

Motorcycle-friendly Roads – applying a customer lens to a motorcycle safety programme

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Abstract

Last year there were 54 motorcyclist deaths on New Zealand roads and more than 1000 injuries. The costs to the Accident Compensation Corporation Scheme are higher for this group of road user than for any other.

A joint initiative between Accident Compensation Corporation (ACC), Motorcycle Safety Advisory Council (MSAC) and New Zealand Transport Agency (NZTA) aims to make motorcycling safer by developing a programme of motorcycle-friendly roads.

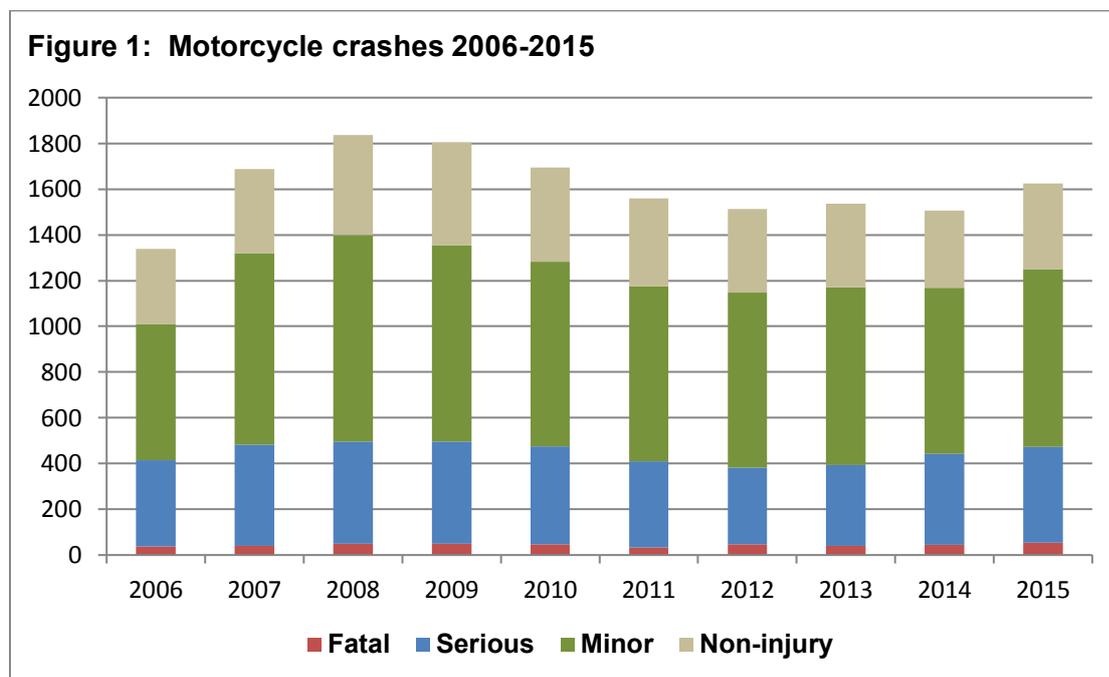
The first stage of the project was to identify the highest risk roads for motorcyclists from a technical engineering perspective. Understanding the customer perspective is the key to delivering successful road safety interventions on our roads, so the next step was to engage with motorcyclists and apply their lens to the data.

This paper follows the journey of identifying the highest risk motorcycle routes and the engagement process used to find the most favoured routes for motorcycle-friendly safety improvements, along with some key insights from the motorcyclist's perspective.

Background

There has been an increasing trend in motorcycle deaths and injuries in NZ since 2006 [Ministry of Transport (MOT)] (Figure 1). This coincides with a quadrupling of motorcycle registrations since the early 2000s. From 2004 - 2014, registrations grew from 89,332 machines, to 159,046. In August 2016, NZTA statistics indicated that there are currently 169,138 registered motorcycles and mopeds in New Zealand and this trend is expected to continue to climb due to economic and environmental drivers.

Motorcycle riders are nearly 21 times more likely to be killed or injured than car/van drivers per 100 million km travelled (MOT, NZ Household Travel Survey). In 2014, motorcyclists made up 15% of all road deaths and 10% of all injuries on our roads [NZTA, Crash Analysis System (CAS)].



Source: NZTA, CAS

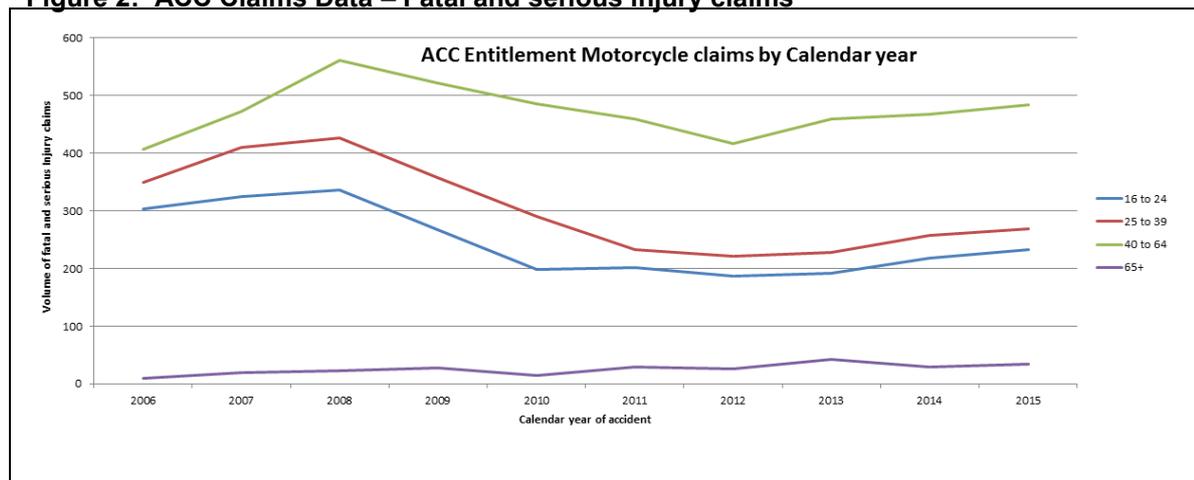
According to ACC analytics, motorcycle crashes cost \$90M in 2016 (new + existing claims). In total, it is expected that \$131 million will need to be collected in levies to pay for the On-going Claim Liability (OCL) of motorcyclists' injuries occurring in 2017/ 2018 (note that the OCL for claims in the 2016/17 year is projected to reach \$114m).

Improving motorcycle safety is one of the top five high priorities in Safer Journeys 2010-2020 and the latest Safer Journeys Action Plan for 2016-2020 has a renewed focus on motorcycle safety, with it being categorised as "high priority".

Deaths and injuries to motorcycle users over the last 15 years have essentially grown in proportion to the size of the motorcycle fleet, and this is comparable to other jurisdictions such as Victoria in Australia.

This increase is reflected in ACC claims data (Figure 2) indicating that the number of crash claims has been on an upward trend since 2012.

Figure 2: ACC Claims Data – Fatal and serious injury claims



The increasing trend for motorcycle deaths and injuries is made up mostly of males 40+, who are riding on the open road on large bikes and 16-24 year olds in urban areas. The older riders have a high impact on the ACC scheme in dollar terms while the younger riders impact on the number of motorcycle crashes. Anecdotal evidence suggests that attitudes to risk play a major role in determining rider behaviour and crash statistics, irrespective of age or trip purpose.

Research undertaken by Colmar Brunton, defining motorcyclist attitudes to risk and learning, identified that the psychographic profiles of motorcyclists fit predominantly into two groups; *Thrillseekers* and *Improvers*. These two groups make up 67% of the riding population of approximately 80,000 riders. The Colmar Brunton research suggests that these riders are motivated by the feeling of exhilaration and freedom that riding provides. Being considered a good rider by peers is more important than riding safely, where the consequences of not making safe choices are often not considered.

To support a focus on addressing the increasing trend for motorcyclist injury, ACC and MSAC have developed a Motorcycle Safety Strategy (Appendix 1) to direct ACC/MSAC activity and support the Safer Journeys Action Plan 2016-2020.

This work discussed in this paper sits within the Roads and Roadsides pillar of the strategy with a focus on working together with the NZTA and Councils to make roads and roadsides motorcycle-friendly by:

- Providing data and information to identify higher-risk motorcycle routes on road networks;
- Providing co-funding for motorcycle safety countermeasures on higher-risk routes;
- Upskilling the sector by providing motorcycle-friendly road engineering training.

The Journey

This paper follows a journey of identifying the highest risk motorcycle routes, engaging motorcyclists to find their most favoured riding routes, implementing safety improvements, along with some key insights from the motorcyclist's perspective.

For ACC, the focus for roads and roadsides investment is the open road (>70km/h). It is on these roads that the 40+ year old riders cost ACC the most - in particular the cost of compensation during recovery for higher income earners. These rural riders, if they crash, have more severe outcomes due to higher speeds, distance and time to specialised medical care, and longer times for recovery compared to young riders.

Identifying high risk roads for motorcycling

In the past there have been a number of attempts to classify high risk routes for motorcycling. It has not been easy to develop a robust method with major constraints being small numbers of motorcyclists using routes with volumes generally less than 2% on average, and small numbers of motorcycle crashes compared to other road users.

Early in 2016, a technical working group comprising stakeholders from ACC, NZTA, NZAA and consultant experts agreed a way forward to identify high risk routes for motorcycling using a variant of the Urban KiwiRAP risk mapping protocol for motorcycling.

For clarity, a high risk motorcycle route is a road where the injury crash density or collective risk is classified as high/high-medium compared to other roads (see www.roadsafetyrisk.co.nz). The formula for collective motorcycle risk is as follows:

$$\text{Collective motorcycle risk} = \frac{\text{Estimated M/C DSI equivalents / number of years of data}}{\text{Length of road section}}$$

The team at Abley Transportation Consultants (Abley) were tasked with developing motorcycling specific severity indices¹ for different crash movements in urban and rural speed environments, as well as establishing suitable risk thresholds. Severity indices were determined using whole-of-NZ motorcycle crash data over a 10-year period from the NZTA's CAS.

The motorcycling severity indices were applied to all reported injury crashes involving a motorcyclist in the most recent 10-year period, which allowed an estimated Death and Serious injury (DSi) casualty equivalents risk metric to be calculated for each route. Crashes occurring in the last 5 years were given double weighting to place greater emphasis on more recent crashes.

The Urban KiwiRAP risk mapping model for all road users has been successful in achieving the iRAP vision of identifying that around 50% of deaths and serious

¹ The ratio of deaths and serious injuries for every reported injury crash.

injuries occur on approximately 10% of the road network. Those parts of the network with a significantly higher risk of death and serious injury are classified as high-risk.

The same approach was used for the modified motorcycling model; however when the results were sense-checked, some short lengths of corridor with one injury crash recorded over the 10-year period were classified as high-risk. Because it is statistically unreliable to classify a corridor as high-risk based on one injury crash,

A second threshold was introduced requiring a minimum of two motorcycle injury crashes to have occurred on a corridor in order for it to qualify as a high risk corridor for motorcycling. This new threshold resulted in the number of high risk corridors representing 3.2% of the NZ road network by length. However, this 3.2% of the identified network was found to account for 38.1% of the estimated motorcyclist DSI's nationwide.

Further analysis to shift the threshold to identify 5% of the network (while retaining the requirement for two injury crashes in the last 10 years) had very limited benefits with only another 1.6% of estimated DSI's nationwide being captured. The technical working group decided that the benefits were not significant enough to lower the high-risk threshold and agreed retain the threshold at the level that identified 3.2% of the NZ road network by length as high-risk for motorcycling.

To validate the results and confirm that the new DSI casualty equivalents approach would provide a more targeted approach than using injury crashes a comparison was conducted on the Auckland Region. Auckland had previously applied the earlier edition *Safer Journeys for Motorcycling on New Zealand Roads* collective risk method.

Under the old methodology, 7% of Auckland's road network by length was identified as high risk for motorcycling. These corridors accounted for 46% of all motorcyclist injury crashes in the region. In contrast the new methodology, using the DSI casualty equivalents approach, identified just 2% of the network as being high/high-medium for motorcyclists. However, that 2% of the network accounted for 37% of all motorcyclist injuries in the region.

This comparison showed the new DSI casualty approach provided improved targeting to risk of injury. The more targeted approach means that investment can be isolated to a small proportion of the network with the greatest potential to impact on motorcycle safety.

For the whole of New Zealand, the DSI casualty approach identifies:

- 90% of the road network has had less than 1 motorcycle injury crash in the last 10 years,
- 3.2% of the network accounts for 38.1% of the estimated DSI's nationwide over a 10-year period,

- 2,798 kilometers of road over the whole of NZ is classified as high risk,
- 70% of the serious and fatal motorcycle crashes are on roads with speed limits greater than 70km/h.

Understanding the customer perspective

Understanding the customer perspective is the key to delivering successful road safety interventions on NZ's roads, so the next phase of the journey was engagement with motorcyclists to apply their lens to the technical analysis.

It had been identified that, while the technical data for highest risk roads for motorcycling was available, if investment was targeted at those segments and they weren't favoured motorcycling routes, the safety gains from the use of the investment would not be realised.

On-line electronic networks from MSAC, motorcycle clubs, NZAA, NZTA, IAM (NZ Institute of Advanced Motorists), Police and ACC's RideForever were activated to provide a steer on where motorcyclists were riding. Support was welcomed from BestBikingRoads.com who provided their routes and links to load onto the www.roadsafetyrisk.com website which we proposed using for consultation. Input from IAM, MSAC and many others provided favourite club and weekend rides to load onto the consultation site. In total there were 135+ routes loaded onto the maps.

The consultation process, having identified that the best channels to approach motorcyclists were via online social forums, peer-to-peer, or through events, choose a Survey Monkey process with links to the maps and free-form fields to capture any additional rides that may have been popular. We used a variety of contact methods to directly link motorcyclists to the consultation, including club mail-outs, facebook, club newsletters, and direct email.

Over the 6 week consultation period, 1567 responses were received, from an estimated population of around 80,000 motorcycle riders. Motorcyclists were asked a standard batch of demographic questions relating to themselves and their bikes, before selecting the routes they rode most frequently from a map. Further questions directly relating to the favoured routes provided information about how frequently the routes were ridden and whether the rides were recreational or for commuting.

Gaining visibility of the risk for motorcyclists alongside where the riders were actually riding through the use of GIS mapping has provided valuable insight that hasn't been available in the past. Sections of high risk that are popular to motorcyclists can be viewed alongside information about safety improvement work under construction, allowing motorcycle friendly infrastructure improvements to be made in a cost-effective and targeted to risk manner.

Next Steps

During 2017, the Coromandel Loop Motorcycle Safety Demonstration Project will be completed. This Project began in 2008 and was the first high-risk motorcycling route identified for funding by the new motorcycle levy as part of the launch of Motorcyclists Own the Options (MOTO), now the Motorcycle Safety Advisory Council (MSAC).

Since its inception, partner NZTA has progressed with the project in sections as funding became available, managing additional funding for motorcycle-friendly countermeasures from the motorcycle levy. The first phase - the southern section of the loop – was completed in 2013-14 and the first initiative on the northern section, wide edge lines, was completed in 2014-15. The final section of the Loop was planned for completion mid-2017 but weather has been the main contributor to completion being moved out to the end of 2017.

The benefits of this project will not be known for at least 5 years after its completion. Based on Australian projects focussing on similar road environments and intervention types, the expectation is that the completed route will have a reduction in casualty crashes within the region of 24% for motorcycles and 16% for all vehicles at the lower end (Victoria Motorcycle Black Spot Programme) and 40% for motorcycles and 24% for all vehicles at the upper end (Victoria Motorcycle Black Length Programme). The countermeasures used on the Coromandel Loop Project are closely aligned with those used on the Victoria Black Length Programme.

Local motorcyclists have been proactively involved in this project. Initially motorcyclist representatives were involved in the drive-overs to look at crash sites and contribute their insights to the solutions that were installed eg sites where gravel migration is a problem, bends where sight visibility is obscured by vegetation. They have shaped the countermeasures that were installed and provided feedback after their installation eg the success of 200mm wide high performance non-skid edge line markings.

On this route there is a high proportion of loss of control on bends crashes. Some early perceptual countermeasures were developed using line markings. More recently a participatory design process involving local motorcyclists has been used to develop existing perceptual countermeasures further. There have also been new designs developed in an attempt to assist riders both;

- reduce speed approaching bends,
- provide cues for correct positioning to achieve the correct line through a bend.

This work will develop over time and if it proves successful in reducing the loss of control on bends crashes, there may be opportunities to roll perceptual

countermeasures out to other sites with similar participatory design workshops including local motorcyclists in other areas.

Over the next few years, an increase in investment in motorcycle-friendly roads in partnership with road controlling authorities is anticipated. Currently a work programme for motorcycle-friendly countermeasures is being developed for the 2017-18 year and a longer term programme for 2018-21 is proposed.

The long term goal is that, as these proposed interventions prove their success, motorcycle-friendly countermeasures will be included into business-as-usual practice on all frequently used motorcycle routes. As a result, statistically significant reductions in fatal and serious motorcyclist injuries resulting from crashes on treated high-risk routes for motorcyclists are expected. Not only does this benefit motorcycle riders, but it will reduce costs for ACC of motorcycle claims, as well as having a secondary benefit of crash and claim cost reductions for other road users.

APPENDIX 1

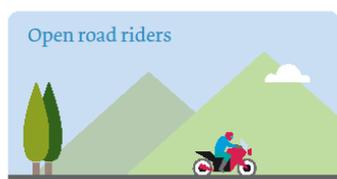


Motorcycle Safety Strategy

Minimising the incidence and impact of motorcyclist injury



What we know



- are involved in nearly three quarters of fatal motorcycle crashes*
- often lose control on bends and curves in motorcycle-only crashes
- sustain more severe injuries because they ride in higher speed environments
- see skills as a core safety factor and are open to improving skills.



- are involved in almost two-thirds of all motorcycle injury crashes*
- are less likely to be severely injured or killed as they mostly ride at lower speeds
- most often injured at intersections in crashes involving other vehicles
- are less likely to prioritise skills or wear appropriate protective gear.



- are primarily at fault in just over one third of all motorcycle crashes*
- often don't see motorcyclists as they don't prioritise them as a road safety issue
- tend to think interactions with motorcycles are risky
- often have little empathy for riders because they see them as reckless.

*Police-reported crashes (MOT Crash Facts 2015)

Priority focus areas



RIDER SKILLS

Enable riders to reduce their chance of crashing by increasing the availability and uptake of Ride Forever coaching.



HUMAN FACTORS

Address driver and rider attitudes and behaviours that contribute to crashes through targeted communications for at-risk groups.



VEHICLE TECHNOLOGY

Encourage the use of technologies that make riders safer with a specific focus on increasing the uptake of anti-lock braking systems (ABS) on motorcycles.



PERSONAL PROTECTIVE EQUIPMENT

Increase the uptake of equipment that protects riders from injury by helping to provide better consumer information.



ROADS AND ROADSIDES

Work with road controlling authorities to improve road design and maintenance with specific focus on helping to make high-risk routes more motorcycle friendly.

Desired outcome



We will achieve this by ensuring that

- More riders are upskilled through Ride Forever.
- Riders and drivers better understand the causes of motorcycle crashes and actions they can take to reduce the risk of injury.
- Riders better understand the benefits of safety technology and are more likely to purchase motorcycles with improved safety features.
- More riders are wearing better personal protective equipment.
- Roads are increasingly designed and maintained to improve motorcyclist safety.

Who will do this

- 1 Both ACC and MSAC will take an evidence-based approach to programmes.
- 2 ACC will use communications to support and promote the initiatives and ensure they are readily available to motorcyclists.
- 3 MSAC will engage with motorcyclists to promote safety and understand community perspectives.
- 4 ACC will partner with road safety partners and the motorcycle sector to deliver our programmes and help validate the outcomes.