.

In 2014 NZTA began a pilot for this signature project in Southland and Otago, an area which appeared to have higher rates of crashes involving overseas drivers than other regions. As a contribution to this pilot, the Otago Regional Council (ORC) and Environment Southland (with funding assistance from NZTA), analysed road-trauma data to identify the issues associated with tourist driver crashes in southern New Zealand (the Otago and Southland local-government regions). This report documents the result of that analysis, and is part a wider body of work undertaken by the ORC and Environment Southland to examine the causes and characteristics of serious road trauma in southern New Zealand.

This report on tourist driver crashes examines five areas in detail, describing how crashes involving one or more tourist drivers tend to differ from crashes where only local drivers are involved. The districts examined are those southern ones with a relatively high proportion of crashes involving overseas-licence-holders: Southland District, Queenstown Lakes District, Central Otago District, Clutha District and Waitaki District. Dunedin City, Invercargill City and Gore District were not analysed at district-level because overseas-licence-holder crashes are not a major issue in these three districts. The number and/or proportion of overseas-licence-holder injury crashes are relatively small in Invercargill City and Gore District (four in each for 2010-2013 inclusive). Although Dunedin City had a reasonable number of overseas-licence-holder injury crashes over this time (33), these only make up a very small proportion of all injury crashes (2.2%). These districts are shown on Map 1 in Section 3.

Except for Clutha and Waitaki Districts, each district has been analysed separately to establish the fine detail associated with crashes in each district. Clutha and Waitaki Districts were combined for the purposes of statistical analysis because the number of tourist crashes in each was too small to analyse as separate district datasets. There was no statistical evidence that combining them for the purposes of this analysis would be problematic, since overseas-licence-holder crashes made up approximately the same proportion of injury crashes in both districts.

In this report, all references to a district include both local roads and state highways in a district, unless otherwise specified.

1.2. Report layout

Section 2.1 explains how crashes have been categorised into 'overseas' or 'local' crashes based on the licence type of the driver in the key vehicle. The report presents the systematic

differences found between those crashes categorised as involving at least one tourist driver, and those crashes categorised as involving only local drivers. Those situations where no systematic differences were observed between tourist driver crashes and local driver crashes (other than for crash severity and trends over time) are not discussed. Thus if, in the discussion on tourist crashes in a particular district, a particular factor is not mentioned this means that no systematic differences in that factor were observed between tourist driver crashes and local driver crashes occurring in the district. The summaries for each district do, however, list areas and issues where the groups (tourist and local crashes) are the same, but where we might have expected a difference.

The Results section collates the patterns that are common to all districts studied, those that are common to multiple districts studied, and those found only in a single district. Detailed results for each of the districts are set out in the Appendix.

At the start of each district sub-section in the Appendix, there is a summary of the statistical findings. This is followed by a sub-section describing the severity and trend in tourist crashes for the four years 2010 to 2013. The next sub-section for each district explains the main themes found in statistical analysis of tourist crashes in that district. The final sub-section explains in detail other statistically-significant factors and characteristics associated with tourist crashes in the district.

The conclusion lists the three matters on which we recommend that efforts to reduce serious road trauma involving tourist drivers in southern New Zealand should concentrate.

1.3. Explanation of the importance of analysing crashes using statistics

The usefulness of statistical analysis in a road-safety context cannot be understated. Consider, for example, whether speeding is truly associated with young people (such as young tourist drivers), or whether that assumption is related to the bias of road-safety specialists (i.e. they know that young people tend to crash more and are risk-takers, so will tend to interpret ambiguous results as indicating that young people tend to speed). The only fair way to determine such matters as whether young people really are over represented in speeding crashes is to use mathematics; specifically, statistical analysis.

Statistics help us recognise systematic patterns that exist and to distinguish these from patterns we think we recognise, but which do not exist in reality. In other words, statistics help us to understand whether the pattern that our brain perceives is a random 'pattern' — due to random chance — or a systematic pattern caused by factors able to be identified through statistical analysis. Being able to make this distinction is important in road safety, since much of the variation is the number of road crashes is known to be random rather than systematic.

In everyday life, many people are wary of 'coincidences', with popular beliefs such as, 'There's no such thing as coincidence', and, in the style of several conspiracy theories, 'Everything is connected', often being expressed. A classic example is the gambler's fallacy (also known as the 'Monte Carlo fallacy')[1]: This is the erroneous belief that if something happens more often than it 'should' in the present, it will happen less often in the future (to

[1] See Wikipedia: http://en.wikipedia.org/wiki/Gambler%27s_fallacy .

'even out' or 'reach a "balance'). For example, imagine flipping a (fair) coin 10 times in a row and observing 10 heads. The probability of observing this, before starting the test, is 0.5^{10} = 0.00098 (i.e. rare, but certainly within the realms of possibility – if 100,000 people performed this test at the same time, we would expect to find 98 people observing 10 heads in a row).

Many people feel intuitively that continuing to flip the same coin would eventually show tails, and, in fact, the rate of tails will be high in the future to 'balance out' the high number of heads already observed. However, in reality, this is a fallacy. The probability of flipping a coin and observing tails is 0.5, just as it has been throughout the trial. Similarly, the likelihood of observing a long train of tails is just as small as it was before observing the long train of heads. There is no 'balance' to reach. Many people find this difficult to believe. In reality, the 'pattern' of observing 10 heads in a row was random chance. The pattern was false, created by our brains attempting to make sense out of an unlikely event. Statistical analysis thus eliminates the human tendency to assume most patterns are real and uses mathematics to determine whether, for example, a coin or die is weighted.

2. Methodology

2.1. Using licence-type as a proxy to indicate tourist or non-tourist status

The licence-type variable was selected to categorise 'crashes' neatly into one of the two categories. For the purpose of statistical analysis, no crash can be in both categories (as only one driver is present in the key vehicle, and the licence he/she was holding at the time of the crash is the only one recorded on the traffic-crash report). This method was chosen to enable statistical analysis using chi-square analyses, which require that categories of interest are both mutually exclusive and exhaustive. A crash must thus be in either the 'overseas' or 'local' categories, as the driver in the key vehicle must either hold an overseas licence (overseas category), or not (local category).

The 'key vehicle' is defined by the Police as 'the vehicle exhibiting the bolded movement on the police-movement-coding sheet'[2]. It does not necessarily indicate fault.

The local-crash category thus includes all crashes where the driver of the key vehicle possessed a learner licence, a restricted licence, a full licence, had never been licenced by the appropriate authority, was disqualified or forbidden from driving, held an expired licence or a licence for the wrong class of vehicle, and situations where the driver of the key vehicle's licence was unknown (or irrelevant – for example, if the key vehicle was actually a bicycle and thus no licence was recorded for its rider). The local-crash category includes domestic visitors – that is, people domiciled in other New Zealand districts.

Although in this report, 'overseas-licence-holders' are referred to as 'tourists', we recognise that some overseas-licence-holders are migrants who live in New Zealand but have not yet acquired a New Zealand licence. Migrants who have not yet acquired a New Zealand licence probably make up only a small proportion of overseas-licence-holders in this dataset; treating 'overseas-licence-holders' as mainly composed of overseas tourists seems a fair assumption in this region of New Zealand. Despite this, it is important to note that 'tourists' may include a small number of migrants who live in New Zealand full time, but have not yet acquired a local New Zealand licence.

2.2. Origin of data analysed

The largest source of data available on crashes in New Zealand is from the NZTA's CAS (Crash Analysis System) database. This report uses CAS crash records from Otago and Southland, over the 2010-2013 period (inclusive). This period was chosen to ensure a reasonably sized dataset that is relevant to the present day (i.e. to ensure that enforcement and reporting rates remain relatively stable throughout the dataset). Using earlier data (e.g. 2000) could inadvertently bias results due to different patterns of police reporting; later data (e.g. 2013 only) does not provide a large enough dataset for detailed analysis.

Note that while the Otago dataset contains all reported injury crashes over the 2010-2013 period, the Southland dataset does not. Specifically, the number of 2013 crashes in the

[2] See NZTA's *Guide for the Interpretation of Coded Crash Reports from the Crash Analysis System (CAS),* January 2014, http://www.nzta.govt.nz/resources/guide-to-coded-crash-reports/index.html .

Southland dataset used to produce this report is artificially low, given that the dataset was obtained in mid-January while unfiled police reports from November and December were still being processed. This is not anticipated to affect the results of the statistical analysis, as data from November and December is available for 2010, 2011 and 2012 (and only very few crashes, relative to the size of the total dataset, have been excluded in late-2013).

2.3. Issues with CAS data

2.3.1. Sampling of crashes

This section makes clear the limitations of the database clear so that readers of this report are aware of the problems with the dataset and interpret the report with these in mind.

There is a tendency - regionally, nationally and internationally - for crashes to be under reported. The under-reporting of crashes is well known in both the national [3] and international[4] literature. In New Zealand, the Ministry of Transport (MOT) attempts to take this under reporting into account when calculating the social cost of road trauma to New Zealand[5].

Research shows that even some crashes resulting in serious injury requiring a stay in hospital are absent from the CAS database. We assume that most serious motor-vehicle crashes are in CAS, however.

This under reporting would not be a major issue if crashes were under reported equally; that is, if the crashes in the CAS database were a representative sample of the actual population of all crashes in a particular region or district. However, this is not the case; research indicates that some crashes are more likely to be reported than others. In particular, fatal and serious crashes are more likely to be reported than minor crashes, which in turn are more likely to be reported than property-damage-only crashes. Research shows that car crashes are more likely to be reported than motorcycle crashes[6]. Other factors influencing whether or not a crash will be reported include the number of vehicles involved, the age of the road users involved in the crash, the month the crash occurred in and the geographic region the crash occurred in, among others[1].

Under reporting, therefore, means that the sample of crashes recorded in the CAS database is not a representative sample of all crashes occurring in New Zealand. For this reason, generalising statistics and results obtained from the database to the overall crash population in a particular region is theoretically problematic, and should be performed with caution.

We have no information to assess whether crashes involving tourists in New Zealand are reported more, on average, or less on average, than the rate of reporting for all crashes.

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[3] Alsop, J., & Langley, J. (2001).Under-reporting of motor vehicle traffic crash victims in New Zealand. *Accident Analysis & Prevention, 33,* 353-359. doi: 10.1016/S0001-4575(00)00049-X

[4] Amoros, E., Martin, J.-L., Laumon, B. (2006).Under-reporting of road crash casualties in France. *Accident Analysis & Prevention, 38,* 627-635. doi: 10.1016/j.aap.2005.11.006

[5] See the Ministry of Transport's website: http://www.transport.govt.nz/research/roadcrashstatistics/thesocialcostofroadcrashesandinjuries/ .

[6] Alsop, J., & Langley, J. (2001).Under-reporting of motor vehicle traffic crash victims in New Zealand. *Accident Analysis & Prevention, 33,* 353-359. doi: 10.1016/S0001-4575(00)00049-X

2.3.2. Subjectivity

The second major issue with the CAS database is that many of the results reported in the database are subjective (I.e. the result of police judgement at the crash scene). We are aware that in the southern region, the Police are diligent in trying to make their traffic-crash reports accurate and consistent. Nevertheless, the reporting system leaves some factors to the discretion of officers much more than others. For example, simple facts of the crash, such as the time of day it occurred, the vehicles involved, and the drivers' demographic details (age, sex and licence type) should not differ strongly between officers. By contrast, other variables, such as whether the officer believes speed was a factor in the crash, are likely to be subjective.

The experience of individual Police officers ranges widely. Furthermore, we understand that most Police personnel are not trained extensively on how to produce accurate and detailed traffic-crash reports. This issue should be considered when determining how to interpret and apply the findings from this report. Some factors will be more subjective than others.

2.3.3. District-level analyses

For this analysis, only the driver of the key vehicle (vehicle with role 1, as assigned by the Police) in each crash was analysed to avoid the tendency to afford greater weight to multi-vehicle crashes. If all drivers involved in injury crashes were analysed, crashes involving multiple vehicles would effectively be counted at least two or three times over, depending on the number of vehicles involved.

The two crash types are defined formally below for each district analysed:

- injury crashes occurring in the district from 2010-2013 that involved a driver holding an overseas licence driving the key vehicle
- Injury crashes occurring in the same district from 2010-2013 that did not involve a driver holding an overseas licence driving the key vehicle.

Comparing these two crash types sheds light on what factors tend to be associated with overseas-driver crashes in the district.

2.4. Determining significance

Generally, patterns in this analysis are only reported with a *p*-value of 0.01 or lower (i.e. 99.0% significance or higher). When an issue is statistically significant, this indicates that the observed pattern is unlikely to be due to chance. Different researchers have different thresholds for 'significance'.

A common threshold in scientific research is 95% (i.e. a result is reported to be systematic and not due to chance when we are 95% sure, statistically, that the pattern is systematic). For other researchers, 95% is not enough, and 99% (or even 99.5% as in the medical sciences, for example) is required before a pattern is reported as systematic and unlikely to be due to random chance.

Raising the bar so high increases the risk of failing to detect a real pattern (committing a Type II error, in statistical parlance). On the other end of the scale, when multiple statistical analyses are undertaken, the risk of detecting a false association (i.e. believing that there is a

statistically significant effect, when in reality there is none and the association is random chance) increases. This is also referred to as 'committing a Type I error', which means incorrectly detecting an absent or false pattern. For more information on this phenomenon, see further information on the 'multiple comparisons problem'[7].

[7] See Wikipedia: http://en.wikipedia.org/wiki/Multiple_comparisons .

3. Results

3.1. Summary of results: Common and unique patterns found

3.1.1. Patterns common to all districts in the South studied: Southland, Queenstown Lakes, Central Otago, Clutha and Waitaki

- Tourist crashes in all southern districts examined disproportionately involve unfamiliarity with New Zealand road rules/road conditions.
- Tourist crashes in all southern districts examined are of the same severity, on average, as local crashes.
- The number of tourist crashes in all southern districts examined is remaining stable.

3.1.2. Patterns common to most of the districts studied: Southland, Queenstown Lakes, Clutha and Waitaki

- Tourist crashes in these four districts (but not Central Otago) disproportionately involve young adults (25-34 year-old age group).

3.1.3. Patterns common to some of the districts studied: Southland, Clutha and Waitaki

- Tourists crash often on gravel roads in Southland, Clutha and Waitaki districts.

3.1.4. Patterns unique to single areas studied

Southland District

- Tourist crashes happen during the day, in bright sunlight.
- Tourist crashes tend to disproportionately involve vans or utilities (utes).
- Tourist crashes take place midblock (particularly on curved sections of road).
- SH 94 is particularly susceptible to tourist crashes.
- Tourists disproportionately crash while making an illegal movement.

Queenstown Lakes District

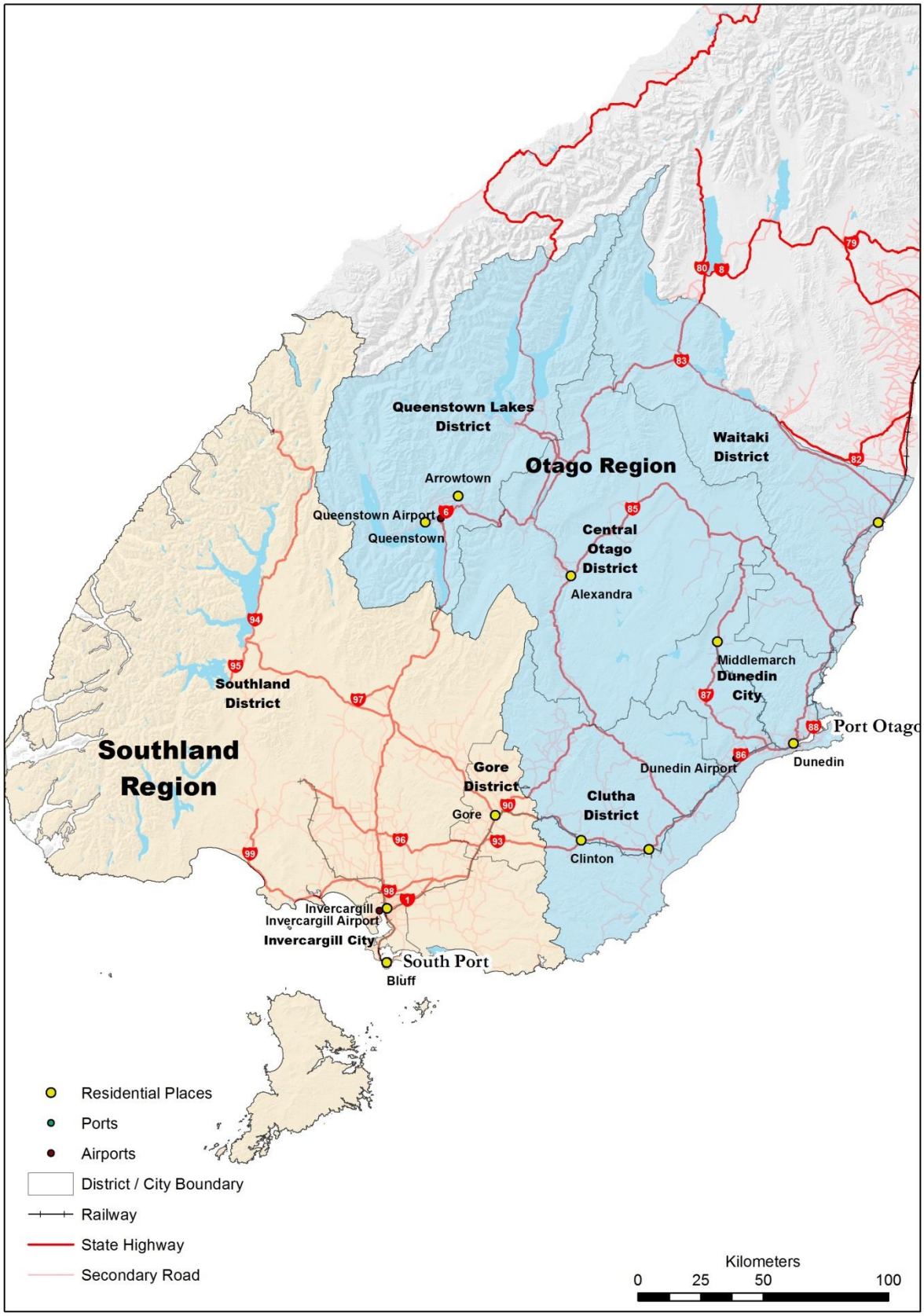
- Tourist crashes overwhelmingly involve cars/station wagons.
- Tourists disproportionately crash while ‘deliberately’ failing to keep left (e.g. swinging wide, cutting corners).

Clutha and Waitaki districts combined

These two districts were combined into a single dataset, and treated as a single district. We have no statistical evidence to assume there would be different tourist crash patterns in the two districts.

- Tourist crashes tend to take place over the summer.
- Tourist crashes frequently involve losing control of the vehicle.

Map 1 Local Government regions and districts in southern New Zealand



3.1.5. Summary of key-vehicle findings for each district

Southland District: Overseas-licence-holder crashes are associated closely with vans or utes (these categories of vehicle are combined in CAS), compared to local-licence-holder crashes.

Queenstown Lakes District: Overseas-licence-holder crashes are associated closely with cars/station wagons, presumably rental cars, compared to local-licence-holder crashes which frequently involve motorcycles and SUVs.

Central Otago, Clutha and Waitaki districts: There is no statistically significant difference between key-vehicle involvement between overseas- and local-licence-holder crashes (i.e. the car/van crash ratio is the same for overseas-licence-holders and local-licence-holders).

3.1.6. Tourist injury crashes as percentage of all injury crashes

Table 1, below, shows the comparative number of tourist crashes in each district (those that resulted in an injury), along with the percentage of injury crashes in the district that these comprise. The table shows those tourist driver crashes that involved an overseas licence holder in the key-vehicle role.

Table 1 Number and percentage of tourist injury crashes in each district, 2010-2103

District	Number of injury crashes involving a tourist driver	Percentage of all injury crashes involving a tourist driver
Central Otago	23	11.5%
Waitaki and Clutha	49	8.2% (10.1% in Clutha; 5.8% in Waitaki)
Queenstown Lakes	58	18.0%
Southland	111	20.9%

Comparative to all districts in New Zealand, Southland and Clutha Districts have experienced a relatively high rate of casualties per head of population (consistently between 60 and 79 per 10,000 population, over these four years[8]. The number of tourist crashes occurring in these districts is a major contributor to this statistic.

Figures 2, 7, 20 and 29 in the Appendix show the trend in tourist and local crashes in each district over the four years analysed. The next section discusses how this trend has been stable over 2010 to 2013 inclusive.

3.2. Explanation of patterns and trends found

Six of these findings require explanation, set out below.

[8] Ministry of Transport (2014). Motor vehicle crashes in New Zealand 2013. Yearly report 2014. Statistical statement calendar year 2013. ISSN: 1176-3949, available at http://www.transport.govt.nz/research/roadcrashstatistics/motorvehiclecrashesinnewzealand/motor-vehicle-crashes-in-new-zealand-2013/ See also the reports on this website for the calendar years 2010, 2011, and 2012, specifically the table and figure showing casualties per 10,000 population for each population centre / district.

The number of tourist crashes in all southern districts remains stable.

This pattern indicates that the number of tourist crashes in southern New Zealand stayed relatively constant over the four years 2010-2013 inclusive, without a noticeable increase or decrease. See figures 2, 7, 20 and 29 in the Appendix for an illustration of the results of the statistical analysis of this factor for each district.

Testing for statistical significance in terms of the trend (i.e. asking whether the upward/downward trend for tourists is statistically significant or not) is difficult and cannot be performed using a traditional chi-square procedure. It is also ill-advised with such small sample sizes as those for tourists in this analysis. Instead, this analysis tests if the trend is different between tourists and non-tourists; that is, if tourists have followed a slightly different trend over the past four years, compared with locals.

The only district that showed a statistically significant difference in trend between tourists and non-tourists was Southland District, where non-tourist crashes have been heavily decreasing over the past four years, but tourist crashes have been remaining stable.

To summarise, the four red lines representing tourist crashes in figures 2, 7, 20 and 29 in the Appendixare staying constant, with no perceptible increases or decreases. By contrast, the blue lines in these four figures (representing non-tourist crashes) show more variation; the number of injury crashes in Southland District is decreasing sharply, while the other districts show an relatively stable line (particularly in Clutha and Waitaki, where virtually no change has occurred over the 2010-2013 period).

This finding indicates that the number of tourist crashes in southern New Zealand has not increased over the past few years, and is staying stable (even where non-tourist crashes are decreasing, as in Southland District).

Tourist crashes in all southern districts are of the same severity, on average, as local crashes.

This finding means that tourist crashes tend not to be any more or less severe, on average, than local crashes. See figures 1, 6, 19 and 28 in the Appendix for an illustration of the results of the statistical analysis of this factor for each district. These four graphs indicate that, on average, there is no difference in severity between crashes involving tourists and crashes involving locals.

Figure 6 in the Appendix, which depicts injury crashes in Clutha and Waitaki, indicates the proportion of fatal crashes is higher among tourists; the difference is not statistically significant however, and is unlikely to represent a real effect. If there were an issue causing tourists to have more serious crashes on average, the proportion of serious (non-fatal) crashes should also be higher among tourists. This is not the case, however; specifically, 18.4% of injury crashes involving tourists in the key-vehicle role are classed as ‘serious’, compared to 22.2% of injury crashes involving locals in the key-vehicle role.

With respect to injury crashes in Central Otago, shown in Figure 1 in the Appendix, it is important to recognise that while the pie charts may look different at first glance, the pie chart on the left (‘*Tourists*’) represents only a very small sample size and the large black section labelled ‘*Fatal*’ only comprises two crashes. This means that the trauma burden associated with tourist crashes is low, despite the implication from the left pie chart that tourist crashes

tend to be severe. That implication is not borne out by statistical analysis, shows that tourist crashes in Central Otago are not any more or less severe, on average, than non-tourist crashes.

As a result of the statistical analysis and the above comments, any apparent difference, such as in figures 1 and 6 in the Appendix for Central Otago and Clutha/Waitaki, respectively, is not likely to be representative of a real pattern and can be attributed to random variation.

This finding directly contradicts the populist belief that tourist crashes, commonly reported in the media recently, tend to be more severe than local crashes (with some commentators even calling tourists a 'black spot')[9]. This finding indicates that tourists are not over represented in fatal and serious crashes anywhere in the southern New Zealand districts examined here.

Tourist crashes in all southern districts disproportionately involve unfamiliarity with New Zealand road rules/road conditions.

A crash was classed as *'Inexperience: Overseas*' if the attending Police officer at the scene notes that one or more overseas/migrant drivers failed to adjust to New Zealand road rules and/or road conditions (crash code 404). See Figures 3, 13, 26 and 41 in the Appendix for an illustration of the results of the statistical analysis of this factor for each district.

This finding at first glance seems obvious. Naturally, tourist crashes will be associated with a higher level of unfamiliarity with local conditions (associated with a failure to adjust to local New Zealand road rules and/or road conditions), compared with crashes involving local New Zealanders.

This finding reveals two important facts. Firstly, it confirms that tourist crashes do tend to be associated with a failure to adjust to New Zealand road rules and/or road conditions; that is, they often crash in situations where local New Zealand drivers probably would not. This fact provides useful supporting evidence that tourist crashes tend to be different to local crashes in a variety of ways, and thus a specialised examination of their crash patterns (as performed in this report) is fully justified.

Secondly, this finding verifies that separating crashes into 'tourist' crashes and 'local' crashes using the licence type of the key-vehicle driver, is a viable method of examining factors associated with tourist crashes. Given that crashes classed as 'tourist' crashes are strongly associated with 'tourist/migrant inexperience' (as determined by the Police), as we would expect, it is clear that separating crashes using the key-vehicle-driver method is a thematically valid way of examining the differences between tourist and non-tourist crashes.

The importance of this finding is most obvious if we consider the alternative (that no significant correlation was found between 'tourist' crashes and 'overseas inexperience', as determined by the Police). If this were the case, then separating 'tourist' and 'non-tourist' crashes via key-vehicle driver would be open to questioning.

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[9] For example, the editorial in the Otago Daily Times on the foreign driver issue in southern New Zealand, 9 April 2014: http://www.odt.co.nz/opinion/editorial/298187/action-foreign-drivers .

Whatever measure of 'tourist' used by analysts, it should correlate highly with police reports of 'tourist inexperience' to be validated as a useful measure. In this case, 'tourist' crashes are associated with police reports of 'tourist inexperience', in every single district (including Central Otago, with a tourist-crash sample size of only 23). That they do correlate indicates that the method used to separate 'tourist' and 'non-tourist' crashes is a valid method of measuring the thematic differences between 'tourist' crashes and 'non-tourist' (local) crashes.

Tourist crashes in all southern districts except for Central Otago disproportionately involve younger adults aged 25-34 years old.

This pattern is particularly pronounced in Queenstown Lakes District, but is also present in Southland, Clutha and Waitaki districts. The pattern is absent in Central Otago District, whose age distribution of tourist crashes looks much like the age distribution of locals' crashes. See figures 10, 23, and 38 in the Appendix for an illustration of the results of statistical analysis of the age of tourist drivers having serious crashes in these districts. For comparison, note a typical pattern observed for local crashes in Figure 39 in the Appendix. (This figure shows the pattern for Southland District, but Queenstown Lakes, Central Otago, Clutha and Waitaki districts show a similar pattern.)

The 15-24 year-old age group is high among the districts and crash types studied (i.e. both tourists and non-tourist crashes in all districts). The main difference between each 'local-crash' graph and the 'tourist-crash' graph in figures 10, 23, and 38 in the Appendix is the 25-34 year-old age group. This 25-34 year-old age group is not a major part of local crashes, but features heavily among tourist crashes in all districts analysed, except for Central Otago.

Tourists crash often on gravel roads in Southland, Clutha and Waitaki districts.

A large proportion of tourist crashes, relative to local crashes, occur on gravel roads in these three districts. In Southland, Clutha and Waitaki districts, unsealed roads do not feature heavily in local crashes, but are much more common among tourist crashes, as figures 9 and 43 in the Appendix show, for Clutha/Waitaki and Southland districts, respectively.

Tourist crashes in Waitaki, Clutha, Queenstown Lakes District and Southland District overwhelmingly involve cars/station wagons, but tourist crashes in Southland District (only) also disproportionately involve vans/utes.

A large minority of injury crashes among Queenstown Lakes locals have involved vehicles other than cars, however - SUVs and motorcycles in particular, as shown by the difference between figures 21 and 22 in the Appendix. This finding is noticeably different to the results for Southland District, where overseas-licence-holder crashes were closely associated with vans/utes while local-licence-holder crashes were less so (illustrated by figures 32 and 33 in the Appendix). In contrast, in Queenstown Lakes District both overseas-licence-holder and local-licence-holder crashes are associated with vans/utes.

It is worth noting that determining which vehicles are classed as '*Vans'* is difficult, as the police classification of each vehicle depends largely on the classification of the manufacturer. For example, many vehicles can be classed interchangeably as either a van or a station wagon, depending on the manufacturer's designation. Police placed a vehicle classed as a '*Van'* in the '*Van'* category above, while a vehicle classed as a '*Station wagon*' is classified

as a *'Car*' by the Police. For example, a campervan similar to the vehicle below is classed as a '*Van'*.

The green vehicle shown below can, however, be classed either as a '*Van'* or *'Station wagon*' (and thus either a '*Van'* or a '*Car'* in the above figure), depending on the manufacturer's designation[10]. For this reason, it is important to keep in mind that '*Van'* (the van/utes category in CAS) typically refer to vehicles in the style of the white campervan above.

The finding that tourist crashes in Queenstown Lakes District overwhelmingly involve cars/station wagons is probably due to exposure. Fewer tourists drive motorcycles and SUVs, compared to local drivers, and so they crash less often in these vehicles. This knowledge is useful for policymakers, as it ensures that road-safety policies aimed at improving the safety of motorcycle riders and SUV drivers do not focus unduly on tourists. Overseas-licence-holders make up a very small proportion of SUV and motorcycle crashes in Queenstown Lakes District.

[10] *Pers. comm.,* Acting Senior Sergeant Geoff Sutherland of Southern Highway Patrol. 15th April, 2014.

4. Conclusion

There are three main findings concerning the crash severity and trend in crash numbers:

- Tourist crashes in all southern districts examined disproportionately involve unfamiliarity with New Zealand road rules/road conditions.
- Tourist crashes in all southern districts examined are of the same severity, on average, as local crashes.
- The number of tourist crashes in all southern districts examined remains stable.

Comparative to all districts in New Zealand, Southland and Clutha Districts experienced a relatively high rate of casualties per head of population in the four years studied 2010 to 2013. The number of tourist crashes occurring in these districts is a major contributor to this statistic and distorts any national comparison of the casualty rate per head of population, by district / population centre. We recommend that any such comparison also include the numbers of tourist crashes resulting in injury as a percentage of all injury crashes.

We recommend that efforts to reduce the level of serious road trauma caused or suffered by tourist drivers in southern New Zealand concentrate on:

- improving tourist drivers' knowledge of New Zealand road conditions and road rules
- teaching tourist drivers how to drive on gravel roads: targeting drivers aged 25 to 34 years, in particular, and/or sealing roads commonly used by tourists
- improving safety along SH 94 (which involves more than road engineering; attention should also be paid to reducing fatigue and improving concentration, for example).

Detailed results for each of the districts examined, which are appended, will assist in the design of an effective intervention programme on these issues.

Appendix—Results for each district

5.1 Central Otago

5.1.1 Summary

- Twenty-three injury crashes from 2010-2013 involved a tourist (i.e. an overseas-licence-holder) in the key-driver role. This represents 11.5% of all injury crashes in the district over this period.
- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist-crash numbers remain stable (i.e. not increasing or decreasing strongly).

Tourist crashes are associated with 'overseas inexperience', as determined by the Police. Compared to non-tourist crashes in the Central Otago District, tourist crashes are more likely to:

- involve men driving the key vehicle
- based on police opinion, involve one or more tourists/migrants being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions.

Compared to tourist driver crashes in the Central Otago District, local driver crashes are less likely to:

- involve women driving the key vehicle.

Each of the factors listed above has been determined to be statistically significant at the 95% level or higher. (That is, we can be at least 95% confident that the factors listed do represent a systematic difference between crashes involving an overseas-licence-holder in the key-vehicle-driver role and crashes involving a non-overseas-licence-holder in the key-vehicle-driver role, as opposed to random, chance variation).

Note that given the very low sample size, the list of significant results is noticeably smaller than for analyses of other districts in this report. This is to be expected, and indicates that the patterns described below are strong, despite the difficulties associated with the small sample size. If a pattern is not described in the rest of this section on the Central Otago District, it does not mean that no pattern exists (as with other analyses); the small sample size in this particular district means that finding statistically significant patterns is extremely hard, as most patterns will be attributed to random chance.

Observing tourist-crash patterns for another four or five years in Central Otago is recommended before clear and accurate conclusions can be drawn about tourist crashes in this district.

5.1.2 Crash severity and trend

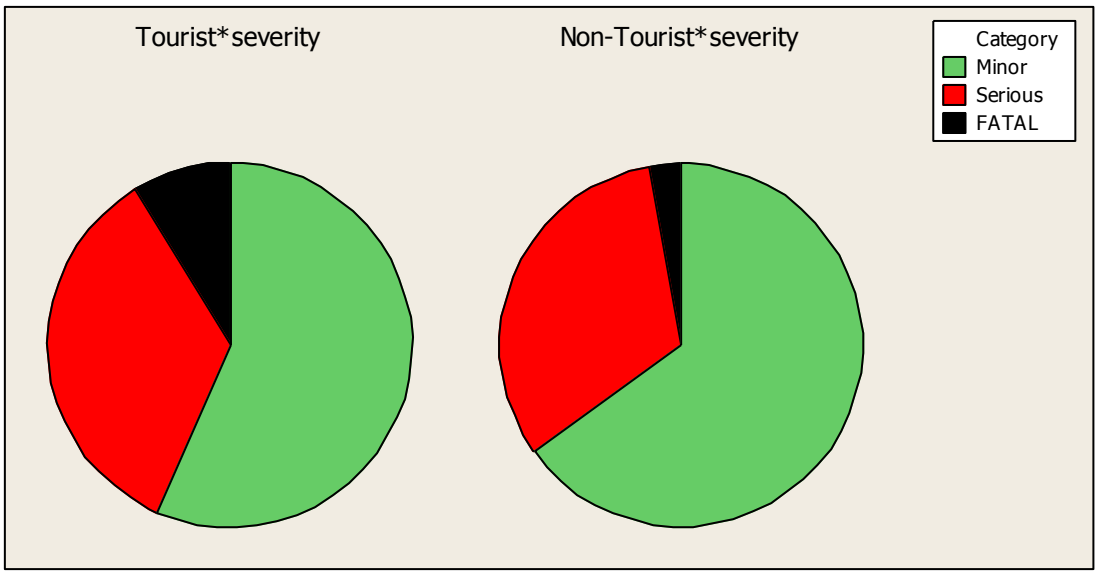
Findings:

- Twenty-three injury crashes in the Central Otago District from 2010-2013 involved an overseas-licence-holder in the key-driver role. This represents 11.5% of all injury crashes in the district over this period.

- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist crashes remain stable (i.e. not increasing or decreasing strongly).

Figure 1 shows that the proportion of fatal, serious and minor crashes are similar between tourists and non-tourists; any apparent difference is not likely to be representative of a real pattern, and can be attributed to a random variation.

Figure 1 Comparative severity of tourist and non-tourist-injury crashes in the Central Otago District (2010-2013)

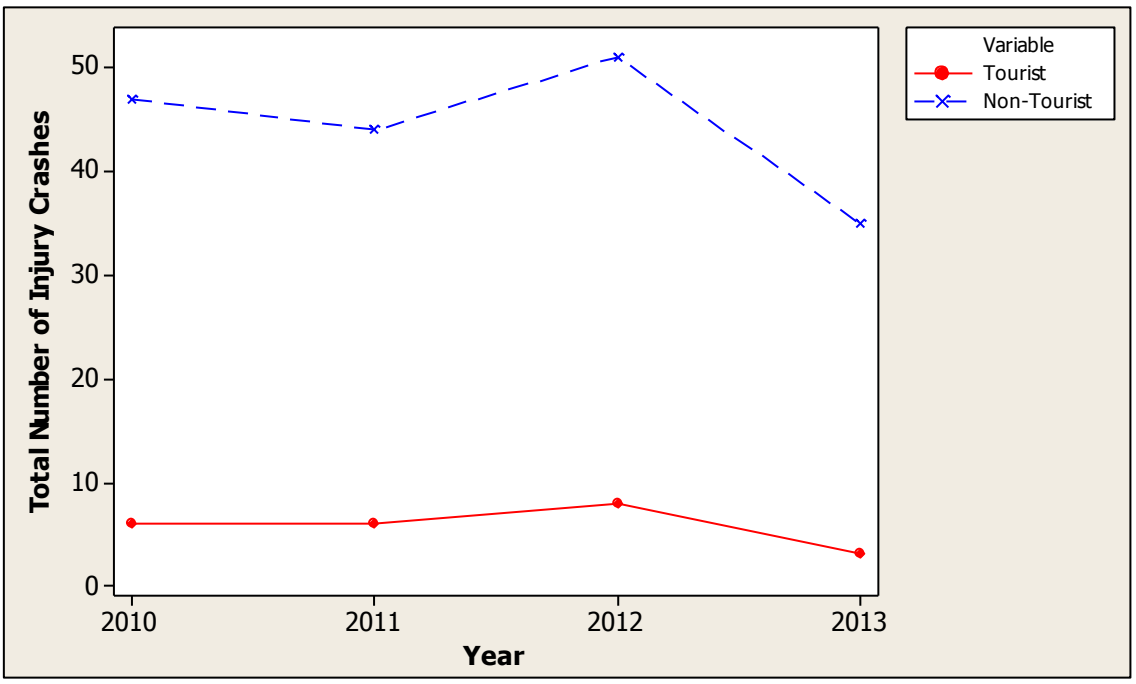


It is important to recognise that while the two pie charts in Figure 1 may look quite different at first glance. The graph on the left (‘*Tourists*’) represents a very small sample size; for example, the large black section labelled ‘*Fatal*’ comprises two crashes. This means that the trauma burden associated with tourist crashes is low, despite the implication of the left graph that tourist crashes tend to be severe. This implication is not borne out by statistical analysis, which indicates that tourist crashes are not any more or less severe, on average, than non-tourist crashes. There is no statistical evidence (χ^2 = 2.273, *p*-value > 0.1) that crashes involving overseas-licence-holders in the key-vehicle role in the Central Otago District (‘tourist’ crashes) are any more or less severe than crashes that do not involve overseas-licence-holders in the key-vehicle-driver role (‘non-tourist’ crashes).

Figure 2 indicates that the pattern is similar between tourist and non-tourist crashes. Both have remained quite stable, with a noticeable decrease in 2013. It is too soon to call this decrease the beginning of a long-term-downward trend.

Any apparent difference in trend between tourists and non-tourists is not likely to be representative of a real pattern, and can be attributed to random variation. There is no statistical evidence (χ^2 = 0.745, *p*-value > 0.1) that crashes involving overseas-licence-holders in the key-vehicle role in Central Otago District (‘tourist’ crashes) have followed a different pattern over the past few years, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role (‘non-tourist’ crashes).

Figure 2 **Annual trend in number of tourist- and non-tourist-injury crashes in the Central Otago District (2010-2013)**



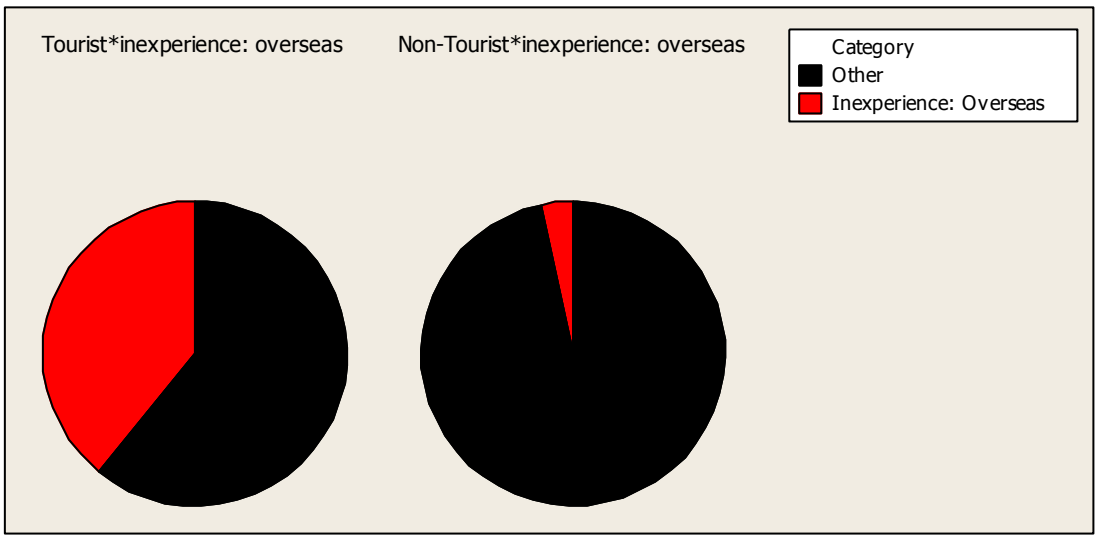
5.1.3 Themes

It is also important to note that the sample size for the Central Otago District is particularly small. Only 23 injury crashes in the district over the 2010-2013 period involved an overseas-licence-holder in the key-vehicle-driver role. This means that finding statistically significant differences between overseas-licence-holder crashes and non-overseas licence-holder crashes will be difficult. As a result, if a variable in this report is not mentioned (i.e. indicating that there is no difference between the two groups), it is important to recognise that this may be attributable to sample size limitations, as opposed to a true lack of difference between tourists and non-tourists. If a variable in this report is mentioned (i.e. indicating that there is a difference between the two groups), it is indicative of a strong pattern (as it is observable despite the limitations of sample size).

One statistically significant theme stood out in the analysis of data for the Central Otago District:

- Tourist crashes are associated with ‘overseas inexperience’, as determined by the Police.
- More specifically, relative to non-tourist crashes, tourist crashes are closely associated with one or more migrants/tourists in the crash being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions: See Figure 3.

Figure 3 **Comparative incidence of tourist- and non-tourist-injury crashes in the Central Otago District, in which inexperience was judged a factor (2010-2013)**



A crash was categorised as *'Inexperience: Overseas*' if one or more parties in the crash was noted to be an overseas/migrant driver who failed to adjust to New Zealand road rules or road conditions (crash code 404). There is extremely strong evidence (99.9%) suggesting that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are more likely to involve inexperience relating to unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Overall, 39.1% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions. By contrast, 3.4% of injury crashes not involve an overseas-licence-holder in the key-vehicle-driver role were associated with unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions.

This number is probably associated with a New Zealand driver visiting from another part of the country, with migrants who have recently acquired a New Zealand licence (and thus whose crashes are classed in the 'non-tourist' category), or with crashes involving a local-licence holder in the key vehicle and an overseas-licence holder in the second or third vehicle. These crashes are classed as 'non-tourist' (because a local is in the key vehicle), but there may still be some small number of tourists involved in these 'non-tourist' crashes and thus contributing to the 'overseas inexperience', described above.

This finding at first glance seems obvious. Naturally, tourist crashes will be associated with a higher level of overseas inexperience (associated with a failure to adjust to local New Zealand road rules and/or road conditions) than crashes involving local New Zealanders.

However, the finding reveals two important facts. Firstly, separating crashes into 'tourist' crashes and 'local' crashes via the licence type of the key-vehicle driver is a viable method of examining factors associated with tourist crashes. Given that crashes classed as 'tourist' crashes are strongly associated with 'tourist/migrant inexperience' (as determined by the Police), as we would expect, it is clear that separating crashes using the key-vehicle-driver

method is a thematically valid way of examining the differences between tourist and non-tourist crashes.

The importance of this finding is obvious if we consider the alternative (that no significant correlation was found between 'tourist' crashes and 'overseas inexperience', as determined by the Police). If this were the case, then separating 'tourist' and 'non-tourist' crashes via key-vehicle driver would be open to questioning. Whatever measure of 'tourist' used by analysts, it should correlate with police reports of 'tourist inexperience' to be validated as a useful measure. In this case, 'tourist' crashes are associated with police reports of 'tourist inexperience', as shown by the graph above. The *p*-value is extremely low (< 0.001 (3.s.f.)), even with a sample size of just 23. This finding indicates that the method used to separate 'tourist' and 'non-tourist' crashes is a valid method of measuring the thematic differences between 'tourist' crashes and 'non-tourist' (local) crashes.

The second useful finding relates to another finding: That tourist crashes do tend to be associated with a failure to adjust to New Zealand road rules and/or road conditions. That is, they often crash in situations where local New Zealand drivers probably would not. This provides useful supporting evidence that tourist crashes tend to be different to local crashes in a variety of ways, and thus a specialised examination of their crash patterns (as performed in this report) is fully justified.

5.1.4 Crash characteristics and factors

Demographic factors

Driver gender

Findings:

- Relative to non-tourist crashes, tourist crashes in the Central Otago District are closely associated with men in the key-vehicle-driver role.
- Relative to non-tourist crashes, tourist crashes do not typically involve women in the key-vehicle-driver role.

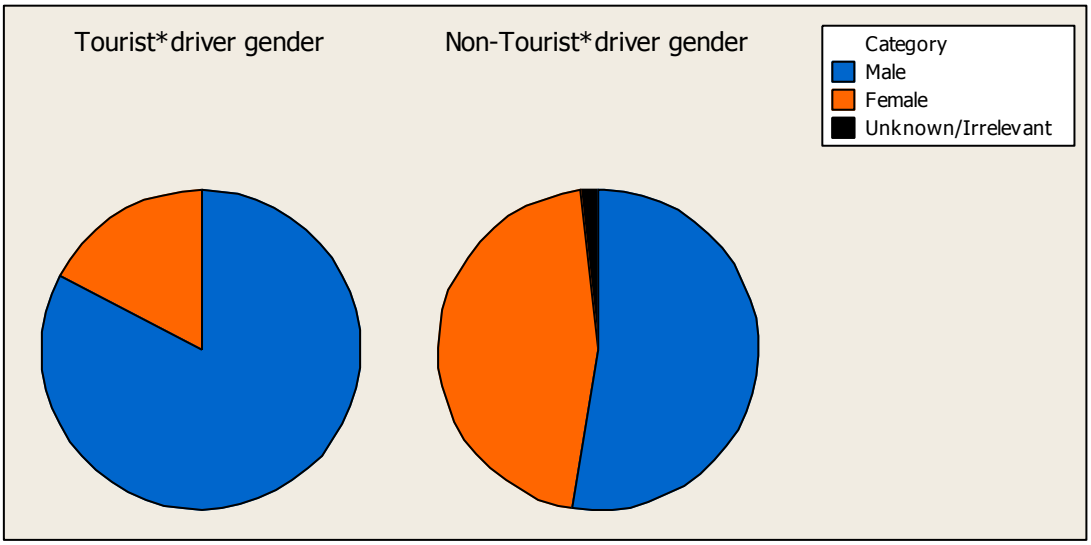
There is significant evidence (97.5%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve a different gender distribution in the key-vehicle-driver role, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). Injury crashes involving men in the key-vehicle-driver role show a high proportion of tourists in the key-vehicle-driver role. By contrast, when crashes involve women in the key-vehicle-driver role, there is a much smaller proportion of injury crashes involving tourists in the key-vehicle-driver role.

Of all Central Otago District injury crashes (2010-2013) involving a woman in the key-vehicle-driver role, 4.7% have been overseas-licence-holders. By contrast, of the Central Otago District injury crashes (2010-2013) involving a man in the key-vehicle driver role, 17.0% have been overseas-licence-holders.

Clearly, the two pie charts in Figure 4 show a completely different pattern. The pie chart on the left ('tourist' crashes) indicates that most injury crashes involving overseas-licence-holders in the key-vehicle-driver role have been associated with men. By contrast, with respect to crashes involving local New Zealand licence-holders, the gender split is much

more even, with approximately equal numbers of men and women in the key-vehicle-driver role.

Figure 4 **Gender of drivers involved in tourist- and non-tourist-injury crashes in the Central Otago District (2010-2013)**



The category, '*Unknown/Irrelevant'*, shown in Figure 4, is used by the Police when the key vehicle is a cyclist, in which case, the road user is a rider, not a driver. Their gender is thus determined '*Irrelevant*', or where the gender of the driver of the key vehicle is unknown, it is classed as being ('*Unknown'*).

4.1. Clutha and Waitaki districts (Coastal Otago)

5.2.4 Summary

- Overall, 49 injury crashes in Clutha and Waitaki districts from 2010-2013 involved a tourist driver (i.e. an overseas-licence-holder in the key-driver role). This figure represents 8.2% of all injury crashes in the districts over this period [10.1% of Clutha District injury crashes, and 5.8% of Waitaki District injury crashes].
- There is no statistically significant difference in crash distribution of tourist crashes and non-tourist crashes (i.e. they make up about the same proportion of the overall crash profile in both districts).
- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist crashes remain stable (i.e. not increasing or decreasing strongly).
- Tourist crashes tend to take place over the summer.
- Tourists crash often on gravel roads.
- Tourist crashes disproportionately involve young adults (25-34 years age group).
- Tourist crashes disproportionately involve losing control of the vehicle, perhaps representing unfamiliarity with New Zealand road rules/road conditions.

Compared to non-tourist crashes in the Clutha and Waitaki Districts, tourist crashes are more likely to:

- take place over summer (particularly in February and December)
- involve a van or ute as the key vehicle (i.e. vehicle driven by the tourist)
- take place midblock
- take place on sections of road with no road markings at all
- occur on unsealed roads
- involve 25-34 year-olds driving the key vehicle
- based on police opinion, involve one or more parties in the crash losing control of their vehicle
- based on police opinion, involve one or more tourists/migrants being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions.

Compared with local driver crashes, tourist crashes are less likely to:

- involve a motorcycle as the key vehicle (i.e. vehicle driven by the tourist)
- take place on sections of road with a painted traffic island
- take place on sections of road with a centre line (and no other markings)
- involve 45-54 year-olds driving the key vehicle
- involve 55-64 year-olds driving the key vehicle.

Each of the factors listed above have been determined to be statistically significant at the 95% level or higher. In other words, we can be at least 95% confident that the factors listed represent a systematic difference between crashes involving a tourist driver (i.e an overseas-licence-holder in the key-vehicle-driver role) and crashes involving a local-licence-holder in

the key-vehicle-driver role in Clutha and Waitaki districts, as opposed to random, chance variation; tourist crashes are rare in Clutha and Waitaki districts in the five conditions listed above. For example, tourist crashes involving motorcycles are very rare.

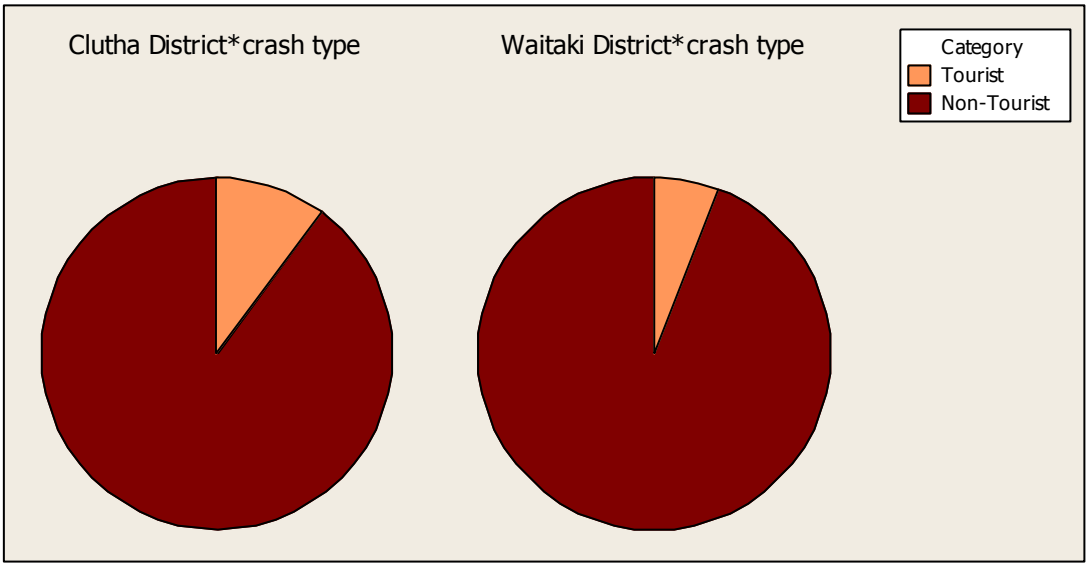
5.2.5 Crash severity and trend

Findings:

- Overall, 49 injury crashes in Clutha and Waitaki districts from 2010-2013 involved an overseas-licence-holder in the key-driver role. This represents 8.2% of all injury crashes in the districts over this period (10.1% of Clutha District injury crashes, and 5.8% of Waitaki District injury crashes).
- There is no statistically significant difference in crash distribution of tourist crashes and non-tourist crashes in the districts (i.e. they make up about the same proportion of the overall crash profile in both districts).
- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist crashes remain stable (i.e. not increasing or decreasing strongly).

There is no statistical evidence ($\chi 2 = 3.484$, p-value > 0.05) that crashes involving overseas-licence-holders in the key-vehicle role ('tourist' crashes) are apportioned differently between the districts, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). In other words, this finding indicates that tourist crashes make up about the same proportion of the overall crash record in Clutha and in Waitaki districts. Any apparent difference in tourist crash proportions between the two pie charts in Figure 5 can be attributed to random chance, given the high p-value.

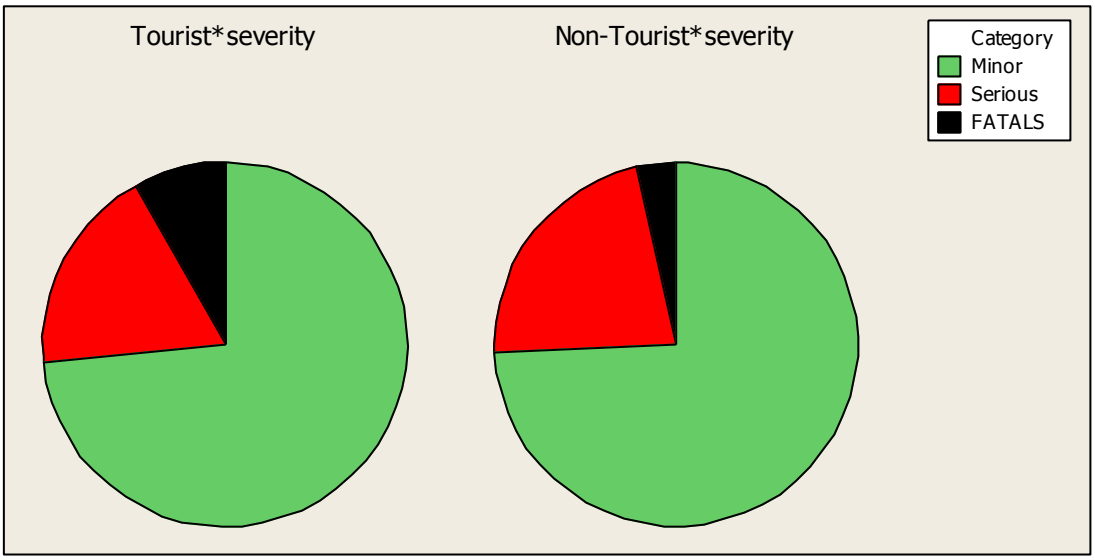
Figure 5 **Comparative incidence of tourist- and non-tourist-injury crashes in Clutha and Waitaki districts (2010-2013)**



Overall, 10.1% of injury crashes in the Clutha District over the 2010-2013 period have involved tourists in the key-vehicle-driver role, and 5.8% of injury crashes in the Waitaki District over the same period have involved tourists in the key-vehicle-driver role.

Figure 6 shows that the proportion of fatal, serious and minor crashes in the Clutha and Waitaki districts are similar for tourists and non-tourists. Any apparent difference is not likely to be representative of a real pattern, and can be attributed to random variation. There is no statistical evidence (χ^2 = 2.846, *p*-value > 0.1) that crashes involving overseas-licence-holders in the key-vehicle role in Clutha and Waitaki districts ('tourist' crashes) are any more or less severe than crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes)

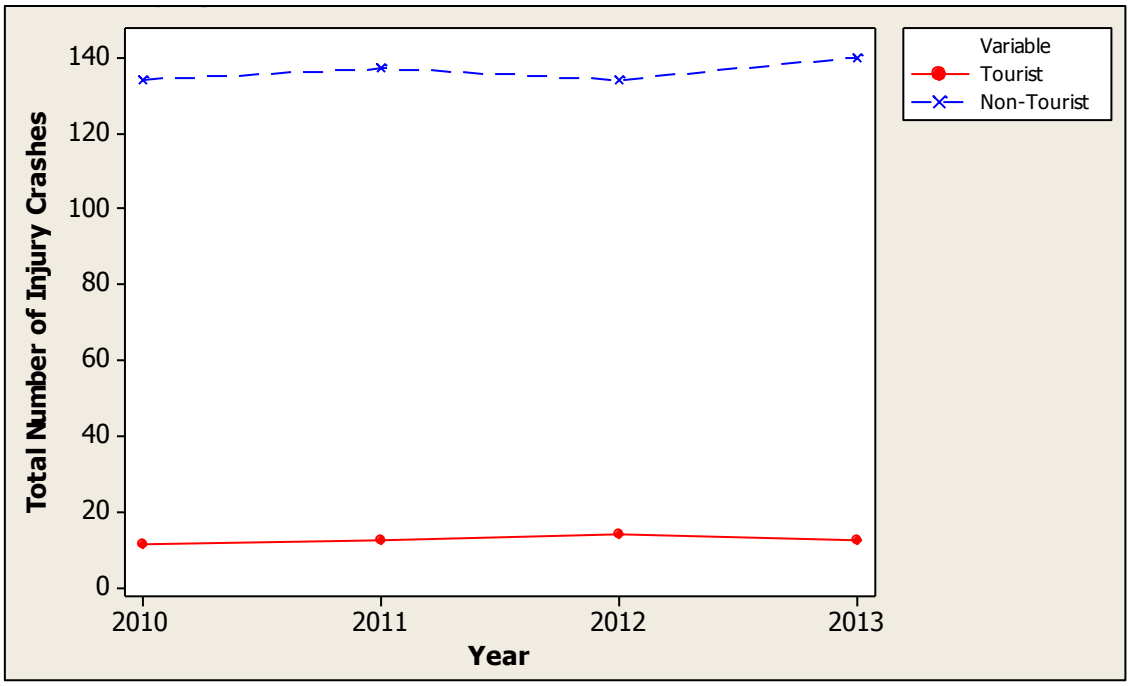
Figure 6 **Comparative severity of tourist- and non-tourist-injury crashes in Clutha and Waitaki Districts, 2010-2013**



Note that although the proportion of fatal crashes is higher among tourists (although the difference is not statistically significant), this is unlikely to be representative of a real effect, regardless of statistical analysis. If an issue existed that was causing tourists to have more serious crashes on average, the proportion of serious crashes should also be higher among tourists. This is not the case, however; specifically, 18.4% of injury crashes involving tourists in the key-vehicle role are classed as 'serious', compared to 22.2% of injury crashes involving locals in the key-vehicle role.

Figure 7 indicates that the pattern is similar between tourist and non-tourist crashes; both remain stable. Any apparent difference in trend is not likely to be representative of a real pattern, and can be attributed to random variation. There is no statistical evidence (χ^2 = 0.403, *p*-value > 0.1) that crashes involving overseas-licence-holders in the key-vehicle role in Clutha and Waitaki districts ('tourist' crashes) have followed a different pattern over the past few years, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Figure 7 **Annual trend in number of tourist- and non-tourist-injury crashes in Clutha and Waitaki districts combined (2010-2013)**



5.2.6 Themes

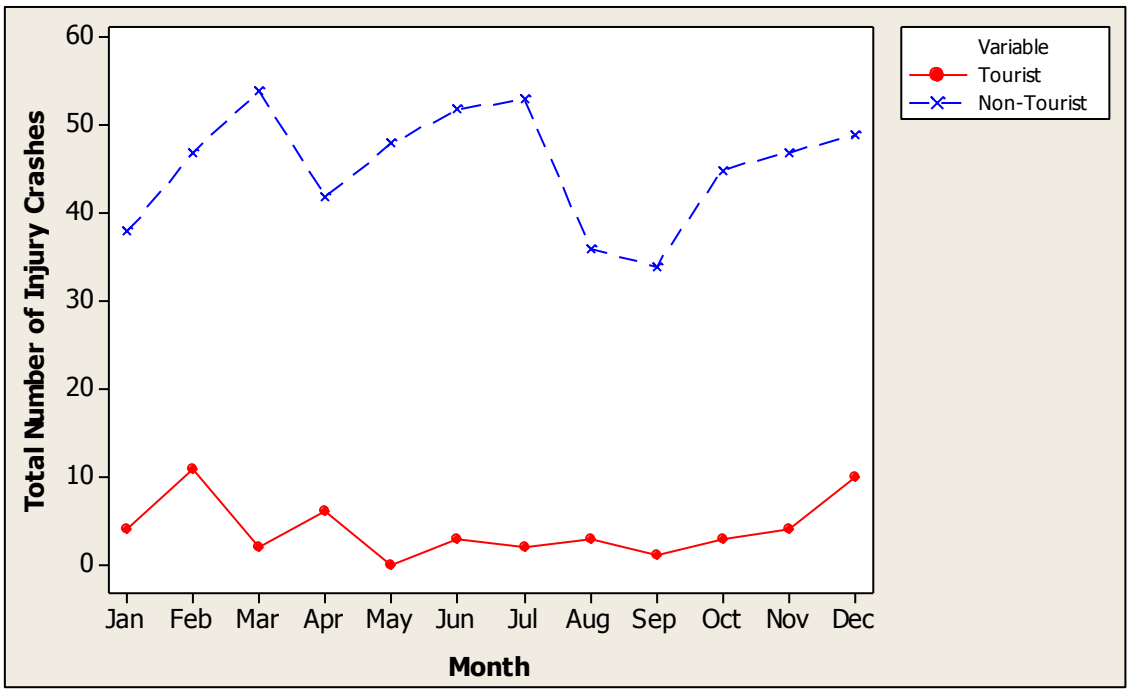
Four statistically significant themes stood out in the analysis of data combined for the Clutha and Waitaki districts:

- Tourist crashes tend to take place over the summer.
- Tourists crash often on gravel roads.
- Tourist crashes disproportionately involve young adults (25-34 years age group).
- Tourist crashes disproportionately involve losing control of the vehicle, perhaps representing unfamiliarity with New Zealand road rules/road conditions.

1. Tourist crashes in Clutha and Waitaki Districts tend to take place over the summer.

Figure 8 indicates that tourist crashes in Clutha and Waitaki districts peak over the summer months (particularly December and February). By contrast, local crashes peak several times, including late summer/early autumn (March) and in winter (June/July).

Figure 8 **Number of tourist- and non-tourist-injury crashes in Clutha and Waitaki districts combined (2010-2013), by month of year**



This occurrence is probably associated with exposure. One of the major tourist destinations in Clutha and Waitaki districts is the ecotourism hub of the Catlins, and visitor numbers in this region peak over summer[11]. This trend may help to explain the much higher tourist-crash rate over summer. This knowledge is useful for policymakers; it ensures that tourism operators and road-controlling authorities in coastal Otago focus their efforts to improve tourist safety over the summer months.

It seems likely that the reason why tourists crash so often over summer, compared to locals, is exposure. More tourists explore coastal Otago during summer, compared to winter (where tourism is more concentrated around Queenstown and the alpine regions of southern New Zealand).

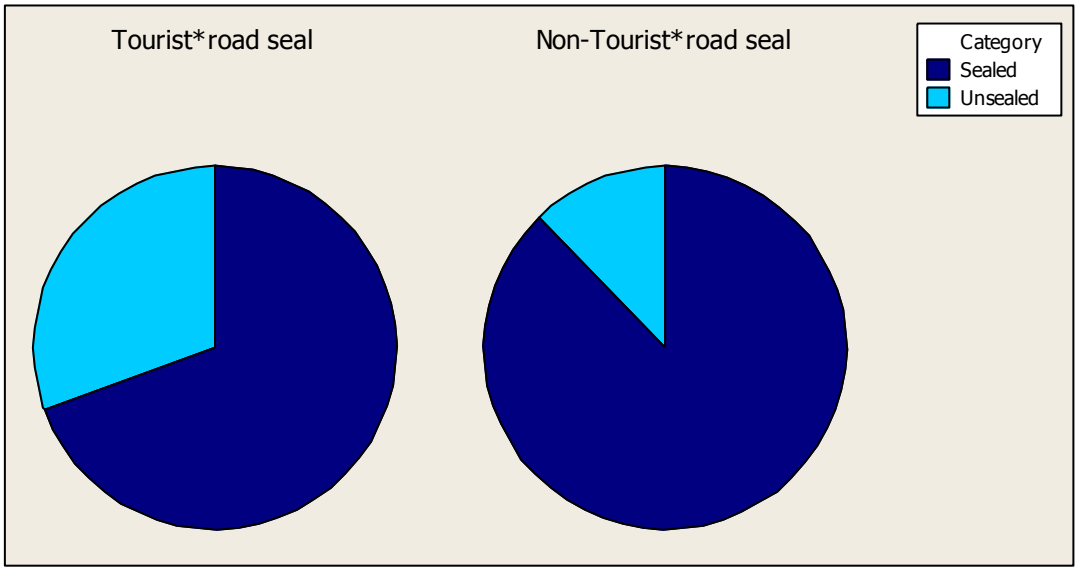
[11] See the *Catlins* website: http://www.catlins.org.nz/accommodation.php, which indicates that accommodation may be difficult to find in summer unless booked in advance.

2. Tourists crash often on gravel roads.

Relative to non-tourist crashes, tourist crashes in Clutha and Waitaki districts are closely associated with unsealed roads. Strong evidence (99.9%) suggests that crashes involving overseas-licence-holders in the key-vehicle driver role ('tourist' crashes) frequently occur on unsealed sections of road, compared with crashes that do not involve overseas-licence-holders in the key-vehicle driver role ('non-tourist' crashes).

Specifically, 30.6% of injury crashes involving an overseas-licence-holder as the key-vehicle-driver in Clutha and Waitaki districts (2010-2013) have taken place on unsealed roads. By contrast, 12.3% of injury crashes not involving an overseas-licence-holder as the key-vehicle-driver have taken place on unsealed roads.

Figure 9 **Comparative severity of tourist- and non-tourist-injury crashes on sealed and unsealed roads in Clutha and Waitaki districts (2010-2013)**



As Figure 9 shows, tourists experience a much higher proportion of crashes on gravel roads, compared to locals. This finding is unlikely to be related to exposure. (If anything, locals are likely to drive on more gravel roads than tourists, given the number of gravel roads in Clutha and Waitaki districts that are not tourist routes but are driven frequently by locals.) This may be an issue of education; gravel roads are uncommon overseas, and many tourists will not have experienced driving on them before visiting New Zealand.

The friction on a gravel road can be very low, meaning that driving fast is quite dangerous. Many locals will be aware of this and compensate by lowering speed and driving carefully. However, for those who are unfamiliar with gravel roads, driving at speed can appear deceptively safe, which may help to explain the high-crash rate on gravel roads among tourists shown in Figure 9.

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3. Tourists tend to crash while they are young adults (25-34 years old).

The evidence is powerful (99.5%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve younger key-vehicle drivers than crashes

that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Findings:

- Relative to non-tourist crashes, tourist crashes in Clutha and Waitaki districts are closely associated with the 25-34 year-old age group.
- Relative to non-tourist crashes, tourist crashes do not typically involve the 45-54 year-old age group.
- Relative to non-tourist crashes, tourist crashes do not typically involve the 55-64 year-old age group.

These findings indicate that while the distribution of tourist and non-tourist crashes is evenly spread throughout most age groups, injury crashes involving 25-34 year-olds in the key-vehicle-driver role are the exception; this age group shows a much higher proportion of tourists in the key-vehicle-driver role. As to crashes involving 45-54 year-olds and 55-64 year-olds in the key-vehicle-driver role, a smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

Figure 10 **Age of driver involved in injury crashes in the Clutha and Waitaki districts (2010-2013) involving an overseas-licence-holder**

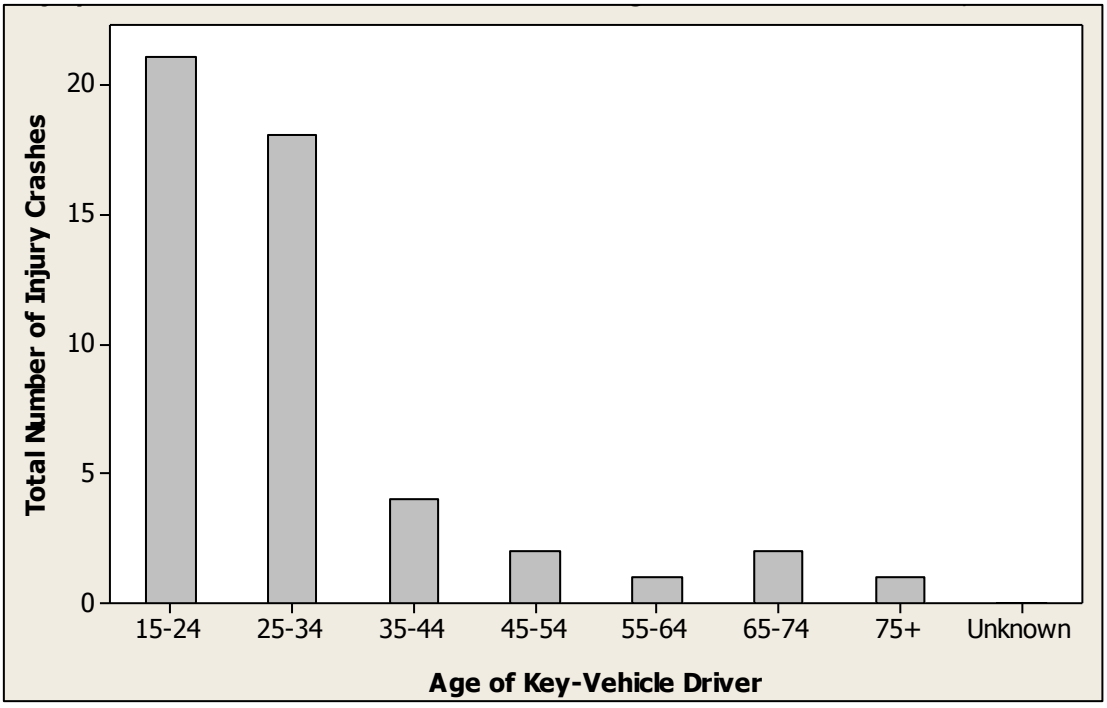
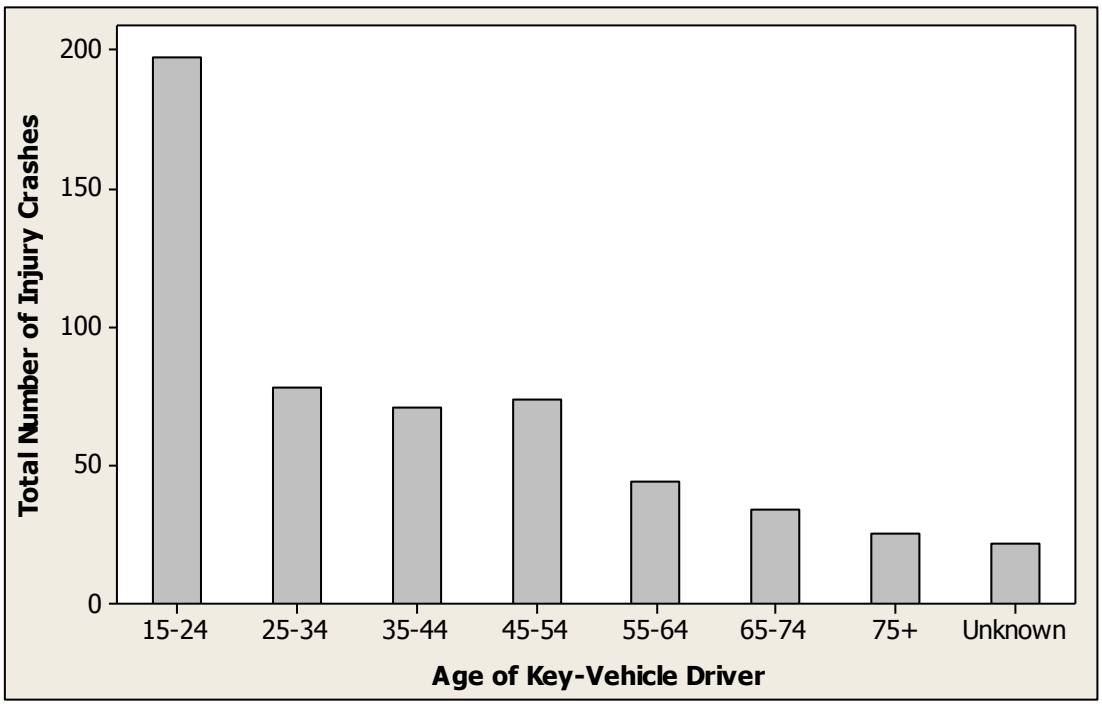


Figure 11 **Age of driver involved in those injury crashes in the Clutha and Waitaki districts (2010-2013) which do not involve an overseas-licence-holder**



Figures 10 and 11 show the age of driver in those injury crashes in Clutha and Waitaki districts (2010-2013), divided into those who held an overseas-licence-holder (Figure 10) and those who did not (Figure 11). Note that these two figures refer to key-vehicle-drivers only.

Figures 10 and 11 illustrate that, as usual in road safety, the 15-24 year-old age group is particularly over represented in traffic crashes. The 25-34 year-old age group is not far behind tourists, however. This is starkly different from the local-licence-holder graph (Figure 11), where crash rates drop off dramatically after the 15-24 year-old age group.

Of all the injury crashes in the Clutha and Waitaki districts (2010-2013) involving a 25-34 year-old in the key-vehicle-driver role, 18.8% have been overseas-licence-holders. By contrast, of all the injury crashes in the Clutha and Waitaki districts (2010-2013) involving a 45-54 year-old in the key-vehicle-driver role, 2.6% have been overseas-licence-holders. Similarly, of all the injury crashes involving a 55-64 year-old in the key-vehicle-driver role, 2.2% have been overseas-licence-holders.

The main points of difference between the two figures are for the age groups 25-34, 45-54 and 55-64. 25-34 year-olds make up a substantial proportion of key-vehicle overseas-licence-holder crashes. However, this age group makes up a much smaller proportion of non-overseas-licence-holder crashes. By contrast, 45-54 and 55-64 year-olds make up a very small proportion of key-vehicle-overseas-licence-holder crashes, but a sizeable minority of non-overseas-licence-holder crashes.

These findings are possibly related, in part, to the demographics of the two driving populations. Overseas-licence-holders require some level of material wealth, which is not usually accrued until their late-20s or early-30s, to enable them to travel to New Zealand. By contrast, local-licence-holders do not need to buy airplane tickets or secure accommodation

to drive in the Clutha and Waitaki districts, meaning that the local 15-24 year-old age group is probably much larger than the overseas 15-24 year-old age group.

The low crash numbers among older tourists indicates that perhaps something else is going on here. Very few crashes involve older tourists (aged 45 or over), compared with older locals. This begs the question of whether, perhaps, older tourists are more competent on New Zealand roads, beyond the usual decline in crash rate associated with middle-aged drivers (that we see in the local-road graph). In other words, is there something about young tourists that makes them particularly susceptible to crashing on our roads, given that older tourists seem to navigate the New Zealand road system with much more success (i.e. fewer crashes)?

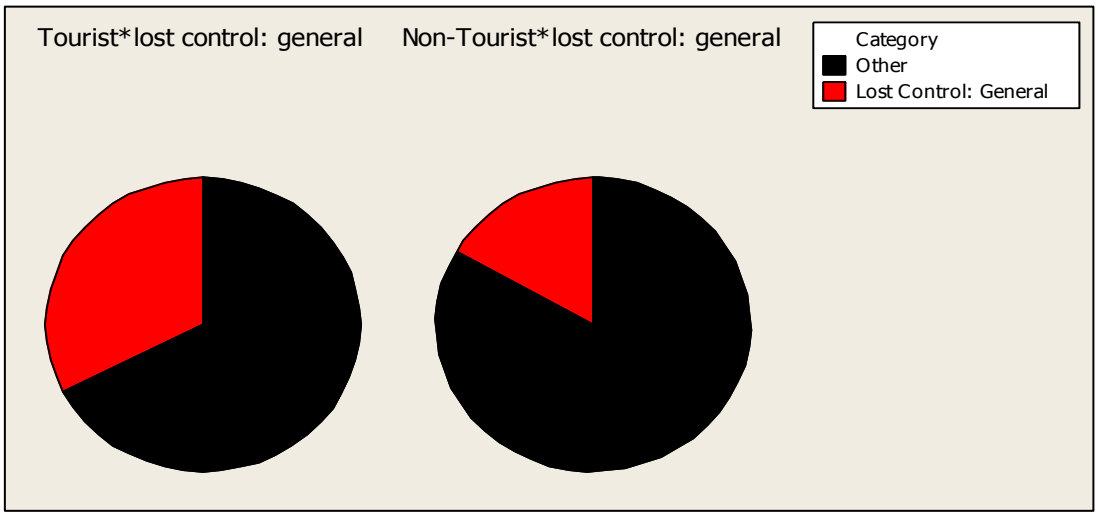
4. Tourist crashes frequently involve losing control of the vehicle.

Finding: relative to non-tourist crashes, tourist crashes in the Clutha and Waitaki districts are closely associated with one or more parties losing control of their vehicle.

A crash was categorised as *'Lost control: General'* if one or more parties in the crash lost control for unspecified reasons (crash code 130); lost control while under heavy braking (crash code 132); lost control under heavy acceleration (crash code 133); lost control due to a vehicle fault (crash code 136); lost control due to attempting to avoid another vehicle, pedestrian, party or obstacle on roadway (crash code 137); lost control on an unsealed road (crash code 138); and/or lost control at the end of seal (crash code 139).

Figure 12 indicates that tourists tend to crash while engaging in these behaviours much more often than non-tourists.

Figure 12 **Comparative incidence of tourist- and non-tourist-injury crashes in the Clutha and Waitaki districts (2010-2013), in which the driver lost control of the vehicle**



The evidence is strong (99.0%) suggesting that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are more likely to involve one or more parties losing control of the vehicle, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

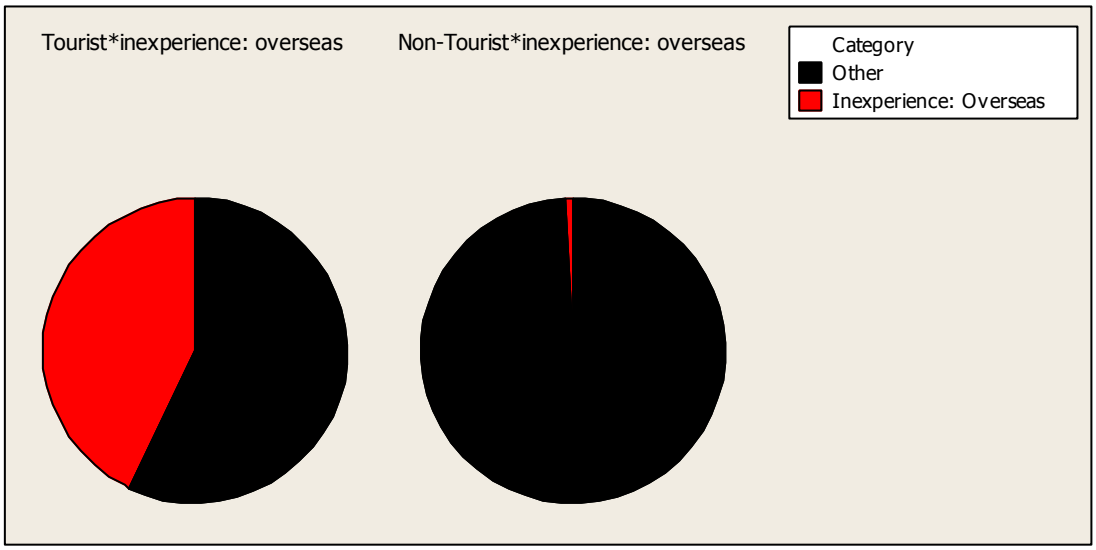
Overall, 32.7% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties losing control of their vehicle (in one or more of the ways specified above). By contrast, 16.7% of injury crashes not involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties losing control of their vehicle (in one or more of the ways specified above).

Determining why tourists tend to lose control of their vehicle (and locals do not) is crucial, as this information will help policymakers to determine how best to reduce the incidence of this crash-type among tourists. It is possible that this issue is related to exposure – namely, that tourists tend to drive more difficult roads than locals, thus increasing the incidence of loss-of-control crashes. Alternatively, other issues may be the cause, such as tourists' difficulty with gravel roads.

Given other information provided in this analysis indicating that tourists tend to crash much more often on unsealed roads than locals, it seems likely that many of these loss-of-control crashes can be attributed to unfamiliarity with or poor handling on an unsealed road.

To emphasise tourists' unfamiliarity with New Zealand roads and/or road conditions, Figure 13 shows '*Overseas inexperience'*, as determined by the Police. '*Overseas inexperience'* in this context includes crashes where a tourist or migrant in the crash was unfamiliar with, or poorly adjusted to, New Zealand road rules and/or road conditions. While this topic is rather broad, it indicates that educating tourists on specific road rules and/or road conditions (e.g. gravel roads) that might be challenging could be a viable intervention strategy.

Figure 13 **Comparative incidence of tourist- and non-tourist-injury crashes in the Clutha and Waitaki districts combined (2010-2013), in which inexperience was judged a factor**



5.2.7 Crash characteristics and factors

1.1.1.1 Timing

Month

Finding: relative to non-tourist crashes, tourist crashes in the Clutha and Waitaki districts are closely associated with February and December: See Figure 8.

The evidence is strong (99.0%) suggesting that crashes involving overseas-licence-holders in the key-vehicle role in Clutha and Waitaki districts ('tourist' crashes) tend to occur at different times of year, compared with crashes that do not involve overseas-licence-holders in the key-vehicle driver role ('non-tourist' crashes).

Crashes involving tourists and non-tourists are evenly split throughout the year. During summer, however, particularly February and December, tourist crashes make up a high proportion of total-injury crashes in Clutha and Waitaki districts, as Figure 8 shows.

19.0% of injury crashes, occurring during February in Clutha and Waitaki districts (2010-2013), have involved tourists in the key-vehicle-driver role. Similarly, 16.9% of injury crashes occurring during December have involved tourists in the key-vehicle-driver role. These numbers are much larger than anticipated, given that 8.2% of injury crashes have involved tourists in the key-vehicle-driver role.

1.1.1.2 Crash characteristics

Key vehicle

Findings:

- Relative to non-tourist crashes, tourist crashes are closely associated with vans (and utes).
- Relative to non-tourist crashes, tourist crashes do not typically involve motorcycles as the key vehicle.

There is some evidence (95.0%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve different key vehicles, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes): See differences between figures 14 and 15. Note these two figures refer to key-vehicle-drivers only.

These findings indicate that crashes involving tourists and non-tourists in the Clutha and Waitaki districts are evenly split across most of the nine key-vehicle types used in CAS data; the exception is with respect to vans (and utes), where a much higher proportion of injury crashes involve tourists in the key-vehicle-driver role. As to motorcycles, a smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

The primary difference between figures 14 and 15 is that concerning '*Van*' and '*Motorcycle*'. A sizeable minority of crashes involving tourists as the key-vehicle-driver have vans as the key vehicle. However, key-vehicle vans make up a much smaller proportion of non-tourist crashes. By contrast, no crashes involving tourists as the key-vehicle driver are associated

with motorcycles as the key vehicle. However, motorcycles as the key vehicle make up a reasonable proportion of non-tourist crashes.

Specifically, 19.2% of injury crashes involving a van (or ute) in the key-vehicle role in the Clutha and Waitaki districts (2010-2013) have involved a tourist driving that vehicle. 0% of injury crashes involving a motorcycle in the key-vehicle role have involved a tourist riding a motorcycle.

Figure 14 **Type of vehicle involved in the injury crashes in the Clutha and Waitaki districts combined (2010-2013), which involved an overseas-licence-holder driving**

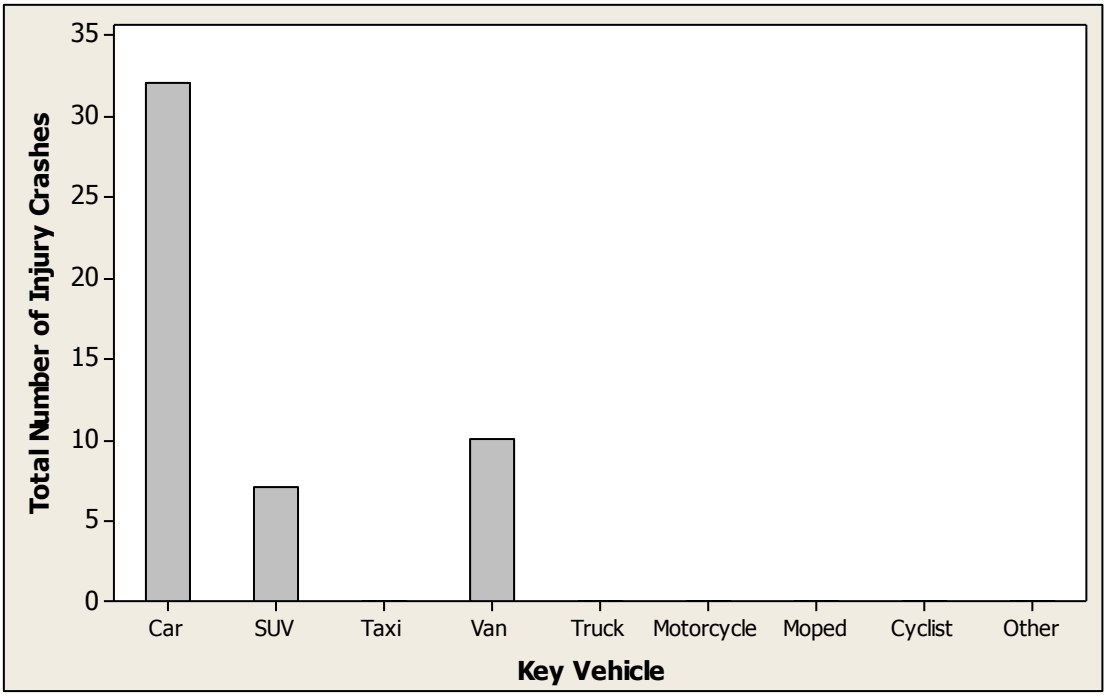
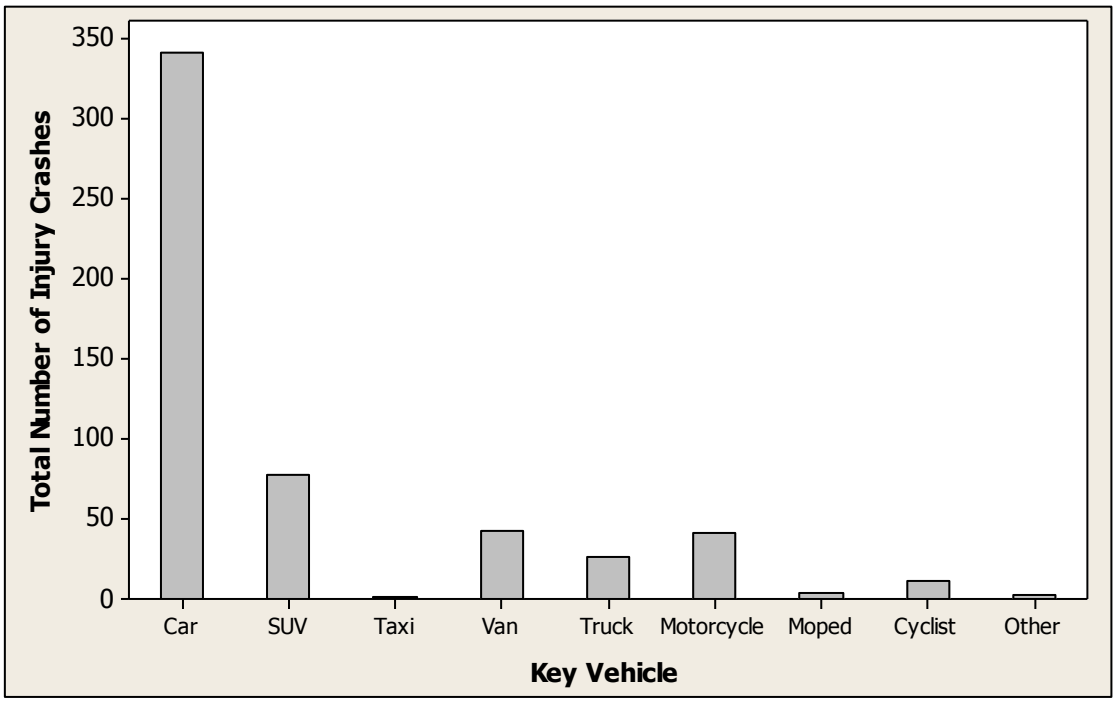


Figure 15 **Type of vehicle involved in the injury crashes in the Clutha and Waitaki districts combined (2010-2013), which did not involve an overseas-licence-holder driving**



1.1.1.3 Infrastructure

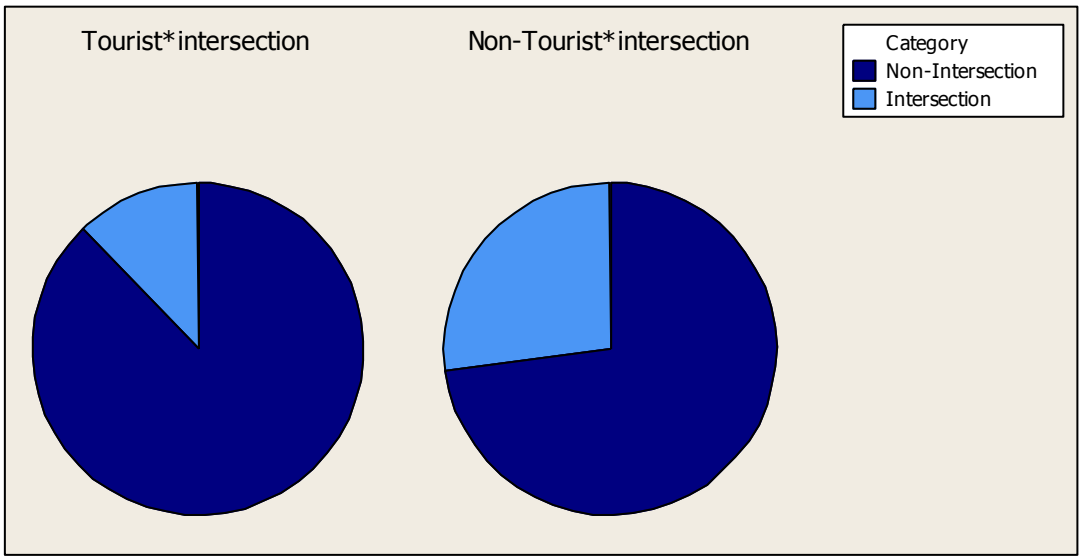
Intersections

There is significant evidence (97.5%) that crashes involving overseas-licence-holders in the key-vehicle driver role ('tourist' crashes) tend to possess a different intersection-crash rate to crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Finding: relative to non-tourist crashes, crashes involving tourists in the Clutha and Waitaki districts tend to take place midblock (rather than at an intersection), as depicted in Figure 16.

The left pie chart in Figure 16 shows crashes involving tourists; the right pie chart shows all other crashes (i.e. 'non-tourist' crashes).

Figure 16 **Comparative incidence of tourist- and non-tourist-injury crashes at intersections or not (i.e. mid-block), in the Clutha and Waitaki districts combined (2010-2013)**



12.2% of the Clutha and Waitaki districts' injury crashes involving tourists in the key-vehicle-driver role (2010-2013) have occurred at intersections; by contrast, 27.2% of injury crashes that have not involved an overseas-licence-holder in the key-vehicle-driver role (2010-2013) have taken place at an intersection.

Road markings

Findings:

- Relative to non-tourist crashes, tourist crashes in the Clutha and Waitaki districts are closely associated with sections of road with no road markings at all.
- Relative to non-tourist crashes, tourist crashes are less likely to occur on sections of road with a centre line (and no other markings).
- Relative to non-tourist crashes, tourist crashes do not typically take place on sections of road with a painted traffic island.

There is evidence (95.0%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to occur on roads with different surface markings, compared to crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

A description of how each crash scene was coded is present in NZTA's Coded Crash Report Guide[12], and the relevant section is reproduced here:

'The following codes are used to indicate what road markings were present at the crash location, if recorded by the attending officer. Only one marking is recorded. The list below is ordered in significance ranking, i.e. a pedestrian crossing is considered to be more important than a centre line, although both may be present at the crash location.'

[12] See NZTA's *Guide for the interpretation of coded crash reports from the Crash Analysis System (CAS)*, version 5.1, March 2012.

The list is given here:

1. Pedestrian crossing
2. Raised island
3. Painted island
4. No-passing line
5. Centre line
6. No markings

Therefore, if the crash occurred at a scene with a pedestrian crossing (and a raised island and centre line), it would be coded as a 'pedestrian crossing'; if the crash occurred at a scene with a no-passing line and a centre line, it would be coded as a 'no-passing line'; if the crash occurred at a scene with a painted island and a centre line, it would be coded as a 'painted island', and so forth.

The findings indicate that crashes involving tourists and non-tourists in the Clutha and Waitaki districts are evenly split across many road-marking types; the exception applies to sections of road with no markings at all, where a much higher proportion of injury crashes involve tourists in the key-vehicle-driver role. As to sections of road with a centre line (and no other markings), a smaller proportion of injury crashes involve tourists in the key-vehicle-driver role; similarly, on sections of road with a painted traffic island, only a small proportion of injury crashes involve tourists in the key-vehicle-driver role.

In the Clutha and Waitaki districts between 2010 and 2013, 15.3% of injury crashes that took place on sections of road with no markings at all involved a tourist in the key-vehicle-driver role. By contrast, 6.2% of injury crashes that took place on sections of road with a centre line (and no other markings) have involved a tourist in the key-vehicle driver role. Similarly, no (0%) of injury crashes that took place on sections of road with a painted traffic island have involved a tourist in the key-vehicle-driver role.

Figures 17 and 18 show the number of injury crashes for the type of road marking present at the crash site for crashes involving tourist drivers and non-tourist drivers, respectively. Note that these two figures refer to key-vehicle-drivers only. The largest difference between figures 17 and 18 relates to the '*None*' ('no road markings') category. A sizeable minority of injury crashes involving tourists have occurred on sections of road with no road markings at all. By contrast, a very small proportion of injury crashes involving locals have occurred on sections of road with no road markings at all.

Figure 17 **Type of road markings at the site of those injury crashes in the Clutha and Waitaki districts combined (2010-2013), which involved an overseas-licence-holder**

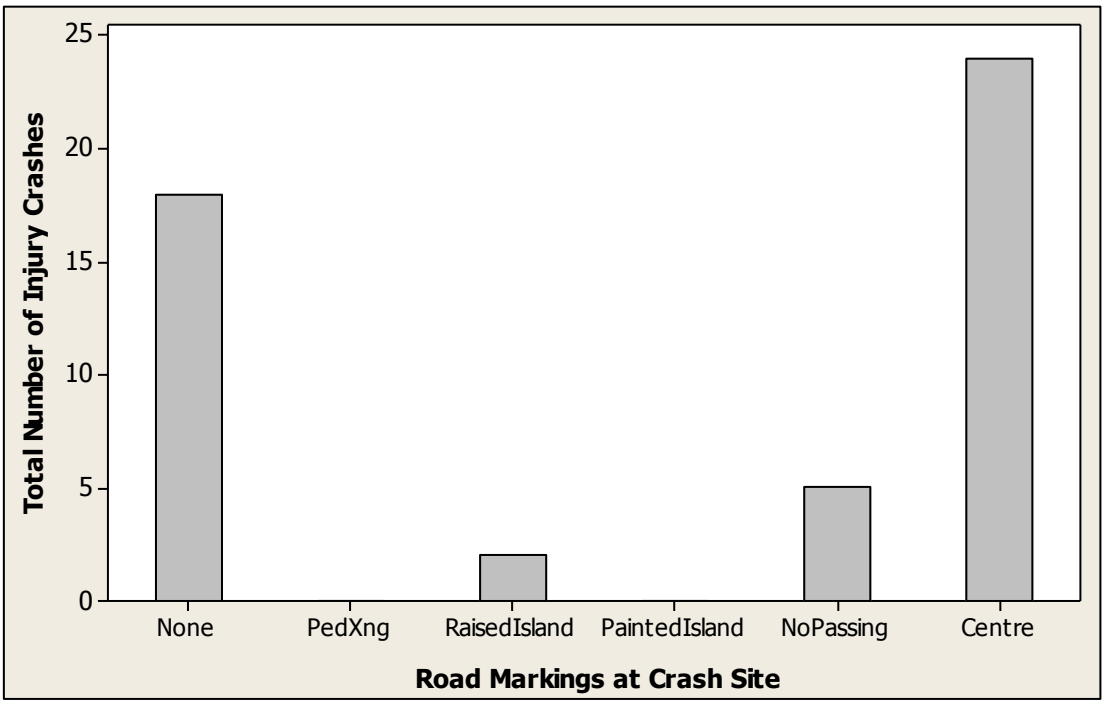
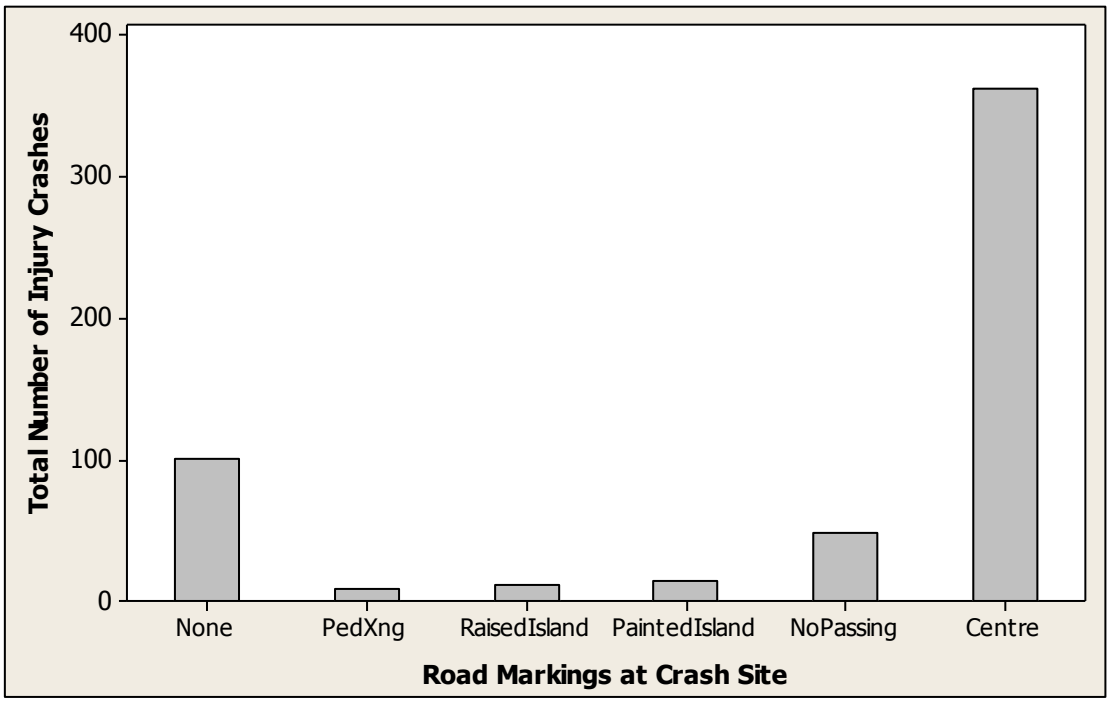


Figure 18 **Type of road markings at the site of those injury crashes in the Clutha and Waitaki districts combined (2010-2013), which did not involve an overseas-licence-holder**



1.1.1.4 Crash characteristics: what caused the crash?

Inexperience: Overseas

Finding: relative to non-tourist crashes, tourist crashes in the Clutha and Waitaki districts are closely associated with one or more migrants/tourists in the crash being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions: See figure 13.

The evidence is extremely strong (99.9%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are more likely to involve inexperience relating to unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). A crash was categorised as *'Inexperience: Overseas'* if one or more parties in the crash was noted to be an overseas/migrant driver who failed to adjust to New Zealand road rules or road conditions (crash code 404).

Overall, 42.9% of injury crashes involving an overseas-licence-holder in the key-vehicle role can be attributed to one or more overseas/migrant drivers in the crash failing to adjust to New Zealand road rules and/or road conditions. By contrast, 0.7% of injury crashes that did not involve an overseas-licence-holder in the key-vehicle-driver role are associated with one or more overseas/migrant drivers in the crash failing to adjust to New Zealand road rules and/or road conditions. This figure, 0.7%, is possibly associated with migrants who have recently acquired a New Zealand licence (and thus whose crashes are classed in the 'non-tourist' category), or with crashes involving a local-licence-holder in the key vehicle and an overseas-licence-holder in the second or third vehicle. These crashes are classed as 'non-tourist' (because a local is in the key vehicle), but there may still be a small number of

tourists involved in these 'non-tourist' crashes, thus contributing to the *Inexperience: Overseas'*, described above.

5.3 Queenstown Lakes District

5.3.4 Summary

- 58 injury crashes in the Queenstown Lakes District from 2010-2013 involved a tourist (i.e. an overseas-licence-holder) in the key-driver role. This represents 18.0% of all injury crashes in the district over this period.
- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist crashes remain stable (i.e. neither increasing nor decreasing strongly).
- Tourist crashes overwhelmingly involve cars/station wagons (as opposed to motorcycles, SUVs, etc.).
- Tourist crashes disproportionately involve young adults (25-34 years old age group).
- Tourists disproportionately crash while 'deliberately' failing to keep left (swinging wide, cutting corners), suggesting unfamiliarity with New Zealand road rules/road conditions.

Compared to non-tourist crashes in the Queenstown Lakes District, tourist crashes are more likely to:

- take place on Wednesdays and Thursdays
- involve cars/station wagons (as opposed to motorcycles, SUVs, etc.)
- involve 25-34 year-olds driving the key vehicle
- based on police opinion, involve one or more parties in the crash deliberately failing to keep left (i.e. swinging wide or cutting corner on bend or intersection)
- based on police opinion, involve one or more tourists/migrants being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions.

Compared with non-tourist driver crashes, tourist driver crashes are less likely to:

- take place on a Friday or Saturday
- involve an SUV/4x4 as the key vehicle (i.e. vehicle driven by the overseas-licence-holder)
- involve a 45-54 year-old driving the key vehicle.

Each of the factors listed have been determined to be statistically significant at the 95% level or higher. In other words, we can be at least 95% confident that the three factors listed above represent a systematic difference between crashes involving a tourist driver (i.e. an overseas-licence-holder in the key-vehicle-driver role) and crashes involving a local-licence-holder in the key-vehicle driver role, as opposed to random, chance variation. In other words, the list above indicates that tourist crashes are very rare in Queenstown Lakes District under these three conditions. For example, tourist crashes are very rare on Fridays and Saturdays.

5.3.5 Crash severity and trend

Findings:

- 58 injury crashes in the Queenstown Lakes District from 2010-2013 involved an overseas-licence-holder in the key-driver role. This represents 18.0% of all injury crashes in the district over this period.

- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist crashes remain stable (i.e. neither increasing nor decreasing strongly).

Figure 19 shows that the proportion of fatal, serious and minor crashes are very similar between tourists and non-tourists; any apparent difference is not likely to be representative of a real pattern, and can be attributed to random variation. There is no statistical evidence (χ^2 = 0.257, *p*-value > 0.1) to suggest that crashes involving overseas-licence-holders in the key-vehicle role ('tourist' crashes) are more or less severe than crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Figure 19 **Comparative severity of tourist- and non-tourist-injury crashes in the Queenstown Lakes District (2010-2013)**

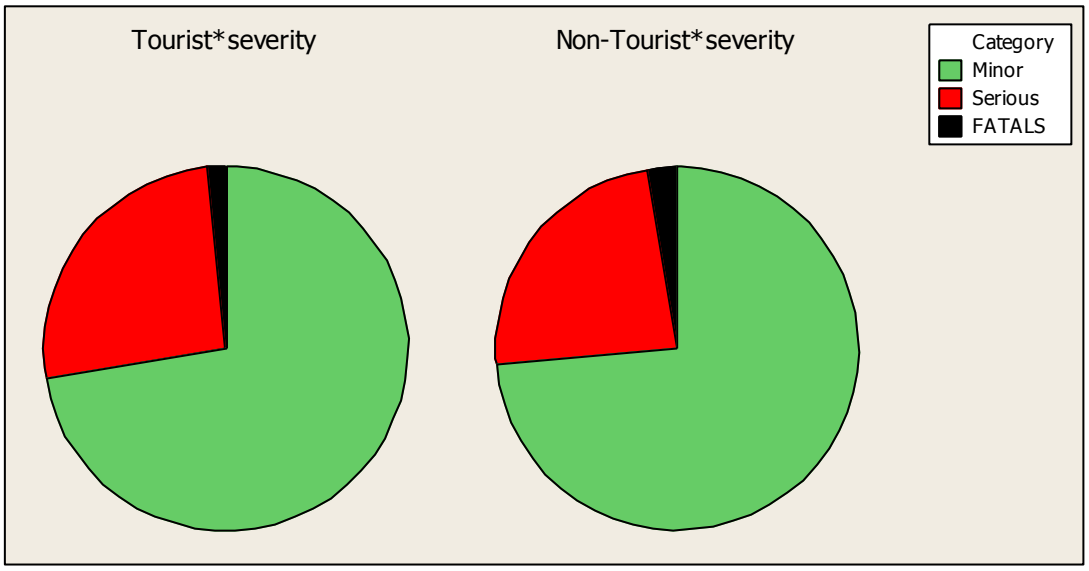
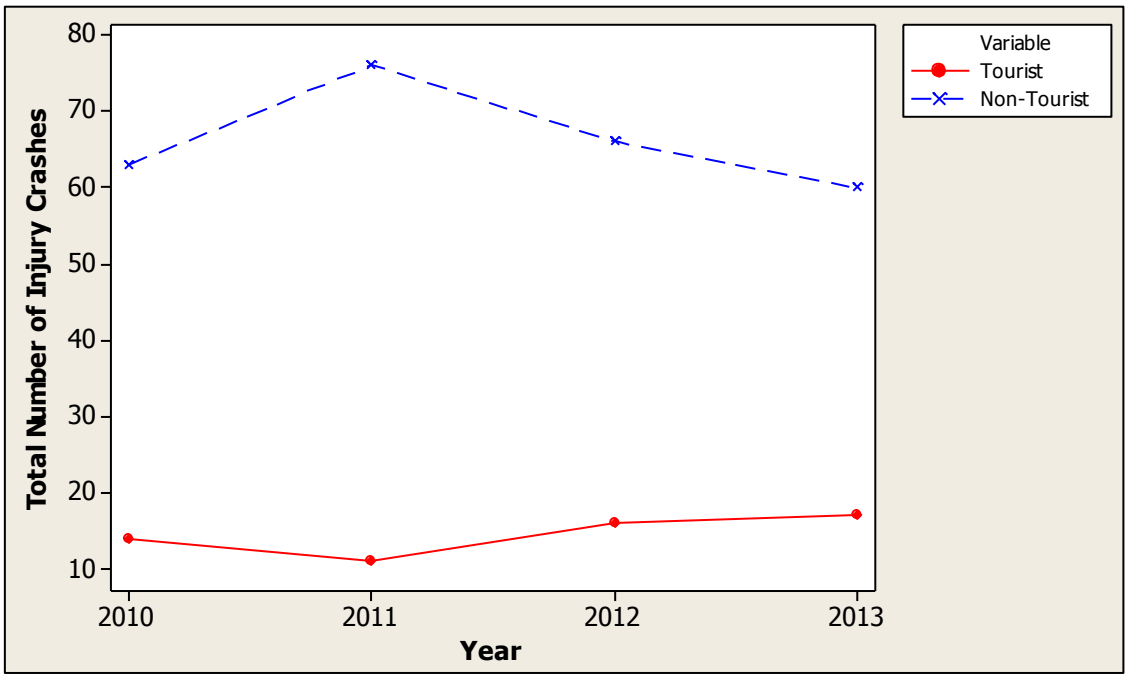


Figure 20 indicates that the pattern is similar between tourist and non-tourist crashes; both remain stable. Any apparent difference in trend is not likely to be representative of a real pattern, and can be attributed to random variation. There is no statistical evidence (χ^2 = 2.692, *p*-value > 0.1) to suggest that crashes involving overseas-licence-holders in the key-vehicle role in the Queenstown Lakes District ('tourist' crashes) have followed a different pattern over the past few years, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Figure 20 **Annual trend in the number of in number of tourist- and non-tourist-injury crashes in the Queenstown Lakes District (2010-2013)**



5.3.6 Themes

Three statistically significant themes stood out in the analysis of data for the Queenstown Lakes District:

- Tourist crashes overwhelmingly involve cars/station wagons (as opposed to motorcycles, SUVs, etc.).
- Tourist crashes disproportionately involve young adults (25-34 years old age group).
- Tourists disproportionately crash while 'deliberately' failing to keep left (swinging wide, cutting corners), suggesting unfamiliarity with New Zealand road rules/road conditions.

1. Tourist crashes in the Queenstown Lakes District overwhelmingly involve cars/station wagons.

As Figure 21 illustrates, most injury crashes involving an overseas-licence-holder have been associated with cars/station wagons (presumably, a large proportion of these are rental cars). A slight majority of injury crashes involving local-licence-holders have also involved cars/station wagons.

Figure 21 **Type of vehicle involved in the injury crashes in the Queenstown Lakes District (2010-2013), which involved an overseas-licence-holder driving the key vehicle**

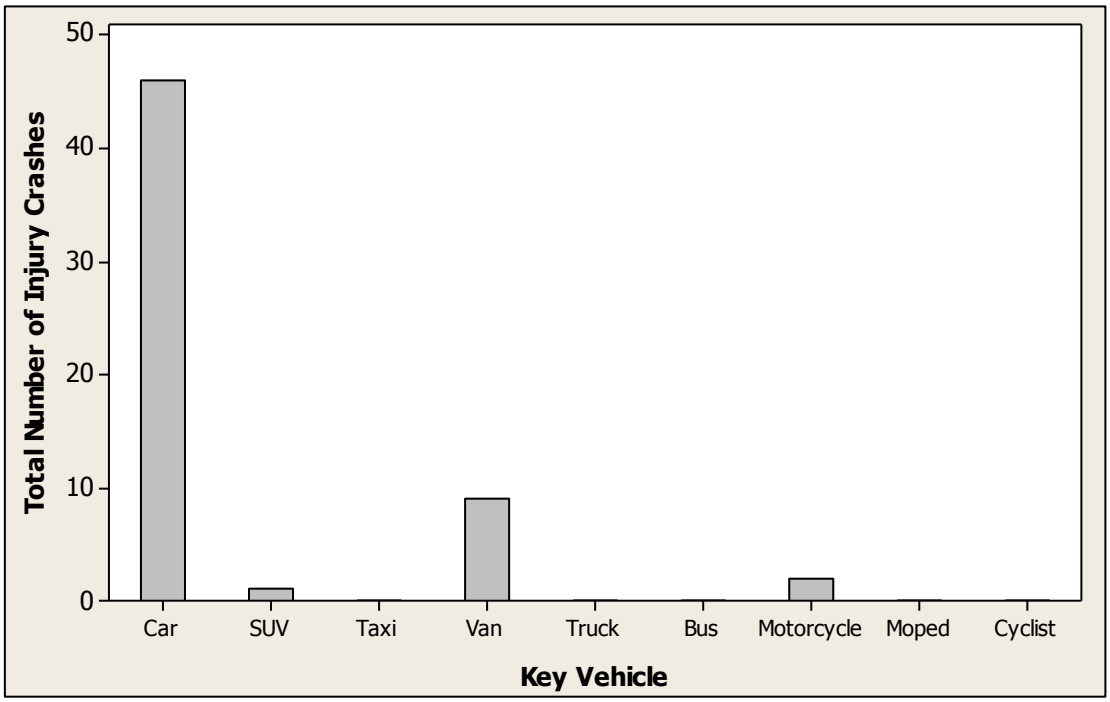
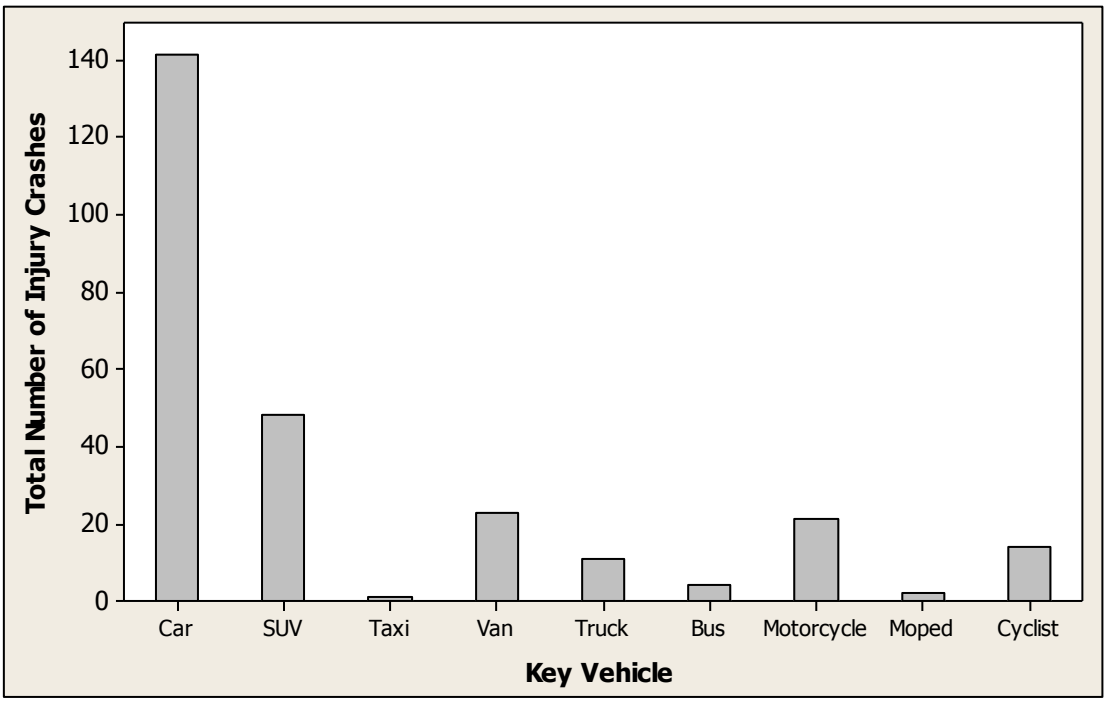


Figure 22 **Type of vehicle involved in the injury crashes in the Queenstown Lakes District (2010-2013), which did not involve an overseas-licence-holder driving the key vehicle**



The evidence is powerful (99.5%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve different key vehicles, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). It is possible that this finding is due to exposure. In other words, fewer tourists drive motorcycles and SUVs compared to local drivers. This knowledge is useful for policymakers, as it ensures that road-safety policies aimed at improving the safety of motorcycle riders and SUV drivers do not focus unduly on tourists. Clearly, overseas-licence-holders make up a very small proportion of SUV and motorcycle crashes.

As Figure 22 shows, although most non-overseas-licence-holder crashes also involve cars (or station wagons), as do most tourist crashes, there is a more diverse spread of key vehicle type amongst the former type of drivers. A large minority of injury crashes among locals have involved other vehicles, particularly SUVs and motorcycles; this trend is absent in the tourist graph, indicating that very few tourist crashes occur in these vehicles (particularly SUVs). (Note, Figures 21 and 22 refer to key-vehicle-drivers only.)

2.0% of injury crashes involving an SUV (or 4x4) as the key vehicle have involved a tourist driving the vehicle. By contrast, 24.6% of injury crashes involving a car (or station wagon) as the key vehicle have involved a tourist driving the vehicle.

A sizeable minority of injury crashes in the overseas-licence-holder category involve an overseas-licence-holder at the helm of a van (or ute). However, most involve an overseas-licence-holder driving a car (or station wagon).

2. Tourists tend to crash while they are young adults (25-34 years old).

Of all the Queenstown Lakes District injury crashes (2010-2013) involving a 25-34 year-old in the key-vehicle driver role, 30.9% have been overseas-licence-holders. 25-34 year-olds make up a substantial proportion of key-vehicle-overseas-licence-holder crashes. Conversely, this age group makes up a much smaller proportion of non-overseas-licence-holder crashes.

Although the 15-24 year-old age group is over represented in traffic crashes (as is commonly found), there are more crashes among the tourists' 25-34 year-old age group. (See Figure 23.) This is different from the local-licence-holder graph (Figure 24), where crash rates drop off dramatically after the 15-24 year-old age group. (Figures 23 and 24 refer to key-vehicle-drivers only.)

This finding is likely to be related, in part, to the demographics of the two driving populations. Tourists often tend to be in the 25-34 year-old age range. But it begs the question as to whether young tourists are susceptible to the hazards on New Zealand roads (given that older tourists seem to navigate New Zealand roads well).

Figure 23 **Age of driver in injury crashes in the Queenstown Lakes District (2010-2013), which involved an overseas-licence-holder driving**

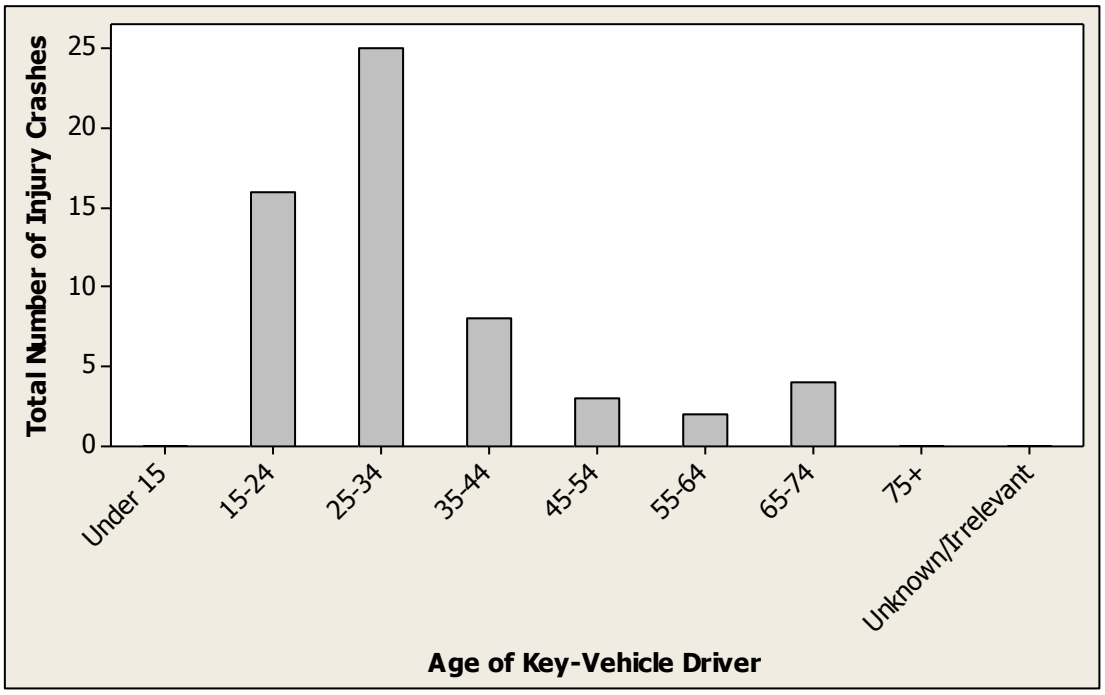
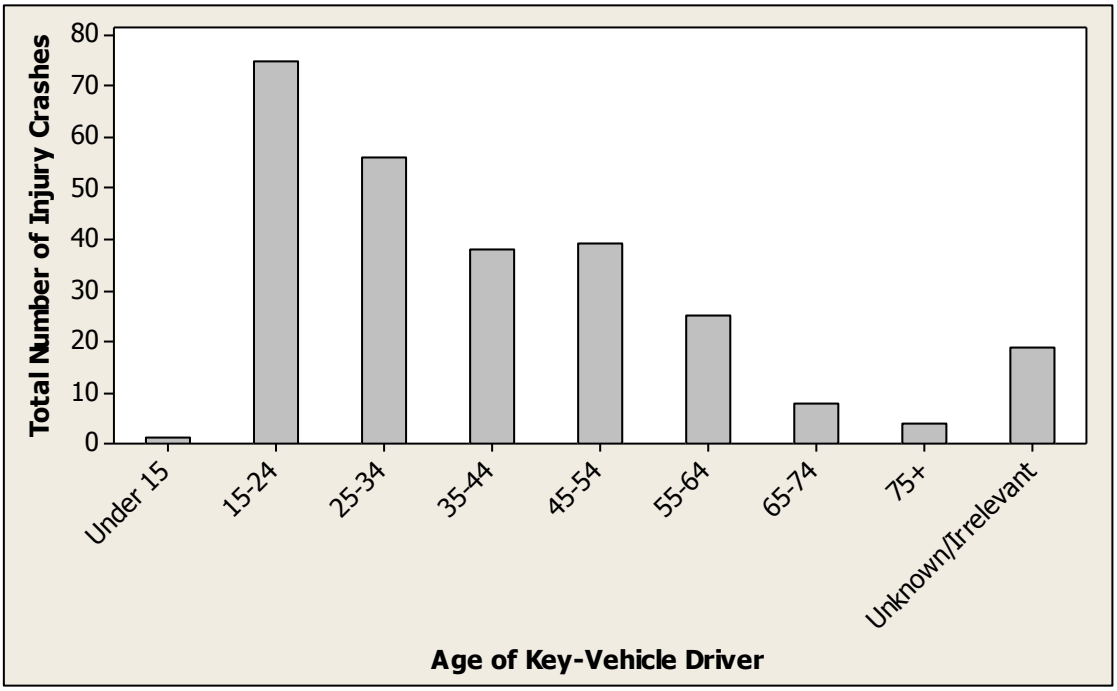


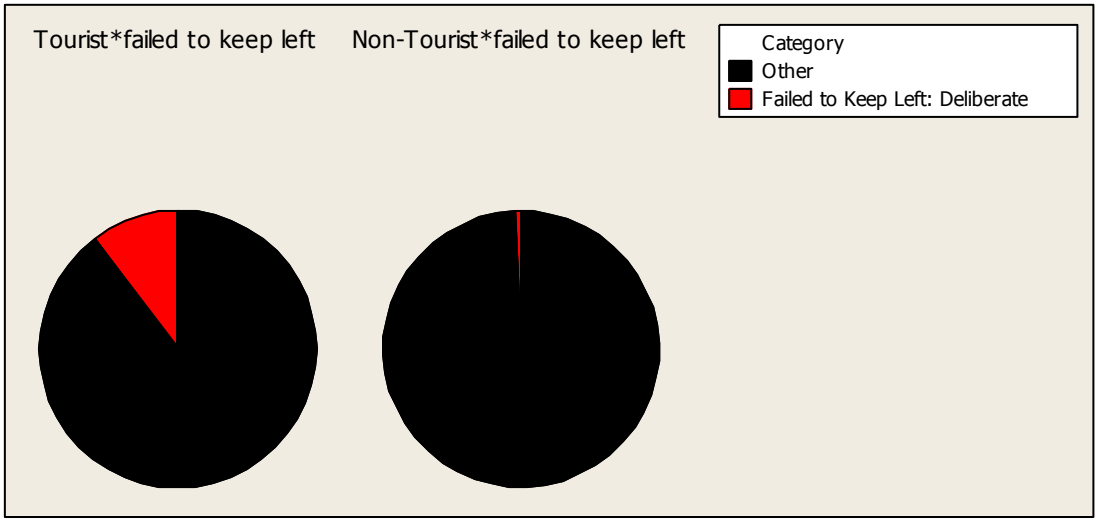
Figure 24 **Age of driver in injury crashes in the Queenstown Lakes District (2010-2013), which did not involve an overseas-licence-holder driving**



3. Tourists disproportionately crash while 'deliberately' failing to keep left.

'Deliberately failing to keep left' in this context refers to swinging wide or cutting a corner on a bend or intersection. Figure 25 indicates that tourists engaging in these behaviours tend to crash much more often than non-tourists driving in this manner.

Figure 25 **Comparative incidence of tourist- and non-tourist-injury crashes in the Queenstown Lakes District (2010-2013), where the driver deliberately failed, or did not fail, to keep left**



The evidence that crashes involving 'tourists' in the key-vehicle-driver role are more likely to involve one or more parties deliberately failing to keep left, compared with crashes that do not involve 'tourists' in this role, is strong (99.9%). Specifically, 10.3% of injury crashes

involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties deliberately failing to keep left (i.e. swinging wide or cutting corner on a bend or intersection). By contrast, 0.8% of injury crashes that did not involve an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties deliberately failing to keep left (i.e. swinging wide or cutting corner on a bend or intersection).

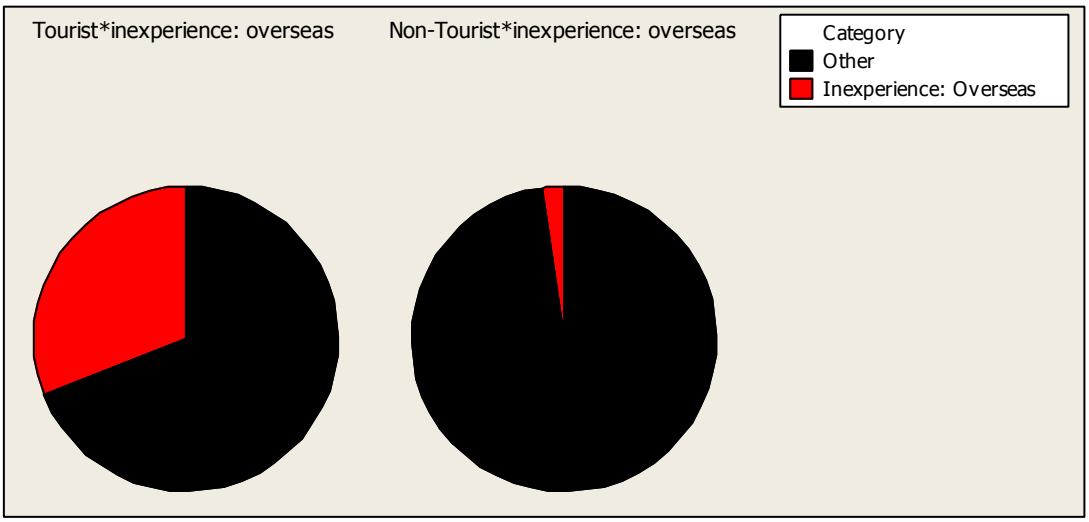
This finding is interesting, as cutting a corner or swinging wide is not typically associated with a failure to remember the rules of the road (i.e. driving on the incorrect side of the road), which is what many road-safety analysts assume must be occurring when a tourist 'fails to keep left'. Although it is true that tourists seem to crash more often due to a failure to keep left, this failure is not associated with driving on the incorrect side of the road accidentally (i.e. wobbling over the road, misjudging distance and being slightly too far to the left or right, or failing to keep left on a straight section of road, presumably due to failing to remember the road rules or falling back into the driving habits of their right-hand-drive countries). This failure is actually associated with cutting corners and swinging wide, which may indicate that tourists are simply unaware of how to approach bends and intersections appropriately in New Zealand. Police categorise a crash as *'Failed to keep left: Deliberate*' if one or more parties in the crash swung wide on a bend (crash code 121); swung wide at an intersection (crash code 122); cut a corner on a bend (crash code 123); and/or cut a corner at an intersection (crash code 124).

This may be an issue of education: Tourist drivers may be approaching a bend too quickly and thus swinging wide or cutting the corner, or they may be driving at an appropriate speed, but unaware of the dangers of these behaviours on New Zealand's winding and often narrow roads. To support the idea that tourists are not adequately educated about New Zealand road rules, Figure 26 shows crashes associated with '*Overseas: Inexperience'* (as determined by the Police).

'*Overseas: Inexperience'* in this context includes crashes where a tourist or migrant in the crash was unfamiliar with, or poorly adjusted to, New Zealand road rules and/or road conditions.

While this topic is rather broad, it does indicate that education on specific road rules (e.g. not cutting a corner or swinging wide) may be a viable intervention strategy, given that many tourists may be unaware of the dangers of such behaviour on New Zealand roads.

Figure 26 **Comparative incidence of tourist- and non-tourist-injury crashes in the Queenstown Lakes District (2010-2013), in which inexperience was judged to be a factor,**



5.3.7 Crash characteristics and factors

1.1.1.5 Timing

Day of week

Findings:

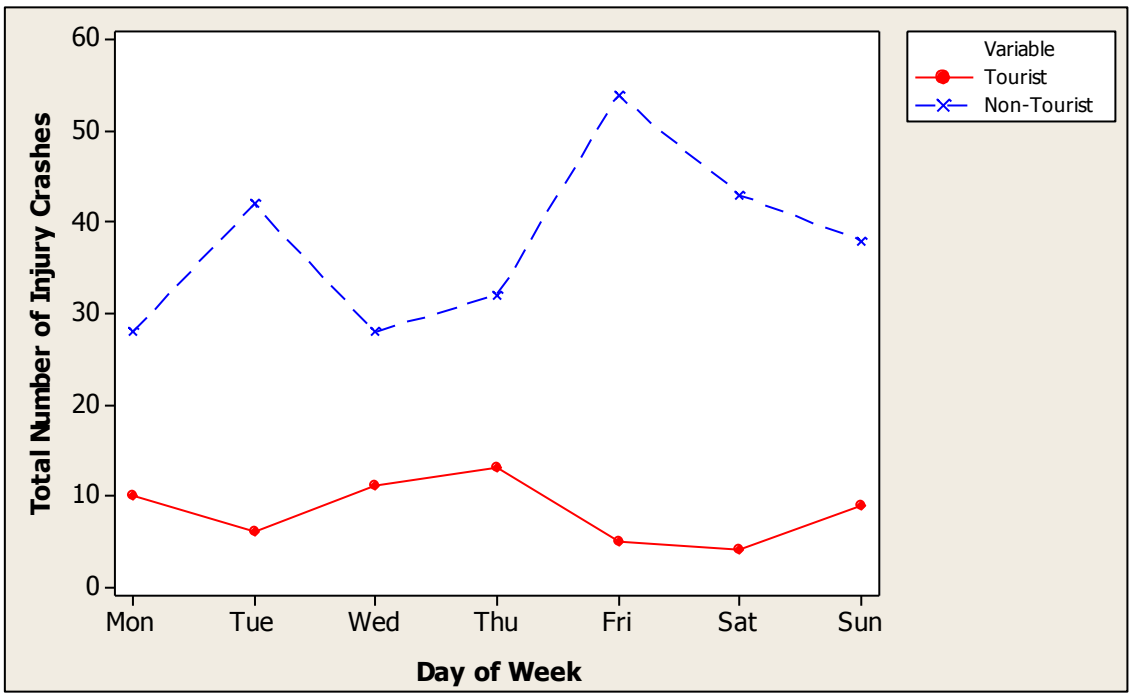
- Relative to non-tourist crashes, tourist crashes in the Queenstown Lakes District are more likely to occur on Wednesdays and Thursdays.
- Relative to non-tourist crashes, tourist crashes are less likely to occur on Fridays and Saturdays.

There is significant evidence (97.5%) to suggest that crashes involving overseas-licence-holders in the key-vehicle role ('tourist' crashes) tend to occur on different days of the week, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

These findings, shown in Figure 27, indicate that crashes involving tourists and non-tourists are evenly split throughout the beginning of the week (Sunday-Tuesday). On Fridays and Saturdays, tourists make up a very small proportion of total-injury crashes. However, on Wednesdays and Thursdays, they make up a relatively high proportion of total-injury crashes.

28.2% of injury crashes occurring on a Wednesday have involved tourists in the key-vehicle-driver role; and 28.9% of injury crashes occurring on a Thursday have involved tourists in the key-vehicle-driver role. By contrast, 8.5% of injury crashes occurring on a Friday have involved tourists in the key-vehicle-driver role; and, similarly, 8.5% of injury crashes occurring on a Saturday have involved tourists in the key-vehicle-driver role.

Figure 27 **Number of tourist- and non-tourist-injury crashes in the Queenstown Lakes District (2010-2013), by day of the week**



Note that tourist and non-tourist crashes are similar across the Sunday-Tuesday period. Relative to the non-tourist graph, the tourist line on Figure 27 shows a sizeable peak across Wednesday-Thursday, and a sizeable trough across Friday-Saturday.

1.1.1.6 Demographics

Driver age

Theme 2, above, discussed how many of the serious- and fatal-tourist crashes in these districts involve young adults aged 25 to 34 years. Other findings about the age of drivers in crashes causing serious road trauma are:

- relative to non-tourist crashes, tourist crashes do not typically involve the 45-54 year-old age group
- relative to non-tourist crashes, tourist crashes do not typically involve drivers stated to have an unknown or irrelevant age, which means they do not usually involve key-vehicle cyclists.

The evidence is strong (99.0%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve younger key-vehicle drivers than crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Although the distribution of tourist and non-tourist crashes is evenly spread throughout most age groups, injury crashes involving 25-34 year-olds in the key-vehicle-driver role are the exception. This age group shows a much higher proportion of tourists in the key-vehicle-driver role. In contrast, a much smaller proportion of injury crashes involving 45-54 year-olds in the key-vehicle-driver role involve tourists in the key-vehicle role.

Of all the injury crashes occurring in the Queenstown Lakes District (2010-2013) involving a 45-54 year-old in the key-vehicle-driver role, 7.1% have been overseas-licence-holders. By contrast, 45-54 year-olds make up a very small proportion of key-vehicle-overseas-licence-holder crashes, but a sizeable minority of non-overseas-licence-holder crashes.

The very low crash numbers among older tourists indicate that perhaps something else is going on. Very few crashes involve older tourists (aged 45 or over), compared with older locals.

Note that the Police typically indicate '*Irrelevant'* when the key vehicle is a bicycle because there is no key driver, only a key rider. Therefore, the demographics of the key driver are considered to be irrelevant. As a result, it is not surprising that crashes involving tourists in the key-vehicle-driver role are less likely to involve cyclists in that key-vehicle position. This finding is mainly an artefact of the way crashes have been classified for this analysis, and need not be interpreted in any great detail. Of all the crashes that have occurred in the Queenstown Lakes District (2010-2013), which incurred an injury, involved an unknown or irrelevant-aged driver (or rider) in the key-vehicle-driver role; 0% have been overseas-licence-holders.

1.1.1.7 Crash characteristics: What caused the crash?

Inexperience: Overseas

Finding: relative to non-tourist crashes, tourist crashes in the Queenstown Lakes District are closely associated with one or more migrants/tourists in the crash being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions.

A crash was categorised as *'Inexperience: Overseas*' if one or more parties in the crash was noted to be an overseas/migrant driver who failed to adjust to New Zealand road rules or road conditions (crash code 404). The evidence is strong (99.9%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are more likely to involve inexperience relating to unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Overall, 31.0% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions. By contrast, 2.3% of injury crashes involving a local-licence-holder in the key-vehicle-driver role were associated with unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions. This 2.3% is probably associated with migrants who have recently acquired a New Zealand licence (and thus whose crashes are classed in the 'non-tourist' category), or with crashes involving a local-licence-holder in the key vehicle and an overseas-licence-holder in the second or third vehicle. These crashes are classed as 'non-tourist' (because a local is in the key vehicle), but there may still be some small number of tourists involved in these 'non-tourist' crashes and thus contributing to the *Inexperience: Overseas*', described above.

5.4 Southland District

5.4.4 Summary

- Overall, 111 injury crashes in the Southland District from 2010-2013 involved a tourist driver (i.e. an overseas-licence-holder) in the key-driver role. This represents 20.9% of all injury crashes in the district.
- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist crashes remain stable (i.e. not increasing or decreasing strongly)**.**
- Tourist crashes happen during the day, in bright sunlight.
- Tourist crashes tend to disproportionately involve vans/utes.
- Tourist crashes take place midblock (particularly on curved sections of road).
- Tourist crashes are disproportionately common on SH 94.
- Tourist crashes disproportionately involve young adults (25-34 year-old age group).
- Tourist crashes disproportionately involve illegal movements (e.g. parking inappropriately or driving on the wrong side of the road), representing unfamiliarity with New Zealand road rules/road conditions.
- Tourists often crash on gravel roads.

Compared to non-tourist crashes in the Southland District, tourist crashes are more likely to:

- take place on Tuesdays and Fridays
- take place over the Easter holiday period
- take place during daytime hours (i.e. 10 am-4 pm)
- involve head-on collisions.
- involve a van or ute as the key vehicle (i.e. vehicle driven by the tourist)
- take place midblock
- occur on severe curves
- take place at un-signalised locations (i.e. in the absence of traffic-control devices such as give-way signs, traffic lights, etc.)
- occur on rural roads (roads with a speed limit of 80 km/h or higher)
- occur on unsealed sections of road
- take place on state highways (in particular, SH 94)
- take place in bright sunlight
- Involve 25-34 year-olds driving the key vehicle
- based on police opinion, involve one or more parties failing to keep left
- based on police opinion, involve one or more parties performing an illegal movement or manoeuvre, and/or parking or stopping inappropriately
- based on police opinion, involve one or more tourists/migrants being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions
- based on police opinion, be caused, partially or wholly, by slippery gravel on the road surface.

Compared with non-tourist driver crashes, tourist driver crashes are less likely to:

- take place on a Saturday or a Monday
- occur at night (10 pm-4 am)
- involve colliding with an obstruction on the road surface (e.g. parked or broken-down vehicle, etc.)
- involve an SUV/4x4 as the key vehicle (i.e. vehicle driven by the overseas-licence-holder)
- occur on straight sections of road
- take place at T-junctions or crossroads (X-junctions)
- occur at give-way signs or stop signs
- take place in darkness
- involve a 45-54 year-old driving the key vehicle
- involve one or more parties recording an alcohol level over the legal limit
- be associated with inattention on the part of one or more road users in the crash
- involve new-driver inexperience on the part of one or more motorists in the crash.

Each of the 12 factors listed above has been determined to be statistically significant at the 95% level or higher (i.e. we can be at least 95% confident that the factors listed represent a systematic difference between crashes involving a tourist driver (an overseas-licence-holder in the key-vehicle-driver role) and crashes involving a local-licence-holder in the key-vehicle-driver role, as opposed to random, chance variation). The list (above) should be interpreted to indicate that tourist crashes are very rare under these 12 conditions. For example, tourist crashes are very rare on Saturdays and Mondays.

5.4.5 Crash severity and trend

Findings:

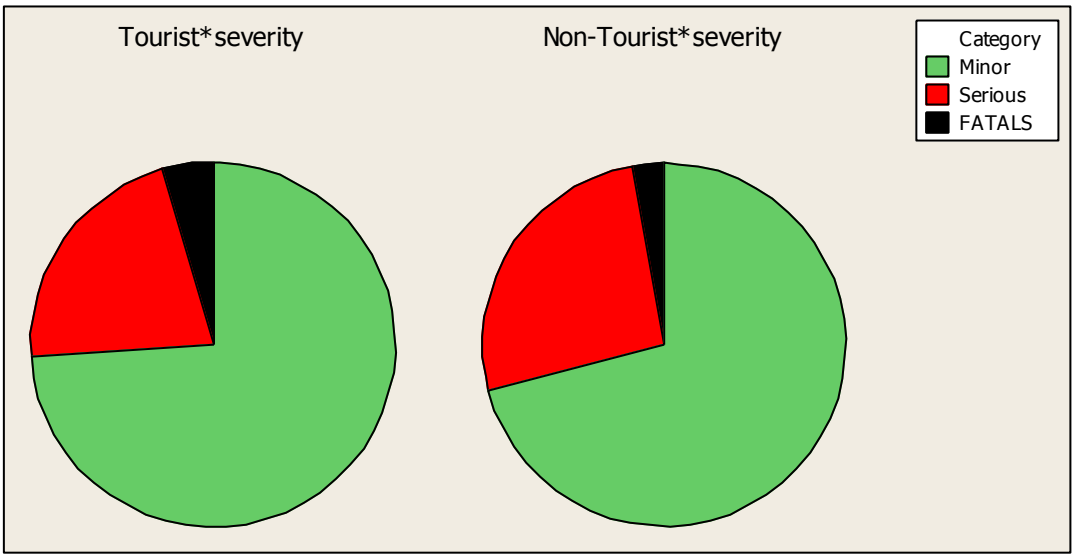
- Overall, 111 injury crashes in the Southland District from 2010-2013 involved an overseas-licence-holder in the key-driver role. This represents 20.9% of all injury crashes in the Southland District.
- There is no statistically significant difference in severity profile between tourist crashes and non-tourist crashes.
- Tourist crashes remain stable (i.e. neither increasing nor decreasing strongly)**.**

Figure 28 shows that the proportion of fatal, serious and minor crashes are very similar between tourists and non-tourists; any apparent difference is not likely to be representative of a real pattern, and can be attributed to random variation. There is no statistical evidence (χ^2 = 1.591, *p*-value > 0.1) that crashes involving overseas-licence-holders in the key-vehicle role ('tourist' crashes) are any more or less severe than crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Although the proportion of fatal crashes is higher among tourists (even if the difference is not statistically significant), this is unlikely to be representative of a real effect, regardless of statistical analysis. If there was an issue causing tourists to have more serious crashes on average, the proportion of serious crashes should also be higher among tourists. However,

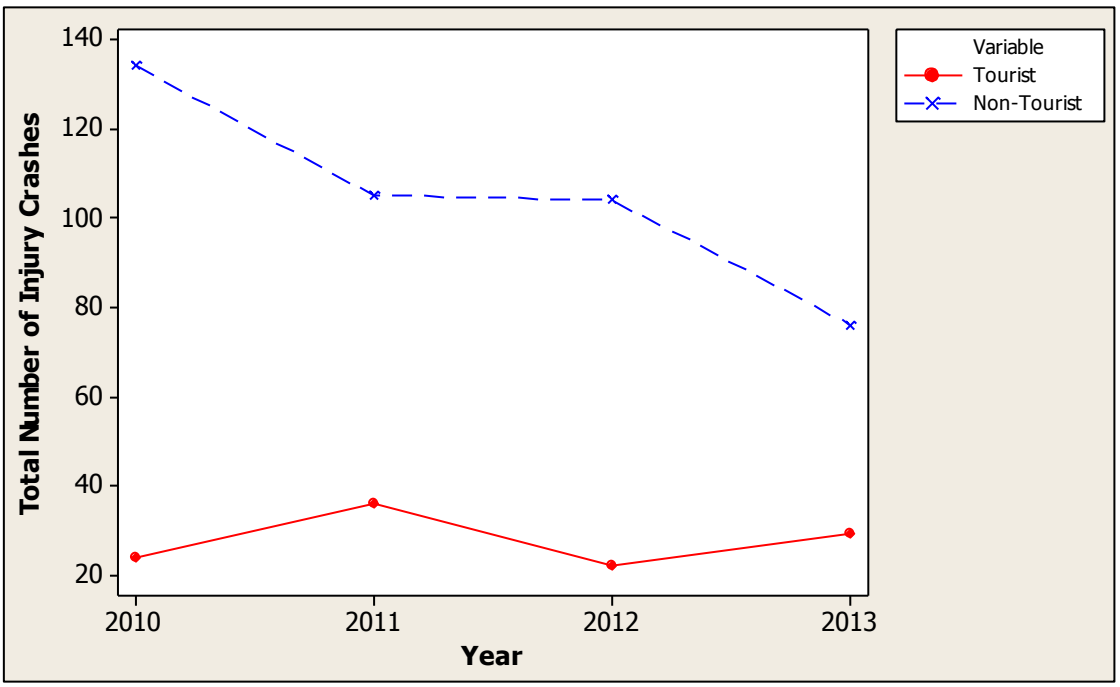
this is not the case. (Specifically, 21.6% of injury crashes involving tourists in the key-vehicle role are classed as 'serious', compared to 26.3% of injury crashes involving locals in the key-vehicle role.)

Figure 28 **Comparative severity of tourist- and non-tourist-injury crashes in the Southland District (2010-2013)**



There is evidence (95.0%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) have followed a different trend over the 2010-2013 period, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). Specifically, crashes involving tourists have followed an unusual pattern, as shown in Figure 29; they made up a small proportion of all injury crashes in Southland District in 2010 (15.2%) and 2012 (17.5%), but made up a much larger proportion of injury crashes in 2011 (25.5%) and 2013 (27.6%).

Figure 29 **Annual trend in the number of tourist- and non-tourist-injury crashes in the Southland District (2010-2013)**



It is difficult to determine from this finding whether tourist crashes are beginning to play a major role in the Southland District crash record. The question becomes: Which years are the anomaly? If 2011 and 2013 were unusual years for tourism, then the proportion of injury crashes involving tourists is not increasing dramatically; on the other hand, if 2012 were the anomalous year, then the proportion of injury crashes involving tourists is rising substantially in the district.

Regardless of which year was the anomaly, Figure 29 clearly shows that while non-tourist crashes are heavily decreasing, tourist crashes are remaining stable. Note that the numbers for 2013 (for both tourist and non-tourists) are likely to be slightly lower than actual values since this dataset was obtained while late-year crashes from 2013 (November and December) were still being processed by the Police and NZTA staff.

5.4.6 Themes

Seven statistically significant themes stood out in the analysis of data for the Southland District:

- Tourist crashes happen during the day, in bright sunlight.
- Tourist crashes tend to disproportionately involve vans/utes.
- Tourist crashes take place midblock (particularly on curved sections of road).
- Tourist crashes are disproportionately common on SH 94.
- Tourist crashes disproportionately involve young adults (25-34 year-old age group).
- Tourist crashes disproportionately involve illegal movements (e.g. parking inappropriately or driving on the wrong side of the road), representing unfamiliarity with New Zealand road rules/road conditions.
- Tourists crash often on gravel roads.

1. Tourist crashes happen during the day, in bright sunlight.

There is extremely strong evidence (99.9%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to take place at different times of day, and under different lighting conditions, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

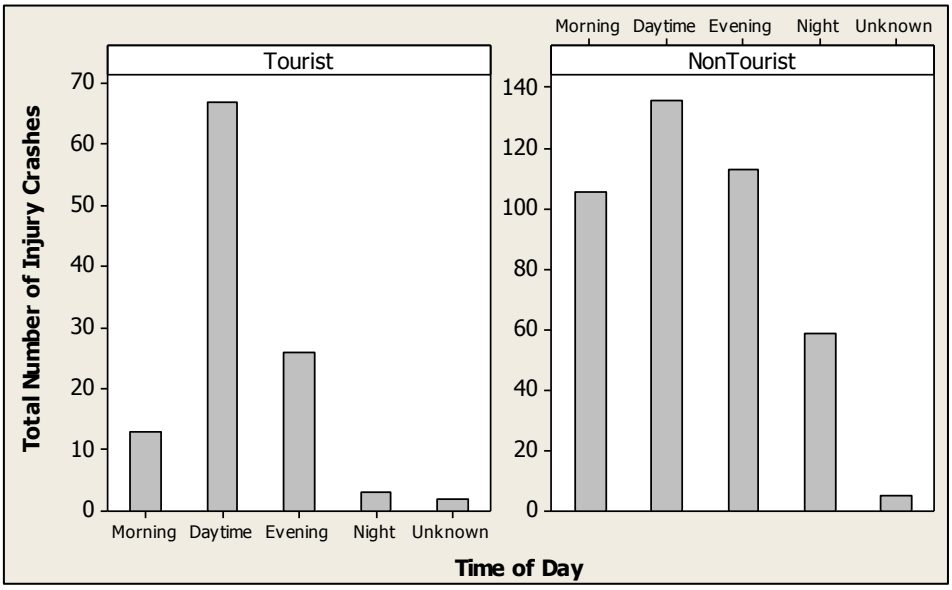
Crashes involving tourists and non-tourists are evenly split in the morning (4 am-9:59 am) and evening (4 pm-9:59 pm). 33.0% of injury crashes occurring during the day (10 am-3:59 pm) have involved tourists in the key-vehicle-driver role, as Figure 30 shows. However, 4.8% of injury crashes occurring during the night (10 pm-3:59 am) have involved tourists in the key-vehicle-driver role.

Although most tourist crashes occur during the daytime, non-tourist crashes are more evenly spread throughout the day, with a sizeable minority taking place at night (10 pm-3:59 am). 32% of local-licence-holder crashes have taken place between 10 am and 4 pm.

This means that tourist crashes are not typically caused by poor visibility associated with night-time driving, or other factors such as alcohol and fatigue, which are also associated with night-time driving.

It is possible that tourists do the bulk of their driving between 10 am and 4 pm, but locals are also likely do the bulk of their driving during this period as well. The crash rates are very different however, as shown in Figure 30. In addition, further analysis indicates that tourists tend to crash during bright sunlight at a far higher rate than locals.

Figure 30 **Comparative incidence of tourist and non-tourist-injury crashes in the Southland District (2010-2103), by time of day**



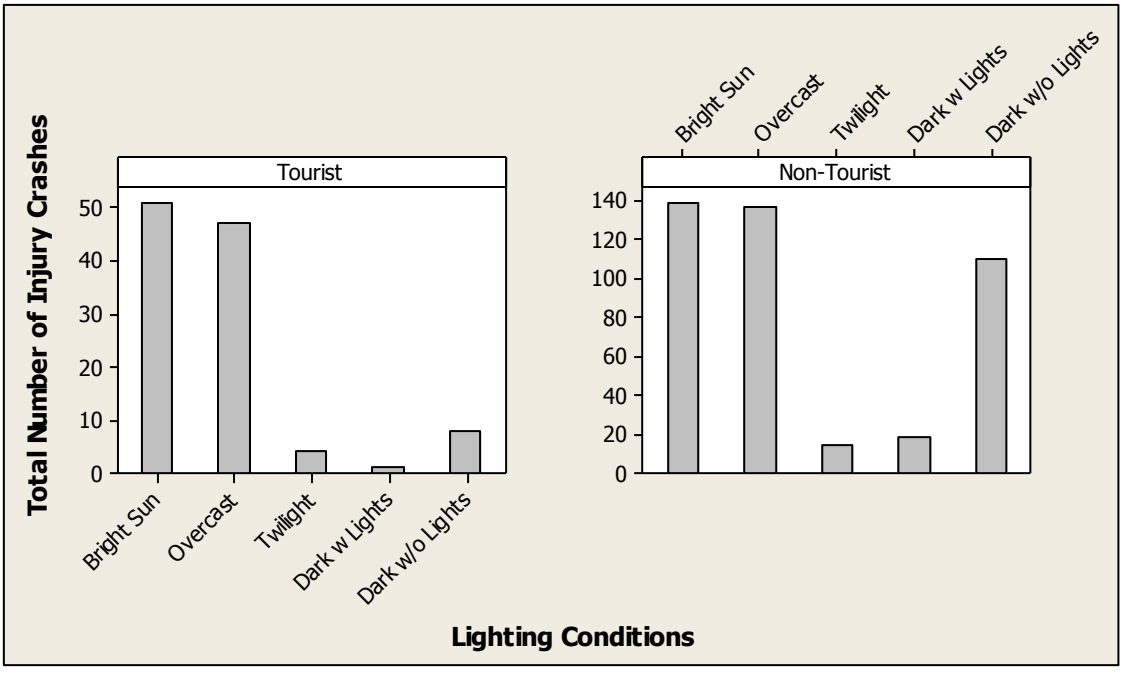
The evidence is extremely strong (99.9%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to occur under different lighting conditions to crashes that do not involve overseas-licence-holders in this role ('non-tourist' crashes).

Crashes involving tourists and non-tourists in the Southland District are evenly split across overcast and twilight conditions; bright sunlight is the exception, where a much higher proportion of injury crashes involve tourists in the key-vehicle-driver role. As to darkness (either lit or unlit by artificial lighting), a much smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

5.0% of injury crashes taking place in darkness (with streetlights) in the Southland District (2010-2013) involved a tourist in the key-vehicle-driver role. Similarly, just 6.8% of injury crashes taking place in darkness (without streetlights) involved a tourist in the key-vehicle-driver role. By contrast, 26.8% of injury crashes taking place in bright sunlight involved a tourist in the key-vehicle-driver role.

Figure 31 shows that tourists tend to experience a high proportion of their crashes in bright sunlight; by contrast, non-tourists are more split, with an equal number of crashes taking place in bright sunlight, overcast conditions and darkness (in the absence of street lighting).

Figure 31 **Comparative incidence of tourist- and non-tourist crashes in the Southland District (2010-2013), in different lighting conditions**



2. Tourist crashes in Southland District tend to disproportionately involve vans/utes.

As Figure 32 shows, most injury crashes have involved tourists driving cars (or station wagons), a large proportion of which will presumably be rental cars. Most injury crashes involving local-licence-holders have also involved cars/station wagons (see Figure 33). However, a large minority of tourist crashes have involved the tourist driving a van (or ute).

It is possible that tourists tend to drive vans and utes more than local New Zealand-licence-holders. This seems unlikely in such a large rural district however (further research is needed to answer this question). It is also possible that tourists crash more often in campervans compared with local New Zealanders, perhaps because they are not comfortable driving a larger vehicle on New Zealand roads.

Figure 32 **Type of vehicle involved in the injury crashes in the Southland District (2010-2013), which involved an overseas-licence-holder driving**

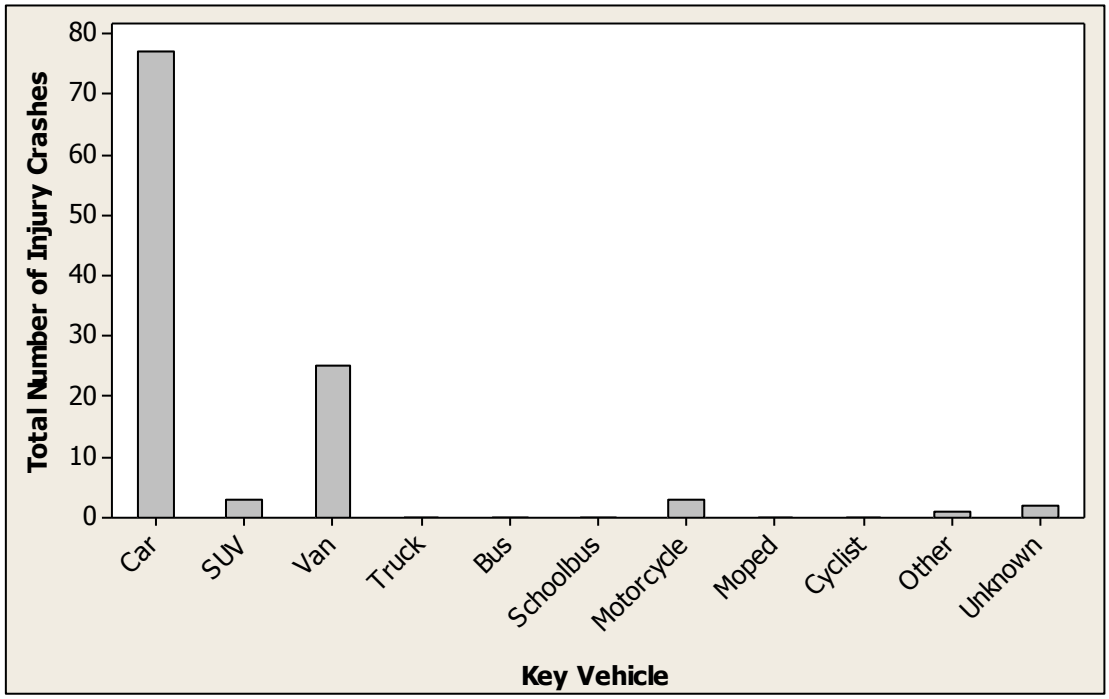
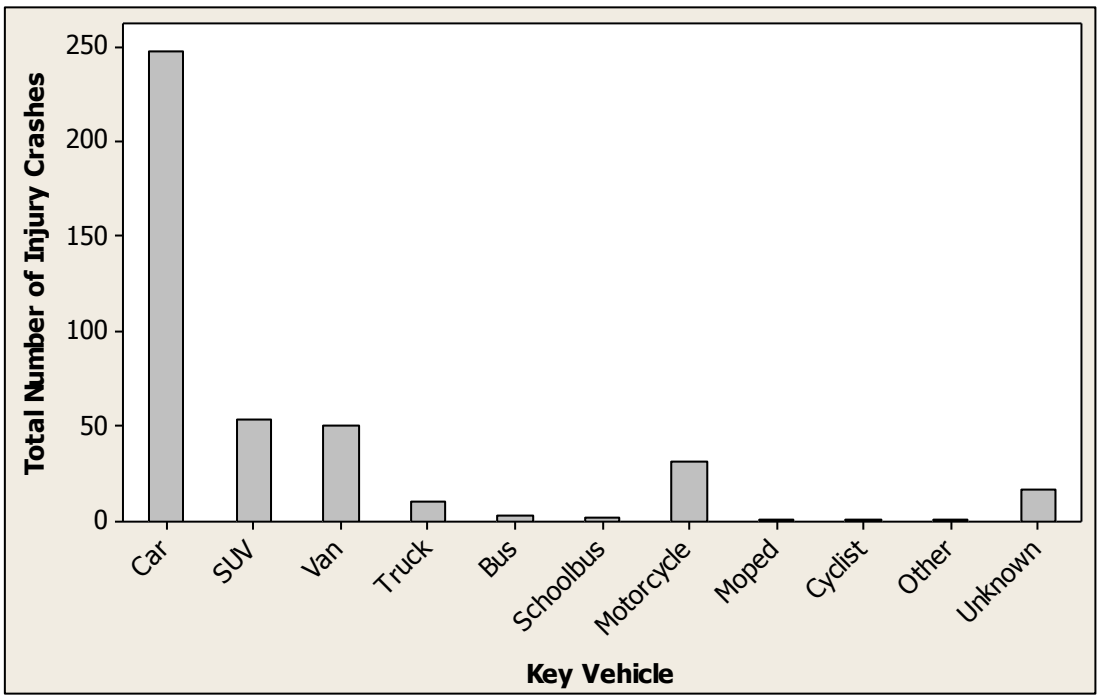


Figure 33 **Type of vehicle involved in the injury crashes in the Southland District (2010-2013), which did not involve an overseas-licence-holder driving**



3. Tourist crashes in the Southland District take place midblock, particularly on curved sections of road.

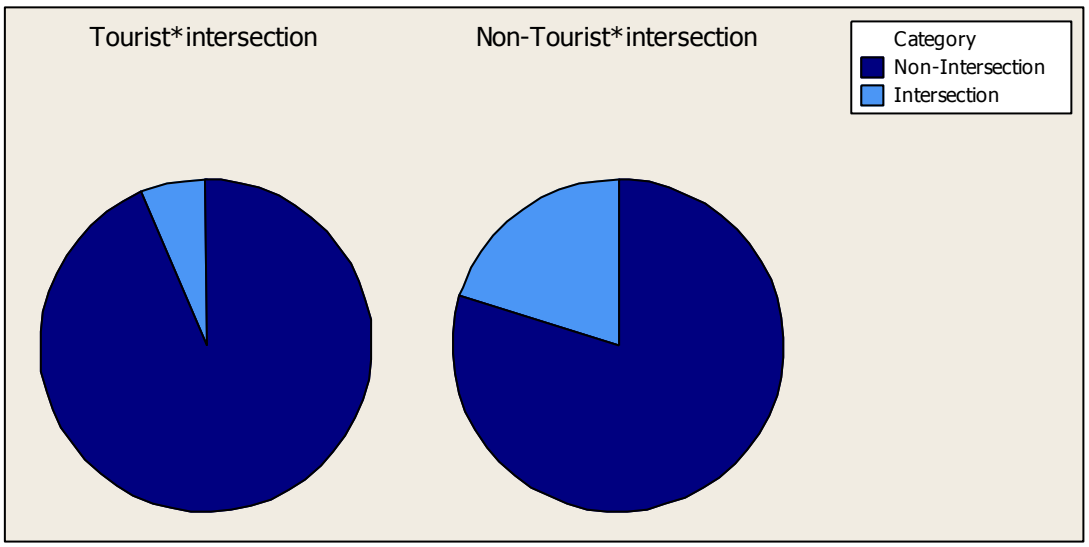
Relative to non-tourist crashes, tourist crashes are closely associated with midblock locations (see Figure 34). Tourist crashes in this district tend not to take place on straight sections of road, but on severe curves (see Figure 35).

The evidence is extremely strong (99.9%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to possess a different intersection crash rate to crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). Specifically, over the 2010-2013 period, 94% of injury crashes involving overseas-licence-holders in the key-vehicle-driver role in the Southland District took place midblock. By comparison, only 80% of injury crashes involving local-licence-holders occurred midblock.

6.3% of the Southland District's injury crashes involving tourists in the key-vehicle-driver role (2010-2013) have taken place at an intersection; by contrast, 20.0% of the injury crashes that have not involved tourists in the key-vehicle-driver role have taken place at an intersection.

This pattern could be attributed to where tourists tend to drive compared to locals (i.e. they happen to drive routes with fewer intersections than locals do). It could also be an indication that tourists have more difficulty with midblock locations than at intersections. In particular, compared to locals, tourists are especially unlikely to crash at T-junctions or crossroads (X-junctions): See Figure 48.

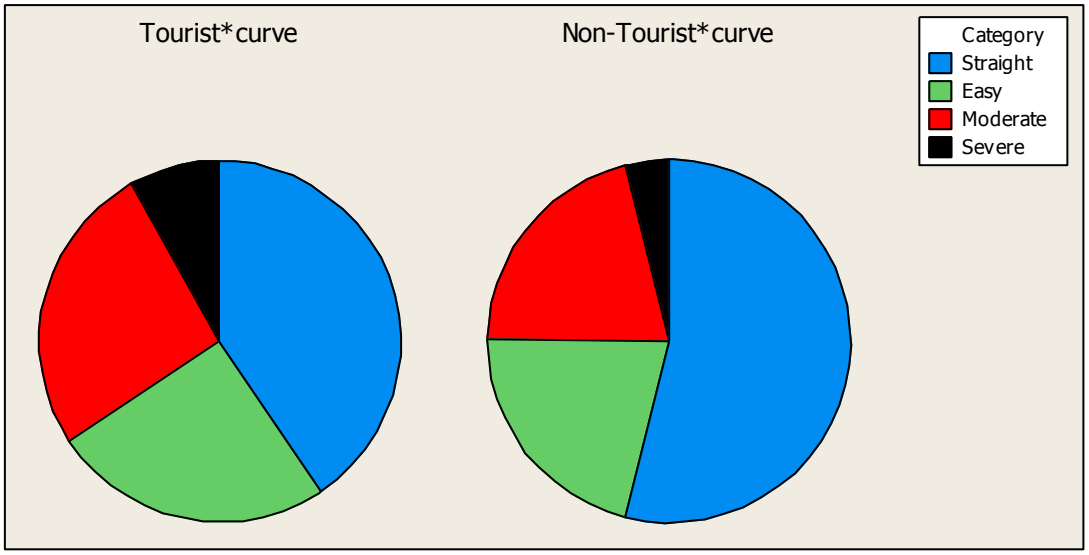
Figure 34 **Comparative incidence of tourist- and non-tourist-injury crashes in the Southland District (2010-2013), at intersections, or not (i.e. mid-block)**



These findings raise the question of why tourists crash so much at midblock locations, compared to locals. Further investigation would be needed to determine whether it is related to where they tend to drive (i.e. tourists tend to drive routes without many intersections and high numbers of curves), or whether tourists find intersections easier to navigate than midblock, curved-sections of road.

There is evidence (95.0%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to take place on curved sections of road, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). The severity of the road's curvature is determined by the Police at the crash scene. Police categorise the section of road where the crash occurred as either '*Straight'*, *'Easy curve'*, *'Moderate curve* or '*Severe curve'*.

Figure 35 **Comparative incidence of tourist- and non-tourist-injury crashes in the Southland District (2010-2013), on different degrees of road curvature**



The pie chart in Figure 35 shows that the proportion of tourist-injury crashes that take place on easy and moderate curves is very similar to the proportion of non-tourist-injury crashes taking place on easy and moderate curves (i.e. easy and moderate curves pose a similar problem for tourists and non-tourists). The biggest difference is notably with 'severe-curve' crashes; a sizeable minority of tourist crashes take place on severe curves, whereas severe curves hardly register as an issue among non-tourist crashes. By contrast, tourists do not seem to crash often on straight sections of road, relative to non-tourists; straight-road crashes among non-tourists actually make up most of all injury crashes, but do not reach this threshold among tourists.

Specifically, 36.0% of injury crashes taking place on severe curves in the Southland District (2010-2013) have involved a tourist in the key-vehicle-driver role. Only 16.6% of injury crashes taking place on straight sections of road have involved a tourist in the key-vehicle-driver role.

4. SH 94 is particularly susceptible to tourist crashes.

More injury crashes involving overseas-licence-holders in the key-vehicle-driver role take place on SH 94 than on the Southland District's entire local-road network (see Figure 35). Specifically, 44% of all injury crashes involving overseas-licence-holders in the key-vehicle driver role in the Southland District over the 2010-2013 period have taken place on SH 94. By comparison, 12% of injury crashes involving local-licence-holders have taken place on SH 94.

The evidence is strong evidence (99.9%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to take place on different state highways, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). While the proportion of tourist and non-tourist crashes on most state highways in Southland is relatively constant, SH 94 has a much higher proportion of tourists involved in injury crashes. (See Figures 36 and 37, noting that these figures refer to key-vehicle drivers only.)

Overall, 20.9% of injury crashes in the Southland District involve tourists in the key-vehicle-driver role. However, 49.0% of injury crashes taking place on SH 94 in the Southland District (2010-2013) have involved a tourist in the key-vehicle-driver role.

Over the 2010-2013 period, more injury crashes involving overseas-licence-holders in the key-vehicle-driver role have taken place on the Southland District's portion of SH 94 than throughout the whole of the district's local-road network.

Figure 36 **Number of injury crashes on each state highway in the Southland District (2010-2013), involving an overseas-licence-holder driving**

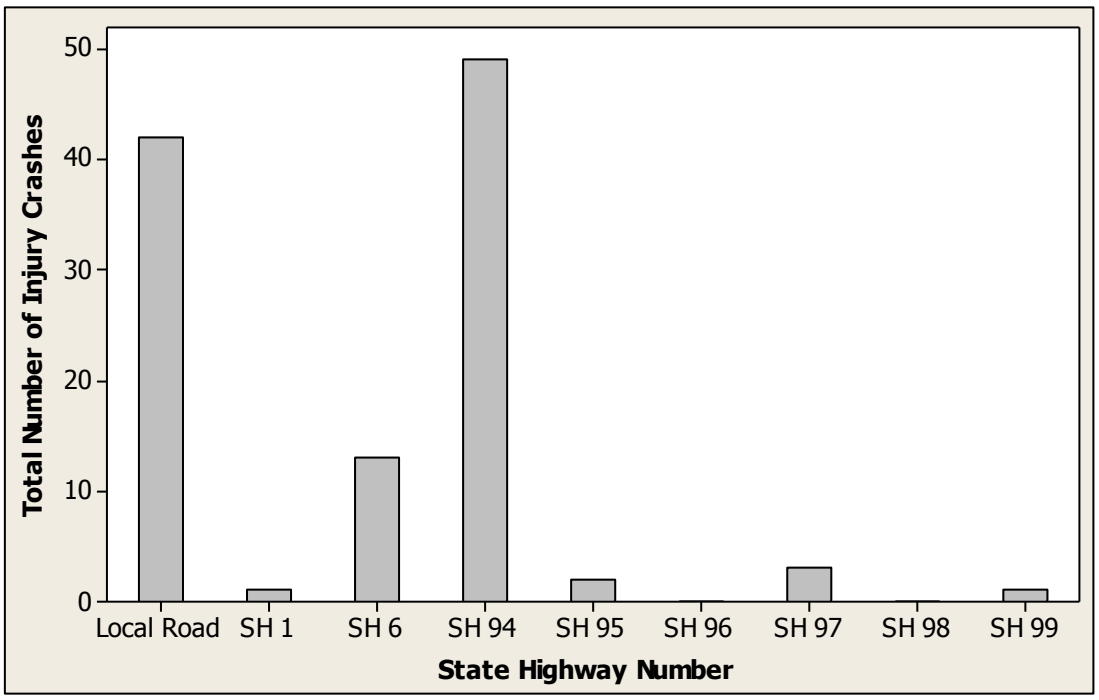
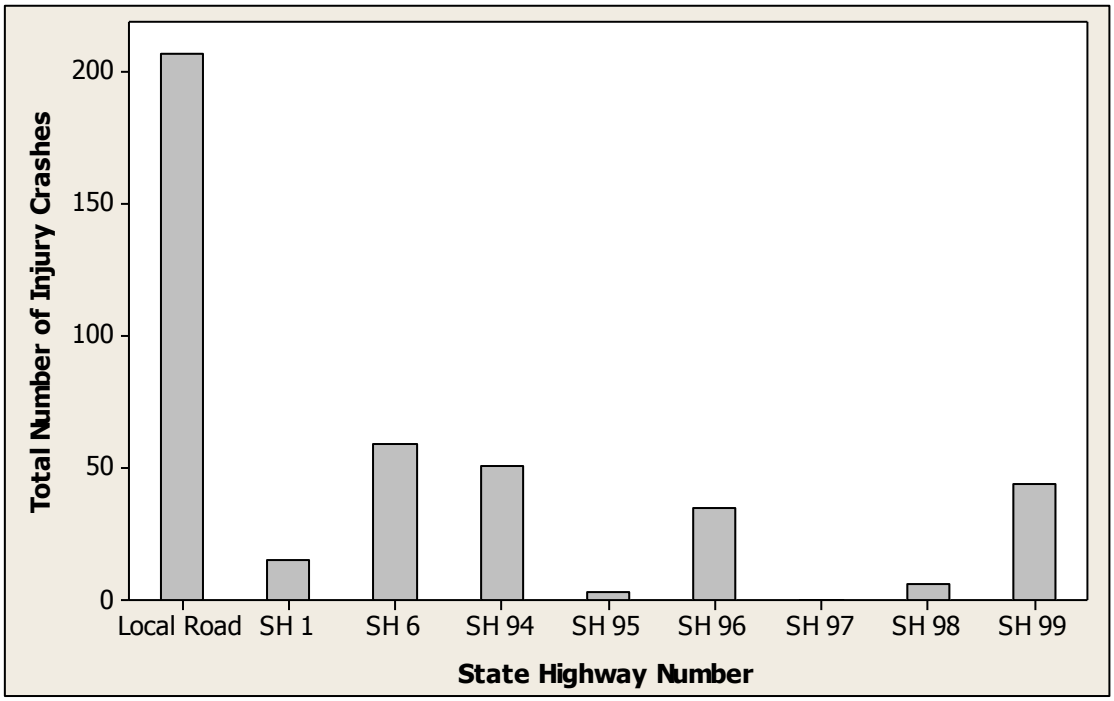


Figure 37 **Number of injury crashes on each state highway in the Southland District (2010-2013) that did not involve an overseas-licence-holder driving**



This could be partly due to where tourists tend to drive. SH 94 is a scenic route, linking two major tourist destinations (Te Anau and Milford Sound). It is not surprising that so many

tourists crash on this state highway. Given that this seems to be such a problem for tourists, it is likely that SH 94 also has other features that prove difficult for tourists to navigate.

Obviously, tourists tend to travel on SH 94 more than locals, but the question remains as to whether there are sections of the route that are particularly difficult for tourists to navigate and that could be targeted for upgrades.

5. Tourists tend to crash while they are young adults (25-34 years old) (and relative to locals, do not typically involve the 45-54 year-old age group).

The evidence to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve younger key-vehicle drivers than crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes) is strong (99.5%). Although the distribution of tourist and non-tourist crashes is evenly spread throughout most age groups, injury crashes involving 25-34 year-olds in the key-vehicle-driver role are the exception. This age group shows a much higher proportion of tourists in the key-vehicle-driver role. With respect to crashes involving 45-54 year-olds in the key-vehicle-driver role, a much smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

Figure 38 shows that although, as is often the case in road safety, the 15-24 year-old age group is over represented in traffic crashes, the 25-34 year-old age group is not far behind for tourists. This is a starkly different scenario to that shown in Figure 39, where, among the local-licence-holder crashes, crash rates drop off dramatically after the 15-24 year-old age group.

Specifically, of all the Southland District injury crashes (2010-2013) involving a 25-34 year-old in the key-vehicle-driver role, 33.0% have been overseas-licence-holders. By contrast, of all the Southland District crashes causing injury (2010-2013) involving a 45-54 year-old in the key-vehicle-driver role, 7.6% have been overseas-licence-holders. Note that the bar graphs (below) refer to key-vehicle-drivers only.

Figure 38 **Age of driver involved in injury crashes in the Southland District (2010-2013) that involved an overseas-licence-holder driving**

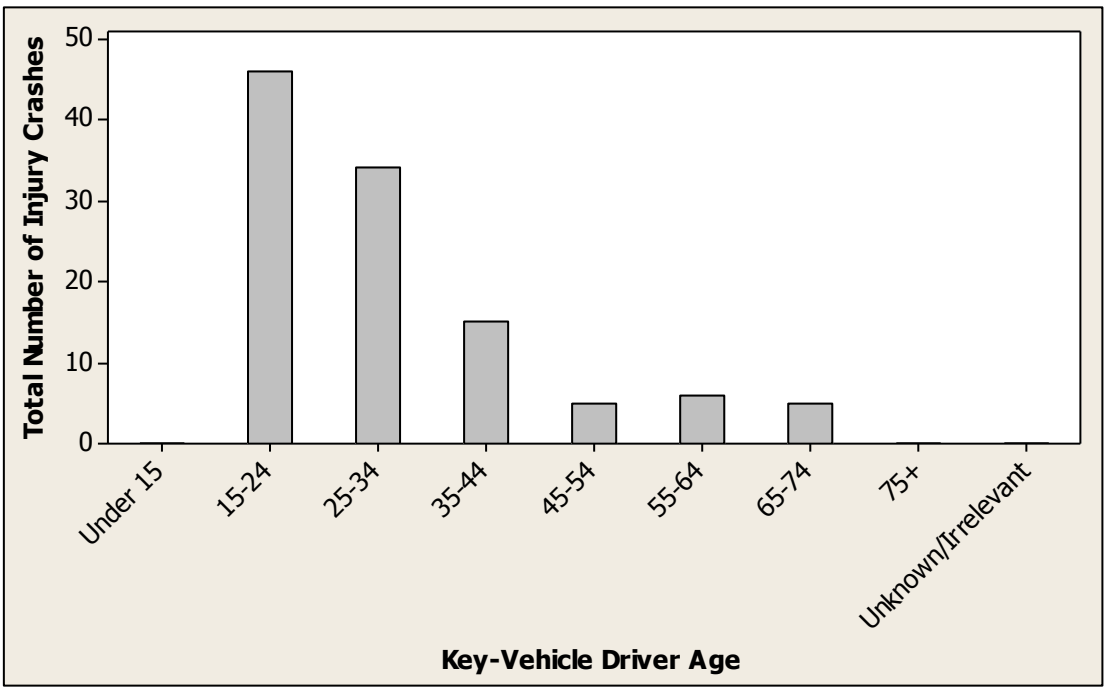
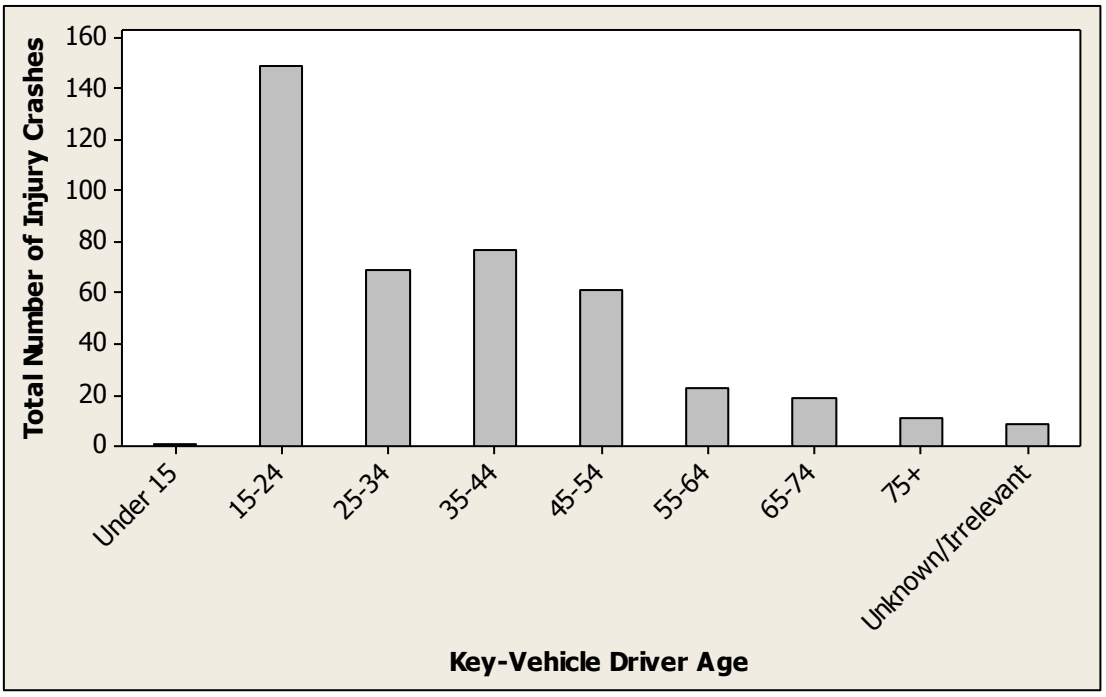


Figure 39 **Age of driver involved in injury crashes in the Southland District (2010-2013) that did not involve an overseas-licence-holder driving**



The low-crash numbers among older tourists could suggest that something else is going on. Very few crashes involve older tourists (aged 45 or over), compared with locals. As with the Queenstown Lakes District, this raises the question of whether older tourists are more competent on New Zealand roads, beyond the usual decline in crash rate associated with middle-aged drivers (that we see in the local-road graph). In other words, is there something

about younger tourists that makes them particularly susceptible to crashing on our roads, given that older tourists seem to navigate the New Zealand road system with much more success?

6. Tourists crash to a disproportionate extent while making an illegal movement.

There is strong evidence (99.9%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are more likely to involve one or more parties performing an illegal movement or manoeuvre, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). A crash was classified as a '*Forbidden movement'* if one or more parties in the crash was driving or riding on the footpath (crash code 204); was on incorrect side of the road, island or median (crash code 205); was driving a motor vehicle in the cycle lane (crash code 208); was riding, as a cyclist, on a pedestrian crossing/pedestrian signals (crash code 210); or was parked or stopped inappropriately (crash code 440).

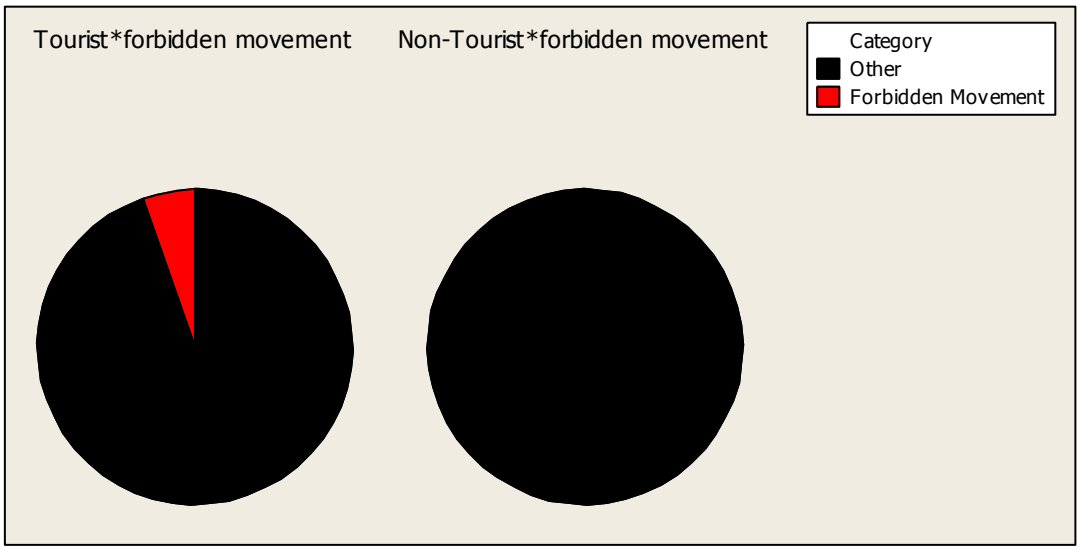
Figure 40 indicates that tourists tend to crash while engaging in these behaviours much more often than non-tourists. This may be an education issue; many tourists may be unaware that these behaviours are illegal (for example, a visitor to New Zealand may not understand that driving in the cycle lane is forbidden, and certainly may not be aware of the intricacies of parking laws in New Zealand).

Relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with one or more parties performing an illegal movement or manoeuvre, and/or parking or stopping inappropriately.

Overall, 5.4% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties performing an illegal movement or manoeuvre and/or parking or stopping inappropriately. By contrast, 0.2% of injury crashes not involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties performing an illegal movement or manoeuvre and/or parking or stopping inappropriately.

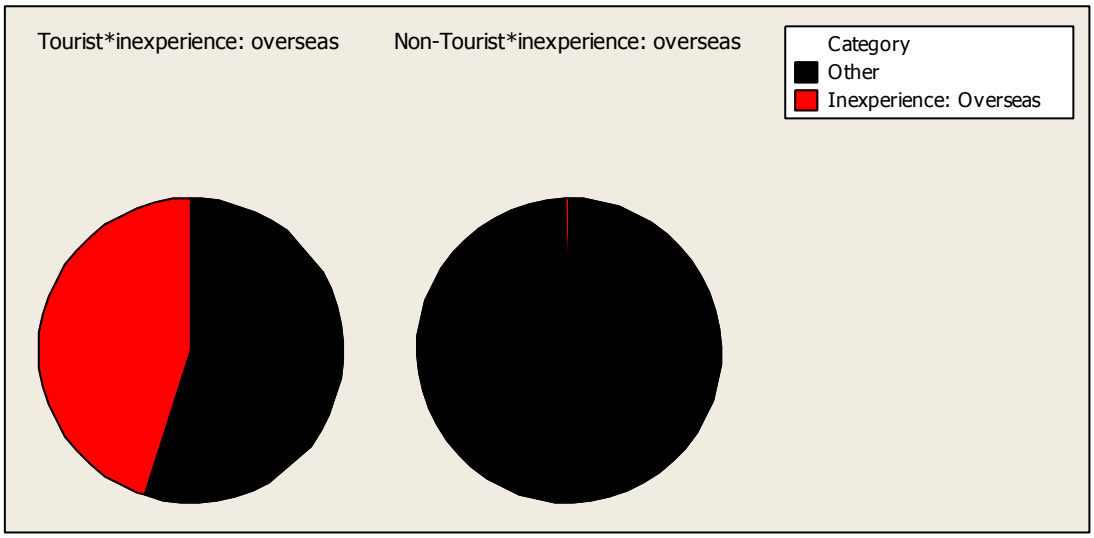
Note that although the right pie chart in Figure 40 appears completely solid, there is a sliver of red representing a single non-tourist crash that involved a forbidden movement. Due to that one crash only representing such a small proportion of all non-tourist crashes, it is not visible in Figure 40.

Figure 40 **Comparative incidence of tourist and non-tourist crashes in the Southland District (2010-2013), which are associated with the driver undertaking a forbidden movement**



To support the idea that tourists are not educated adequately about New Zealand road rules, Figure 41 shows crashes associated with '*Overseas: Inexperience'* (as determined by the Police).

Figure 41 **Comparative incidence of tourist- and non-tourist-injury crashes in the Southland District (2010-2013), in which inexperience was judged a factor**



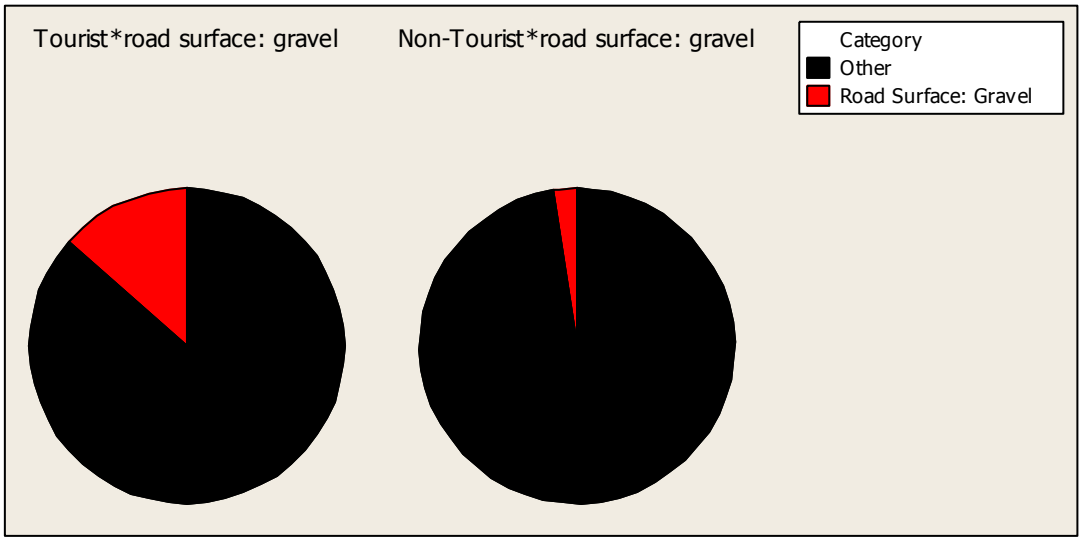
'*Overseas: Inexperience'* in this context includes crashes where a tourist in the crash was unfamiliar with, or poorly adjusted to, New Zealand road rules and/or road conditions. While this topic is broad, it does indicate that education on specific road rules (e.g. parking laws) and/or road conditions (e.g. gravel roads, or specific information on State Highway 94) may be a viable intervention strategy.

7. Tourists often crash on gravel roads.

Relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with slippery gravel on the road surface at the crash site. There is strong evidence (99.9%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist] crashes) are more likely to involve a slippery-road surface associated with gravel, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). '*Road surface: Gravel'* in this context refers to crashes caused wholly or partially by gravel on the road surface (as determined by the Police at the crash scene (crash code 813).

As Figure 42 shows, tourists experience a much higher proportion of crashes caused by gravel roads, compared to locals. Overall, 13.5% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with a slippery-gravel road surface; by contrast, 2.4% of injury crashes not involving an overseas-licence-holder in the key-vehicle-driver role were associated with a slippery-gravel-road surface.

Figure 42 **Comparative incidence of tourist- and non-tourist crashes in the Southland Districts (2010-2013) on gravel roads, and on other road surfaces**



Relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with unsealed roads, as shown in Figure 43. Specifically, 23.4% of injury crashes involving an overseas-licence-holder as the key-vehicle-driver in the Southland District (2010-2013) have taken place on unsealed roads. By contrast, 12.9% of injury crashes not involving an overseas-licence-holder as the key-vehicle-driver have taken place on unsealed roads.

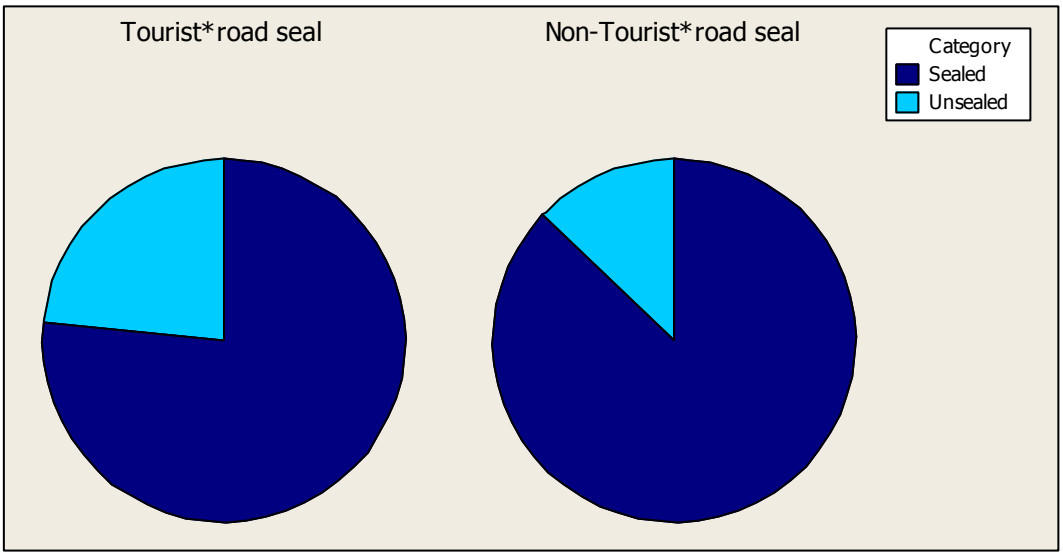
This evidence that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) frequently occur on unsealed sections of road, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes), is strong (99.0%).

This may also be an issue to do with education; gravel roads are relatively uncommon overseas, and many tourists may not have experienced driving on a gravel road before visiting New Zealand. It is unlikely to be related to exposure (if anything, locals are likely to

drive on more gravel roads than tourists, given the number of gravel roads in the Southland District that are not tourist routes but are driven frequently by locals).

The friction on a gravel road can be very low, meaning that driving fast can be dangerous; many locals will be aware of this and compensate by lowering speed and driving carefully. However, for those who are unfamiliar with gravel roads, driving at speed can appear deceptively safe, which may help to explain the high-crash rate on gravel roads among tourists shown in Figure 42.

Figure 43 **Comparative incidence of tourist- and non-tourist crashes on sealed and unsealed roads in the Southland District (2010-2013)**



5.4.7 Crash characteristics and factors

1.1.1.8 Timing

Day of week

Findings:

- Relative to non-tourist crashes, tourist crashes in the Southland District are more likely to occur on Tuesdays and Fridays.
- Relative to non-tourist crashes, tourist crashes are less likely to occur on Saturdays and Mondays.

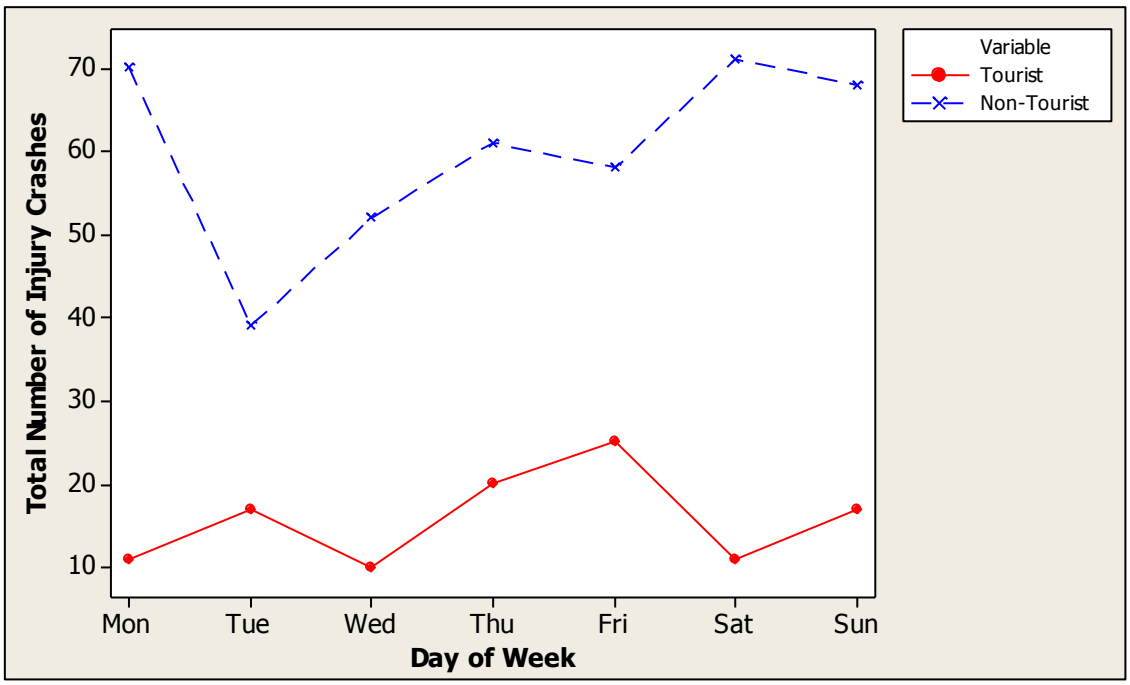
There is evidence (95.0%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to take place on different days of the week, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

These findings indicate that crashes involving tourists and non-tourists are evenly split throughout the middle of the week (Wednesday-Thursday) and on Sundays. However, on Saturdays and Mondays, tourists make up a very small proportion of total-injury crashes in the district; and on Fridays and Tuesdays, they make up a high proportion of total-injury crashes.

30.4% of injury crashes occurring on a Tuesday in the district (2010-2013) have involved tourists in the key-vehicle driver role; and 30.1% of injury crashes occurring on a Friday have involved tourists in the key-vehicle-driver role. By contrast, 13.6% of injury crashes occurring on a Monday have involved tourists in the key-vehicle-driver role; and 13.4% of injury crashes occurring on a Saturday have involved tourists in the key-vehicle-driver role.

Note that the two lines in Figure 44 are similar across the Wednesday-Thursday period. Relative to the non-tourist data line, the tourist data line shows notable peaks on Tuesday and Friday, and sizeable troughs on Saturday and Monday.

Figure 44 **Number of tourist- and non-tourist-injury crashes in the Southland District (2010-2013), by day of the week**



Holiday period

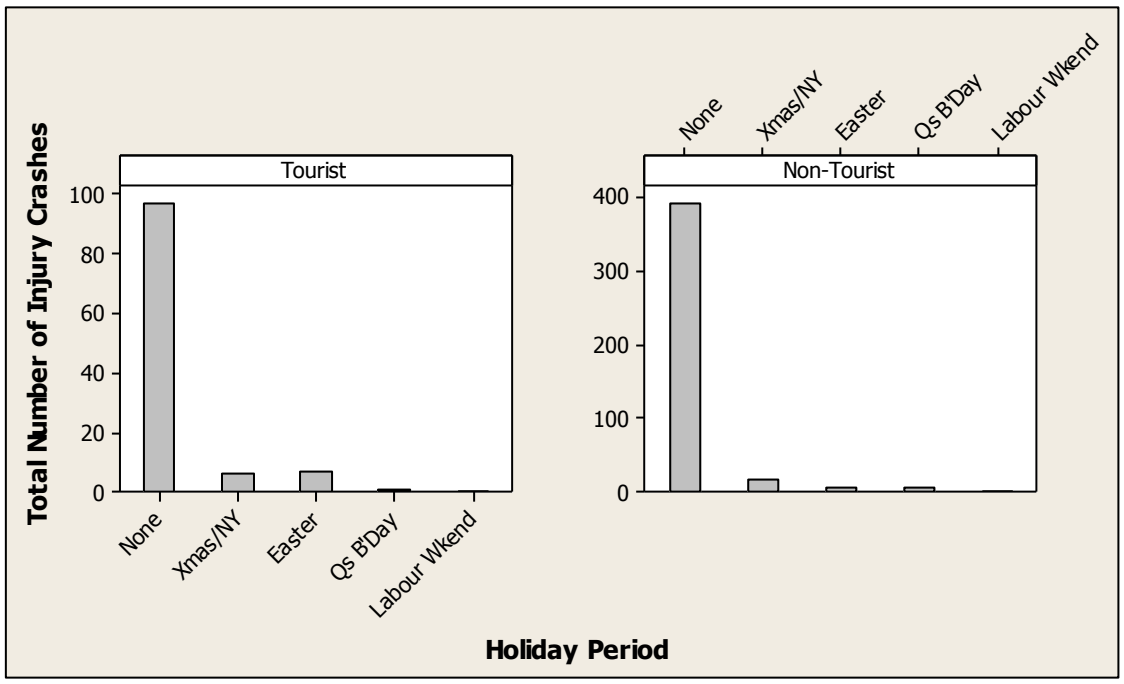
Finding: relative to non-tourist crashes, tourist crashes are closely associated with the Easter holiday period.

There is some evidence (95.0%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to take place during different holiday periods, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

This finding indicates that crashes involving tourists and non-tourists across holiday periods are evenly split; however, over Easter, a much higher proportion of injury crashes involve tourists in the key-vehicle-driver role. Overall, 20.9% of injury crashes involve tourists in the key-vehicle-driver role. However, 53.8% of injury crashes occurring over Easter in Southland District (2010-2013) have involved tourists in the key-vehicle-driver role.

Figure 45 indicates that tourist crashes are particularly prominent over Easter; in 2010-2013, more tourists (in the key-vehicle-driver role) have crashed over Easter than over the Christmas/New Year holiday period.

Figure 45 **Comparative incidence of tourist- and non-tourist-injury crashes in Southland District (2010-2013), during different holiday periods**



1.1.1.9 Crash characteristics

Movement type

Findings

- Relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with head-on collisions.
- Relative to non-tourist crashes, tourist crashes do not typically involve a collision with an obstruction (e.g. parked or broken-down vehicle, etc.).

There is significant evidence (97.5%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve different sorts of movements just before the crash, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Figure 46 **Injury crashes in the Southland District (2010-2013), involving an overseas-licence-holder driving, by movement type**

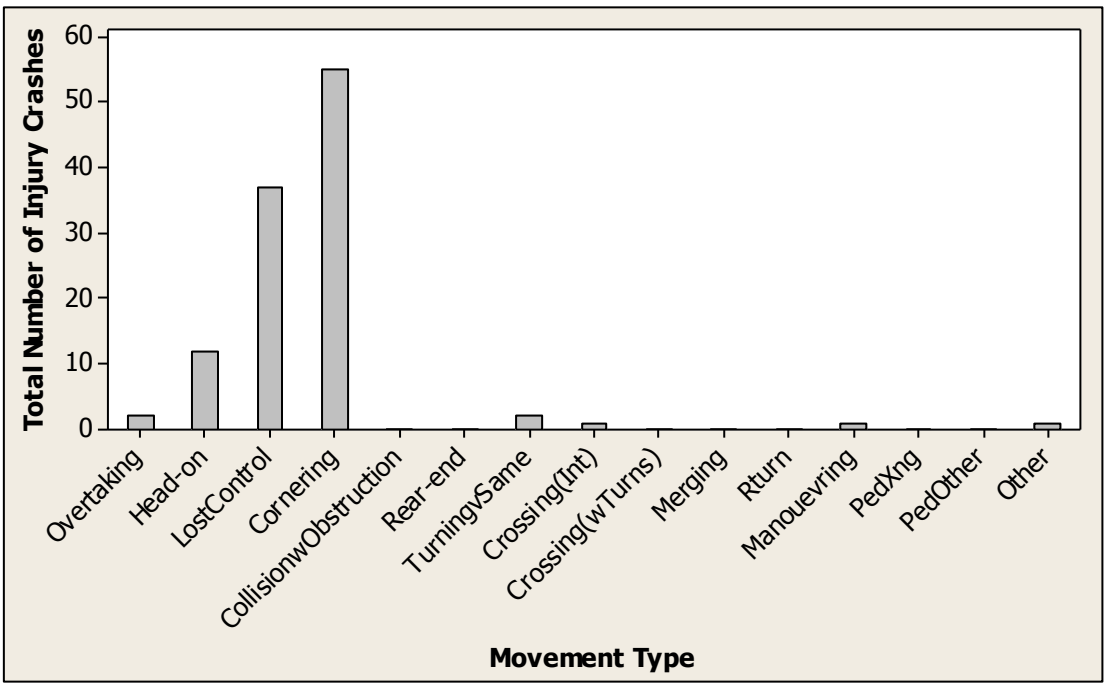
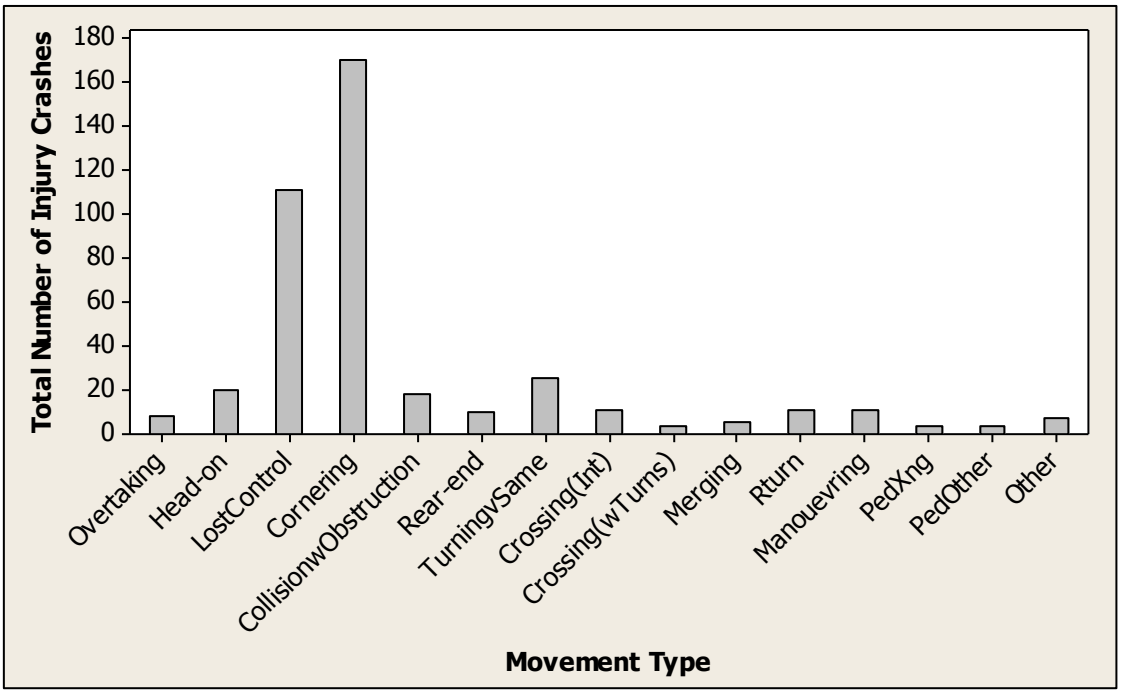


Figure 47 **Injury crashes in the Southland District (2010-2013) that did not involve an overseas-licence-holder driving, by movement type**



Figures 46 and 47 show the 15 movement types identified by the Police: '*Overtaking'* (and lane change), *'Head-on'*, *'Lost control'* (on a straight section), *'Cornering;* (on a bend), *'Collision'* (with obstruction of some kind), *'Rear-end'*, *Turning versus same direction'* (i.e. crash involved two vehicles on the same side of the road, with one or both attempting to turn, often resulting in a sideswipe crash), *'Crossing' (no turns)* (i.e. side-impact crash),'C*rossing' (vehicle turning)* (i.e. crash involved at least one vehicle turning, usually at an intersection),

'*Merging'*, *Right-turn against'* (i.e. making a right turn against the flow of through traffic),*'Manoeuvring'* (crash during complex manoeuvre e.g. parking, U-turn), *'Pedestrian crossing road'*, *'Pedestrian other'* (crash involved pedestrian **not** crossing the road, e.g. on footpath or leaving vehicle) and *'Miscellaneous'*.

These findings indicate that crashes involving tourists and non-tourists are evenly split across most movement types; the exception is head-on collisions, where a much higher proportion of injury crashes involve tourists in the key-vehicle-driver role. With respect to crashes involving one or more parties hitting some sort of obstruction, a much smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

37.5% of injury crashes involving a head-on collision in the Southland District from 2010-2013 have involved a tourist in the key-vehicle-driver role. By contrast, 0% of injury crashes involving a collision with some sort of obstruction have involved tourists in the key-vehicle-driver role.

The obvious difference between Figures 46 and 47 involves '*Head-on*' and '*CollisionwObstruction*'. A sizeable minority of injury crashes involving tourists as the key-vehicle driver are head-on crashes. However, head-on crashes barely feature among non-tourists. By way of contrast, no injury crashes involving tourists as the key-vehicle driver were associated with a collision with an obstruction of some kind. However, this crash type makes up a notable minority of non-tourist crashes.

Note, Figures 46 and 47 refer to key-vehicle drivers only.

Key vehicle

Findings:

- Relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with vans (or utes) as the key vehicle.
- Relative to non-tourist crashes, tourist crashes do not typically involve SUVs/4x4s as the key vehicle.

There is powerful evidence (99.5%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to involve different key vehicles, compared with crashes that do not involve overseas-licence-holders in the key-vehicle driver role ('non-tourist' crashes).

On figures 32 and 33 earlier in this section, there are eleven vehicle types identified : '*Car'* (or station wagon), '*SUV'* (or 4x4), '*Van'*, '*Truck'*, '*Bus'*, *'Schoolbus*, '*Motorcycle'*, *'Moped'*, *'Cyclist'*, *'Other'* and *'Unknown'.* (These figures refer to key-vehicles only.) These findings indicate that crashes involving tourists and non-tourists are evenly split across most key-vehicle types; the exceptions are vans (and utes), where a much higher proportion of injury crashes involve tourists in the key-vehicle-driver role. With respect to SUVs (and 4x4s), a much smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

5.3% of injury crashes involving an SUV (or 4x4) in the key-vehicle role in the Southland District from 2010-2013 have involved a tourist driving that vehicle. 33.3% of injury crashes involving a van (or ute) in the key-vehicle role have involved a tourist driving that vehicle.

The obvious difference between figures 32 and 33 involves *'SUV*' (or 4x4) and *'Van*' (or ute). A sizeable minority of crashes involving tourists as the key-vehicle driver involve vans as the key vehicle; however, key-vehicle vans make up a much smaller proportion of non-tourist crashes. By contrast, very few crashes involving tourists as the key-vehicle driver are associated with SUVs/4x4s as the key vehicle; however, SUVs/4x4s as the key vehicle make up a reasonable proportion of non-tourist crashes.

1.1.1.10 Infrastructure

Junction type

Findings:

- Relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with midblock locations.
- Relative to non-tourist crashes, tourist crashes do not typically take place at T-junctions or crossroads (X-junctions).

The evidence is powerful (99.5%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to occur at different junction types, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Crashes are divided into five categories: '*Not At Junction'* (crash occurred at least 10 m from a junction of any kind), '*Driveway'*, '*Crossroads'* (X-junction), *'T-Junction'* and '*Multi-leg'*, which is defined as 'any junction with more than four legs entering or leaving the intersection').

These findings indicate that crash rates among tourists and non-tourists at driveways and multi-leg junctions are relatively similar. The exception is midblock locations, where a much higher proportion of injury crashes involve tourists in the key-vehicle-driver role. With respect to crashes taking place at T-junctions and crossroads (X-junctions), a much smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

9.4% of injury crashes taking place at T-junctions in the Southland District (2010-2013) involved a tourist in the key-vehicle-driver role. Similarly, 6.3% of injury crashes taking place at crossroads (X-junctions) involved a tourist in the key-vehicle-driver role. By contrast, 24.7% of injury crashes taking place at midblock locations (i.e. at least 10 m from a junction of any kind) involved a tourist in the key-vehicle-driver role.

Figure 48 **Comparative incidence of tourist- and non-tourist crashes in the Southland District (2010-2013), by type of junction at crash site**

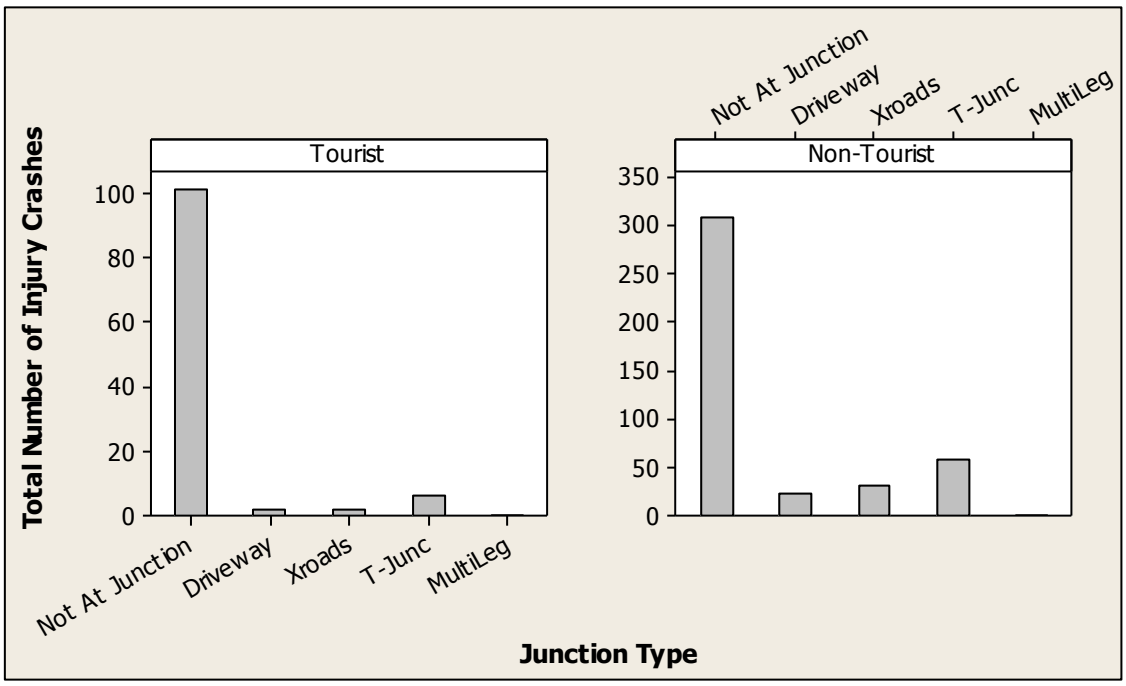


Figure 48 shows that most injury crashes involving tourists in the key-vehicle-driver role have occurred midblock (at least 10m from a junction). By contrast, while most of the injury crashes involving non-tourists in the key-vehicle-driver role have also occurred midblock, a sizeable minority have taken place at T-junctions and crossroads (X-junctions).

Traffic control

Findings:

- Relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with un-signalised locations.
- Relative to non-tourist crashes, tourist crashes do not typically take place at give-way signs or stop signs.

Crashes are divided into three categories: '*None'* (crash did not take place at a traffic control device), '*Give-way sign'*, and '*Stop sign'*. There is strong evidence (99.0%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to occur at different sorts of traffic-control devices, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

These findings indicate that a much higher proportion of injury crashes at un-signalised locations involve tourists in the key-vehicle-driver role; however, with respect to crashes occurring at give-way signs and stop signs, a much smaller proportion of injury crashes involve tourists in the key-vehicle-driver role.

Figure 49 **Comparative incidence of tourist and non-tourist crashes in the Southland District (2010-2013), by type of traffic signal**

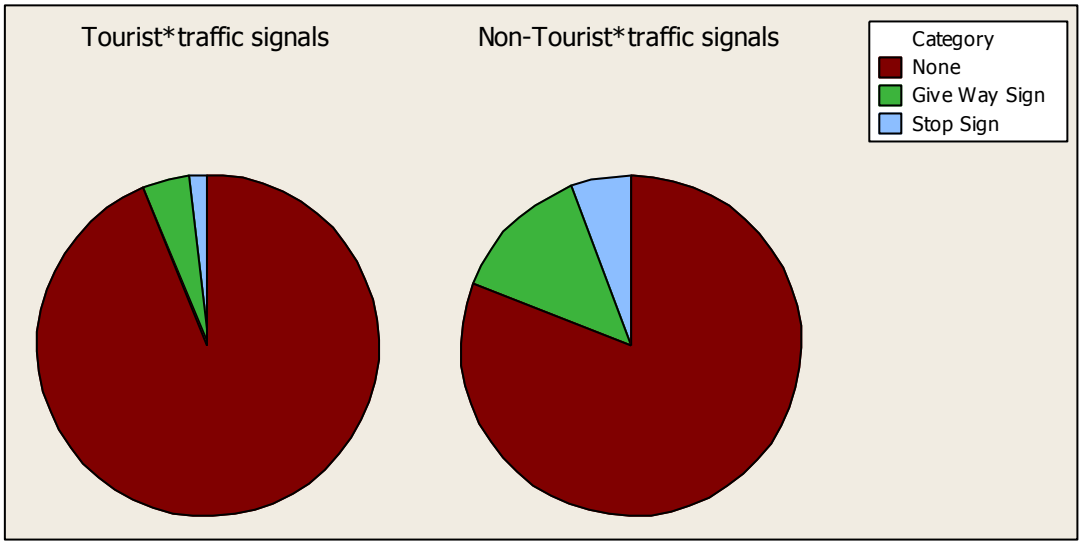


Figure 49 shows that the majority of crashes involving an overseas-licence-holder in the key-vehicle-driver role over the 2010-2013 period have taken place at un-signalised locations. By contrast, a sizeable minority of crashes involving non-tourists in the key-vehicle-driver role have occurred at give-way and stop signs.

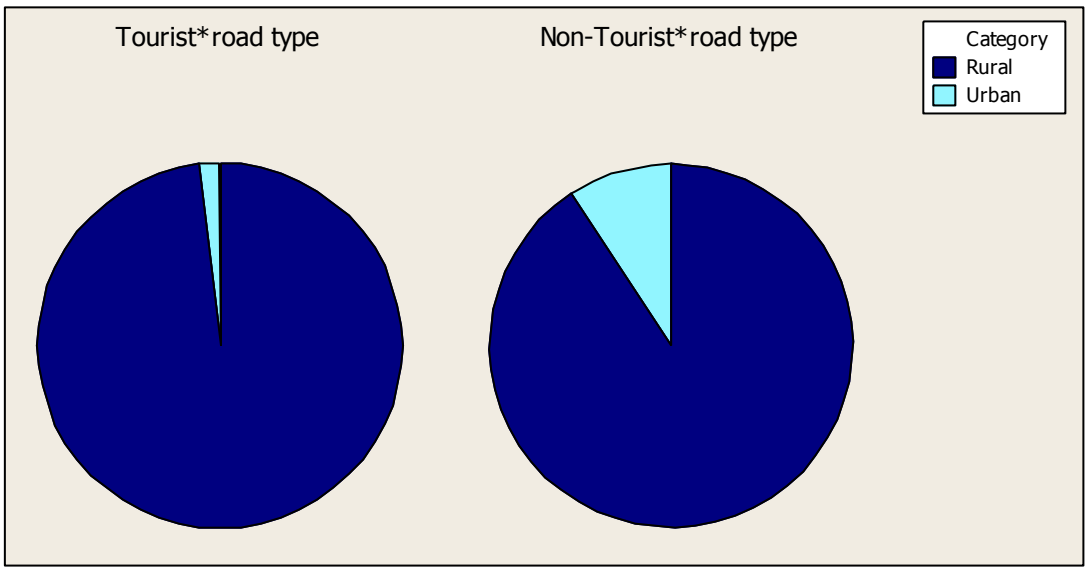
8.2% of injury crashes taking place at give-way signs in the Southland District (2010-2013) have involved a tourist in the key-vehicle driver role. Similarly, 7.7% of injury crashes taking place at stop signs have involved a tourist in the key-vehicle-driver role. By contrast, 23.5% of injury crashes taking place at un-signalised locations (i.e. locations without any form of traffic control device) have involved a tourist in the key-vehicle-driver role.

Road type

Finding: relative to non-tourist crashes, tourist crashes in Southland District are closely associated with rural roads (roads with an 80 km/h speed limit or higher): see Figure 50.

Crashes are divided into '*Urban'* roads (70 km/h speed limit or lower) and *'Rural'* roads (80 km/h speed limit or higher). There is strong evidence (99.0%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) tend to occur on sections of road with higher-speed limits, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). Specifically, crashes involving tourists tend to take place on rural roads (80 km/h speed limit or higher).

Figure 50 **Comparative incidence of tourist and non-tourist crashes on urban and rural roads in the Southland District (2010-2013)**



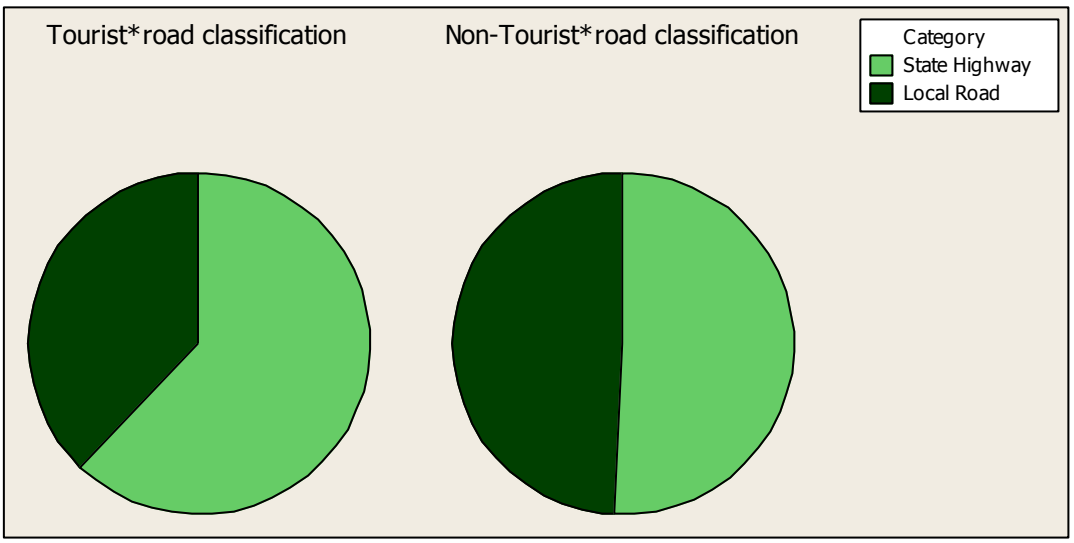
98.2% of injury crashes involving an overseas-licence-holder as the key-vehicle-driver in the Southland District (2010-2013) have taken place on rural roads (defined as 80 km/h speed limit or higher). By contrast, 90.7% of injury crashes not involving an overseas-licence-holder as the key-vehicle driver have taken place on rural roads (80 km/h speed limit or higher).

Road classification

Finding: relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with state highways: See Figure 51.

There is evidence (95.0%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are closely associated with state highways, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes). Specifically, crashes involving tourists are associated with state highways.

Figure 51 **Comparative incidence of tourist and non-tourist crashes on state highways and local roads in the Southland District (2010-2013)**



62.2% of injury crashes involving an overseas-licence-holder as the key-vehicle-driver in the Southland District (2010-2013) have taken place on state highways. By contrast, 50.8% of injury crashes not involving an overseas-licence-holder as the key-vehicle-driver have taken place on state highways.

1.1.1.11 Crash characteristics: What caused the crash?

Above BAC limit

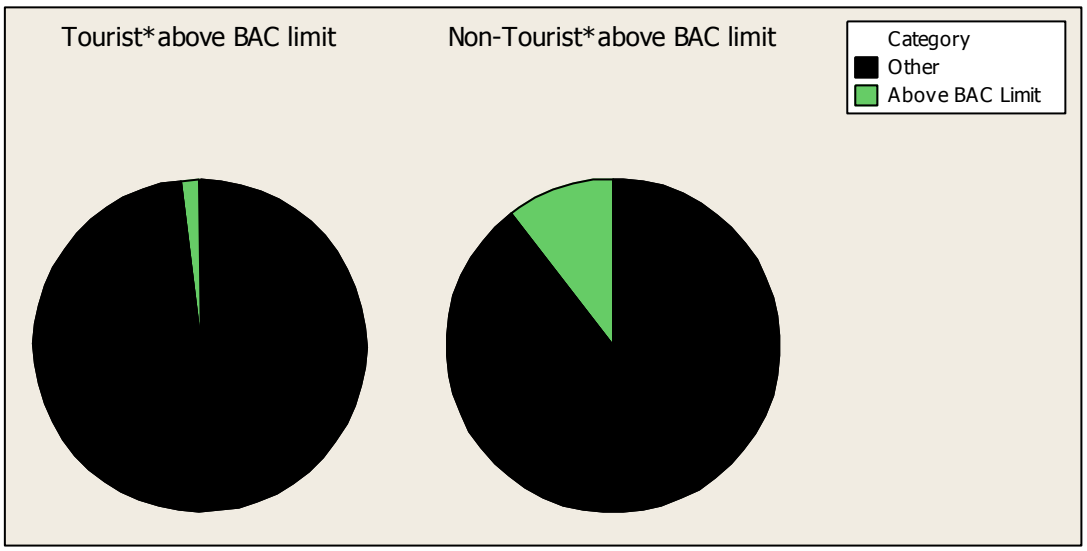
Finding: relative to non-tourist crashes, tourist crashes in the Southland District do not typically involve one or more parties recording an alcohol level over the legal limit.

There is powerful evidence (99.5%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are less likely to involve one or more parties over the blood alcohol limit than crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

A crash was categorised as '*Above BAC limit*' if one or more parties in the crash were noted to be above the legal limit for alcohol and/or refusing to take the test (crash code 103). According to the Police, refusing the test is very rare; therefore, the majority of 103-coded crashes involve road users who were above the legal alcohol limit[13].

[13] *Pers. comm.*, Steve Larking, Acting Road Policing Manager for the Southern District. 13th Nov., 2013.

Figure 52 **Comparative incidence of tourist and non-tourist crashes in the Southland District (2010-2013), involving a driver over the BAC limit, or not**



As Figure 52 depicts, 1.8% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties recording an alcohol level over the legal limit. By contrast, 10.5% of injury crashes not involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties recording an alcohol level over the legal limit.

Failed to keep left

Finding: relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with one or more parties failing to keep left.

A crash was categorised as *'Failed to keep left'* if one or more parties in the crash swung wide on a bend (crash code 121); cut corner on a bend (crash code 123); cut corner at an intersection (crash code 124); and/or was simply too far left/right(crash code 129). There is significant evidence (97.5%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are more likely to involve one or more parties failing to keep left, compared with crashes that do not involve overseas-licence-holders in the key-vehicle driver role ('non-tourist' crashes).

Figure 53 **Comparative incidence of tourist and non-tourist crashes in the Southland District (2010-2013), involving a driver who failed to keep left, or not**

As Figure 53 illustrates, 15.3% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties failing to keep left; by contrast, 7.6% of injury crashes not involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties failing to keep left.

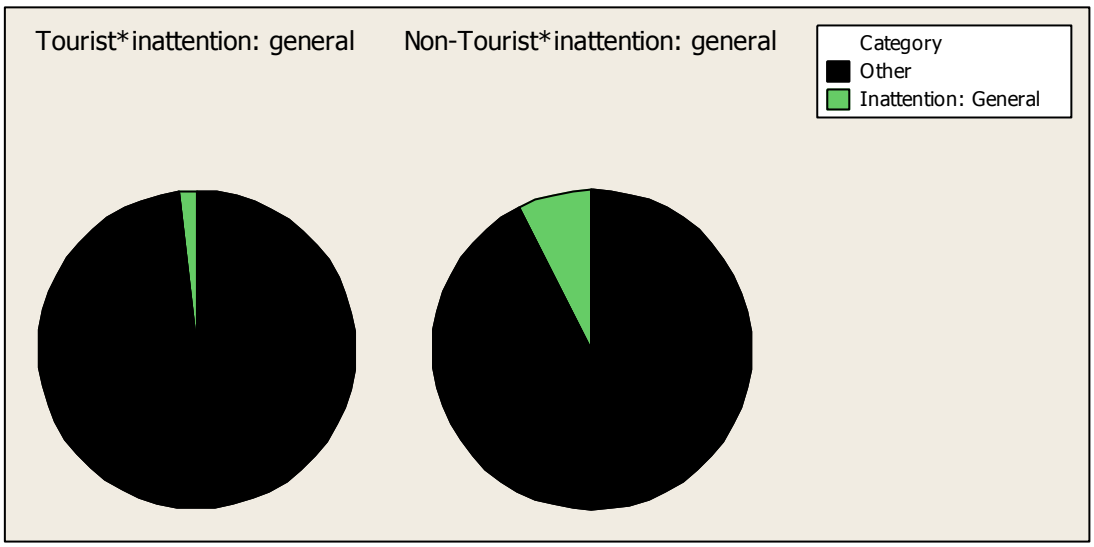
Inattention: General

Finding: relative to non-tourist crashes, tourist crashes in the Southland District tend not to involve inattention on the part of one or more road users in the crash.

There is evidence (95.0%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are less likely to involve inattention on the part of one or more road users in the crash, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

A crash was classified as *'Inattention: General'* if one or more parties in the crash was noted to be inattentive (crash code 330), including being inattentive to regulatory signs/markings (crash code 336), inattentive to warning signs (crash code 337), inattentive to direction/information signs and markings (crash code 338), and inattentive to obstructions on the roadway (crash code 341).

Figure 54 **Comparative incidence of tourist and non-tourist crashes in the Southland District (2010-2013), involving a driver recorded as being inattentive**



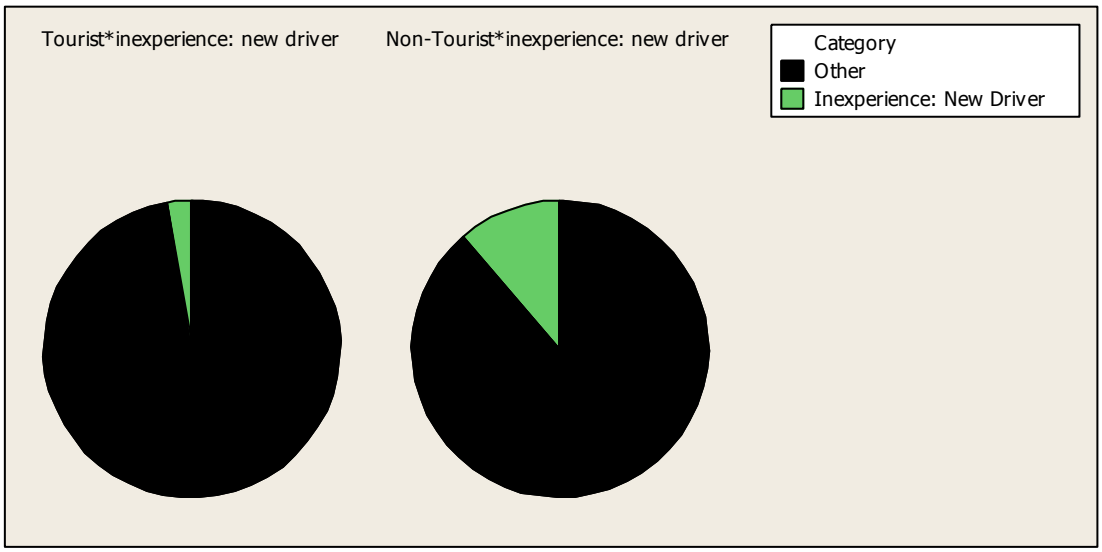
Overall, as Figure 54 illustrates, 1.8% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties failing to pay attention (for unspecified reasons, or for the reasons listed above); by contrast, 7.6% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with one or more parties failing to pay attention (for unspecified reasons, or for the reasons listed above).

Inexperience: New driver

Finding: relative to non-tourist crashes, tourist crashes in the Southland District tend not to involve new-driver-inexperience on the part of one or more road users in the crash.

A crash was categorised as *'Inexperience: New driver*' if one or more parties in the crash was noted as being inexperienced by driving in fast in complex or heavy traffic (crash code 401), inexperienced due to being a new driver (crash code 402), and/or was a new driver under instruction (crash code 405). There is strong evidence (99.0%) that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are less likely to involve new-driver inexperience on the part of one or more road users, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Figure 55 **Comparative incidence of tourist and non-tourist crashes in the Southland District (2010-2013), involving a driver recorded as being an inexperienced new driver, or not**



Overall, as Figure 55 illustrates, 2.7% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with a novice driver's (or rider's) inexperience; by contrast, 11.2% of injury crashes not involving an overseas-licence-holder in the key-vehicle-driver role were associated with a novice driver's (or rider's) inexperience.

Inexperience: Overseas

Finding: relative to non-tourist crashes, tourist crashes in the Southland District are closely associated with one or more migrants/tourists in the crash being unfamiliar with, or poorly adjusting to, New Zealand road rules and/or road conditions, as illustrated in Figure 41.

A crash was categorised as *'Inexperience: Overseas*' if one or more parties in the crash was noted to be an overseas/migrant driver who failed to adjust to New Zealand road rules or road conditions (crash code 404). There is strong evidence (99.9%) to suggest that crashes involving overseas-licence-holders in the key-vehicle-driver role ('tourist' crashes) are more likely to involve inexperience relating to unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions, compared with crashes that do not involve overseas-licence-holders in the key-vehicle-driver role ('non-tourist' crashes).

Note that, although the right panel in Figure 41 appears completely solid, there is a sliver of red (barely visible in the above graph), which represents two non-tourist crashes that involved failure to adjust to New Zealand road rules (perhaps from recent migrants who had successfully acquired a New Zealand licence, and thus were not categorised in the left panel as 'tourists'). Due to those two crashes representing a tiny proportion of all non-tourist crashes, it is not visible in the above chart.

Overall, 45.0% of injury crashes involving an overseas-licence-holder in the key-vehicle-driver role were associated with unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions; by contrast, 0.5% of injury crashes not involving an overseas-licence-holder in the key-vehicle-driver role were associated with unfamiliarity with, or poor adjustment to, New Zealand road rules and/or road conditions.

This 0.5% is possibly associated with migrants who have recently acquired a New Zealand licence (and thus whose crashes are classed in the 'non-tourist' category), or with crashes involving a local-licence-holder in the key vehicle and an overseas-licence-holder in the second or third vehicle. These crashes are classed as 'non-tourist' (because a local is in the key vehicle), but there may still be some small number of tourists involved in these 'non-tourist' crashes and thus contributing to the '*Inexperience: Overseas*', described above.