



FLOOD RISK COMMUNICATION RESEARCH INTO PRACTICE BRIEF 4

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Public survey of driving and recreating in floodwater

Dr Mel Taylor¹, Dr Matalena Tofa¹, Lisa Fountain¹ and Dr Katharine Haynes²

1. Macquarie University
2. University of Wollongong



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MACQUARIE
University
SYDNEY · AUSTRALIA



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Statement of purpose: The Research into Practice Brief series provides concise summaries of research findings for end-users and practitioners. This brief provides an overview of findings from a nationally-representative survey of the Australian general public that investigated driving and recreating in floodwater.

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BACKGROUND

Globally, floods are the highest cause of mortalities from natural hazards and the most frequent cause of death is drowning (Peden et al., 2017). In Australia, the activities linked to the highest proportion of flood deaths are driving into floodwater and recreating in floodwater (Haynes et al., 2017). Among fatalities linked to driving into floodwater, males and drivers of larger vehicles were over-represented (Peden et al., 2017; Haynes et al., 2017). The Royal Life Saving Society (2018) found that there has been a 10 per cent reduction in deaths by drowning in rivers, creeks and streams, from 2016/17 to 2017/18, and a 16 per cent reduction as compared with the 10-year average in Australia (RLSS, 2018). However, 25 per cent of all drowning fatalities in 2017/18 occurred in rivers, creeks and streams, which is a greater proportion than drowning deaths at beaches and swimming pools (RLSS, 2018). Also, swimming and recreating activities accounted for 25 per cent of all drowning deaths (RLSS, 2018).

Analysis of mortality figures provides important insights to the activities people are undertaking when entering floodwater and supports identification of high-risk locations and activities. A number of studies have also considered the factors that motivate people to engage in such risky behaviours as driving into floodwater or recreating in floodwater (Ahmed et al., 2018). For example, social factors have been proposed to influence the willingness of people to drive into floodwater; these include avoiding isolation, pressure from other drivers, behaviour of other drivers and the presence of others if rescue was required (Hamilton et al., 2016). However, relatively little is known about how often people drive into or recreate in floodwater in Australia, and the reasons why they have engaged in this risky behaviour.

AIM

This brief provides a top-level snapshot of the findings from a flood-related survey completed by the general public. This aim is to explore the behaviour and decision making of the general public in Australia in relation to driving into, or recreating in, floodwater, and to discuss the implications for emergency services communication and messaging. A more detailed academic report is currently being prepared.

PUBLIC SURVEY

A public survey was constructed to mirror an occupational survey that was developed with the assistance of SES agencies across Australia. The survey was distributed online by Qualtrics Research Services, between December 2018 and January 2019. The sample was constructed to be proportionally representative of the adult Australian general population by state, and balanced for age and gender. The survey consisted of eight main sections: driving details; demographics; experiences of entering floodwater, either on land or in flooded rivers; willingness to drive through water on roads; experience of driving into floodwater; experience of turning around in floodwater; general attitude to risks; and flood risk messages. This review will summarise some of the key findings from the first five sections mentioned. A separate Research into Practice Brief, *Evaluation of flood risk communication materials* (2020), focusses on findings related to flood risk messaging and communications.

RESPONDENTS

A total of 2,184 respondents undertook the public survey. As shown in Figure 1, below, the highest proportion of respondents were between the ages of 55-64 (19 per cent), and 65-74 years (19 per cent), and the lowest proportion were aged 75 and over (6 per cent). The highest proportion of respondents were from New South Wales (32 per cent), while only 1 per cent were from the Northern Territory (Figure 2, page 2). There was only a slightly higher proportion of males (51 per cent) than females (48 per cent).

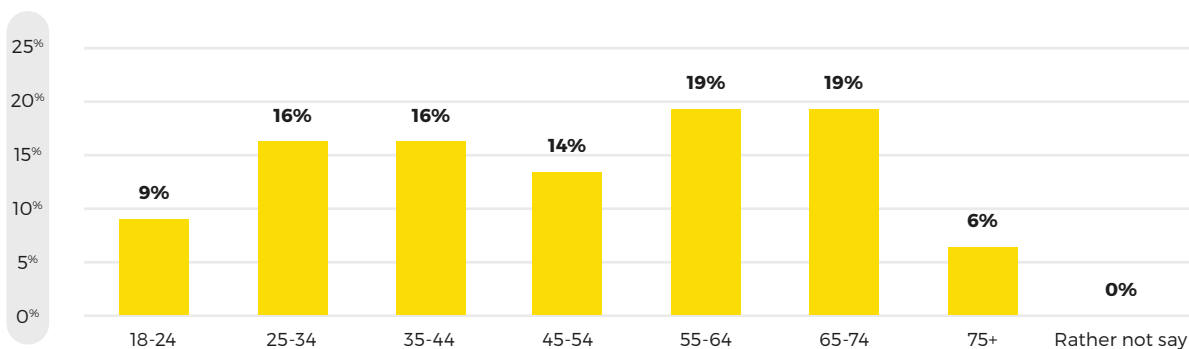


Figure 1: Age profile of survey responders.



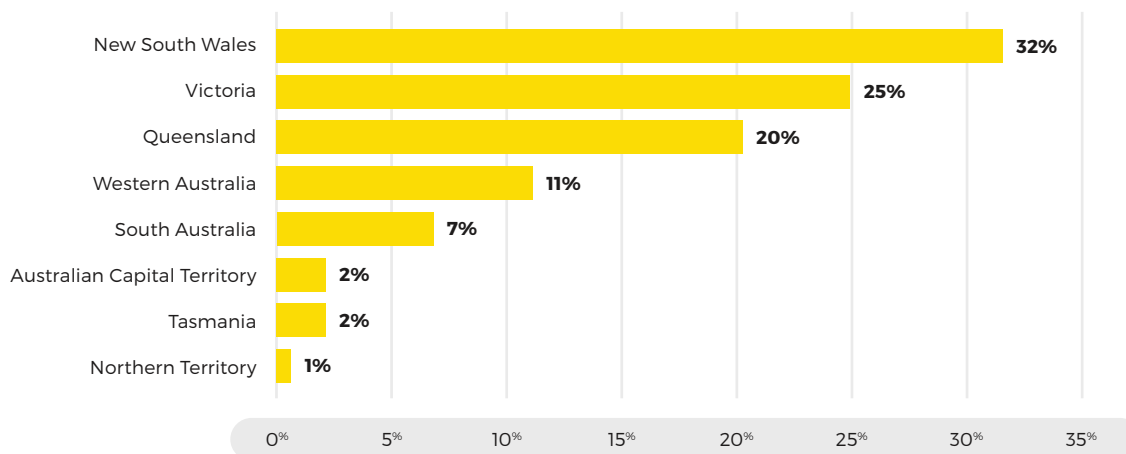


Figure 2: Location of survey responders.

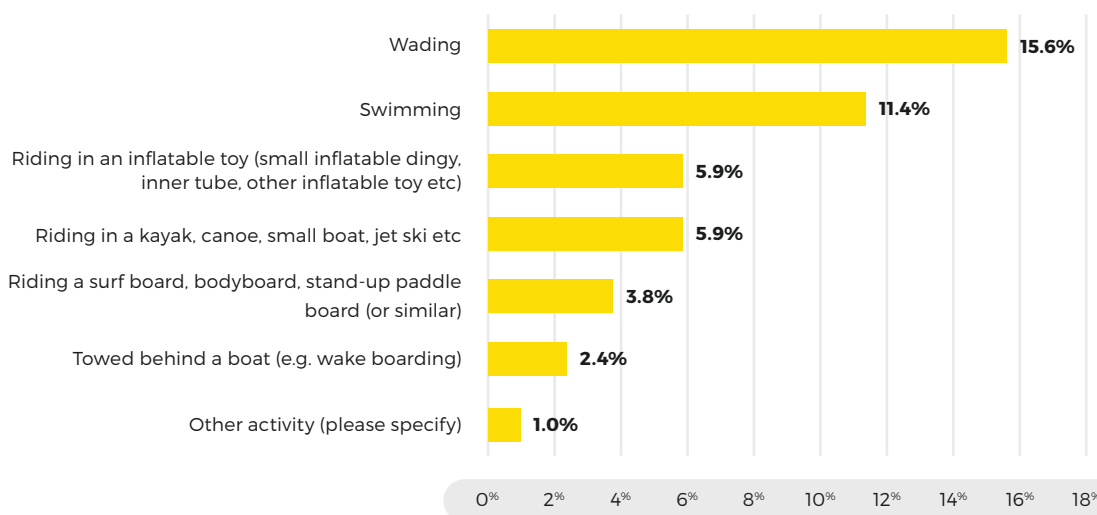


Figure 3: Activities undertaken in floodwater on land (multiple responses were allowed).

ENTERING FLOODWATER

This section explores and reports on those respondents who had 'ever' entered floodwater, for what reasons, and what activities they were engaged in at the time. The survey refers to two different flooding conditions (on flooded land/in flooded rivers) to reflect different scenarios.

Entering floodwater on land

Floodwater on land refers to water where it normally isn't, for example a flooded park or street. In total, 26 per cent of respondents reported that they had engaged in activities in floodwater on land. Respondents were asked what they had been doing in floodwater on land (Figure 3). The highest proportion of respondents reported they

were wading (n=340, 15.6 per cent). Out of those respondents who waded in floodwater, 34 per cent reported that the main reason was leisure, followed by testing the depth of water before driving through (17 per cent) (Figure 4, page 3).

Entering flooded rivers

A flooded river is described as a river that is flowing deeper and faster than normal. Overall, 19 per cent of respondents had engaged in activities in a flooded river, the majority of whom engaged in swimming (n=182, 8.3 per cent), and wading (n=130, 6 per cent), as shown in Figure 5, page 3. The majority of respondents (77 per cent) who entered a flooded river to swim selected leisure as their main reason (Figure 6, page 4).



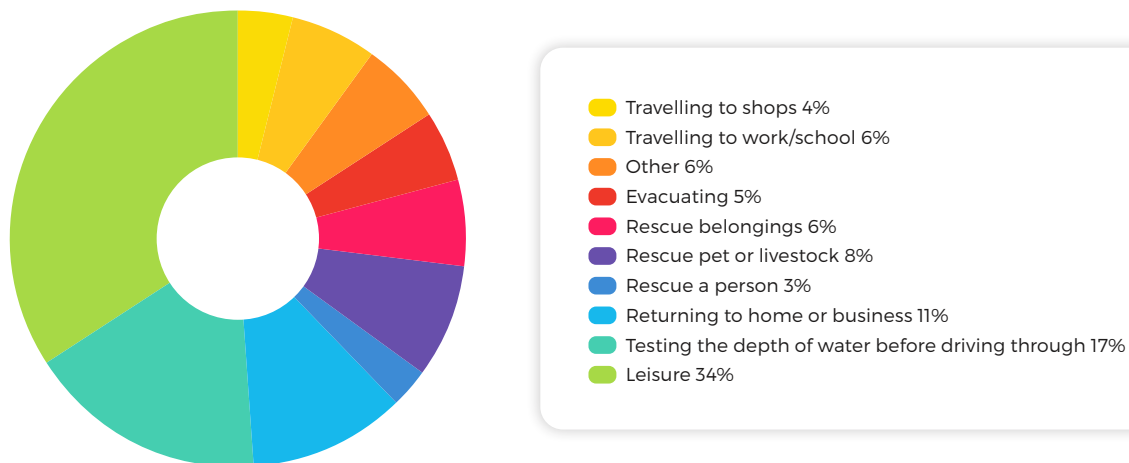


Figure 4: Main reasons for wading through floodwater on land.

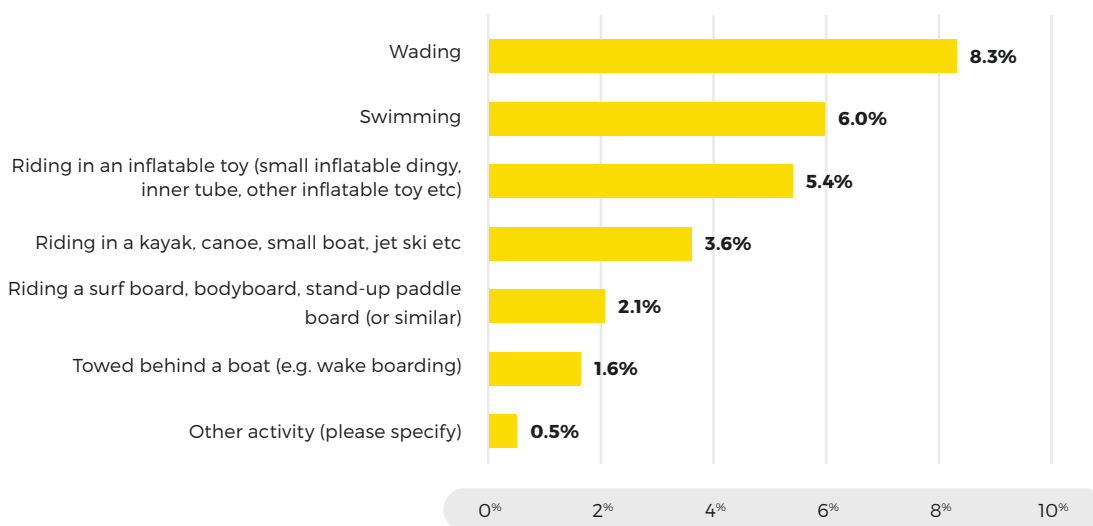


Figure 5: Activities undertaken in flooded rivers (multiple responses were allowed).

ENTERING FLOODWATER IN MOTOR VEHICLES

This section will focus on the experiences of survey respondents driving into floodwater. A definition of floodwater on the road was developed with the assistance of SES end-users, to reflect driving through floodwater. Floodwater on the road was defined as an environment with:

- water across the road surface;
- little to no visibility of the road surface markings under the water (i.e. uncertainty of road quality/integrity and possibly depth)
- water on normally dry land, which could be either flowing or still.

Based on this definition, respondents were then asked if they had ever driven through or been driven through floodwater and to provide an

example incident and answer questions about their experience; such as factors influencing their decision making; activities engaged in at the time; social influences; and outcomes of the incident.

Understanding the decision making and behaviours related to driving into floodwater is a crucial step for holistic behavioural change as it can inform improved prevention and education strategies that aim to reduce the number of vehicle-related flood fatalities (Ahmed et al., 2018).

Driving characteristics of respondents

The driving characteristics of respondents are summarised below:

- 91 per cent of respondents were drivers;
- 76 per cent had held a driver's licence for more than 10 years;



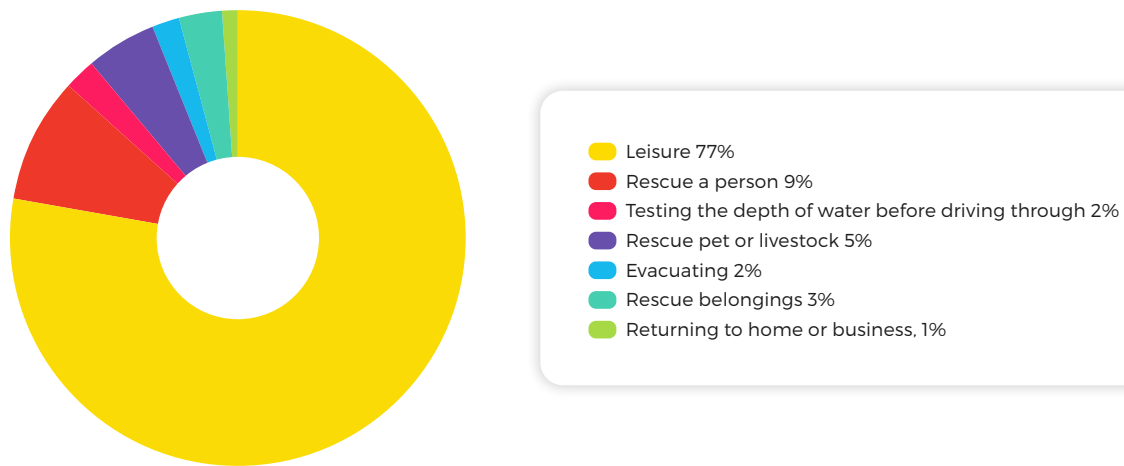


Figure 6: Main reasons for swimming in flooded rivers.

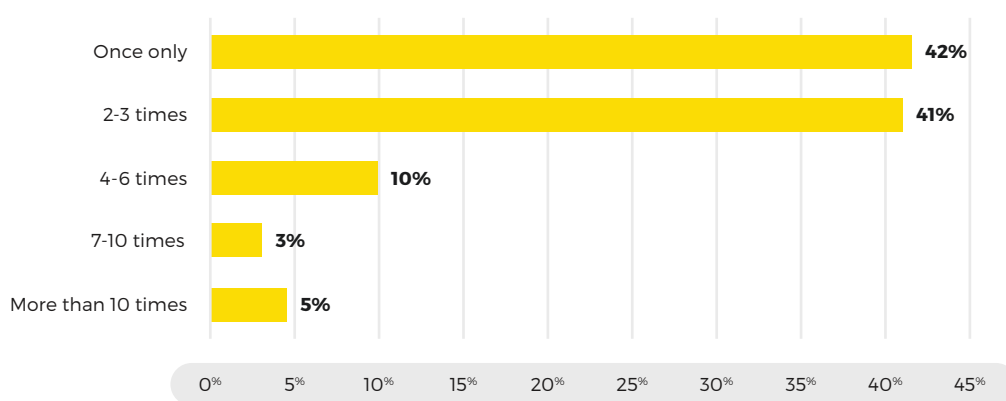


Figure 7: Frequency of driving/being driven through floodwater in the last five years.

- 42 per cent reported driving between 2-7 hours per week;
- 44 per cent reported that they usually drive medium to large sized cars;
- 54 per cent drive a 2WD;
- 16 per cent drive a 4WD, and
- 16 per cent drive an AWD.

Experiences driving into floodwater

Over half of the respondents (56 per cent) had ever driven through or been driven through floodwater. Respondents were more likely to have entered floodwater in a vehicle if they were male, rated their driving ability as 'high', had undertaken an advanced driving course, and typically engaged in more hours of driving, per week.

Respondents who had reported driving through (or being driven through) floodwater were then asked how many times they have driven/been driven through floodwater within the last five years. Of those who responded (55 per cent, n=1,190), 42 per cent of respondents had driven/been driven through floodwater only once, and a further 41 per cent had

driven/been driven through on two or three occasions (Figure 7, above).

Respondents were then asked to recall and provide details of a single recent or memorable experience of driving through floodwater. This was undertaken to provide a snapshot of the types of situations in which the Australian general public typically enter floodwater in vehicles.

Out of the 1,167 (53 per cent) respondents who reported a specific event:

- 38 per cent reported the event having occurred in a suburban location (Figure 8, above)
- 45 per cent reported that the water seemed still, and an additional 44 per cent reported that the water was flowing slowly (Figure 9, above)
- 43 per cent estimated that the water was between 15cm - 30cm deep (Figure 10, page 6)

Factors influencing the decision to drive into floodwater

This section explores the decision making and the motivations for entering floodwater in a vehicle. The responses are based on the example of driving



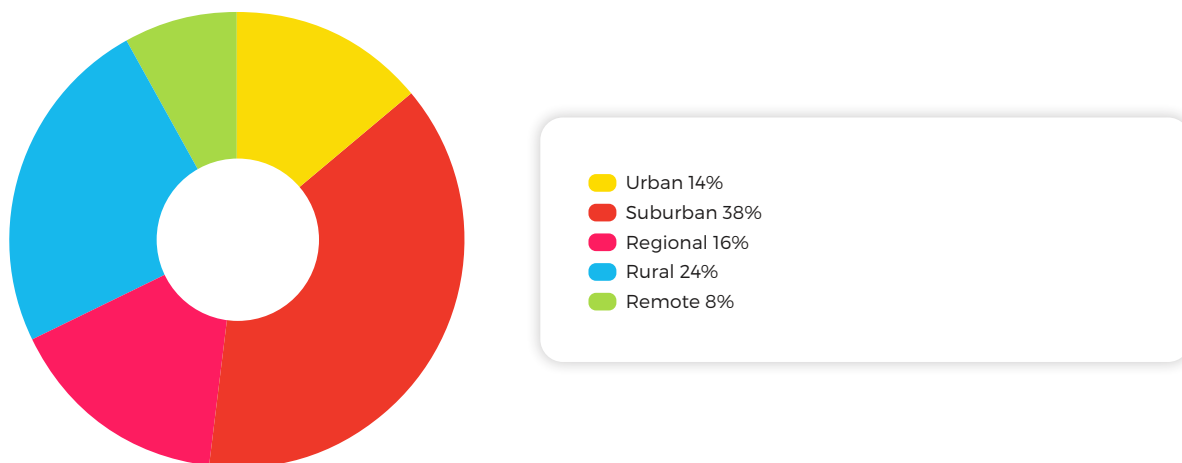


Figure 8: Specific event of driving into floodwater: Location of event.

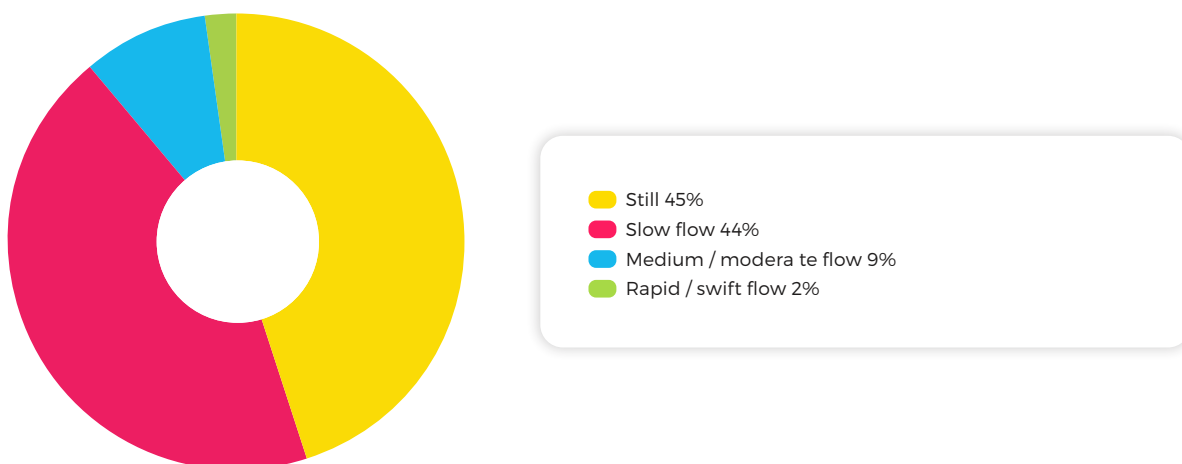


Figure 9: Specific event of driving into floodwater: Water movement/flow.

into flood water previously recalled by the 1,167 who reported an event.

Figure 11 (page 6) depicts the activities respondents were engaged in at the time of this event.

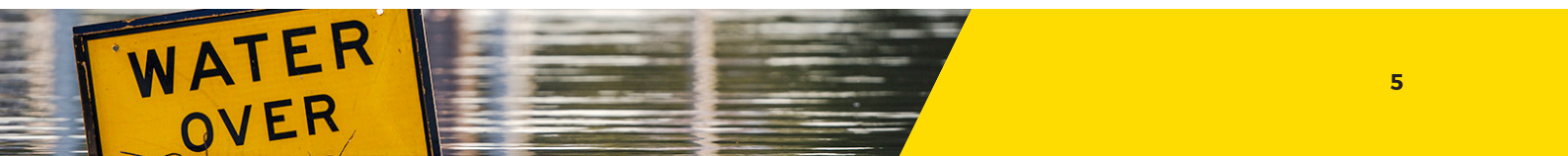
A fifth of respondents (20 per cent) were returning home from work, a further 17 per cent were either on holiday, sightseeing or on a leisure drive, and 15 per cent reported that they were shopping or running errands. The smallest proportion of respondents reported driving through floodwater whilst dropping off their children to school or college (1 per cent); going to school, college, or university (2 per cent); or returning home from school, college, or university (2 per cent).

Respondents were asked to consider 'the extent to which' 21 different factors (see Figure 12, page 7) influenced their decision to drive through floodwater in the reported event. These factors related to the

journey (i.e. urgency, lack of alternative route), ability and experience (i.e. knowing road well, professional training), the influence of others (i.e. other road users, vehicle occupants, emergency services/council), work-related pressures, and signage. Respondents were asked to indicate the extent to which each influenced their decision, using a rating scale from 1 ('not at all') to 7 ('a great deal'). Figure 12 (page 7) summarises the mean ratings given for each factor. The most highly rated factors were 'careful consideration of the situation' and 'knowing the road well.'

Social influences

The influence of others was anticipated to be a factor that would influence decisions to enter floodwater and was explored in more detail in the survey. Those respondents who recalled an event where they had previously entered floodwater in a vehicle, were asked what the people in other vehicles were doing at the



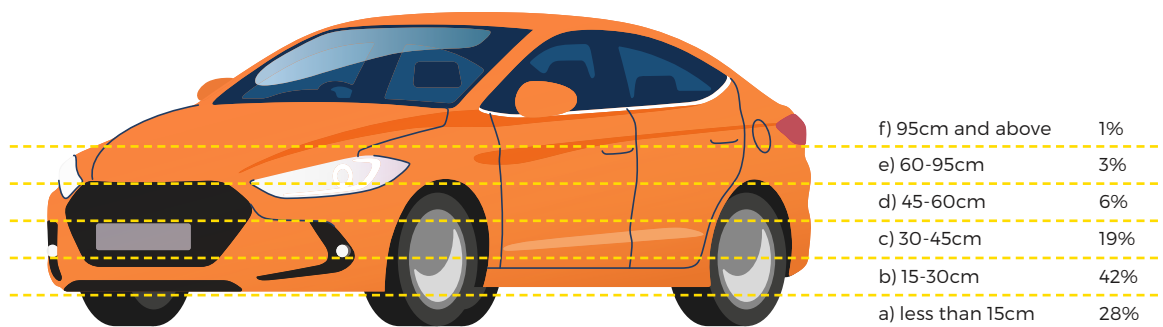


Figure 10: Specific event of driving into floodwater: Estimated water depth.

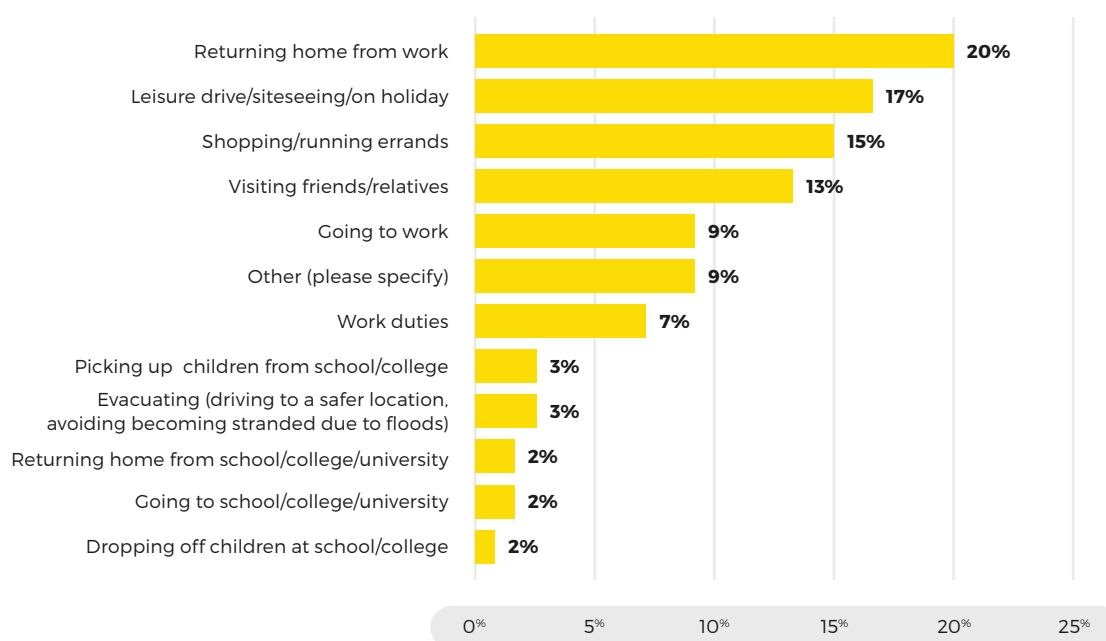


Figure 11: Specific event of driving into floodwater: Activity being undertaken at the time of the event.

time of this event (see Figure 13, page 7). The majority of people in other vehicles were driving through the floodwater at the time (64 per cent), while only 2 per cent were turning around.

From those respondents who reported an event where they had entered floodwater in a vehicle, 75 per cent (n=878) were driving at the time, and 61 per cent (n=711) were carrying passengers. Out of those respondents carrying passengers, 15 per cent (n=103) reported that passengers influenced their decision to drive through. These respondents were given the opportunity to comment on how passengers influenced the decision making regarding driving into floodwater. A total of 97 respondents made a text comment, and these were thematically coded (Table 1, page 8). Coercion/pressure resulting from

other passengers suggesting to, convincing, or telling the driver to drive into floodwater, emerged as the most reoccurring theme.

Outcomes of driving into floodwater

Participants were asked whether they succeeded on the reported occasion that they drove through floodwater. The vast majority (90.7 per cent) answered “yes, without any issues;” hence, most of the driving through floodwater incidences reported had no negative consequences. Only 9.3 per cent of the 1,167 respondents reported some consequences from driving into floodwater, i.e. damage to their car, having to be rescued (Figure 14, page 8).



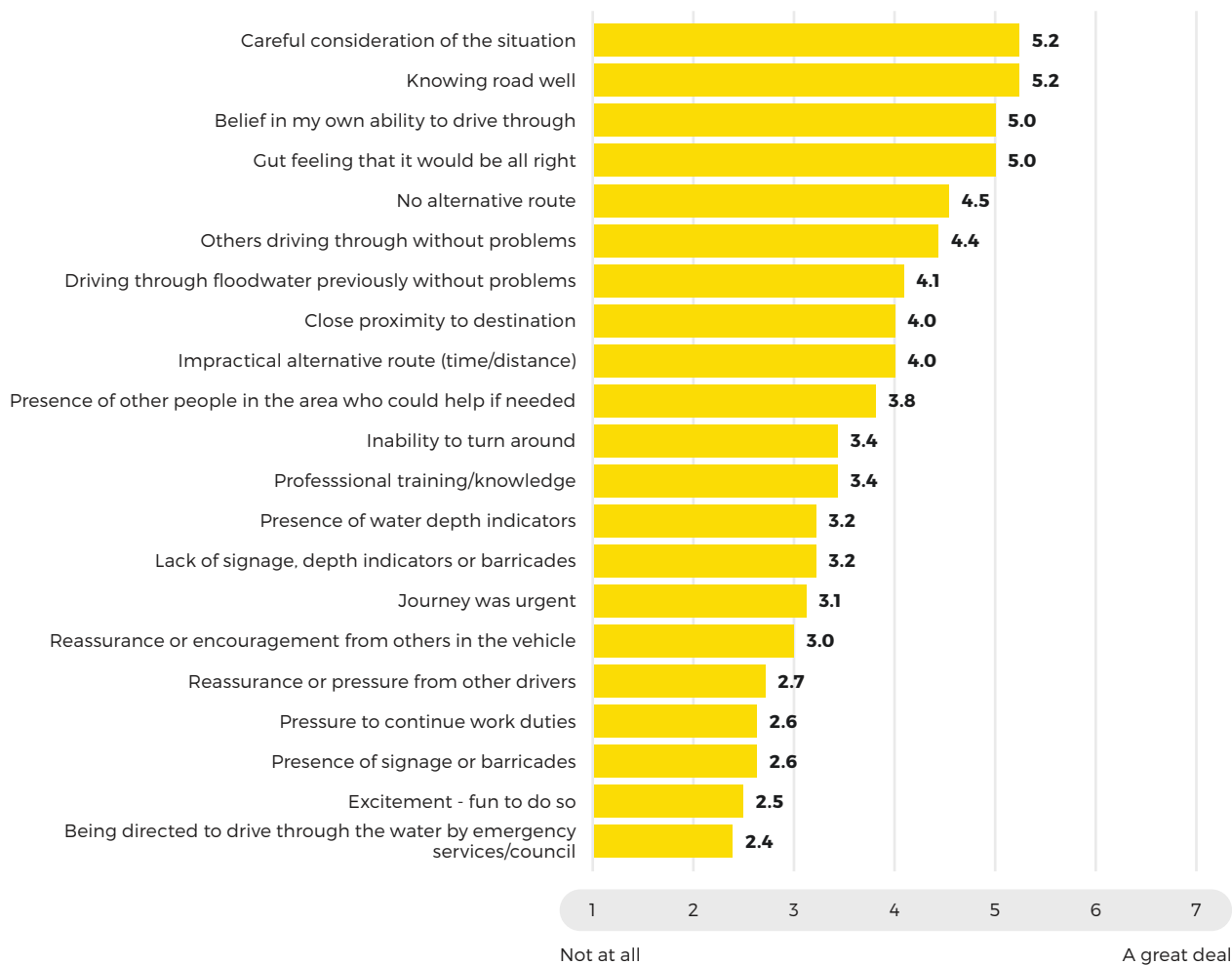


Figure 12: Specific event of driving into floodwater: Extent to which various factors influenced the decision to drive into floodwater.

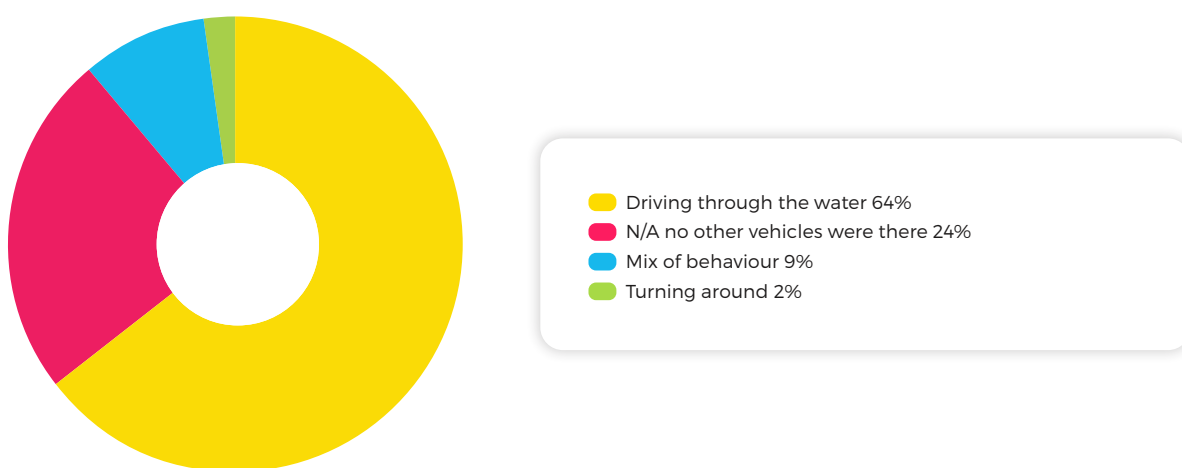


Figure 13: Behaviour of people in other vehicles.



THEMES	FREQUENCY	EXAMPLE COMMENTS
Coercion/pressure (suggested – convinced – told)	30	“Husband said it would be ok has driven through worse”, “Yes, kids were nagging”, “My father told me to floor it”, “Convinced the driver that it was safe to go thru” [sic]
Consensus (agreed – discussed – decided)	25	“With mates we all assessed and it looked fine”, “We both agreed it was ok”
Urgency of journey	13	“We needed to get to the airport”, “My daughter was due to sit an exam at school”, “Getting dark”, “We had to get out now or we would have been cut off without food”
Wading first	4	“Walked it for me first”, “My partner checked it out by walking across it”

Table 1: Thematic analysis of the influence of passengers.

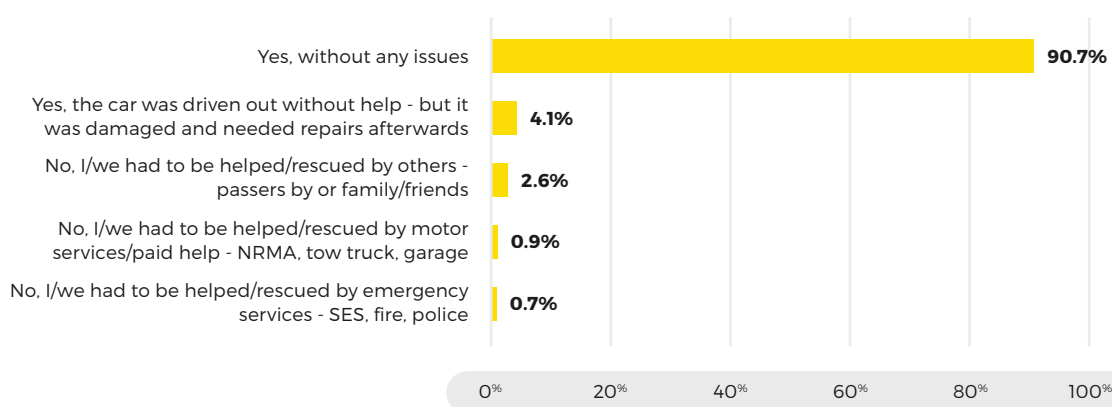


Figure 14: Outcomes of driving into floodwater. Did respondents succeed in driving through floodwater?

IMPLICATIONS

- Over a quarter of all respondents in the survey reported having entered floodwater on land, and 19 per cent had reported having engaged in activities in a flooded river. In both cases, leisure was the most frequently identified reason for entering the water. This poses a challenge because Australians “have an affinity and familiarity with water, especially for recreation” (Taylor et al., 2019: 46).
- For those entering floodwater on land, a significant proportion (34 per cent) were engaged in leisure behaviours; however, the vast majority were not. For example, others were testing water depth prior to driving through; returning to home or business; rescuing pets/livestock, belongings or other people; travelling to work, school or the shops. This suggests that risk communication should not only convey risk-messaging related to leisure or recreation in floodwater but should

also consider the everyday tasks Australians are engaged in around floodwater.

- Over half the respondents have driven through floodwater, and many of those have done so more than once (n=696, 68 per cent). The majority of respondents reported that they drove through floodwater that was shallow and slow/not flowing. Driving through shallow, slow or still water is, however, potentially dangerous.
- The majority of specific driving into floodwaters events were related to common or mundane situations or activities (for example, going to or from work, shopping, etc.). Seemingly the situations or activities were not all about ‘urgent’ or high-stakes situations, and the highest proportion of respondents reported ‘careful consideration’ was involved when deciding to enter floodwater. This suggests that decision making is not about sudden or impulsive behaviour which indicates that there is an opportunity to influence the decision making process.



- These findings are useful for consideration in risk communication and advertising related to entering floodwater on roads. For example, rather than using flood imagery that shows deep or fast-flowing water, or urgent scenarios, risk communications and advertising could use scenarios that reflect typical, everyday instances when people enter floodwater in a vehicle, and the typical depths of water people encounter and consider entering.
- When asked about the extent to which various factors influenced the decision to drive into floodwater, respondents did not perceive 'reassurance or pressure from other drivers' (2.7 per cent) as a significant factor. However, when asked about the behaviour of people in other vehicles at the time of the event, 64 per cent reported that other people were driving through the water. This suggests that the behaviour of others possibly influences drivers more than they either acknowledge or consciously realise.
- Over 90 per cent of respondents who had driven through floodwater succeeded without any issues, which presents an obvious challenge for risk communication. This indicates that many respondents have not experienced negative consequences of driving through floodwater; a firm and definitive message to never drive into floodwater is unlikely to resonate with these individuals, as it would conflict with the personal experiences drawn on to process messaging (Taylor et al., 2019). Although this conveys possible challenges for communication, there is still potential to provide alternative insights to support communication approaches. Since the extent to which other drivers influenced decision making, and success of driving into floodwater are met with confidence, agency and self-efficacy, an essential component of risk communication will need to focus on encouraging people to question their ability.

STRENGTHS AND LIMITATIONS

This study provides important insight into the behaviour and decision making related to entering into floodwater. It reports on a large and diverse sample that represents a range of ages, genders and jurisdictions across Australia. This study does, however, have some limitations. First, the incidents reported by respondents in the driving into floodwater section of the survey, provides a subset of all events. These could be the more recent, or more memorable or risky than usual, rather than representative events. The responses may also be subject to subjectivity or social desirability as the data are self-reported; however, this would be offset by the confidentiality of responses.

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FLOOD RISK COMMUNICATION

This research is funded by the Bushfire and Natural Hazards CRC and is led by Dr Mel Taylor. This project will develop an understanding of the motivations, beliefs, decision making processes and information needs of at-risk groups for flood fatalities, specifically those who drive or recreate in floodwater.

For more information, please see: www.bnhrcr.com.au/research/floodriskcomms

Contact Mel Taylor
mel.taylor@mq.edu.au

Matalena Tofa
matalena.tofa@mq.edu.au

