



Influence of Road Characteristics on Flood Rescues in Australia

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INTRODUCTION

Vehicle-related flood fatalities and rescues are a significant emergency management and road safety problem. Motorists may enter floodwater that is too deep or too fast, or may attempt to drive along roads that have been washed away.

Gissing et al. (2017) investigated the influence of road characteristics on flood fatalities based on a site analysis of 21 road sections where fatalities had occurred. The results of this research indicated that some characteristics are common among sites where flood fatalities have occurred. These characteristics variously influence the risk that motorists knowingly or unknowingly enter floodwater, the ability of motorists to turn around upon seeing floodwaters and the likely survivability of entering floodwaters.

This research specifically explored the possible influence of road characteristics at road sites where motorists had been rescued from floodwaters. Results of these non-fatal incidents were then broadly compared with results of analysis regarding the influence of road characteristics where flood fatalities had occurred.

METHODOLOGY

A selection of 26 sites across the Australian jurisdictions of New South Wales (NSW), Queensland (QLD) and Victoria (VIC) were identified for analysis based upon the quality of information available and ease of access to the site.

Analysis of each site involved observational assessment of road structure type; roadway side barriers; road side topography; downstream depths adjacent to the roadway; signage; warning systems; lighting; road pavement; road alignment; road grade; speed restrictions; traffic volume; downstream vegetation; ability for a vehicle to be turned around prior to crossing the floodway, causeway or bridge; and presence of roadside markers and curb.

RESULTS

Some 12 sites were located in areas with small upper catchments, meaning that it is likely that flood water would rise quickly. Of these sites, three were impacted by local drainage issues where floodwater would pool, typically under a railway underpass.

Vehicles at six sites were washed off the road, while vehicles at 17 sites became stopped on the road without being washed from it. Where vehicles had been washed off the road (on four occasions), the vehicle remained several metres from the road with water up to the bonnet of the vehicle. The other cases included a vehicle that had traveled some 20 metres downstream but was not completely submerged and a driver who had successfully escaped his vehicle and was rescued from a tree.

At the six sites where the vehicles were washed off the road surface, none of the roads had side barriers. At one of these sites it would not be possible to install barriers as the site was a 4WD creek crossing. Curb and guttering was present at 11 sites.

Signage was likely to be present at 14 (out of 24) of the sites at the time of the incident. At some sites signs, such as depth indicators, were observed in photographs during the incident. However, it is difficult to confirm the status of signage and changes that may have occurred following the incidents. Depth markers were the most common, being present at 15 (out of 24) sites, followed by "road subject to flooding" at 14 (out of 24) sites and "floodway" or "causeway" at 13 (out of 24) sites. Roadside markers were observed at 18 sites.



Site of flood fatality at Leppington, 2016

CONCLUSIONS

In comparison to results found by Gissing et al. (2017) in the analysis of sites where fatalities had occurred, this analysis supports conclusions regarding the possible impacts of roadside barricades in preventing vehicles from leaving the road. Both studies identified that, where barriers were absent, vehicles left the road. Discussions with road operators and emergency services have reflected some challenges in the installation of barriers: for example, they may act to catch debris, redirect floodwaters and introduce additional maintenance costs.

Both studies have identified that flood signage was present at the majority of sites, showing that motorists either ignore signs, fail to see them or misunderstand their meaning. Emergency managers and road operators should further consider methods to increase the effectiveness of signage as discussed in Gissing et al. (2017).

REFERENCES

GISSING, A., TOFA, M., OPPER, S. & HAYNES, K. 2017. Influence of road characteristics on flood fatalities in Australia. East Melbourne, Victoria: Bushfire and Natural Hazards Cooperative Research Centre.



Site of flood fatality outside of Canberra, 2016



Site of flood fatality Caboolture, QLD, 2015