NSW GOVERNMENT

Transport for NSW

Boating incidents in NSW

Statistical Report for the 10-year period ended 30 June 2018

Centre for Maritime Safety

April 2019

Contents

Author: Centre for Maritime Safety
Date: April 2019
Agency: Transport for NSW

1 Introduction

This report examines boating incident[1] patterns and trends based on operational incident data, from the Transport for NSW maritime cluster for the 10 year period 2008–09to 2017–18[2].

NSW continues to experience a significant long-term decline in the rates of fatal recreational and commercial boating incidents as well as in the corresponding rates of overall boating incidents. The state also remains on track to achieve the target of a 30% reduction in both total boating fatalities and total boating serious injuries[3] by 2020-21, as set under Transport for NSW's Maritime Safety Plan 2017-21[4].

This is against a background of increasing numbers of people boating. Vessel registration and driver licence numbers continue to grow at approximately 1 per cent a year[5], and there is evidence of rapid growth in the unregistered and unlicensed activities such as paddle craft use.

There are now more than 500,000 people who hold a licence to drive a powered vessel, and nearly 250,000 registered vessels in the state. Almost 1 in 5 NSW households own a boat or watercraft[6] and it is estimated 2 million people go boating each year on the state's waterways[7].

The reduction in trauma on the waterways can be attributed to multiple factors, from improved standards in vessel design and equipment, through to compliance and education programs such as *Wear a Lifejacket*.

Lifejacket wear rates are now at near record levels in NSW and this is reflected in the drop in the rate of recreational boating fatalities due to drowning. However, non-drowning related fatalities, such as those due to speed or not keeping a proper lookout, are not changing and this leaves room for substantial improvement. There is also no sign of any significant long-term decline in the rate of recreational boating serious injury incidents – notwithstanding signs of a reduction in recent years.

The NSW Government is committed to supporting safe, responsible and enjoyable boating. This effort is being delivered by returning boating fees and revenue back to the boating and maritime community through products, services and infrastructure.

While incidents resulting in trauma on the waterways are down, preventable fatalities and serious injuries continue to occur and the Transport for NSW maritime cluster is striving Towards Zero, in support of community expectations of reduced trauma on the state's roads and waterways. To continue the effort to eliminate fatalities and serious injuries, the maritime cluster is adopting the holistic Safe Systems approach to maritime safety[8]. This approach has four elements:

1 Boating incidents are as per national guidelines, and include all accidents related to the operation of a vessel, but exclude situations such as unrelated medical episodes, deliberate intent or unrelated activities such as SCUBA diving.

2 Maritime operational Eagle database records, based on fatality, serious injury and total incident counts and associated records as at 31 October 2018 unless otherwise stated. Incident numbers may be subject to subsequent change as the result of coronial findings or other investigations.

3 Serious injuries are those injuries which result in admission to hospital.

4 As measured against the long-term (10 year) average up to and including 2014-15, the plan's base year.

5 Based on analysis of licence and registration data undertaken by the Transport maritime cluster.

6 Recreational Boating Participation. Report prepared for Transport for NSW by IPSOS. June 2018

7 NSW Boating Industry Association.

8 Transport for NSW, Maritime Safety Plan 2017-21.

- Safer People (the people in the system, including their choices and behaviours)
- Safer Vessels (vessel design and safety equipment can reduce the risk and consequences of serious incidents)
- Safe Waterways (the physical environment and infrastructure in terms of safe navigation, access and storage)
- Safe System (all the supporting elements behind maritime safety, including data, research, education and partnerships).

The Centre for Maritime Safety developed the Maritime Safety Plan 2017-21 (MSP) which identified 10 'problem definitions' related to boating safety. These represent the main safety concerns identified through analysis of long-term incident data. This boating incident report focusses heavily on these 10 problem definitions and provides an indication of how each is tracking in terms of boating incident numbers and severity.

2 Executive summary

There were nine confirmed recreational and commercial boating fatalities in 2017–18, which is significantly below the long-term annual average of nearly 14. While this is considerably more than the 4 lives lost in 2016-17, it is amongst the lowest yearly boating fatality counts over the last 40 years. Total boating fatalities remain strongly on track to meet the target of a 30% reduction under the Maritime Safety Plan 2017-21.

The total number of serious injuries[9] in 2017–18 on recreational and commercial vessels (46) was one of the lowest totals in recent years and significantly below the long-term annual average (68.2). Total serious injuries in boating are currently on track to meet the target of a 30% reduction by 2020-21.

Long-term downward trends remain evident for both recreational and commercial vessel fatal incident rates as well as for total incident rates. There were 228 boating incidents[10] overall in 2017–18, which is significantly below the long-term annual average of 316.5.

There were 115 recreational fatal incidents over the last 10 years. Of these incidents:

- the most common incident types recorded in association with boating incidents were capsizing (32.2%), fall overboard (30.1%) and injury related to towing incidents (8.2%)
- the main causes were: weather conditions (14.8%), excess alcohol, excessive speed and hazardous waters (each 8.7%) and lack of judgement (8.1%)
- open runabouts accounted for 45.5% of all vessels involved in these incidents, followed by sailing vessels (9.8%), cabin runabouts (8.9%) and paddle craft – primarily canoes or kayaks – (8.9%).

There were nine fatal incidents involving only commercial vessels recorded over the last 10 years, with no such incidents in 2017–18.

In terms of the 10 problem definition areas identified in the Maritime Safety Plan, related incident numbers are trending downwards in eight of them. These were:

- Lifejacket wear - the drowning fatality rate for recreational vessel incidents has fallen by more than 60% since 1992-93, without any significant change in the corresponding non-drowning fatality rate.
- Weather conditions – the total number of weather related incidents in 2017–18 (25) was significantly below the long-term (10 year) annual average of 42.8 incidents.
- Excessive speed – the total number of incidents related to excessive speed in 2017–18 (4) was significantly below the long-term annual average of 14.9 incidents.
- No proper lookout – the total number of incidents related to the lack of a proper lookout in 2017–18 (28) was significantly below the long-term average of 42.6 incidents.

9 The serious injuries referred to in this report do not include boating serious injuries treated in NSW hospitals but not reported to the Transport maritime cluster. Examination of recent NSW Health records suggests that a large number of such 'unreported' serious injuries occur each year. However, the characteristics of the serious injuries reported to the Maritime cluster do broadly match those only captured in the Health records, meaning the former are still a useful indicator of overall serious injury trends related to boating.

10 This figure is likely to be an underestimate of the true number of incidents, due to under-reporting of not only serious injures (see previous footnote) but also minor incidents. Nevertheless, patterns and trends related to reported boating incidents are still likely to be a valid indicator of actual patterns and trends. Incidents are required to be reported if death or injury has occurred, there has been damage exceeding $5,000 to vessels or property or if there is a risk of environmental damage. Reporting of other incidents is voluntary.

- Excess alcohol – the total number of alcohol related incidents in 2017–18 (3) was significantly below the long-term average of 6.2 incidents.
- Poor judgement – the total number of incidents related to poor judgement in 2017–18 (50) was significantly below the long-term average of 71.2 incidents.
- Towing activities – the total number of incidents related to towing activities in 2017–18 (5) was significantly below the long-term average of 10.1 incidents.
- Cold water – the total number of incidents where cold water was a likely issue in 2017–18 (8) was significantly below the long-term average of 18.1 incidents.

In the remaining two problem definition areas, the results are more mixed, and – in the case of paddle craft, are likely to have been influenced by increased participation rates over time:

- Personal watercraft – the overall rate of incidents involving a PWC is trending down but the rate of serious injury incidents involving a PWC has shown no significant trend. In 2017–18, the overall rate boating incidents involving a PWC was 121.7 incidents per 100,000 registered PWC, which was significantly below the long-term (10 year) average of 196.0. However, the corresponding rate of serious injury incidents (57.3 incidents per 100,000 registered PWC) was not significantly different to the long-term average of 72.0.
- Paddle safety – there was no significant long-term trend in incidents involving paddle craft, but the number of incidents in 2017–18 was relatively high. The number of incidents involving paddle craft in 2017–18 (7) was significantly greater than the long-term average of 4.5. However, this result should be seen in the context of the high (and growing) popularity of paddle craft.

A further five potential safety issues were also considered. The key results from these are:

- Age and gender – the vast majority of boating fatalities are male (87.6% over the 10 years to 30 June 2018) and there is evidence of over-representation amongst older boaters (those over 70 accounted for 20.2% of fatalities but only 9.7% of licences).
- Vessel wash – there was no significant long-term trend in incidents related to vessel wash, although the number of wash related incidents recorded in 2017–18 was relatively low. The number of wash incidents in 2017–18 (9) was significantly below the long-term average of 11.9.
- Sailing vessels – there was no significant long-term trend in incidents involving sailing vessels, although the number of incidents in 2017–18 was relatively low. The number of incidents involving sailing vessels in 2017–18 (53) was significantly below the long-term average of 70.1.
- Organised competition – racing events, including waterskiing, powerboating and sailing, accounted for 16 (13.9%) of recreational fatal incidents over the 10 year period to 30 June 2018. The number of incidents recorded under organised completion in 2017–18 (16) was significantly above the long-term average of 9.3.
- Secured vessels (those at anchor, berthed or moored) – there was a significant downward trend in the number incidents involving a secured vessel. The number of such incidents in 2017–18 (43) was significantly below the long-term average of 57.5.

Section 8 of this report highlights certain boating safety issues that continue to warrant particular focus, and makes a number of related recommendations. These issues are as follows, with their associated recommendation(s) listed in italics:

- **Lifejacket wear**
  - *The cultural and behavioural factors behind the excellent wear rates on PWC and sailing dinghies need to be examined and applied where possible to other types of small vessel, especially tinnies and paddle craft.*
  - *Changes to policy, strategy and/ or legislation should be considered.*
- **Trauma (non drowning) related incidents**
  - *There needs to be a strong focus on 'safe navigation' and towing safety, particularly in relation to:*
    - *safe speeds, keeping a proper lookout and maintaining safe distances from hazards*
    - *the extra care needed on narrow or busy waterways*
    - *risks associated with high speed turns during towing activities.*
- **Weather**
  - *The Centre for Maritime Safety should continue to work closely with the Bureau of Meteorology to ensure the best possible weather information is available in a user-friendly form.*
- **Personal watercraft**
  - *The current strong focus on education and compliance in areas popular with PWC should continue.*
  - *Innovative ways of creating the perception that rule breakers are at a high risk of being caught – wherever they are – are required. These might include:*
    - *greater collaboration with industry*
    - *increased co-ordination of on-water compliance*
    - *better real-time surveillance*
    - *greater intelligence sharing between not only the Transport maritime cluster and NSW Police but also other agencies that have a presence on or near the water.*
- **Open runabouts**
  - *Open runabout safety is relevant to nearly all of the 10 Problem Definitions identified in the Maritime Safety Plan 2017-21, and as such should remain a strong focus.*
- **Older boaters**
  - *Tailored messages for older boaters need to be delivered to address three main issues:*
    - *complacency*
    - *changing physical and mental abilities*
    - *medical conditions.*

- **Vessel wash**
  - *A continued effort should be made to educate boaters about vessel wash – from two main perspectives:*
    - *wash generating vessels*
    - *vessels vulnerable to the effects of wash.*
  - *Consideration should be given to the development of a state-wide wash strategy, along with any further research needed to better understand the impacts of wash and how these might be mitigated.*
- **Organised completion**
  - *There should be continued consideration of additional measures to mitigate risks related to high-speed competition, for example:*
    - *introduction of improved personal safety equipment*
    - *specific limits on vessel design and engine size or power*
    - *assessment of the suitability of different waterways for particular competition events, taking into account factors such as width and size, shoreline hazards and the risk of wash from other vessels.*

Section 8 also includes a general recommendation – *that efforts to educate, advise and deliver compliance actions to the boating public should continue across all aspects of boating safety.*

3 Safety performance in 2017–18

Safety performance in 2017–18 is assessed against long-term trends (over 10 years or more) and/ or long-term averages (over the 10 year period 2008–09to 2017–18). Both boating fatalities and overall boating incidents were significantly below the long-term average in 2017–18. In addition, both recreational and commercial fatal incident rates continue long-term downward trends.

Fatalities down

The total number of recreational and commercial boating fatalities (9) was significantly below the long-term annual average (13.9). All nine fatalities were recorded on recreational vessels.

A long-term downward trend remains evident for both recreational and commercial fatal incident rates, against a backdrop of increasing vessel numbers.

Total incidents down

The total number of reported incidents was significantly below the long-term average, suggesting a continuing improvement in overall boating safety.

Total incident rates, both for recreational vessels and commercial vessels, continue to fall.

Lifejacket wear rates up

The overall lifejacket wear rate was 43%, a similar result as in 2016-17 but nearly a fivefold increase on the 9% in 2007.

Weather incidents down

The number of incidents related to poor weather conditions in 2017–18 (25) was significantly below the long-term average (42.8). The number of incidents wholly or partly attributed to weather conditions has been strongly trending down over the last 10 years.

Speed incidents down

The number of incidents related to excessive speed in 2017–18 (4) was significantly below the long-term average (14.9). The number of incidents wholly or partly attributed to excessive speed has been strongly trending down over the last 10 years.

Lookout incidents down

The number of incidents related to not keeping a proper lookout for 2017–18 (28) was significantly below the long-term average (42.6). The number of incidents wholly or partly attributed to not keeping a proper lookout has been trending down over the last 10 years.

Alcohol incidents down

The number of incidents related to excess alcohol in 2017–18 (3) was significantly below the long-term average (6.2). The number of incidents wholly or partly attributed to excess alcohol has been trending down over the last 10 years.

Judgement incidents down

The number of incidents in 2017–18 wholly or partly attributed to poor judgment (50) was significantly below the long-term average (71.2). The number of incidents tied to poor judgement has been strongly trending down over the last 10 years.

Towing incidents down

The number of incidents related to towing activities in 2017–18 (5) was significantly below the long-term average (10.1). The number of towing incidents has been trending down over the last 10 years.

Personal watercraft incidents down

The overall rate of incidents involving a PWC in 2017–18 (121.7 per 100,000 PWC registrations) was significantly below the long-term average (196.0). The overall rate of incidents involving a PWC has been trending down over the last 10 years.

but serious injuries remain high

However, the rate of serious injury incidents involving a PWC in 2017–18 (57.3 per 100,000 PWC registrations) was statistically similar to the long-term average (72.0) and has not shown any significant trend over the last 10 years.

Paddle craft incidents up

The number of reported incidents involving paddle craft during 2017–18 (7) was significantly above the long-term average (4.5). However, there has been no significant trend in paddle craft incidents over the last 10 years. At the same time, participation in paddle activities appears to have greatly increased.

Cold water

The number of incidents in 2017–18 believed related to cold water (8) was significantly below the long-term average (18.1). The number of cold water incidents has been strongly trending down over the last 10 years.

There were nine boating fatalities, 46 serious injuries and 228 boating related incidents recorded in the 12-month period to 30 June 2018 (Table 1). While the number of fatalities was up by 125% compared to 2016-17, it was still lower than the long-term average (Table 2). In addition, the recreational vessel fatality rate (per 100,000 vessel registrations) continues a long-term decline (Section 4).

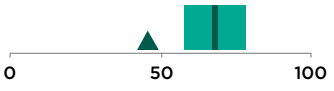
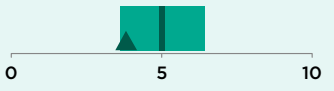
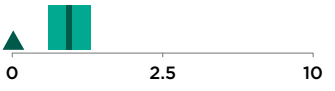
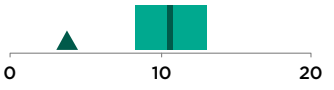
Compared with the previous year, serious injuries in 2017–18 were down by more than 43% and total incidents were down by 13%, with both being significantly lower than the long-term average (Table 2).

Table 1: Fatalities, serious injuries and related incident numbers for the 2017–18 financial year.

Vessel category	Fatalities	Fatal incidents	Serious injuries	Serious injury incidents	Total incidents
Recreational	9	9	41	34	129
Commercial	0	0	4	4	74
Commercial/ recreational	0	0	1	1	25
TOTAL	**9**	**9**	**46**	**39**	**228**
Change on 10 yr. av.	**-35.3%**	**-27.4%**	**-32.6%**	**-27.5%**	**-30.0%**
Average last 10 years*	13.9	12.4	68.2	53.8	316.5

* 10 year average includes 2017–18. Serious injury numbers are likely to have been significantly affected by under-reporting, and based on NSW Health hospital records, the true number of boating-related serious injuries is likely to be considerably higher than what is shown here.

Table 2: Incident Barometer – comparison of 2017–18 against 10 year period (2008–09 to 2017–18) and summary of long-term trends.

Indicator	2017–18	Average last 10 years (10 yr av.)	2017–18 statistical relationship to 10yr av.	Graph* showing 2017–18 vs. 10yr av.	Long-term trend
Total incidents	228	316.5	Lower		Initial increase; now decreasing
Total fatalities	9	13.9	Lower		Fluctuating, but with recent decrease
Total serious injuries	46	68.2	Lower		Generally increasing but with signs of recent decrease**
Fatal incidents (recreational) per 100,000 vessels	3.8	5.0	Similar		Decreasing
Fatal incidents (commercial) per 10,000 vessels	0.0	1.0	Lower		Decreasing
Serious injury incidents (recreational) per 100,000 vessels	14.3	18.3	Lower		Fluctuating**
Serious injury incidents (commercial) per 10,000 vessels	3.7	10.6	Lower		Fluctuating**

* **Key:**

▲ 2017–18 value ▮ 10 year average ■ Statistical range of 10 year average

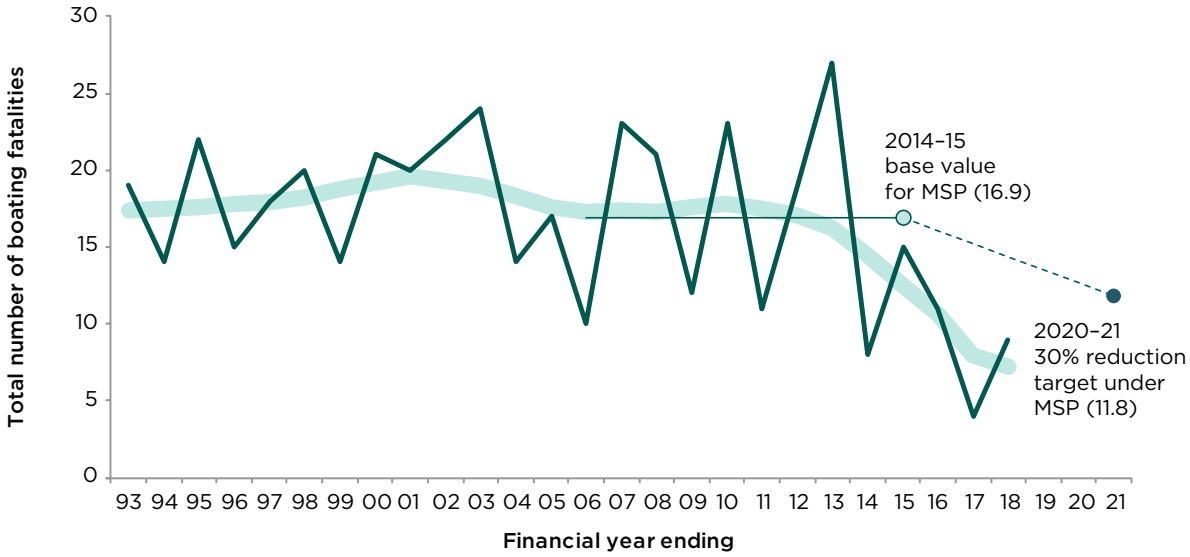
** Trends may have been affected by changes in reporting protocols and/or data capture over time.

4 Latest incident trends

4.1 Fatalities and fatal incidents

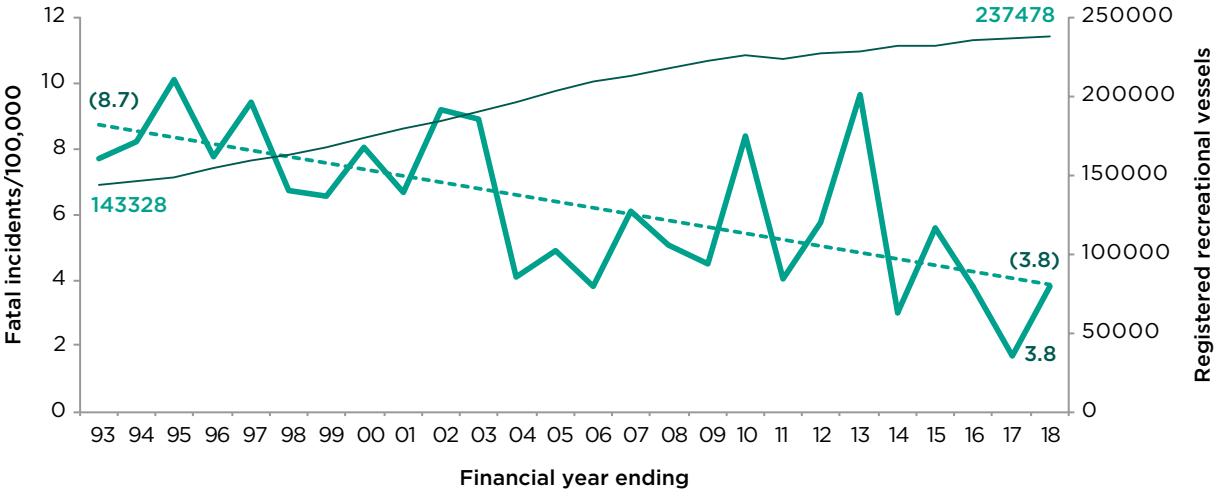
In recent years the overall number of boating fatalities has fallen, and is now well on track to meet the Maritime Safety Plan 2017-2021 target of a 30% reduction (Figure 1). All four of the financial years completed since 2013-14 have had fatality numbers below the respective targets, and this is reflected in a decisive downturn in the indicative trend shown on Figure 1.

Figure 1: Tracking of total boating fatalities against MSP target of a 30% reduction by 2020-21. Base value equals the 10 year average up to and including 2014-15. Pale curve is indicative of medium-term trends and is based on application of five-year moving averages.



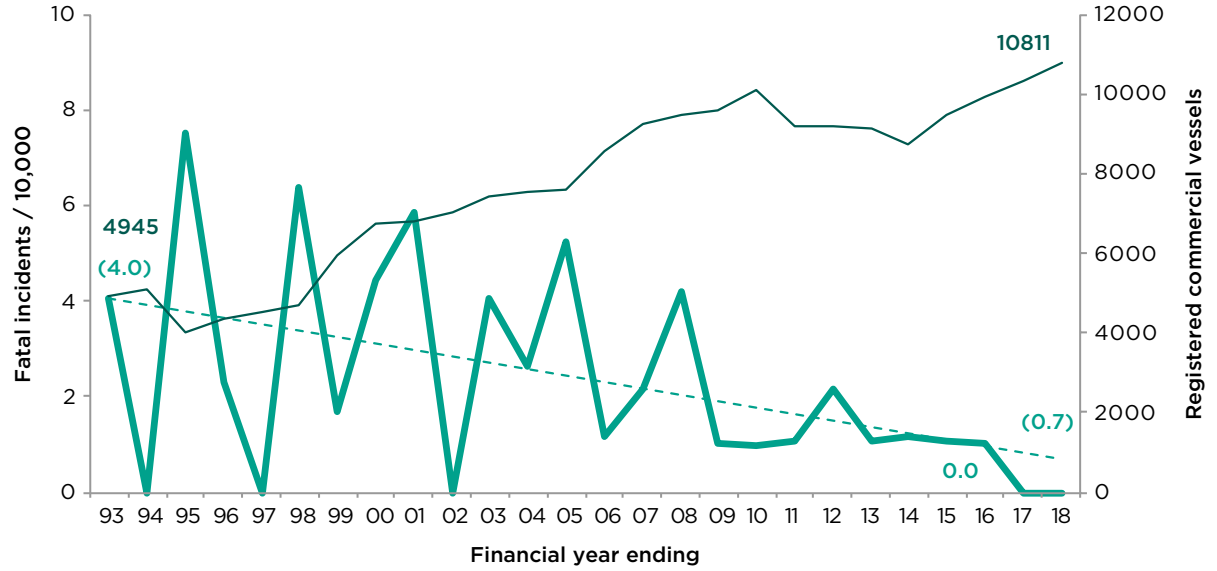
There were 3.8 fatal incidents per 100,000 recreational vessels in 2017–18. In trend terms, the recreational vessel fatal incident rate has decreased by 56% since the early 1990s (Figure 2)

Figure 2: Fatal incidents per 100,000 registered recreational vessels (thick green line) and corresponding registrations (thin dark green line). Long-term linear trend is shown by the dashed line. Data labels show key values, numbers in brackets are trend values.



There were no fatal incidents involving commercial vessels in 2017–18. In trend terms, the commercial vessel fatal incident rate is estimated to have decreased by more than 83% since the early 1990s (Figure 3).

Figure 3: Fatal incidents per 10,000 commercial vessels (thick green line) and corresponding registrations (thin dark green line). Long-term linear trend is shown by the dashed line. Data labels show key values, numbers in brackets are trend values*.

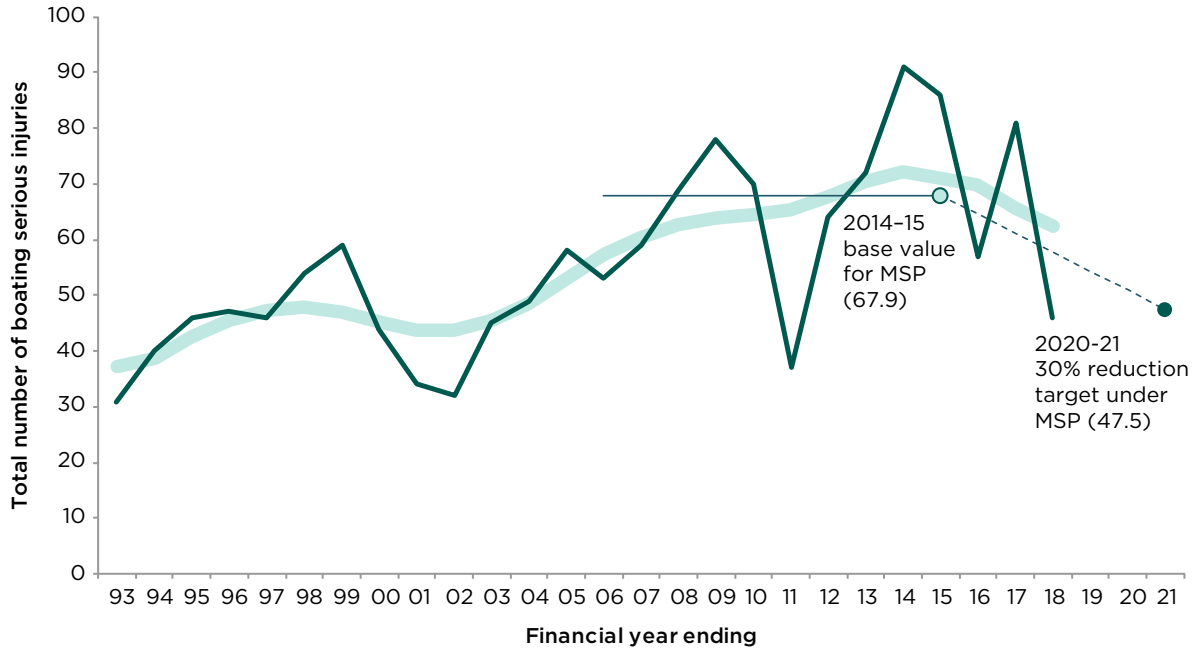


* The precision of the trend line fitted here is affected by the unequal variability in the data through time (latter years having much less variability).

4.2 Serious injuries and serious injury incidents

In recent years the overall number of boating serious injuries – based on Maritime operational data – has shown signs of falling, and is now approximately on track to meet the Maritime Safety Plan 2020–21 30% reduction target (Figure 4). Two out of the four financial years completed since 2013–14 have had serious injury numbers below the respective targets and this is reflected in a slight downturn in the indicative trend shown on Figure 4.

Figure 4: Tracking of total boating serious injuries against MSP target of a 30% reduction by 2020–21*. Base value equals the 10 year average up to and including 2014–15. Pale curve is indicative of medium-term trends and is based on application of five-year moving averages.



* Serious injury numbers are based only on Maritime operational incident reporting and are likely to be an underestimate of actual boating serious injuries based on recent data from NSW Health. Serious injury numbers may have also been affected by changes in reporting protocols and/or data capture over time.

According to incident data recorded by the Transport maritime cluster, there were 14.3 recreational serious injury incidents per 100,000 recreational vessels and 3.7 commercial serious injury incidents per 10,000 commercial vessels in 2017–18. Based on recent data from NSW Health provided to the Centre for Maritime Safety (CMS), these figures are likely to be underestimates – and CMS is working with NSW Health to evaluate the true extent of boating serious injuries on NSW waterways. Based on the evidence currently available, there have been no significant long-term trends in the serious injury incident rates for either recreational or commercial boating incidents – notwithstanding the signs of a reduction in serious injuries in recent years (Figure 4).

4.3 Overall boating incidents

Overall incident rates for both recreational vessels (Figure 5) and commercial vessels (Figure 6) have maintained long-term downward trends. There were 54.3 recreational boating incidents overall per 100,000 recreational vessels in 2017–18 and 68.5 commercial vessel incidents per 10,000 commercial vessels. In trend terms, the overall recreational vessel incident rate has decreased by 53%, while the corresponding commercial vessel incident rate is estimated to have decreased by nearly 58%.

Figure 5: Total incidents per 100,000 registered recreational vessels (thick green line) and corresponding registrations (thin dark green line). Data labels show key values, numbers in brackets are trend values.

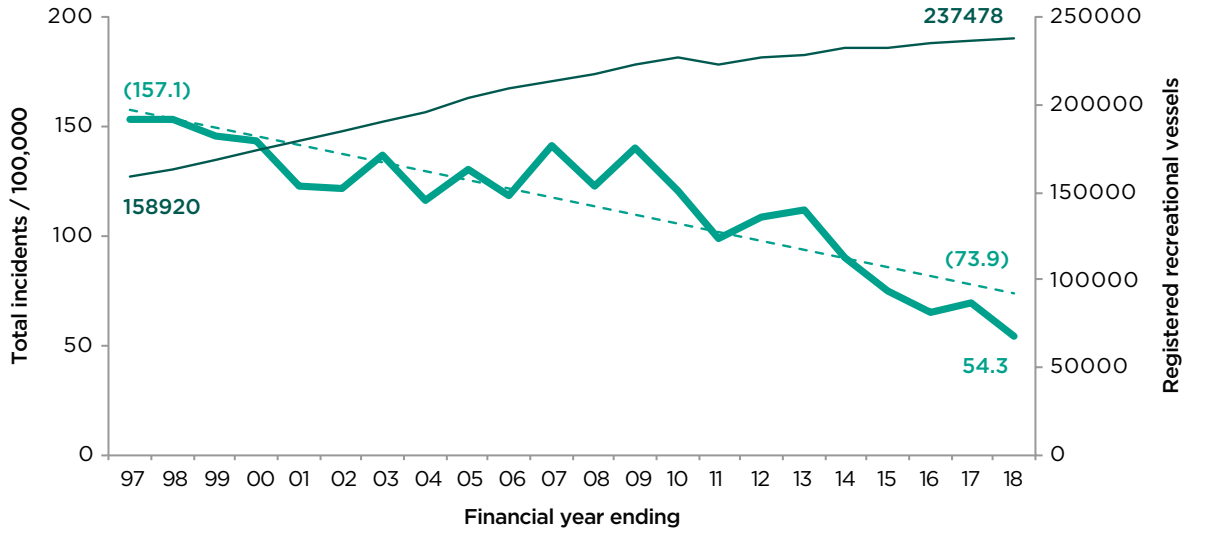
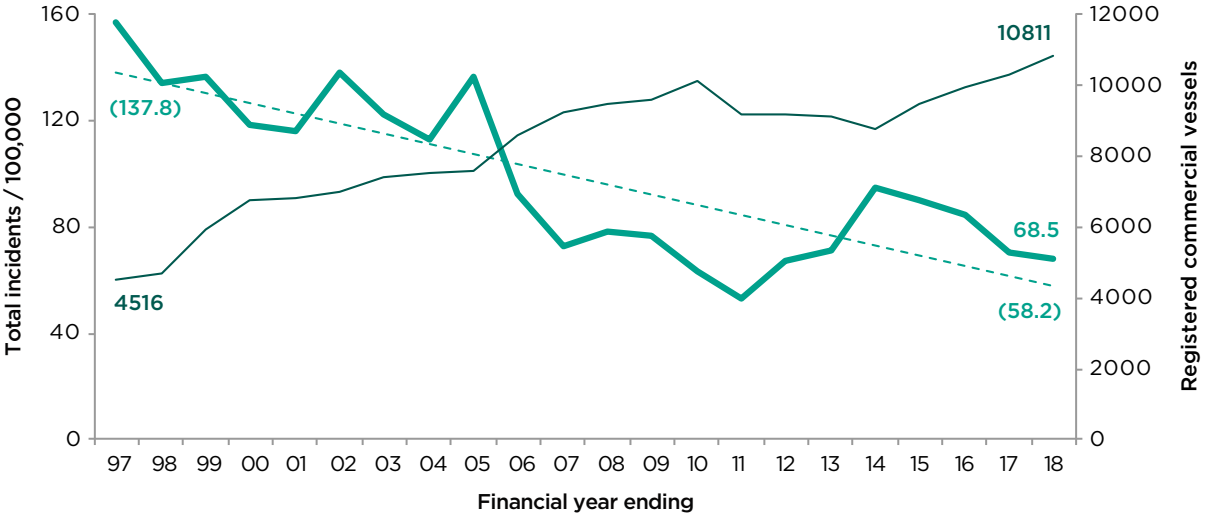


Figure 6: Total incidents per 10,000 commercial vessels (thick green line) and corresponding registrations (thin dark green line). Data labels show key values, numbers in brackets are trend values*.



* While the trend line is statistically significant at P<0.01, its precision is affected by a high degree of serial autocorrelation in the total incident rate.

5 Overview of boating incidents patterns

This section examines incident patterns (for fatal and serious injury incidents taken together) over the 10 year period to 30 June 2018. Recreational and commercial vessel incidents are considered separately[11].

5.1 Incident type

Figure 7: Tableau dashboard display of reported vessel-incident records for recreational boating serious injury and fatality incidents for the 10 year period to 30 June 2018 by incident type and vessel type*.

	Open Runabout	Other/Unspecified	PWC	Sailing Vessel	Cabin Runabout	Motor Cruiser	Paddlecraft	Punt	Inflatable	Powered catamaran	Row Boat	Houseboat	Sailing multihull	*Total Records
Collision with Vessel	35	24	39	17	4	5	2	1		1	4			132
Injury - Towing Incident	68	14	5	1	4			1		1		2		96
Capsizing	43	15	1	2	12	1	9		2	2	1		1	89
Fall Overboard	33	11	14	11	4	5	5	4	1					88
Collision with Fixed Object	25	6	10	3	6	2		2			1		1	56
Person Hit by Vessel	20	7	10		2		2		2	1		2		46
Propeller Injury	30	2			2			3	4			1	1	43
Injury Onboard	4	4	3	18		4		1		2		1		37
Fall in Vessel	6	5	6	5	3	1			1	1				28
Fire or Explosion (Fuel)	10	6	4	1	1	6								28
Other/Unspecified	7	4	4	3	3	1		1	1					24
Bar Crossing Incident	9	2	1		5	2				1				20
Grounding	4	1	1	7	3	1								17
Sinking	9	2		1	3									15
Swamping	4	2		1	4	3	1							15
Collision with Submerged Object	8	3	1		1									13
Collision with Floating Object	5	1	1		1									8
Hull Splitting (Structural Failure)	3							1		1				4
Carbon Monoxide Inhalation	1			1		1								3
Fire or Explosion (Other than Fuel)	1					2								3
Collision with Overhead Obstruction	1			1										2
Unique Vessel Totals (Distinct)	261	94	93	62	45	27	17	11	10	5	5	4	3	637

* The coloured numbers within the 'heat map' display show the numbers of incident records for each vessel – incident type combination (N=767), as some incidents had more than one incident type recorded. Total unique vessels=637. "Other/ unspecified" refers to cases where the incident type or vessel type was not recorded or specified in the source data provided by the Transport maritime cluster.

11 Based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

In terms of vessel-incident type combinations recorded in relation to recreational fatality or serious injury incidents (N=767), the most prevalent specific incident types for the 10 year period were collision with a vessel (132 vessel records, 17.2%), towing injury incidents (96 vessel records, 12.5%), capsizing (89 vessel records, 11.6%), fall overboard (88 vessel records, 11.5%) and collision with a fixed object (56 vessel records, 7.3%) – Figure 7. In 2017–18 (N=58) there was a similar pattern of vessel involvement in recreational incidents involving a fatality or serious injury, with collision with vessel (12 vessel records, 20.7%) and capsizing (11 vessel records, 19.0%) being the most prevalent.

In terms of the vessel types involved in recreational fatality or serious injury incidents (Figure 7; N=637), open runabouts accounted for 261 unique vessels involved in such incidents (41.0%) followed by PWC (93, 14.6%), sailing vessels (62, 9.7%), cabin runabouts (45, 7.1%) and motor cruisers (27, 4.2%). These percentages are compared with indicative data on vessel usage in Figure 8, based on survey respondents' recollections of their last boating trip and the type of vessel they were using[12].

Figure 8: Comparison between proportion of vessels involved in reported recreational fatal or serious injury incidents and indicative vessel usage (based on vessel trips[12])

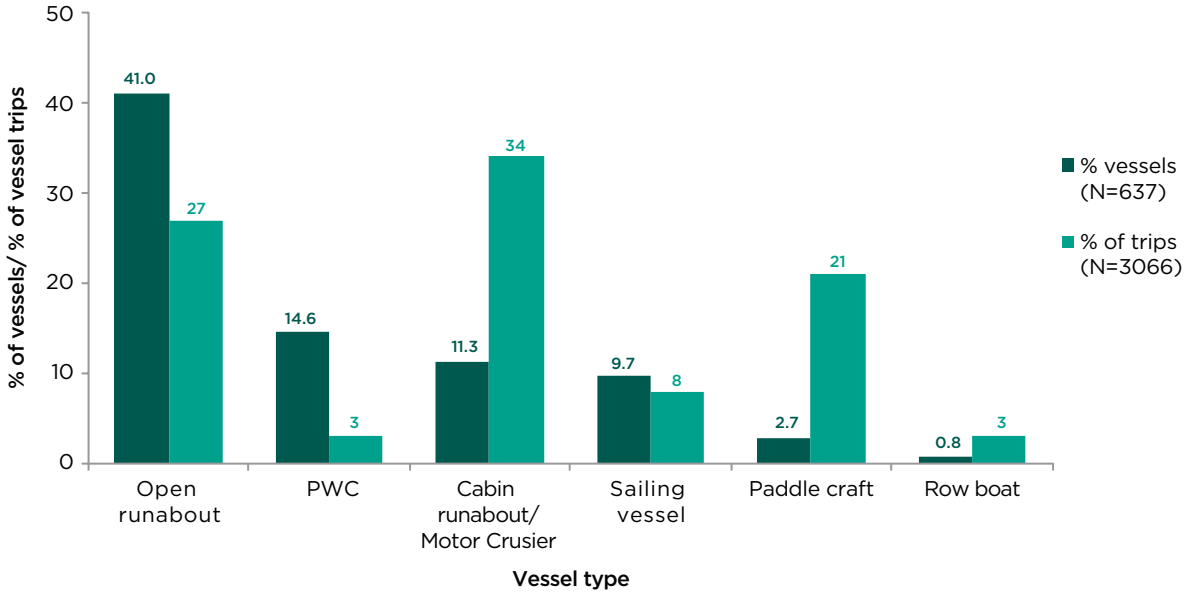


Figure 8 suggests that PWC have been over-represented in relation to fatality and serious injury incidents versus proportion of boating trips by a factor of about 4.9 (14.6% of vessels involved in incidents versus 3% of reported trips). However, it should be noted that this data does not take into account trip length, and therefore might not fully reflect actual usage and risk exposure. Figure 8 also suggests a significant degree of over-representation for open runabouts, by a factor of about 1.5 (41.0% of vessels involved in incidents versus 27% of reported trips). Conversely, there is strong evidence that paddle craft are under-represented in relation to fatality and serious injury incidents (2.7% of vessels involved in incidents versus 21% of trips), as are larger powered vessels (mainly cabin runabout and motor cruisers) and row boats, though to a lesser degree. The small degree of over-representation shown for sailing vessels in Figure 8 is not statistically significant.

12 Recreational Boating Participation. Report prepared for Transport for NSW by IPSOS. June 2018; percentages derived from question about type of boat or watercraft used on most recent trip.

In 2017–18 (N=53) the picture in relation to vessels involved in recreational fatality or serious injury incidents was similar, with the most prevalent vessel types being open runabouts (19 vessels involved, 35.8%), followed by PWC (10, 18.9%) and sailing vessels (9, 17.0%).

If serious injury incidents alone are considered for the 10 year period, the respective involvement of different vessel types is similar. However, it is notable that PWC accounted for 17.1% of the vessels involved in serious injury incidents, a far greater proportion than suggested by their proportion of recreational vessel registrations (3.5% in 2008-09, increasing to 5.9% in 2017–18) or their estimated percentage of vessel trips (3%)[13].

Figure 7 shows that different vessel types had different fatality/ serious injury 'incident type profiles' over the 10 year period. For example, fatal or serious injury incidents involving sailing vessels were often described as injuries onboard[14] (25.0% of 72 records with vessel type equal to sailing vessel), collisions with another vessel (23.6%) or falling overboard (15.3%), while fatal or serious injury incidents involving open runabouts were often towing related injuries (20.9% of 326 records with vessel type equal to open runabout), capsizes (13.2%) and collision with another vessel (10.7%). Nearly two out of every five PWC records related to a fatality or serious injury incident (39.0%, N=100) involved a collision with another vessel.

Examination of the 115 recreational fatality incidents recorded over the 10 year period shows that open runabouts accounted for a high proportion of the 123 unique vessels involved (45.5%, 56 vessels), followed by sailing vessels (9.8%, 12 vessels), cabin runabouts and paddle craft (both 8.9%, 11 vessels) and PWC (4.1%, 5 vessels). The proportion of open runabout involvement in recreational fatality incidents (45.5% of vessels involved) was significantly greater than their estimated percentage of vessel trips (27%)[13]. There were 146 vessel-incident type combinations recorded in relation to recreational fatality incidents. The most prevalent specific incident types were vessel capsize (47 vessel records, 32.2%), fall overboard (44 vessel records, 30.1%) or a towing related injury (12 vessel records, 8.2%). Twenty one out of 68 records (30.9%) with vessel type equal to open runabout involved a vessel capsize. The corresponding percentages were also high on paddle craft (63.6% of 11 records) and cabin runabouts (42.9% of 14 records). With sailing vessels, 9 out of the 14 related records (64.3%) involved in a person falling overboard.

13 Recreational Boating Participation. Report prepared for Transport for NSW by IPSOS. June 2018; percentages derived from question about type of boat or watercraft used on most recent trip.

14 "Injuries onboard" refer to injuries sustained by a person who is within the vessel at the time and where the incident does not readily fall into another incident type – for example bruises or cuts sustained from equipment.

Figure 9: Tableau dashboard display of reported vessel-incident records for commercial serious injury and fatality incidents for the 10 year period to 30 June 2018 by incident type and vessel type*.

	Other/Unspecified	Powered catamaran	Motor Cruiser	Open Runabout	Inflatable	Sailing Vessel	Fishing vessel	Houseboat	Ferry	Cabin Runabout	Paddlecraft	Barge	Pontoon	Punt	PWC	*Total Records
Injury Onboard	9	6	8	3	6	3	4					1				40
Fall in Vessel	6	6	8		3	4	1	1	1			1				31
Fall Overboard	3	1	1	3	1	1		1						1		12
Capsizing	1	1	1	3						1	2					9
Other/Unspecified	2	4						1	1							8
Propeller Injury	3		1	1	1			1						1		8
Collision with Fixed Object	3	2											1			6
Bar Crossing Incident		2	2													4
Collision with Vessel	2		1	1												4
Person Hit by Vessel	1		1		1				1							4
Collision with Floating Object				1						1						2
Injury - Parasailing Incident	1			1												2
Sinking				1			1									2
Collision with Submerged Object	1															1
Fire or Explosion (Fuel)							1									1
Grounding						1										1
Injury - Diving Incident	1															1
Swamping															1	1
Unique Vessel Totals (Distinct)	29	20	18	13	10	9	6	4	3	2	2	1	1	1	1	120

* The coloured numbers within the 'heat map' display show the numbers of incident records for each vessel – incident type combination (N=137), as some incidents had more than one incident type recorded. Total unique vessels=120. "Other/ unspecified" refers to cases where the incident type or vessel type was not recorded or specified in the source data provided by the Transport maritime cluster.

In terms of vessel-incident type combinations recorded in relation to commercial fatality or serious injury incidents (N=137), the most prevalent specific commercial vessel incident types for the 10 year period were injuries onboard (40 vessel records, 29.2%), fall in vessel (31 vessel records, 22.6%) and fall overboard (12 vessel records, 8.8%) – Figure 9. In 2017–18 there were four commercial vessel serious injury incidents involving 5 vessels, and no fatality incidents. Three of the incident-vessel records related to an injury on board or a fall in the vessel, mirroring the picture over the whole 10 years.

In terms of the vessels involved in commercial fatality or serious injury incidents (Figure 9; N=120), powered catamarans accounted for 20 vessels involved in such incidents (16.7%) followed by motor cruisers (18, 15.0%), open runabouts (13, 10.8%), inflatables (10, 8.3%) and sailing vessels (9, 7.5%). In 2017–18, three of the five vessels involved in the four commercial vessel serious injury incidents were powered catamarans[15], along with one motor cruiser and one sailing vessel.

Nine vessels were involved in the nine commercial vessel fatal incidents recorded over the 10 years. These included three open runabouts, two houseboats and one each of fishing vessels, motor cruisers and punts. In one case, the vessel type was not specified.

The information in Figures 7 and 9 shows that recreational and commercial vessel incident types are quite different.

Collisions of various sorts, including a person being hit by a vessel or its propeller, accounted for 300 (39.1%) of recreational vessel – incident type records over the 10 year period. With commercial vessel incidents, collision in its various forms accounted for only 25 (18.2%) of the corresponding records. The comparatively high proportion of various collision incidents in relation to recreational vessels emphasises the need for recreational skippers to drive to a safe speed and to always keep a proper lookout – two measures that above all else would reduce collision risk.

By contrast, injuries on board a vessel, whether recorded as "injury onboard" or as 'fall in vessel", are relatively common on commercial vessels and accounted for more than half commercial vessel fatality or serious injury vessel – incident type records over the 10 year period (62 records, 51.8%). However, these incident types accounted for only 8.5% of the corresponding recreational vessel records. This difference reflects the fact that commercial vessels tend to carry larger numbers of passengers and often have multiple decks, with ramps and stairwells. While these vessels have an excellent overall safety record, the large numbers of passengers, multiple spaces and often complex machinery and equipment means that relatively minor incidents – such as trips and falls, or even injuries from using equipment – are comparatively common. All passenger-carrying commercial vessels are required to have a documented safety system in place, which is designed to help the crew foresee and avoid these incidents.

While incidents recorded as "injury – towing incident" were the most prevalent incident type recorded in relation to recreational vessel incidents over the 10 year period (12.5% of records – Figure 7), no such incidents were recorded in relation to commercial vessels over this period (Figure 9). While some such incidents may have occurred and being recorded under a different incident type, this finding points to the positive overall safety record of commercial waterski and towing operations.

15 Powered catamarans are typically larger charter vessels with a twin hull design, and may include some ferries.

5.2 Incident cause

Figure 10: Tableau dashboard display of reported vessel-incident records for recreational boating serious injury and fatality incidents for the 10 year period to 30 June 2018 by incident cause and vessel type*.

	Open Runabout	Other/Unspecified	PWC	Sailing Vessel	Cabin Runabout	Motor Cruiser	Paddlecraft	Punt	Inflatable	Powered catamaran	Row Boat	Houseboat	Sailing multihull	*Total Records
Other/Unspecified	87	29	26	29	16	6	9	6	3	1	2		1	215
Lack of Judgement	49	18	29	8	6	4			1		1	2		118
No Proper Lookout	43	15	20	8	6	2	1	1	1	1	4			102
Excessive Speed	35	12	10	1	1	1	1			2		1		64
Weather Conditions	13	8	4	14	3		2	2	3				2	51
Hazardous Waters	9	11	5	1	4	1	2		1		1			35
Wash	16	5	6	2	3			1	1					34
Excess Alcohol	19	2	2	1	3	5						1		33
Inexperience	9		7	1			2							19
Fault of Equipment	3	3	2	5	1	3								17
Bar Conditions	7	1			5	2				1				16
Navigational Error	6	2	2	2		1				1	2			16
Fault of Machinery	7	2	2		1	1				1		1		15
Floating or Submerged Object	10	2	2											14
Tidal Conditions	4			1	1				2					8
Inadequate Stability	5							1			1			7
Restricted Visibility	2				1			1						4
Electrical Fault	1					2								3
Improper Loading	2							1						3
Overloading	2						1							3
Fault of Hull	1				1									2
Unique Vessel Totals (Distinct)	261	94	93	62	45	27	17	11	10	5	5	4	3	637

* The coloured numbers within the 'heat map' display show the numbers of incident records for each vessel – incident cause combination (N=779), as some incidents had more than one incident cause recorded. Total unique vessels=637. "Other/ unspecified" refers to cases where the incident cause was not recorded or specified in the source data provided by the Transport maritime cluster. Causes refer to what was reported at the time of an incident, and may not fully reflect actual circumstances in every case.

In terms of vessel-incident cause combinations recorded in relation to recreational fatality or serious injury incidents (N=779), the most prevalent specific incident causes for the 10 year period were lack of judgement (118 vessel records, 15.1%), no proper lookout (102 vessel records, 13.1%), excessive speed (64 vessel records, 8.2%), weather conditions (51 incidents, 6.5%) and hazardous waters (35 vessel records, 4.5%). In 2017–18 (N=72) there was a broadly similar pattern of incident types, with no proper lookout (11 vessel records, 15.3%) and lack of judgement (10 vessel records, 13.9%) being the most prevalent.

The breakdown of vessels involved in recreational incidents by vessel type shown in Figure 10 is as per Figure 7, discussed above. Figure 10 shows that different vessel types had different fatality/ serious injury 'incident cause profiles' over the 10 year period. For example, fatal or serious injury incidents involving sailing vessels were often attributed to weather conditions (19.2% of 73 records with vessel type equal to sailing vessel), while fatal or serious injuries involving PWC were often attributed to lack of judgement (24.8% of 117 records with vessel type equal to PWC), no proper lookout (17.1%) or excessive speed (8.5%). Open runabouts were affected by a wide variety of incident causes, with the most prevalent being lack of judgement (14.8% of 330 records with vessel type equal to open runabout), no proper lookout (13.0%) and excessive speed (10.6%).

Examination of the 115 recreational fatality incidents recorded over the 10 year period shows that there were 149 vessel-incident cause combinations recorded in relation to these incidents. Based on these records, the most prevalent cause was weather conditions (22 records, 14.8%), followed by excess alcohol, excessive speed and hazardous waters (each 13 records, 8.7%) and lack of judgement (12 records, 8.1%).

Figure 11: Tableau dashboard display of reported vessel-incident records for commercial serious injury and fatality incidents for the 10 year period to 30 June 2018 by incident cause and vessel type*.

	Other/Unspecified	Powered catamaran	Motor Cruiser	Open Runabout	Inflatable	Sailing Vessel	Fishing vessel	Houseboat	Ferry	Cabin Runabout	Paddlecraft	Barg	Pontoon	Punt	PWC	*Total Records
Other/Unspecified	12	11	4	4	3	2	5		1					1		43
Lack of Judgement	3	2	5	5	3		1	2	1			1	1			24
Weather Conditions	4		1		2	4										12
Hazardous Waters	1	3	1	1	1						2					9
Excessive Speed	2	1	1	2	2											8
No Proper Lookout	3		1	1		1		1		1						8
Excess Alcohol		1	3					2		1						7
Bar Conditions		2	2							1						5
Inexperience	1	1	2			1										5
Wash	1	1	1			1										4
Fault of Machinery	1	1	1													3
Fault of Equipment	2															2
Fault of Hull					2											2
Floating or Submerged Object	1			1												2
Improper Loading			1	1												2
Lack of Maintenance									1			1				2
Tidal Conditions	2															2
Inadequate Stability				1												1
Overloading				1												1
Unique Vessel Totals (Distinct)	29	20	18	13	10	9	6	4	3	2	2	1	1	1	1	120

* The coloured numbers within the 'heat map' display show the numbers of incident records for each vessel – incident cause combination (N=142), as some incidents had more than one incident cause recorded. Total unique vessels=120. "Other/ unspecified" refers to cases where the incident cause was not recorded or specified in the source data provided by the Transport maritime cluster. Causes refer to what was reported at the time of an incident, and may not fully reflect actual circumstances in every case.

In terms of vessel-incident cause combinations recorded in relation to commercial fatality or serious injury incidents (N=142), the most prevalent specific commercial vessel incident causes for the 10 year period were lack of judgement (24 vessel records, 16.9%), weather conditions (12 vessel records, 8.5%), hazardous waters (9 vessel records 6.3%) and excessive speed and no proper lookout (both 8 vessel records, 5.6%) – Figure 11. No specific causes were attributed to any of the four commercial vessel serious injury incidents recorded in 2017–18.

The information in Figures 10 and 11 shows that recreational and commercial vessel incident causes are similar. Both recreational and commercial vessel-incident records have very similarly ranking causes: lack of judgement (1st and 1st respectively), no proper lookout (2nd and =4th), excessive speed (3rd and =4th), weather conditions (4th and 2nd), Hazardous waters (5th and 3rd), wash (6th and 9th) and excess alcohol (7th and 6th). This suggests that – fundamentally – many of the same decision making imperatives and skill for avoiding incidents are the same for recreational and commercial skippers – for example: exercising sound judgement, watching the weather and sea conditions and always driving at a safe speed.

6 Trends in Maritime Safety Plan problem definitions

This section examines the available evidence in relation to each of the 10 problem definitions identified in the Maritime Safety Plan 2017-21. Where appropriate to the context of the particular problem definition, recreational and commercial vessel incidents are considered separately. This section provides a summary of how safety performance has been tracking against each of the problem definitions – with an emphasis on fatality and serious injury incidents. It should be noted that the data presented does not exactly correspond to the data originally presented in the Maritime Safety Plan 2017-21, as that data was based on fatalities and serious injuries, rather than fatality incidents and serious injury incidents. However, the incident related data still gives a very good indication of trends in relation to fatalities and serious injuries.

6.1 Lifejacket wear

Lifejacket wear[16] is a key factor in the survival of boating incidents where persons are forced into the water[17,18].

Of the 93 people presumed drowned since 2008-09, only 16 (17.2%) of these people are known to have actually been wearing a lifejacket (Table 3), meaning up to 77 lives could have been saved over this period if all presumed drowning victims had been wearing a lifejacket. This represents 59.7% of all recreational boating fatalities since 2008-09. Of these 77 people, the vast majority (72) are known to have not been wearing a lifejacket, while for five victims, the lifejacket-wear status is unknown. Over the last 10 years, 77.4% of those presumed drowned in recreational boating incidents (i.e. nearly 8 out of 10) are known to have not been wearing a lifejacket.

Table 3: Summary of recreational drowning and lifejacket wear statistics for 2017–18, with long-term statistics provided for comparison.

Period	Total recreational boating fatalities	Fatalities presumed due to drowning (number)	Fatalities presumed due to drowning (%)	Drowning victims who were wearing a lifejacket (number)	Drowning victims who were wearing a lifejacket (%)
2017–18	9	5	55.6	2	40*
Last 10 years (2008–09 to 2017–18)	129	93	72.1	16	17.2

* It is not possible to make any statistical conclusion about the 2017–18 wear rate in comparison to that of previous years.

On a more positive note, overall lifejacket wear rates amongst boating participants have increased by around five-fold since 2007 but have recently plateaued in the low to mid 40s (Figure 12).

16 Analysis of lifejacket related data, including drowning and non-drowning fatalities, is based on CMS boating fatality records and on a lifejacket wear observational study (details in Figure 12).

17 O'Connor, P. (2008) National Assessment of Boating Fatalities in Australia 1999 – 2004. Report prepared for the National Marine Safety Committee.

18 Viauroux, C. and Gungor, A (2015) An Empirical Analysis of Life Jacket Effectiveness in Recreational Boating. Paper published in journal Risk Analysis.

At the same time, there has been a long-term decline in the rate of recreational drowning fatalities per 100,000 vessels (Figure 12). Despite the large year-to-year fluctuations in the rate, this decline is statistically significant. In trend terms, the drowning fatality rate has declined from more than eight per 100,000 vessels in 1992–93 to approximately three per 100,000 vessels in 2016-17 – a reduction of more than 60%. However, there has been no such decline in the non-drowning fatality rate (Figure 12). Indeed, the non-drowning rate has remained steady, aside from year-to-year fluctuations, averaging just under two per 100,000 vessels.

The 60% reduction in the rate of recreational drowning fatalities, in the absence of any sign of a decline in the corresponding non-drowning fatality rate, strongly suggests that lifejackets have been saving lives – even in the absence of direct observational evidence such as that provided in a previous study by the National Marine Safety Committee[19]. The non-drowning data essentially acts as a 'control', as it can be thought of as providing the 'background' picture of fatal incidents in the absence of any major influence from lifejacket wear. While wearing a lifejacket can provide some protection from injury in a collision type incident, the lack of any decline in the non-drowning fatality rate suggests that little progress has been made in reducing the rate of fatalities related to factors such as excessive speed, not keeping a proper lookout and towing activities. While overall incident numbers may be falling in relation to these factors (see Figures 14, 15 and 18), collectively, they are still resulting in a similar fatality rate as one or even two decades ago (Non drowning data, Figure 12).

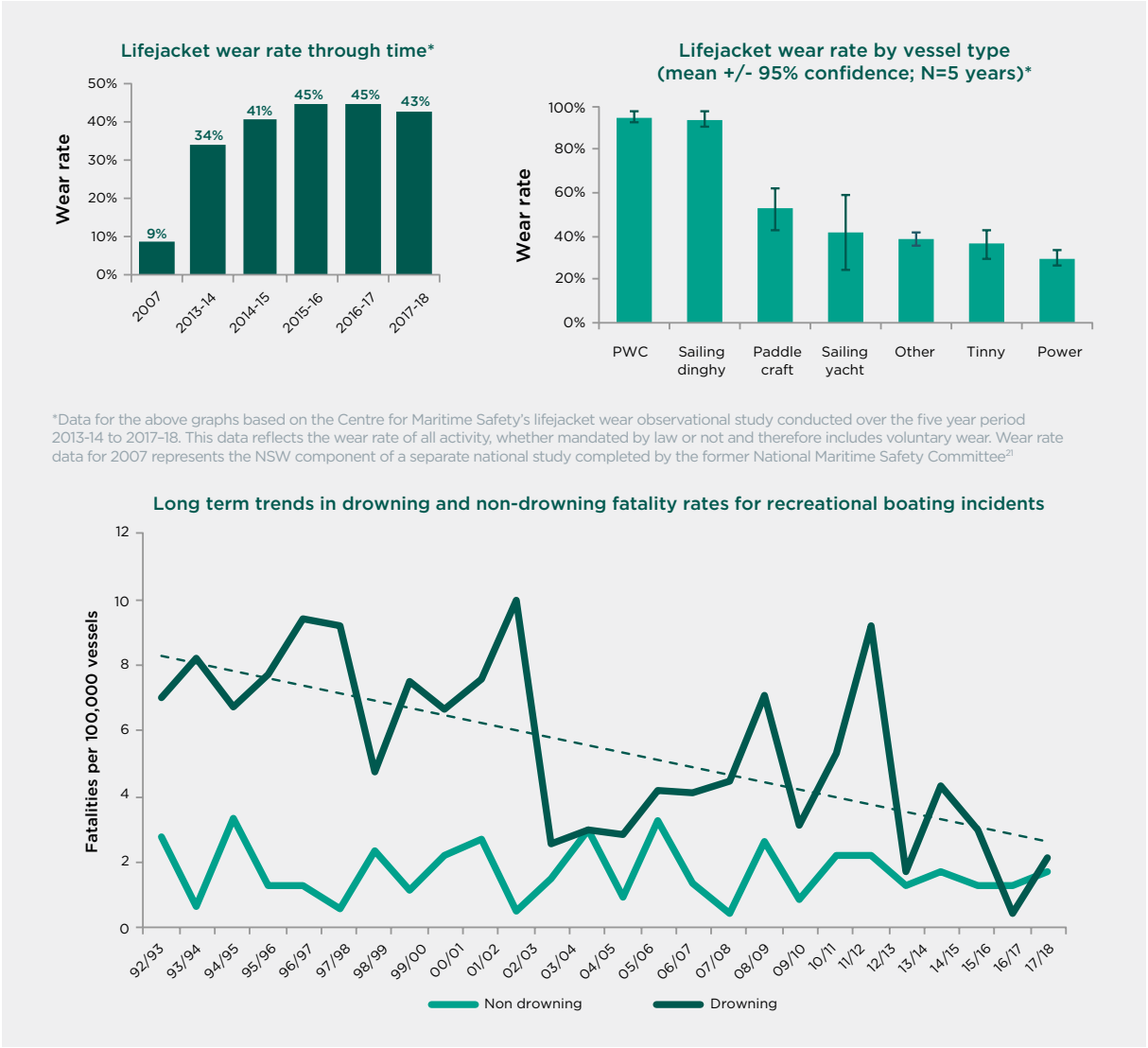
Lifejackets save lives in a number of ways. Firstly they provide support to a person suffering cold shock in the first minutes after entering cold water. Mild cold shock can occur in water as warm as 22-25 degrees C, and cold shock becomes very dangerous at temperatures below about 15 degrees[20]. Cold shock causes rapid uncontrolled breathing, loss of airway control and panic. The main benefit of a lifejacket at this point is in helping the victim keep their airway clear – by supporting the head above the water surface. This is especially important in choppy water. A lifejacket will help a person manage cold shock and regain their composure. Once the worst effects of cold shock have subsided (generally within a few minutes), a person is likely to be in a better position to assess their options. A lifejacket will also greatly assist a person in the water as the subsequent, more gradual, effects of cold water take hold – providing support as the person loses strength in their arms and legs and later suffers the effects of hypothermia and/or general exhaustion. A level 100 lifejacket or above can also help keep an unconscious person's airway clear. In essence, a lifejacket will buy much more time for potential rescue for any person forced into the water. If the water is cold, particularly less than about 15 degrees, the time available for a person not wearing a lifejacket to be successfully rescued may be extremely brief – sometimes only moments – and in most such cases a lifejacket will greatly increase the probability of a successful rescue – particularly if an effective means of communicating distress is available.

The excellent lifejacket wear rates for PWC and sailing dinghies show what is possible in raising wear rates. In the case of PWC, lifejacket wear is compulsory, and the jackets are typically styled in a way that complements the rider and their craft. For sailing dinghies – which are often in races, clubs have a long tradition of mandating lifejacket wear. Additionally, Level 50 lifejackets are generally the jacket of choice for people using PWC or sailing dinghies, and these types of lifejackets tend to have high levels of comfort and wearability when compared with bulkier foam designs of Level 100 or higher. The challenge is drive similar cultures in other small craft such as paddle craft and tinnies.

19 O'Connor, P. (2008) National Assessment of Boating Fatalities in Australia 1999 – 2004. Report prepared for the National Marine Safety Committee.

20 coldwatersafety.org/WhatIsCold.html

Figure 12: Problem definition – lifejackets – at a glance



*Data for the above graphs based on the Centre for Maritime Safety's lifejacket wear observational study conducted over the five year period 2013-14 to 2017–18. This data reflects the wear rate of all activity, whether mandated by law or not and therefore includes voluntary wear. Wear rate data for 2007 represents the NSW component of a separate national study completed by the former National Maritime Safety Committee[21]

Key statistics:

- Lifejacket wear rates have increased in NSW over recent years and are now estimated at 43% across all boating activities, including both where lifejacket wear is mandated and where it is not.
- Over the last 10 years, nearly 8 out of people presumed drowned in recreational boating accidents were not wearing a lifejacket.
- Nearly 60% of all recreational boating fatalities since 2008–09 could have been prevented had all presumed drowning victims been wearing a lifejacket.
- Drowning fatality rates for recreational vessel incidents continue a long-term downward trend, and have fallen by more than 60% since 1992-93. There has been no significant change in the corresponding non-drowning fatality rate.
- Lifejacket wear rates over the last five years have been much higher on PWC (average of 95%) and sailing dinghies (94%) than on tinnies (36%) and larger power vessels (30%). Paddle craft (53%) and sailing yachts (42%) had intermediate wear rates.
- Lifejacket wear rates have also varied significantly among locations covered in the CMS observational study. In 2017–18, Batemans Bay (83%) and Lake Jindabyne (69%) had much higher wear rates than Sussex Inlet (20%) and the Clarence River (17%).

21 Personal Flotation Devices Wear Rate Study 2007. National Marine Safety Committee.

6.2 Weather conditions

Weather conditions[22] were reported as an incident cause in association with 20 (16.1%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. All of these fatal incidents were recreational boating incidents.

When other incident causes likely to relate to large waves and strong winds are included (i.e. hazardous waters and bar conditions), the number of fatal incidents related to 'weather conditions' is even higher – 33 incidents (26.6% of the total). When considering that 45 fatal incidents (36.3%) did not have a specific cause recorded, it is likely that weather conditions – in terms of large waves and/or strong winds were a major cause in more than a third of fatal incidents over this period, and may well have been a factor in more than half.

Weather conditions were also reported as an incident cause in association with 39 (7.1%) of the 546 serious injury incidents recorded over the 10 years, and 428 (13.5%) of the 3167 boating incidents overall.

In 2017–18, weather conditions were associated with 2 out of the 9 fatal incidents (22.2%).

Weather related incidents are trending downwards (Figure 13). The overall number of incidents related to weather conditions in 2017–18 (25) was significantly below the long-term (10 year) annual average of 42.8 incidents.

Figure 13 provides a snapshot of key data and statistics related to boating incidents associated with bad weather conditions.

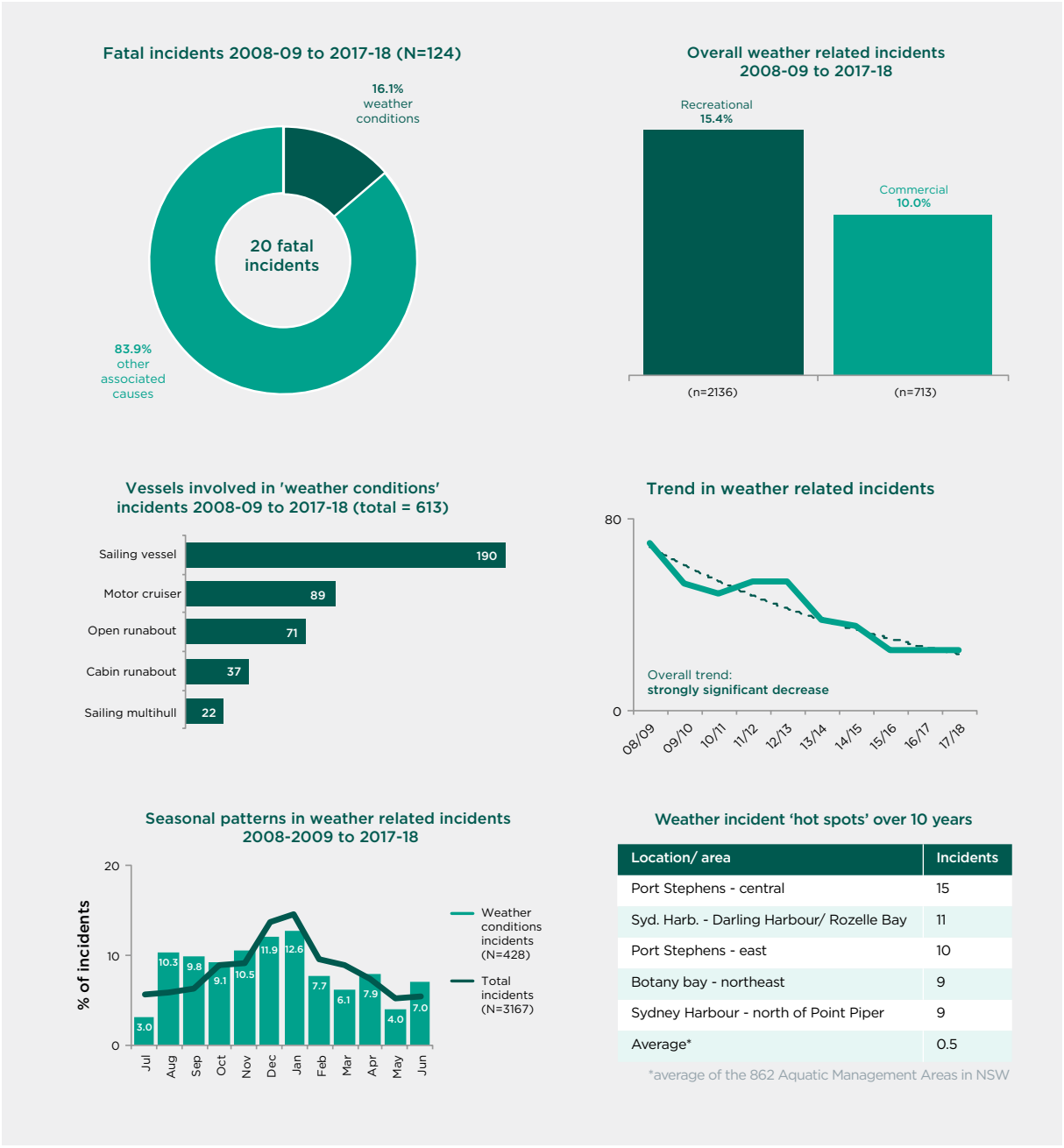
Weather conditions remain a major concern with boating safety, particularly in relation to smaller craft such as tinnies and paddle craft. Some of the key issues are:

- Weather conditions (strong winds) can generate large waves that capsize or swamp smaller vessels. In some cases, large waves (swell) can be generated from distant sources and cause dangerous conditions even if the local weather is fine and calm.
- Strong winds can easily make small craft – particularly paddle craft and sailing vessels – difficult to manage. In certain conditions, these craft can easily be blown offshore, swamped and/or capsized. Strong winds can also cause larger vessels to drag their moorings or be forced aground.
- Fog or heavy rain can drastically cut visibility, making navigation more difficult and increasing the risk of a collision or running aground.
- Heavy rain, even if only in a distant (upstream) part of a catchment, can cause flooding – along with hazardous debris, altered shoals and channels as well as damage/ displacement of navigation marks.
- Thunderstorms, which are common during the peak boating season, can bring lightning, strong winds and occasionally hail.
- Weather can change suddenly, catching out boaters who may be unprepared.

The best safeguard against bad weather is preparation – always checking the forecast ahead of time and whilst on the water, making sure your vessel is designed to handle any likely conditions and having the right safety equipment aboard. If there is any doubt about the weather, it is better to postpone a trip or have an alternate plan that includes a safe haven.

22 Analysis of weather conditions based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 13: Problem definition – weather conditions – at a glance



Location/ area	Incidents
Port Stephens - central	15
Syd. Harb. - Darling Harbour/ Rozelle Bay	11
Port Stephens - east	10
Botany bay - northeast	9
Sydney Harbour - north of Point Piper	9
Average*	0.5

*average of the 862 Aquatic Management Areas in NSW

Key statistics:

- About 1 in 6 fatal boating incidents are associatted with adverse weather conditions.
- The overall number of boating incidents related to weather conditions has declined significantly.
- Overall, recreational vessel incidents are significantly more likely to be associated with weather conditions (15.4%) than are commercial incidents (10.0%).
- 190 (31.0%) of the 613 vessels involved in incidents related to weather conditions were sailing vessels.
- Incidents related to weather conditions can occur at any time of year. Nearly two-thirds (64.3%) occurred in the six month period August to January. 23.8% of all boating incidents in August were associated with weather conditions, followed by September (21.0%) and June (17.4%).

6.3 Excessive speed

Excessive speed[23] was reported as an incident cause in association with 12 (9.7%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. All of these fatal incidents were recreational boating incidents.

Excessive speed was also reported as an incident cause in association with 47 (8.6%) of the 546 serious injury incidents recorded over the 10 years, and 149 (4.7%) of the 3167 boating incidents overall.

In 2017–18, excessive speed was associated with 1 out of the 9 fatal incidents (11.1%).

Incidents related to excessive speed are trending downwards (Figure 14). The overall number of incidents associated with excessive speed in 2017–18 (4) was significantly below the long-term (10 year) annual average of 14.9 incidents.

Figure 14 provides a snapshot of key data and statistics related to boating incidents associated with excessive speed.

Excessive speed remains a key safety concern on the water. Boats don't have brakes and, although the typical powerboat has an engine reverse gear, most vessels are more difficult to handle at higher speeds. Even more importantly, the higher the speed, the less reaction time available for a skipper to (1) recognise a developing hazard – such an obstacle or other vessel and (2) take evasive action. What is "excessive speed" depends on a number of factors:

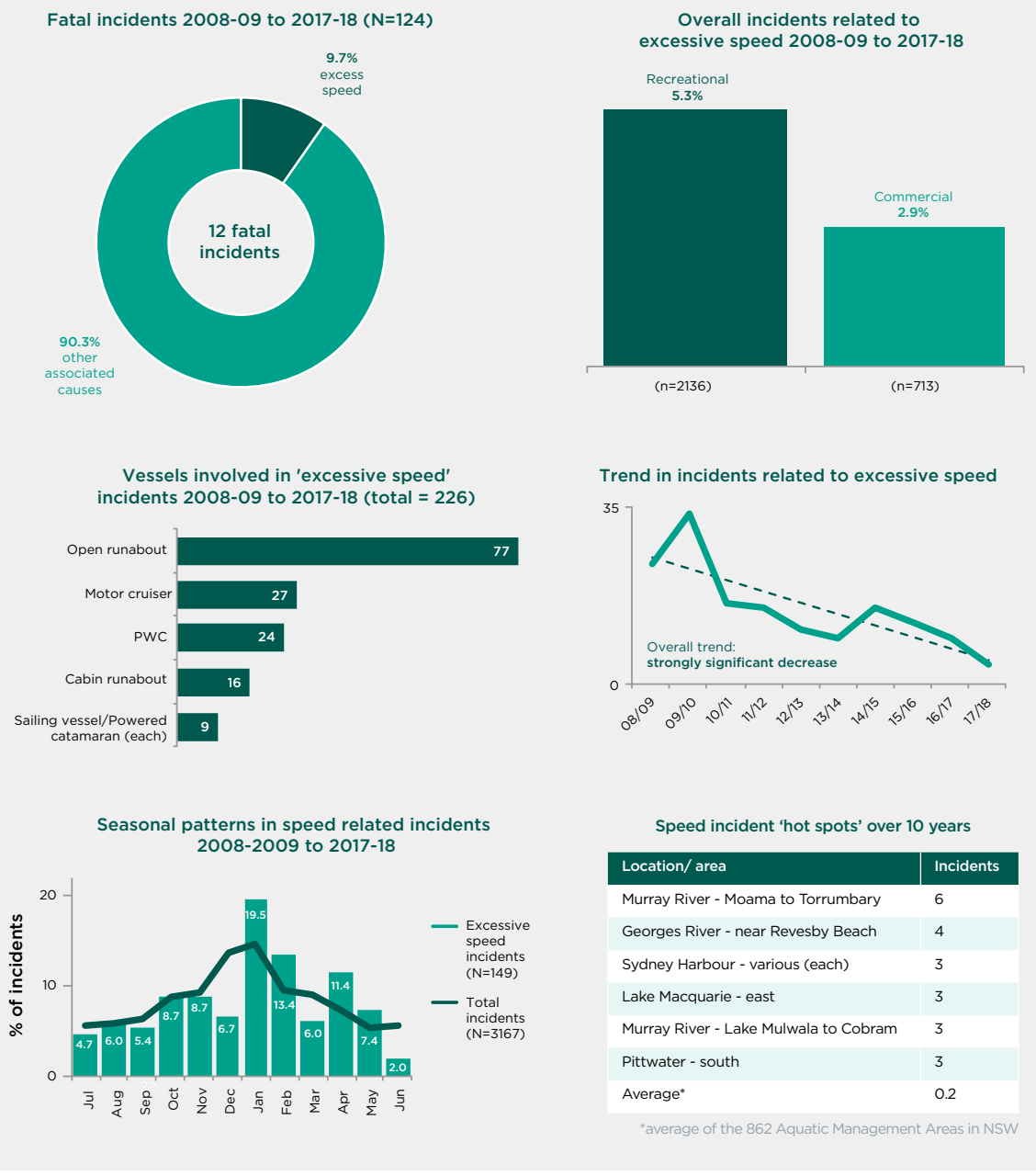
- boat traffic in the area – and especially its proximity
- nearby structures, shorelines or other obstacles
- swimmers or divers in the area
- condition of the water surface (related to wind, waves, boat wash etc.)
- prevailing visibility – which might be reduced in fog or rain
- time of day (particularly night versus day)
- design and handling characteristics of the vessel
- experience and skills of the skipper.

Even on the same waterway, changed circumstances can dramatically reduce what is a safe speed: for example – increased boat traffic leaves little room for avoiding other vessels, structures or people in the water and so requires slower speeds; reduced visibility or darkness makes it harder to see potential hazards and avoid collisions; and choppy conditions may make vessel handling at higher speeds dangerous or uncomfortable for passengers.

Excess speed is closely related to the problem definition of "no proper lookout" (Section 6.4). In many cases an incident attributed to someone not keeping a proper lookout will be partly due to excessive speed. At high speeds, even a momentary absence from keeping a proper lookout can easily contribute to a collision, while at low speeds there is more chance that a skipper could recover the situation and avoid the collision. When considered together, excess speed and lack of a proper lookout were associated with 18 fatal incidents (14.5% of total) and 575 incidents overall (18.2% of total) – Figures 14 and 15. Given that many incidents related to excess speed or not keeping a proper lookout involve a collision between two vessels, it is important that all skippers drive at a speed that is safe for the prevailing conditions and that they also always keep a proper lookout. These are also two fundamental requirements under the International Regulations for Preventing Collisions at Sea. In a high traffic situation, one speeding vessel is enough to greatly increase the risk for all vessels in the vicinity.

23 Analysis of excessive speed based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 14: Problem definition – excessive speed – at a glance



Speed incident 'hot spots' over 10 years

Location/ area	Incidents
Murray River - Moama to Torrumbary	6
Georges River - near Revesby Beach	4
Sydney Harbour - various (each)	3
Lake Macquarie - east	3
Murray River - Lake Mulwala to Cobram	3
Pittwater - south	3
Average*	0.2

*average of the 862 Aquatic Management Areas in NSW

Key statistics:

- The overall number of boating incidents related to excessive speed has declined significantly.
- About 1 in 10 fatal boating incidents are associated with excessive speed.
- Overall, recreational vessel incidents are significantly more likely to be associated with excessive speed (5.3%) than are commercial incidents (2.9%).
- 77 (34.1%) of the 226 vessels involved in incidents related to excessive speed were open runabouts.
- Incidents related to excessive speed occur throughout the year, but with a summer peak. Nearly one-third (32.9%) occurred in January or February. A further 11.4% occurred in April, which takes in the Anzac long weekend and often the Easter break.
- The two locations (one on the Murray River and one on the Georges River) with the highest numbers of excessive speed incidents were also the two locations with the highest numbers of PWC incidents.

6.4 No proper lookout

No proper lookout[24] was reported as an incident cause in association with 6 (4.8%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. All of these fatal incidents were recreational boating incidents.

No proper lookout was also reported as an incident cause in association with 73 (13.4%) of the 546 serious injury incidents recorded over the 10 years, and 426 (13.5%) of the 3167 boating incidents overall.

In 2017–18, there were no fatal incidents associated with the lack of a proper lookout.

Incidents related to the lack of a proper lookout are trending downwards (Figure 15). The overall number of incidents associated with the lack of a proper lookout in 2017–18 (28) was significantly below the long-term (10 year) annual average of 42.6 incidents.

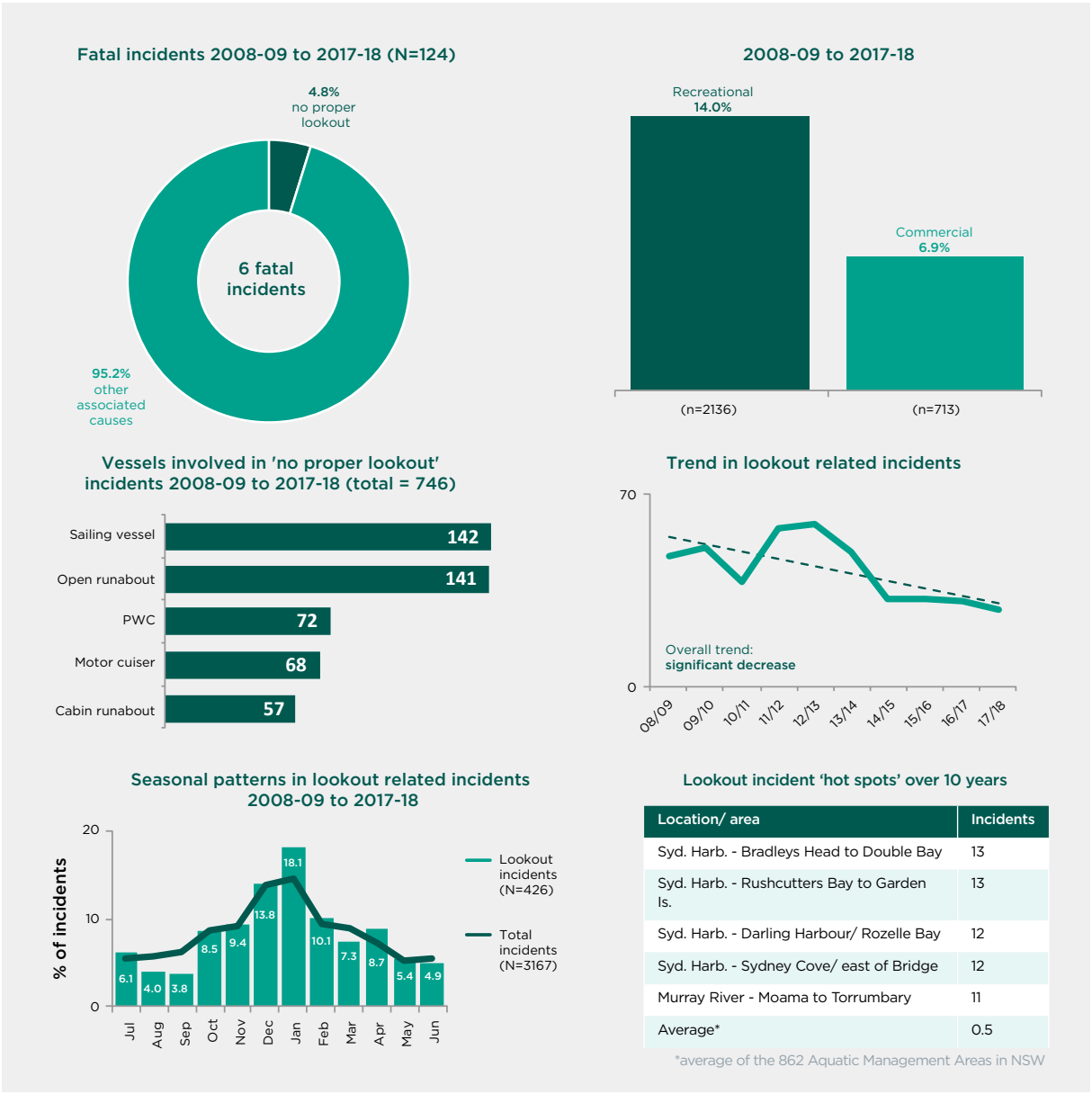
Figure 15 provides a snapshot of key data and statistics related to boating incidents associated with the lack of a proper lookout.

As discussed in Section 6.3, the consequences of not keeping a proper lookout heavily depend on the speeds of the vessels concerned. The slower the relevant vessels are travelling, the greater the chance of recovering from a brief lapse in keeping a proper lookout. In essence, slower speeds are more forgiving and higher speeds more demanding. Nevertheless, a short lapse in keeping a proper lookout can still be dangerous at any speed, as hazards such as another faster travelling vessel may appear suddenly – especially on busy waterways, in narrow channels or near 'blind corners'.

By keeping a proper lookout (and travelling at a safe speed) a skipper gives themselves time to assess, react to and avoid any developing hazards. If the person driving a vessel is finding it difficult or stressful to keep a proper lookout – such as keeping proper track of other vessels and hazards that are nearby – it is likely that they (and/ or the other vessels) are travelling too fast and at an unsafe speed.

24 Analysis of no proper lookout based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 15: Problem definition – no proper lookout – at a glance



Location/ area	Incidents
Syd. Harb. - Bradleys Head to Double Bay	13
Syd. Harb. - Rushcutters Bay to Garden Is.	13
Syd. Harb. - Darling Harbour/ Rozelle Bay	12
Syd. Harb. - Sydney Cove/ east of Bridge	12
Murray River - Moama to Torrumbary	11
Average*	0.5

*average of the 862 Aquatic Management Areas in NSW

Key statistics

- The overall number of boating incidents related to the lack of a proper lookout has declined significantly.
- Nearly 1 in 20 fatal boating incidents are associated with the lack of a proper lookout. The closely-related factor of excessive speed is associated with about 1 in 10 (Section 6.3). These two factors combined were associated with a total of 18 fatal incidents, i.e. about 1 in 7 of all fatal incidents.
- Overall, recreational vessel incidents are significantly more likely to be associated with the lack of a proper lookout (14.0%) than are commercial incidents (6.9%).
- 142 (19.0%) of the 746 vessels involved in incidents related to no proper lookout were sailing vessels. 141 (18.9%) were open runabouts.
- Incidents related to the lack of a proper lookout are highly seasonal, closely mirroring overall boating incidents. The greatest number occurred in January, 77 incidents (18.1% of total).
- Many parts of Sydney Harbour recorded relatively high numbers of incidents associated with the lack of a proper lookout, particularly east of the Harbour Bridge and around Darling Harbour and Rozelle Bay.

6.5 Excess alcohol

Excess alcohol[25,26] was reported as an incident cause in association with 13 (10.5%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. Eleven (84.6%) of these fatal incidents were recreational boating incidents.

Excess alcohol was also reported as an incident cause in association with 25 (4.6%) of the 546 serious injury incidents recorded over the 10 years, and 62 (2.0%) of the 3167 boating incidents overall.

In 2017–18, there was one fatal incident known to have been related to excess alcohol.

Reported incidents associated with excess alcohol are trending downwards (Figure 16). The overall number of incidents related to excess alcohol in 2017–18 (3) was significantly below the long-term (10 year) annual average of 6.2 incidents.

Figure 16 provides a snapshot of key data and statistics related to boating incidents associated with excess alcohol. While more than 1 in 10 fatal boating incidents are linked to excess alcohol, the true prevalence of alcohol – at least as a contributory factor – may be much higher. In many cases, alcohol may be an underlying factor, even if not the most obvious factor. For example, a boat might be caught in bad weather and capsize – but where prior alcohol consumption had affected the skipper's decision making in terms of watching the weather and choosing whether to go out or stay ashore. In such a scenario, if only one incident cause was recorded, it would normally be "weather conditions" rather than "excess alcohol".

The high involvement of open runabouts (more than 35% of all incident-vessel records related to excess alcohol) dispels to some extent the stereotype of 'big party boats' as being the main source of alcohol related risk. Whilst motor cruisers did account for nearly 25% of incident-vessel records related to excess alcohol, it is clear that the issue spans a wide range of vessel types and sizes as well as different boating situations.

The apparent decline in reported incidents related to excess alcohol is most encouraging – and probably reflects a 'spill over' of society's less accepting attitude to drink-driving on the roads. Greater boater education and awareness work in recent years, along with increased on-water random breath testing have also contributed.

The highly seasonal nature of alcohol related incidents, as well as their concentration in the Sydney region, reflects the high levels of boating activity around Sydney (especially during the 'festive season') and the focus of policing resources on waterways such as Sydney Harbour and Botany Bay at this time.

The effects of alcohol can be compounded by the boating environment – including sun, waves and glare. Alcohol impairs coordination, judgement, vision, balance and reaction times, greatly increasing the risk and consequences of an accident in affected individuals[27]. A significant issue is that while alcohol reduces a person's abilities, it also increases self-confidence – a dangerous combination. Passengers are also at risk, particularly if the vessel capsizes or they fall or jump overboard. Alcohol significantly reduces the ability to cope with sudden immersion in the water[28] – especially if conditions are choppy, dark or cold or if the person has drunk heavily[29].

25 Analysis of excess alcohol based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

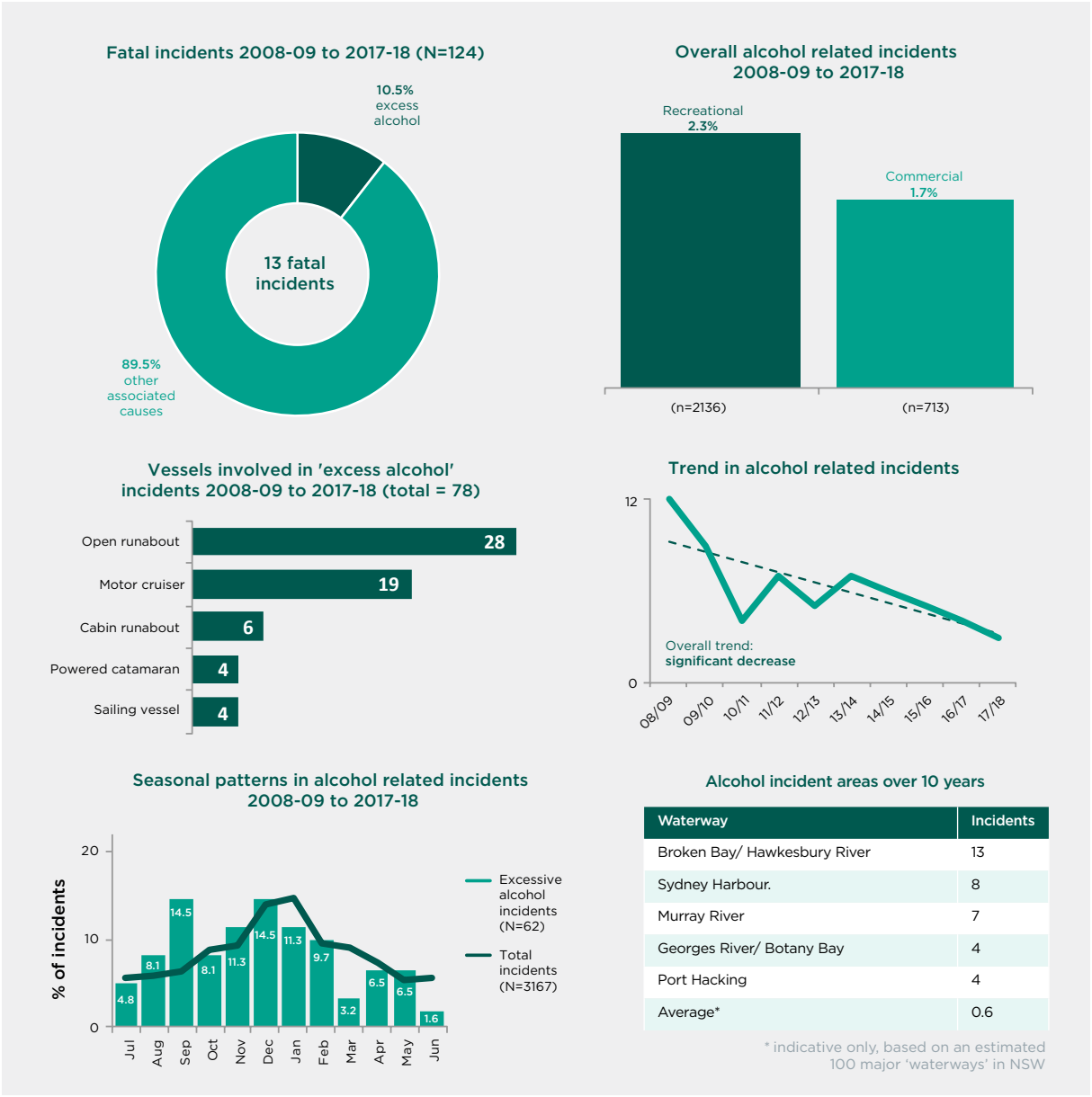
26 An incident will normally have a cause of 'excess alcohol' recorded if a vessel operator involved is known or suspected of having a blood alcohol concentration above the legally prescribed limit (generally < 0.05 grams alcohol in 210 litres of breath or 100 millilitres of blood, but < 0.02 for commercial operators and zero for operators under 18 years of age).

27 NSW Roads and Maritime Services, Boating Handbook.

28 royallifesaving.com.au/families/out-and-about/medical/alcohol-and-water-safety

29 Driscoll, TR, Harrison, JA and Steenkamp, M (2004) Systematic Review: Review of the role of alcohol in drowning associated with recreational activity. Injury Prevention 10:107-113

Figure 16: Problem definition – excess alcohol – at a glance



Alcohol incident areas over 10 years

Waterway	Incidents
Broken Bay/ Hawkesbury River	13
Sydney Harbour.	8
Murray River	7
Georges River/ Botany Bay	4
Port Hacking	4
Average*	0.6

* indicative only, based on an estimated 100 major 'waterways' in NSW

Key statistics

- The overall number of boating incidents related to excess alcohol has declined significantly.
- More than 1 in 10 fatal reported boating incidents are linked to excess alcohol. However, the true prevalence of alcohol as a contributory factor in boating fatalities may be much higher, possibly in the range of 1 in 5 to 1 in 3 (refer footnotes 28&29).
- The prevalence of alcohol as a cause amongst incidents overall is lower (at 2.0%, or 1 in 50) and there is no significant difference in prevalence between recreational and commercial incidents.
- 28 (35.9%) of the 78 vessels involved in incidents relating to excess alcohol were open runabouts. A further 19 (24.4%) were motor cruisers.
- Incidents linked to excess alcohol were highly seasonal, with most in the spring/ summer period. The six month period September to February accounted for nearly 7 out of 10 such incidents (69.4%).
- Alcohol related incidents were prevalent around Sydney, with Broken Bay/ Hawkesbury River, Sydney Harbour, Georges River/ Botany Bay and Port Hacking together accounting for 46.8% of all such incidents in NSW.

6.6 Lack of judgement

Lack of judgement[30] was reported as an incident cause in association with 14 (11.3%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. Eleven (78.6%) of these fatal incidents were recreational boating incidents.

Lack of judgement was also reported as an incident cause in association with 105 (19.2%) of the 546 serious injury incidents recorded over the 10 years, and 712 (22.5%) of the 3167 boating incidents overall.

In 2017–18, there were no fatal incidents for which lack of judgement was recorded as an incident cause.

Incidents related to poor judgement are trending downwards (Figure 17). The overall number of incidents related to poor judgement in 2017–18 (50) was significantly below the long-term (10 year) annual average of 71.2 incidents.

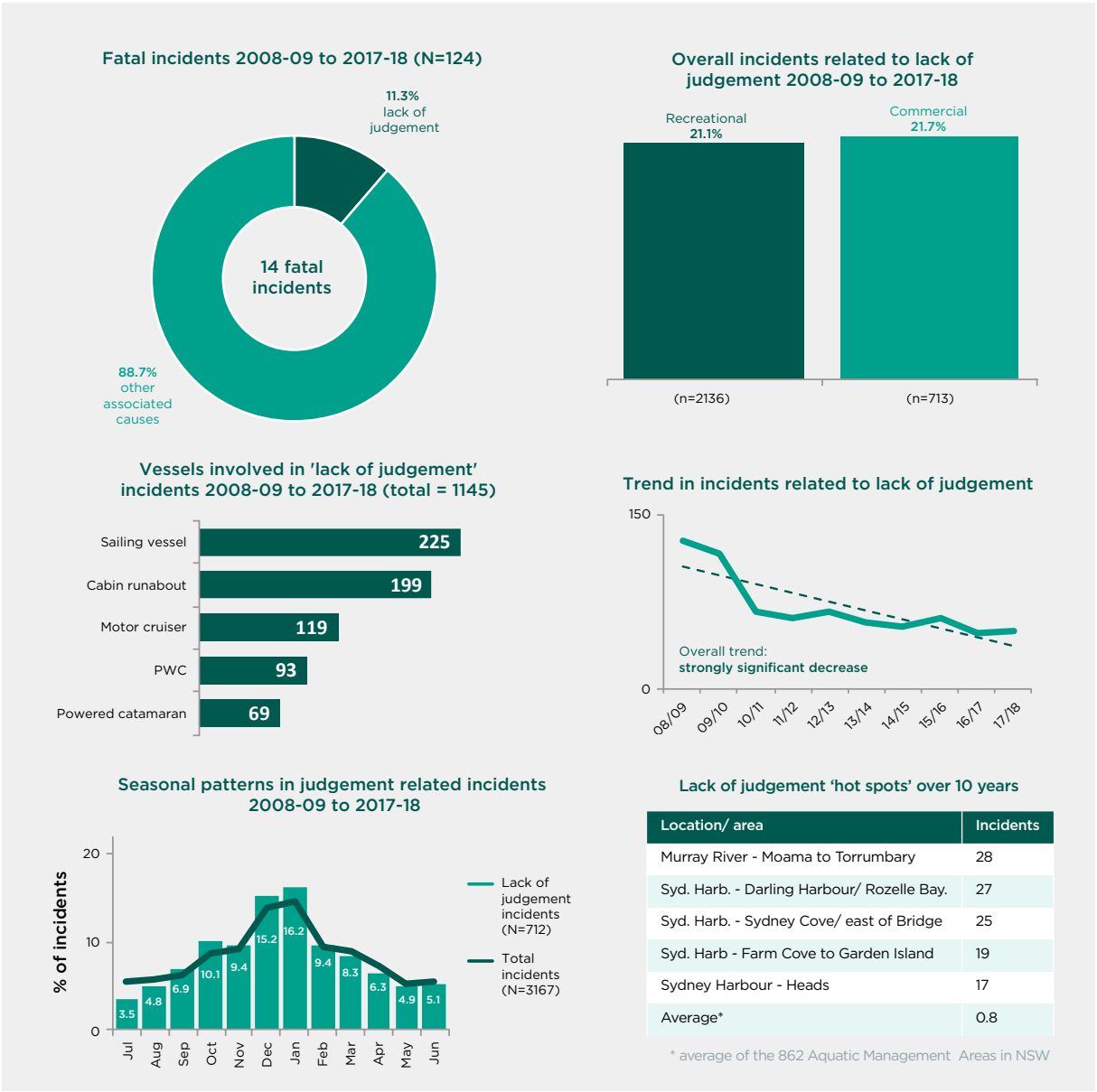
Figure 17 provides a snapshot of key data and statistics related to boating incidents caused by a lack of judgement.

In relation to boating incidents 'lack of judgement' can mean many things. It is normally recorded as an incident cause when other more specific causes (such as excessive speed) are not evident. It often relates to cases where a person showed poor 'seamanship' in a general sense rather than taking (or omitting to take) a single specific action to cause an incident. Often multiple factors are involved in an incident, and if a skipper failed to manage the factors collectively, they might be described as exercising a lack of judgement. Furthermore, most of the specific individual causes currently recorded against boating incidents are likely to be based on a degree of poor judgement – for example misjudging changing weather conditions or misjudging the risks associated with a vessel's speed on a busy waterway.

Given that nearly all boating incidents actually have multiple causes, incidents categorised as being caused by a 'lack of judgment' could potentially be better described and analysed if multiple causes were sought and recorded at the time of reporting. In the absence of, or in addition to, more specific causes, the term 'poor seamanship' could be a good descriptor to use in many cases. A potential challenge with this approach is ensuring that suitably qualified and skilled people are available to assess each boating incident at the time of recording – and ensuring that sufficient incident details are reported in the first place.

30 Analysis of lack of judgement based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 17: Problem definition – lack of judgement – at a glance



Location/ area	Incidents
Murray River - Moama to Torrumbary	28
Syd. Harb. - Darling Harbour/ Rozelle Bay.	27
Syd. Harb. - Sydney Cove/ east of Bridge	25
Syd. Harb - Farm Cove to Garden Island	19
Sydney Harbour - Heads	17
Average*	0.8

* average of the 862 Aquatic Management Areas in NSW

Key statistics

- The overall number of boating incidents related to a lack of judgement has declined significantly.
- About 1 in 9 fatal boating incidents are associated with a recorded incident cause of "lack of judgement".
- Overall, recreational vessel incidents and commercial vessel incidents are about equally likely to be linked to a lack of judgement (21.1% and 21.7% respectively).
- 225 (19.7%) of the 1145 vessels involved in incidents related to lack of judgement were sailing vessels. 199 (17.4%) were open runabouts.
- Incidents linked to a lack of judgement are highly seasonal, closely mirroring boating incidents generally. 31.3% of such incidents occurred in December or January.
- The location with the highest number of incidents caused by a lack of judgement was on the Murray River (28 between Moama and Torrumbary). However, many parts of Sydney Harbour also had high numbers of such incidents – particularly around the Harbour Bridge and in the Darling Harbour/ Rozelle areas.

6.7 Towing activities

Incidents involving towing activities[31], especially those involving a degree of injury, are typically recorded in the Maritime operational database as "Injury – Towing Incident". Towing activities include water skiing, wakeboarding and aquaplaning.

Towing incidents accounted for 12 (9.7%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. All of these fatal incidents were recreational boating incidents. Towing fatalities are normally of the 'non-drowning' type – related to trauma from a collision or propeller injury – rather than people being forced into the water by, for example, a vessel capsize or sinking.

Towing incidents also accounted for 73 (13.4%) of the 546 serious injury incidents recorded over the 10 years, and 101 (3.2%) of the 3167 boating incidents overall.

In 2017–18, there was one fatal incident involving towing activities.

Incidents related to towing activities are trending downwards (Figure 18). The overall number of incidents recorded as towing incidents in 2017–18 (5) was significantly below the long-term (10 year) annual average of 10.1 incidents.

Figure 18 provides a snapshot of key data and statistics related to towing incidents.

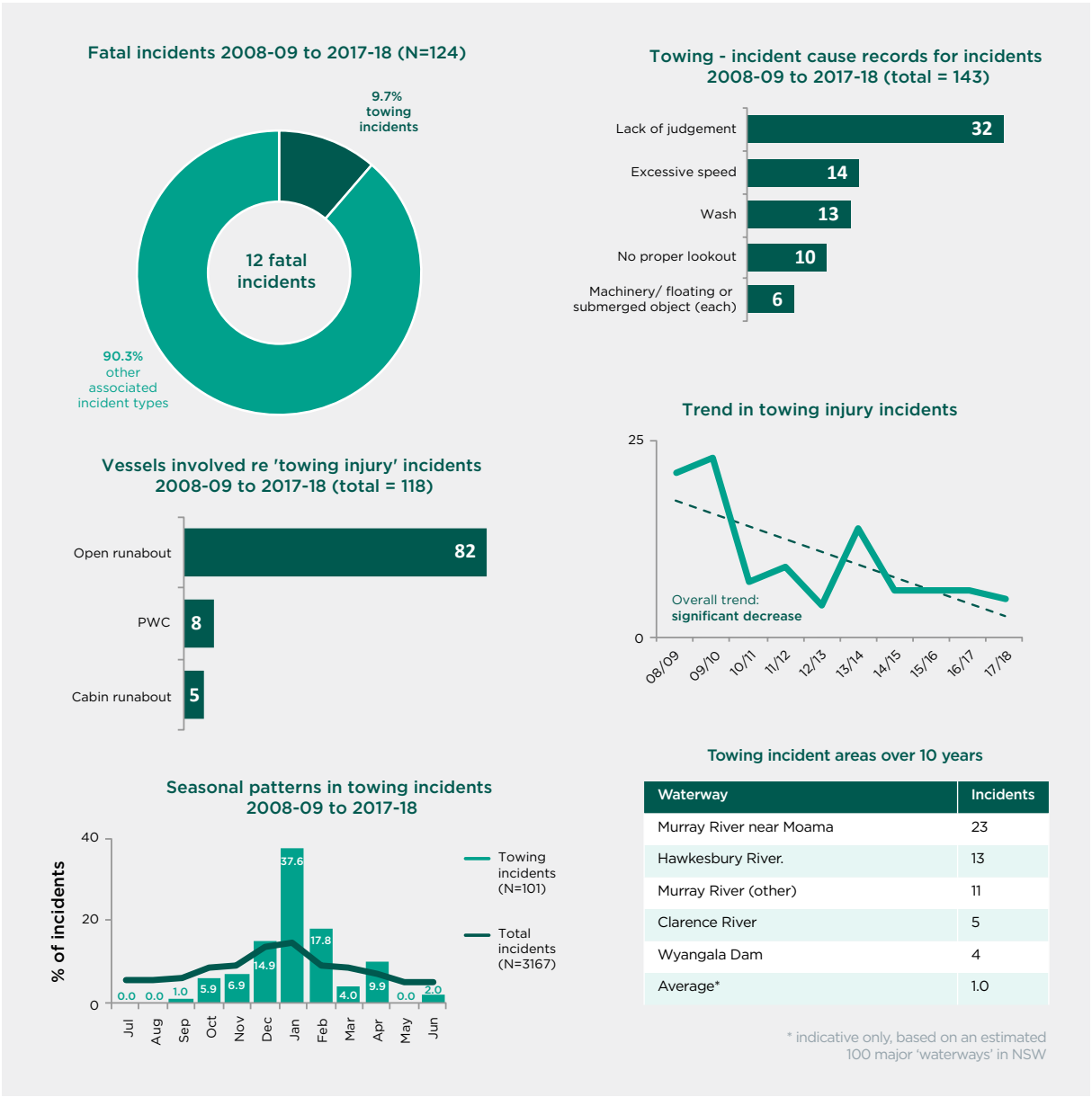
While the overall number of incidents recorded against "injury – towing incident" appears to be trending downwards, this is not a complete record of all towing related incidents. Firstly, this category tends to miss non-injury incidents related to towing, and secondly some towing incidents may be recorded under other incident types – such as "collision with fixed object" or "propeller injury". It is likely that towing still accounts for a sizeable portion of fatalities and serious injuries, and that reducing towing related incidents could go a long way to reducing the rate of non-drowning fatalities referred to in Figure 12.

Towing activities are often conducted at high speed (especially with waterskiing) and on confined waterways with frequent blind corners (e.g. rivers). The person being towed often has limited control and little physical protection in the event of a high speed collision. As a consequence, towing can present some particular hazards:

- vessels colliding at speed, or hitting a towed person, on busy confined waterways
- a fallen person being hit by a following vessel
- propeller injuries – including when a towed person attempts to re-board a vessel
- injuries due to falls at high speed
- strong lateral forces generated when a boat makes a high speed turn, flinging the towed person into a 'whip' and potentially forcing them into a river bank or other obstruction
- the momentum of a fallen person, which exacerbates risks associated with the 'whip' effect
- passengers being flung from shallow bow seats or from elsewhere on a vessel due to lateral forces in high speed turns, and potentially being hit by the boat and/ or its propeller
- towing activities starting and finishing from riverside beach areas, often in the vicinity of swimmers and other people in the water.

31 Analysis of towing activities based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 18: Problem definition – towing activities – at a glance



Towing incident areas over 10 years

Waterway	Incidents
Murray River near Moama	23
Hawkesbury River.	13
Murray River (other)	11
Clarence River	5
Wyangala Dam	4
Average*	1.0

* indicative only, based on an estimated 100 major 'waterways' in NSW

Key statistics

- About 1 in 10 fatal boating incidents overall relate to towing activities. For serious injury incidents, the rate is about 1 in 7. For recreational vessel incidents involving either a fatality or a serious injury, towing injuries accounted for 12.5% of all vessel – incident type records – or 1 in 8 (Figure 7).
- Lack of judgement was the most common cause linked to incident records pertaining to towing over the 10 years (22.4% of such incidents). This was followed by excessive speed (9.8%) and wash (9.1%).
- 82 (69.5%) of the 118 vessels involved in incidents related to the incident type "injury – towing incident" were open runabouts.
- The prevalence of incidents linked to towing injuries has declined significantly.
- Incidents linked to towing were extremely seasonal. The six month period November to April accounted for more than 90% of such incidents (91.1%). January alone accounted for nearly 40% (37.6%).
- Towing incidents overwhelmingly occurred on coastal rivers and on inland waterways. The Murray River accounted for 34 incidents (33.7% of total), while the Hawkesbury River accounted for 13 incidents (12.9%).

6.8 Personal watercraft

PWC[32] were involved in five (4.3%) of the 115 recreational fatal boating incidents recorded in the 10 years to 30 June 2018.

PWC were involved in 74 (17.4%) of the 426 recreational serious injury incidents recorded over the same period. PWC were also involved in 197 (9.2%) of the 2136 recreational boating incidents recorded overall. In terms of vessels, PWC accounted for 17.1% of the vessels involved in recreational serious injury incidents over the 10 year period (Figure 19).

In 2017–18, there was one fatal incident involving a PWC.

While the rate of recreational incidents overall involving a PWC has declined significantly (Figure 19) there has been no improvement in the rate of recreational serious injury incidents involving a PWC. In 2017–18, the overall rate of PWC involvement in boating incidents was 121.7 PWC per 100,000 registered PWC, which was significantly below the long-term (10 year) average of 196.0. However, the corresponding rate of PWC involvement in serious injury incidents (57.3 PWC per 100,000 registered PWC) was not significantly different to the long-term average of 72.0.

Based on the proportion of registered recreational vessels that were PWC during this period (3.5% in 2008-09, increasing to 5.9% in 2017–18), PWC are heavily over-represented in overall recreational boating incidents and especially in recreational boating serious injury incidents. PWC were involved in only a very small number of commercial or commercial/ recreational boating incidents – two involving serious injury and 12 overall.

32 Analysis of PWC based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 19 provides a snapshot of key data and statistics related to PWC.

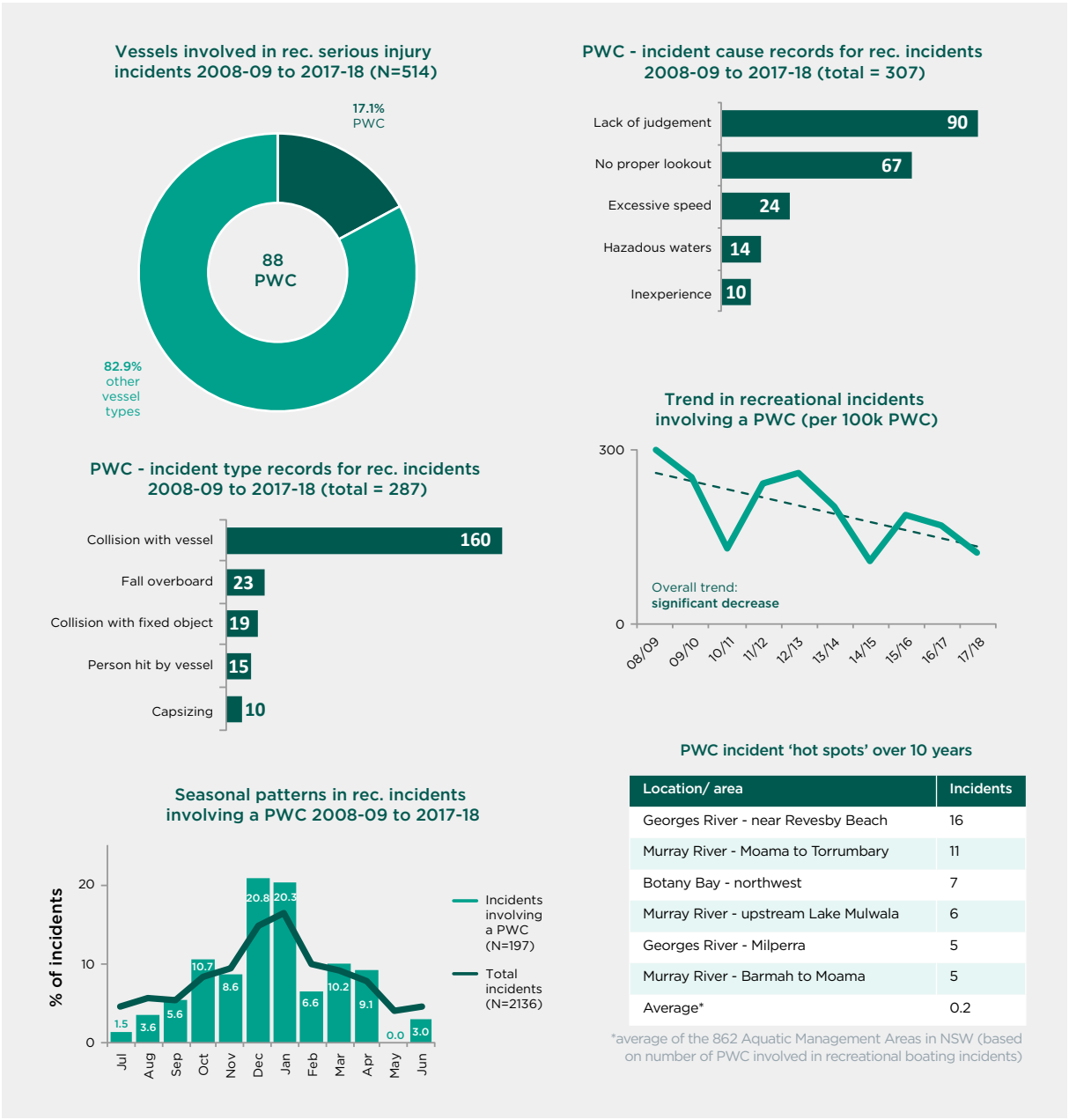
The relatively high serious injury and overall incident rates for PWC relate to the way PWC are often used and to their unique handling characteristics. PWC are typically used in social settings – riders often operate in company with other riders and/or close to the shore where they can be easily observed by friends and family. Anecdotal evidence suggests unlicensed or inexperienced riders often borrow a PWC in these settings. In general, a PWC is seen as a means to have fun on the water rather than just as a means of transport on the water. Whereas most boating activity is focussed on getting 'from A to B' (e.g. to a popular fishing spot or anchorage), PWC activity is often about riding around in one area. Riders sometimes choose to perform complex manoeuvres at speed and in close proximity to other riders and the shore – and this is reflected in the high percentage of collisions among PWC incidents. Many of these collisions are with another PWC.

Being jet-powered, PWC handle differently to typical powered vessels. Turning is achieved by vectoring of the jet's nozzle, rather than with the help of a rudder or propeller leg. In an emergency, the first instinct may be to back off the throttle and steer away from the hazard. While this usually works with a conventional craft, it is less effective with a PWC, which will tend to continue in its original direction no matter which way the steering is directed. This has contributed to many collisions. Instead, the rider needs to maintain or even increase throttle to steer away from trouble – and this is counterintuitive, especially for inexperienced riders. Later model PWC may have off-throttle steering and/ or braking systems to help alleviate this problem. PWC also have great acceleration and speed, and provide occupants with less protection than do most larger craft.

Based on registration and licence numbers, the popularity of PWC is growing at a faster rate than overall boating. In recent years (since July 2012)[33], PWC licences have had an average annual growth of 6.8% while PWC registrations have averaged 7.5% annual growth. The corresponding annual growth figures for general boating are 0.5% and 0.5%.

33 Analysis of licence and registration data undertaken by the Transport maritime cluster.

Figure 19: Problem definition – Personal Watercraft – at a glance



PWC incident 'hot spots' over 10 years

Location/ area	Incidents
Georges River - near Revesby Beach	16
Murray River - Moama to Torrumbary	11
Botany Bay - northwest	7
Murray River - upstream Lake Mulwala	6
Georges River - Milperra	5
Murray River - Barmah to Moama	5
Average*	0.2

*average of the 862 Aquatic Management Areas in NSW (based on number of PWC involved in recreational boating incidents)

Key statistics:

- PWC accounted for 17.1% of vessels involved in recreational serious injury incidents. This is much greater than their share of recreational vessel registrations, which averaged around 5% during the 10 year period to 30 June 2018.
- Lack of judgement was the most common cause associated with incident records pertaining to PWC over the 10 years (29.3% of records). The most common incident type was collision with another vessel (55.7% of records).
- The rate of recreational incidents involving a PWC has trended downwards over the 10 years.
- Recreational incidents involving a PWC are highly seasonal, with a pronounced summer maximum. December and January together accounted for 41.1% of the incidents.
- Both the Georges River/ Botany Bay area and parts of the Murray River featured heavily in terms of incident location.

6.9 Paddle craft

Paddle craft[34] include canoes, kayaks and dragon boat type craft. They were involved in 11 (8.9%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. All of these fatal incidents were recreational boating incidents. In terms of vessels, paddle craft accounted for 8.3% of the vessels involved in fatal incidents over the 10 year period (Figure 20). Paddle craft were involved in 8 (1.5%) of the 546 serious injury incidents and 45 (1.4%) of the 3167 overall boating incidents recorded over the 10 years.

In 2017–18, there was one fatal incident involving a paddle craft.

There has been no significant trend in the number of paddle craft involved in boating incidents (Figure 20). However, the number of paddle craft involved in incidents in 2017–18 (7) was significantly above the long-term (10 year) annual average of 4.5 paddle craft. It is likely that the high figure in 2017–18, as well as the absence of any improving long-term trend, would be at least partly due to the increased participation in paddle craft activities in recent years – which, anecdotally at least, has far exceeded the growth rate for boating generally. In the absence of long-term data on usage or even vessel numbers, it is impossible to say whether paddle craft safety is just holding its own, getting worse or even improving.

Figure 20 provides a snapshot of key data and statistics related to paddle craft incidents.

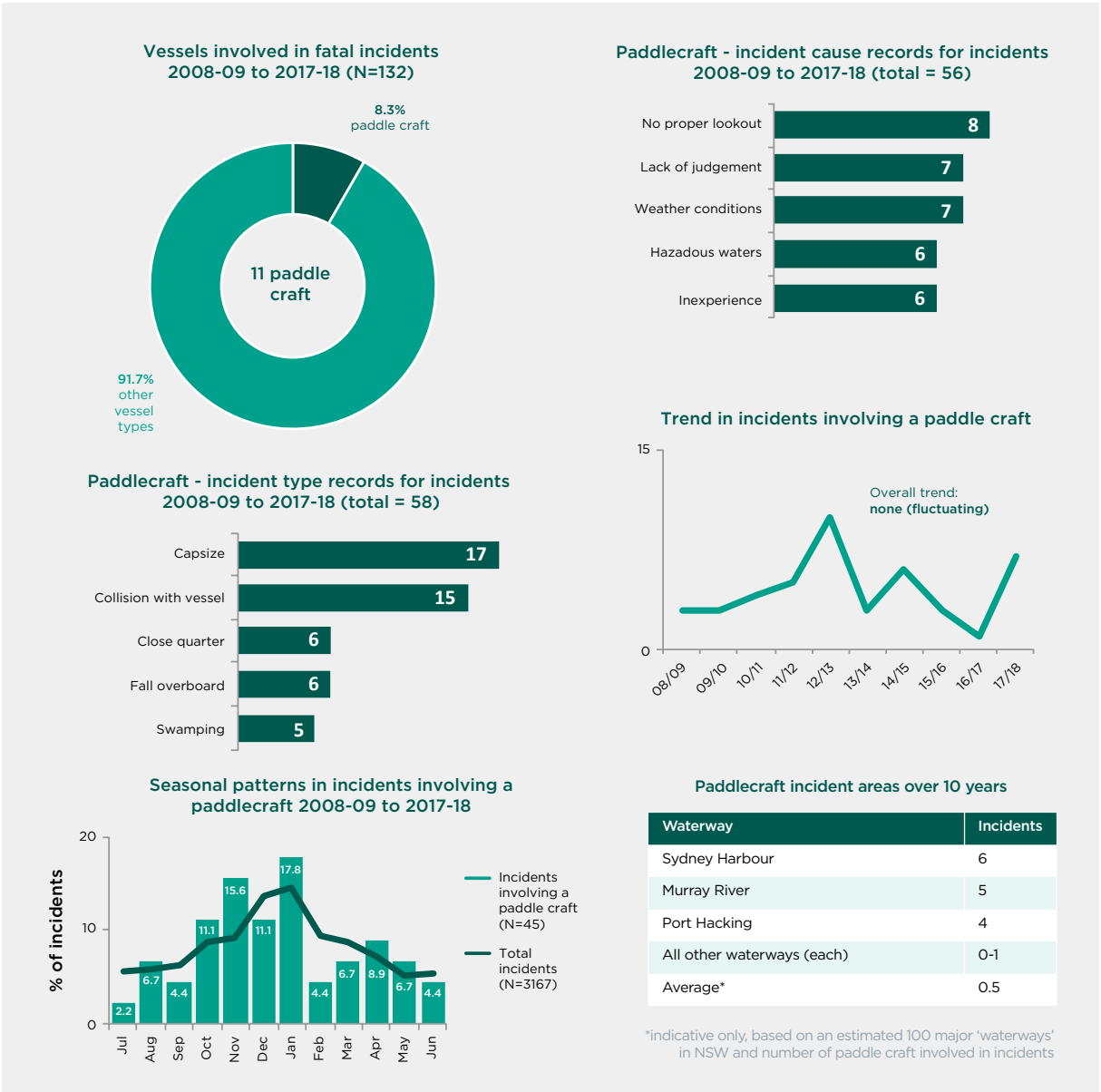
The proportion of fatal incidents involving a paddle craft (8.9%) was significantly higher than the corresponding proportion for incidents overall (1.4%). This difference highlights the fact that for paddle craft, incidents tend to be either very serious (even fatal) or very minor (no injury and little damage) – and it is likely that many of the latter aren't reported. The size and nature of paddle craft makes them relatively vulnerable in a number of ways:

- Paddle craft, being human powered, are much slower than most other craft, making it much more difficult for them to avoid a collision. In particular, they have little ability to get out of the way of a vessel approaching at high speed.
- The small size and low profile of paddle craft makes them relatively hard for other vessel operators to see – particularly at night, or if the water is rough or there is glare. This exacerbates the risk of collision mentioned above.
- Most paddle craft are relatively unstable and easily capsized, and it can be difficult for the paddler to re-board, especially in choppy or rough water. This can have serious consequences if the water is cold (Section 6.10) or if a lifejacket is not worn.
- Paddle craft are extremely vulnerable to the effects of strong wind and waves. Paddlers may be blown off course or forced into the water when conditions are windy and rough. It can be very difficult, or even impossible, to paddle into strong winds.
- Due to their small size, paddle craft don't have room for the range of safety equipment or the navigation lights used by most other vessels.
- Because paddle craft don't need to be registered, it is more difficult to reach and engage paddle craft operators with safety messaging than it is for most other vessel types.

Paddle craft incidents tend to be a mix of people being forced into the water (e.g. capsize) and collision, particularly with another (faster) vessel. Anecdotally, collisions between paddle craft occur frequently, but usually at very low speeds and without injury or damage.

34 Analysis of paddle craft based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 20: Problem definition – paddle craft safety – at a glance



Waterway	Incidents
Sydney Harbour	6
Murray River	5
Port Hacking	4
All other waterways (each)	0-1
Average*	0.5

*indicative only, based on an estimated 100 major 'waterways' in NSW and number of paddle craft involved in incidents

Key statistics

- Paddle craft accounted for 8.3% of the vessels involved in fatal incidents, i.e. about 1 in 12 vessels.
- Of the 47 paddle craft involved in boating incidents, the majority (36) were in involved in recreational incidents. Six were involved in commercial incidents and five in commercial/ recreational incidents.
- No proper lookout was the most common cause associated with incident records pertaining to paddle craft over the 10 years (14.3% of records). This was followed by weather conditions and lack of judgement (both 12.5%).
- The most common incident types were capsize (29.3%) and collisions with another vessel (25.9%).
- The number of incidents involving paddle craft has been fluctuating, without any overall trend.
- Incidents involving paddle craft tend to be seasonal, with most in the late spring to summer period. The four month period October to January accounted for more than 55% of such incidents (55.6%).
- Incidents involving paddle craft occurred on both coastal and inland waterways. Sydney Harbour accounted for 13.3% (6 incidents), the Murray River 11.1% (5 incidents) and Port Hacking 8.9% (4 incidents).

6.10 Cold water

'Cold water'[35] means water cold enough to be dangerous to a person who is forced into the water without protective garments (such as wetsuit). Exactly what is 'cold' depends on the individual and the circumstances: most people begin to feel mild effects of 'cold shock' when they suddenly enter water as warm as 22-25 degrees C. However, the serious effects of cold shock (rapid uncontrolled breathing, loss of airway control, panic etc.) generally prevail at water temperatures below about 15 degrees[36]. At such temperatures, a person without a lifejacket or other form of support is at a high risk of drowning (see also Section 6.1).

NSW straddles a range of climate zones, with boating environments ranging from high alpine areas that have frequent winter snow to sub-tropical coastal waters that support reef-building corals and other warm water biota. Consequently there is a wide range in prevailing water temperatures: the alpine waterways can have dangerously cold water at any time of year, while some northern areas may almost never experience such conditions.

Two key considerations with cold water are so-called alpine waters, as defined in the Marine Safety Regulation 2016, and incidents where a person is likely to have been suddenly forced into the water – i.e. vessel capsize, falling overboard or when a vessel sinks. Data related to these two considerations is included in Figure 21.

Further analyses were also performed in relation to the seasonal pattern and long-term trend for incidents where cold water was likely to have been an issue (Figure 21). This was based on three variables: incident type (those incidents in which a person was likely suddenly forced into the water), time of year (month) and incident location (geographic regions). The associated filters used in the Tableau dashboards are set out in Table 4 below.

Table 4: incident types, months and geographic regions used to define 'cold water' incidents*

Capsizing, Fall overboard and Sinking

July and August	June and September	May, October and November	All remaining months (December – April)
Hawkesbury/ Broken Bay	Hawkesbury/ Broken Bay	Monaro	Alpine waters only:
Hunter/ inland	Hunter/ inland	Murray inland	• Blowering Reservoir
Mid North Coast	Monaro	South Coast	• Burrinjuck Reservoir
Monaro	Murray Inland		• Khancoban Pondage
Murray Inland	South Coast		• Lake Eucumbene
North Coast	Sydney		• Lake Jindabyne
South Coast	Sydney (Botany Bay/ Port Hacking)		• Pejar Dam
Sydney			
Sydney (Botany Bay/ Port Hacking)			

*Incident types based on situations where person likely to be forced into water; months and regions based on likely occurrence of cold water within NSW. "Alpine waters" are those defined under the Marine Safety Regulation 2016 and which have had at least one boating incident in the 10 years to 30 June 2018.

35 Analysis of cold water and related issues based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

36 coldwatersafety.org/WhatIsCold.html

Alpine waters accounted for three fatal incidents and five serious injury incidents over the 10 years to 30 June 2018 – i.e. 61.5% of all alpine waters incidents, a significantly higher proportion than the corresponding figure for non alpine waters (21.0%).

Incidents in which cold water was a likely issue are trending downwards (Figure 21). The overall number of incidents apparently related to cold water in 2017–18 (8) was significantly below the long-term (10 year) annual average of 18.1 incidents.

Figure 21 provides a snapshot of key data and statistics related to cold water.

Cold water is deceptively dangerous. Water conducts heat from the body about 30 times faster than still air of the same temperature. It is also much slower to heat up than air – so that a water body can remain dangerously cold even if the air temperature is high. It takes many days of high air temperatures to significantly warm even a shallow water body, and many weeks for nearshore ocean waters to fully respond to high air temperatures.

Cold water has a series of effects on persons forced into the water. A '1:10:1' rule can be applied as a useful rule of thumb:

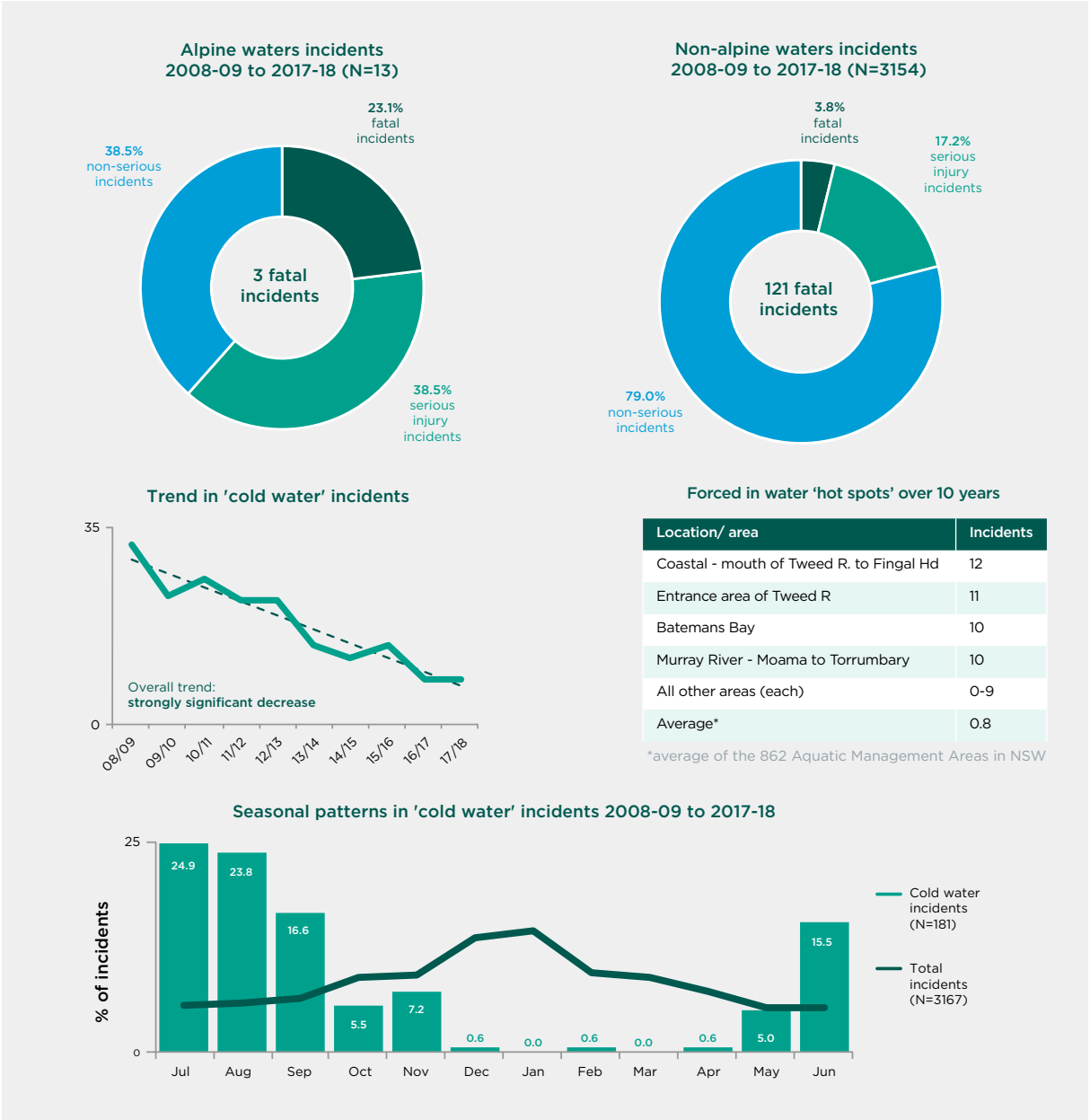
- One minute – cold shock: immersion in cold water immediately impacts breathing, heart rate and blood pressure. Gasping can easily cause inhalation of water, especially if conditions rough or choppy. Some individuals may be at increased risk of heart attack or stroke.
- 10 minutes – incapacitation: cold water reduces muscle strength and control, initially in the extremities and then extending to the arms and legs. This will quickly make swimming or self-rescue difficult or impossible.
- One hour – hypothermia: extended exposure to cold water will ultimately cause hypothermia. In very cold water, this can progress to unconsciousness within about one hour.

Wearing a lifejacket (Section 6.1) will help a person in cold water manage each of these stages and will buy more time for potential rescue. A person forced into cold water without a lifejacket has a high risk of drowning, even if the shoreline is relatively close[37]. If they survive the initial cold shock, drowning – whether as a result of 'swim failure', exhaustion or hypothermia – is almost inevitable if rescue is delayed.

The risks relating to cold water are highest for small craft, such as paddle craft, open runabouts, rowing dinghies and tenders – vessel from which a person can quite easily be forced into the water (e.g. by a vessel capsize). For most of the state, the risks extend well into the spring. Minimising this risk entails only boating where conditions are suitable, wearing appropriate clothing, along with a lifejacket, checking the weather and having at least a couple of means of communication.

37 coldwatersafety.org/WhatIsCold.html

Figure 21: Problem definition – cold water – at a glance



Key statistics

- 'Cold water' incidents (those in which cold water was a likely issue) have trended strongly downwards over the 10 year period.
- Nearly two-thirds (61.6%) of boating incidents on alpine waters resulted in either a fatality or serious injury. This is significantly more than the 21.0% for incidents on other waterways.
- The 13 incidents recorded on alpine waters involved six open runabouts (46.2% of all involved vessels) and three paddle craft (23.1%). Seven of the incidents (53.8%) involved either a vessel capsize or person falling overboard.
- Incidents where a person was likely forced into the water, and therefore may have been exposed to cold water, have occurred across a wide variety of coastal and inland waterways.
- While most 'cold water' incidents occurred in the winter months (June-August; 64.1%), a considerable proportion occurred in spring (September – November; 29.3%).

7 Trends in other potential safety issues

This section examines the available evidence in relation to potential safety issues, that have come to prominence since the Maritime Safety Plan 2017-21 was prepared. These include boater age and gender, vessel wash, sailing vessels, organised competition and vessels reportedly secured (i.e. at anchor, moored or berthed). These issues were briefly considered in the 2016-17 boating incidents report[38] and are examined in more detail here.

7.1 Age and gender

Recreational boating fatalities affect all age groups (Figure 22). The largest number of fatalities over the 10 year period to 30 June 2018 involved people in the 40-49 year age class (17.8%) and the 50-59 year age class (19.4%). However, these two age classes also accounted for the largest numbers of boat licence holders (Figure 22) – meaning that, based on licence numbers being a proxy for exposure (boating usage), the relatively large numbers of fatalities in this 'middle age' range is to be expected.

However, when fatalities and licence numbers are compared across all age classes, evidence of over-representation in boating fatalities is evident amongst those aged 70 and over, and those aged up to 19 years of age (although the latter is affected by the fact that the minimum age for a licence in NSW is 12 years). The over-representation of boaters aged over 70 is notable: they accounted for 20.2% of all fatalities, which was significantly greater than their 9.7% share of boat licences.

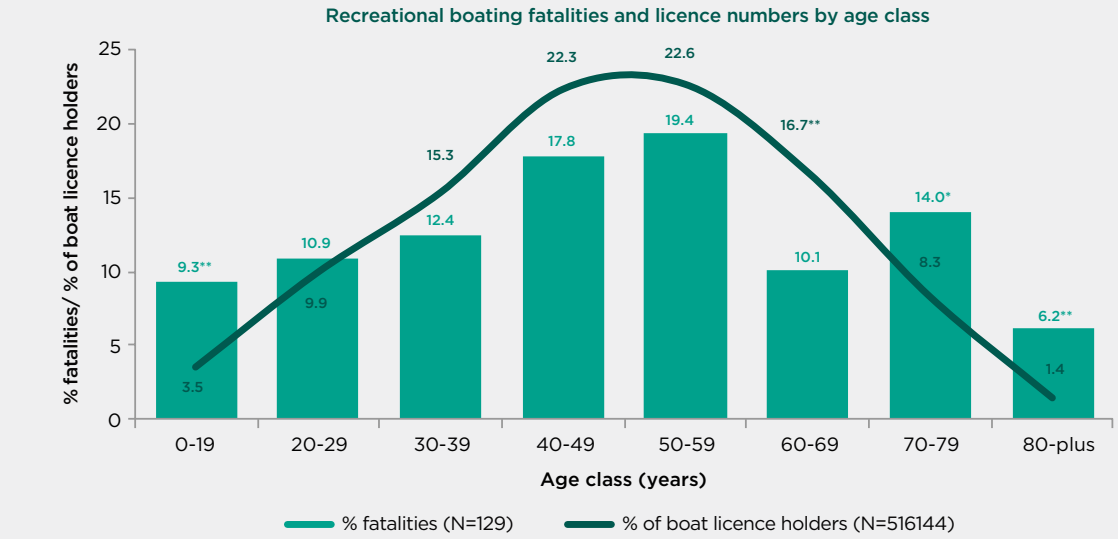
Broadly, across the middle age ranges as a whole (ages 30-69), there was a statistically significant under-representation in terms of fatalities (59.7%) compared with licence numbers (76.9%). This was most pronounced in the 60-69 age class (Figure 22; 10.1% of fatalities versus 16.7% of licences).

Most recreational boating fatalities are male. Over the 10 year period to 30 June 2018, 87.6% of such fatalities were male, i.e. more than 7 out of 8. The high representation of males is even more pronounced in the older age classes: all but one of the 26 fatalities aged 70 or more were male (i.e. 96.2%), and there was a significant downward trend in the proportion of female fatalities with increasing age (Figure 22).

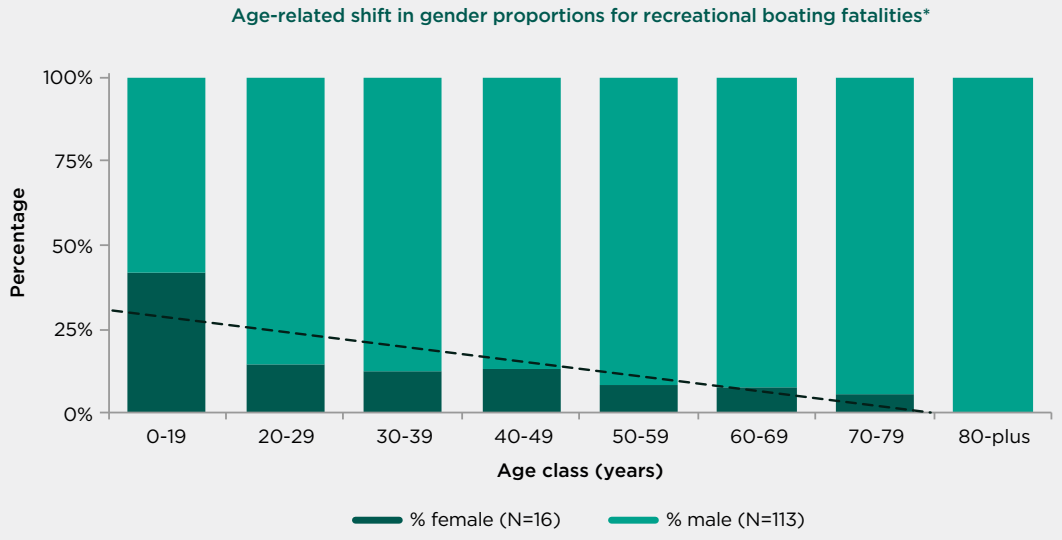
The over-representation of older boaters (those over 70) in boating fatalities raises a number of issues. As more 'baby boomers' reach retirement and potentially participate in boating, there is the risk that fatalities may increase considerably unless the right safety programs can reach this segment of the boating public. While no direct evidence is available, it is likely this over-representation relates to three issues (1) increased confidence/ complacency that comes after many years of experience, (2) a greater likelihood of medical issues with increased age and (3) changes in mental and physical abilities experienced with increased age. While some of these changes would start occurring well before the age of 70, it appears that caution and experience keep much of the risk at bay until around the age of 70 (Figure 22). Nevertheless, many of the safety messages needed for boaters aged 70 and above are likely to be also relevant at a much younger age.

38 Boating incidents in NSW: Statistical report for the 10-year period ended 30 June 2017. Transport for NSW. Pages 61-62.

Figure 22: Potential issue – age and gender – at a glance



**Difference in proportions statistically significant (P<0.05); * difference just outside statistical significance (0.05<P<0.1).



*Dashed line based on weighted regression of the % of females against age class; R-squared = 0.645, P<0.05.

Key statistics

- People aged 70 and above are significantly over-represented in recreational boating fatalities – accounting for 20.2% of fatalities but only 9.7% of boat licences held.
- There is also evidence of over-representation for people aged less than 20 (9.3% of fatalities but only 3.5% of licences), although this is partly due to the fact that licences are not available to people aged less than 12.
- All but one of the 26 fatalities aged 70 and above was male (i.e. 96.2%), highlighting a significant downward trend in the proportion of female fatalities with increasing age. All eight fatalities aged 80 or more were male.

7.2 Vessel wash

Vessel wash[39] is primarily thought of as an environmental or infrastructure issue – particularly in elation to foreshore erosion, sediment movement, habitat alteration and damage to foreshore property and structures. However, excessive vessel wash can also pose a range of safety issues, including:

- capsize or swamping of small vessels;
- injuries to people below decks on larger vessels suddenly hit by unexpected wash;
- injuries to passengers or crew on vessels that encounter wash at high speed; and
- injuries to people embarking or disembarking from a vessel (to either a wharf, pontoon or tender)

Vessel wash was reported as an incident cause in association with 32 (5.9%) of the 546 serious injury boating incident recorded in the 10 years to 30 June 2018. It was also associated with two fatal incidents over this period.

Vessel wash was also reported as an incident cause in association with 119 (3.8%) of the 3167 boating incidents overall. Eighty two (68.9%) of the 119 wash-related incidents involved only recreational vessels, 21 (17.6%) involved only commercial vessels and 16 (13.4%) involved at least one recreational and one commercial vessel.

In 2017–18, there were nine incidents in total associated with vessel wash, four of which were serious injury incidents. There were no fatal incidents linked to wash.

Incidents attributed to vessel wash are not showing any significant trend (Figure 23). However, the overall number of incidents caused by wash in 2017–18 (9) was significantly below the long-term (10 year) annual average of 11.9 incidents.

Figure 23 provides a snapshot of key data and statistics related to boating incidents caused by vessel wash.

The available evidence suggests that vessel wash is a significant safety issue. While dangerous or damaging wash can occur in a variety of circumstances on various types of waterway, there are two main situations where wash is a concern:

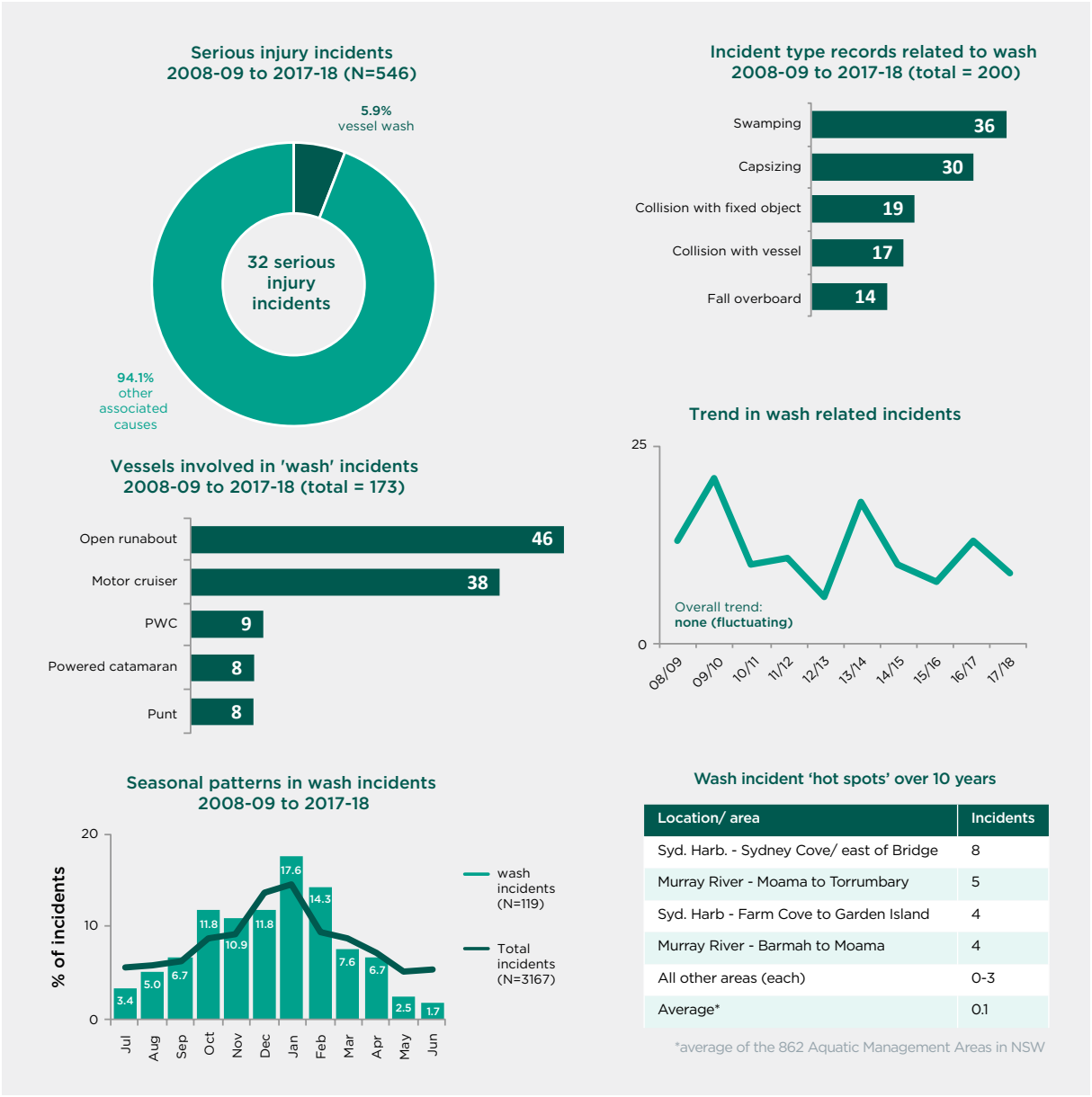
- coastal and inland rivers – where wash from towing activities can affect small craft such as dinghies and paddle craft, as well as contribute to foreshore erosion; and
- busy coastal waterways – where wash from larger displacement and semi-displacement craft can affect both large and small craft, as well as contribute to foreshore erosion, property damage and sediment movement.

The safety effects of wash can be mitigated in a number of ways, although the appropriate measure(s) will very much depend on the particular waterway and the mix of boating uses present. Potential options include:

- speed or wash restrictions
- separating wash generating vessels from vessels vulnerable to the effects of wash
- education of skippers of wash-generating vessels
- education of skippers of vulnerable vessels (e.g. keep a watch for wash, always slow down and steer into the waves).

39 Analysis of vessel wash based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 23: Potential issue – vessel wash – at a glance



Location/ area	Incidents
Syd. Harb. - Sydney Cove/ east of Bridge	8
Murray River - Moama to Torrumbary	5
Syd. Harb - Farm Cove to Garden Island	4
Murray River - Barmah to Moama	4
All other areas (each)	0-3
Average*	0.1

*average of the 862 Aquatic Management Areas in NSW

Key statistics

- About 1 in 17 serious injury boating incidents are primarily caused by vessel wash.
- The vast majority of wash 'incidents' are likely to go unreported, as they usually don't involve a specific vessel incident. Excessive vessel wash is, however, liable to cause environmental or property damage.
- The most common incident types recorded in association with wash incidents were swamping (36 records, 18.0%), capsizing (30 records, 15.0%) and collisions with a fixed object (19 records, 9.5%).
- 46 (26.6%) of the 173 vessels involved in incidents related to wash were open runabouts, while 38 (22.0%) were motor cruisers.
- The overall number of boating incidents related to vessel wash has fluctuated, without showing any significant trend.
- Incidents related to vessel wash are highly seasonal, even more so than boating incidents generally. Nearly three-quarters (73.9%) of incidents associated with vessel wash occurred in the six months October to March.
- Reported wash incidents were most prevalent on Sydney Harbour and on the Murray River.

7.3 Sailing vessels

Sailing vessels[40] include yachts, dinghies and multihulls. These vessels were involved in 13 (10.5%) of the 124 fatal boating incidents recorded in the 10 years to 30 June 2018. In terms of vessels, sailing vessels accounted for 9.8% of the vessels involved in fatal incidents over the 10 year period (Figure 24).

Sailing vessels were involved in 56 (10.3%) of the 546 serious injury incidents and 701 (22.1%) of the 3167 overall boating incidents recorded over the 10 years.

In 2017–18, there was one fatal incident involving a sailing vessel.

There has been no significant trend in the number of sailing vessels involved in boating incidents (Figure 24). However, the number of sailing vessels involved in incidents in 2017–18 (53 – including multihulls) was significantly below the long-term (10 year) annual average of 70.1 sailing vessels.

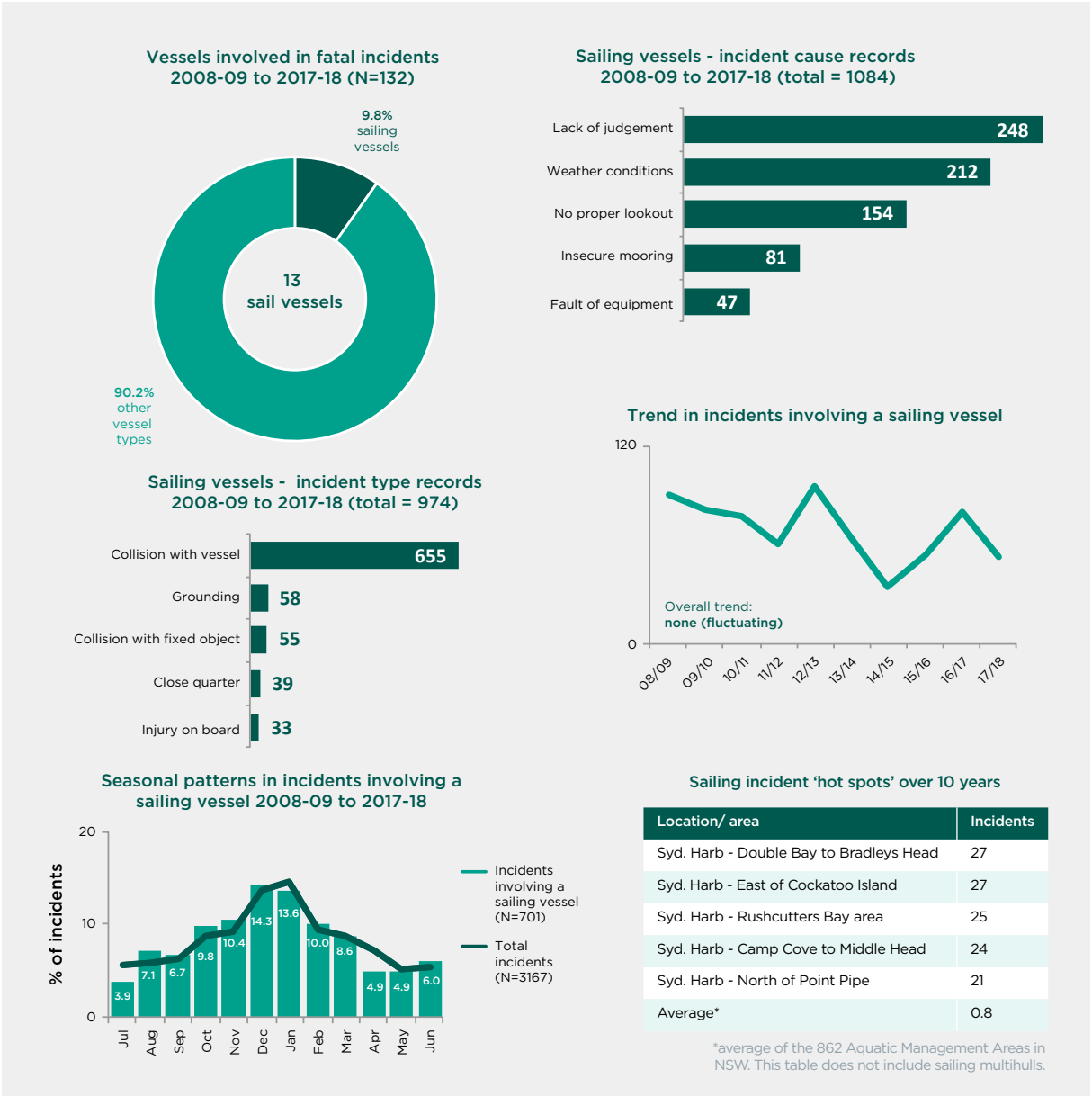
Figure 24 provides a snapshot of key data and statistics related to sailing vessel incidents.

Sailing vessels appear to be mostly involved in two broad categories of incident: (1) incidents where a person is swept overboard offshore – often with serious consequences; and (2) incidents involving collisions or near misses on busy congested waterways like Sydney Harbour, often during a race – usually, but not always, with relatively minor consequences. These scenarios represent two very different sets of risks and therefore require completely different mitigation measures.

For sailing vessel incidents offshore, the key considerations revolve around watching and planning for anticipated sea and weather conditions, precautions to avoid being swept overboard, lifejacket wear and personal distress signalling. For incidents in bays and harbours, the main considerations are keeping a proper lookout and courtesy on the part of both sailing vessels and nearby powered vessels. Under the International Regulations for Preventing Collisions at Sea, all vessels are required to take all necessary means to avoid a collision, and this includes both the vessel with the right of way (often a sailing vessel) and the vessel required to give way (usually a powered vessel). Layered upon this are – in many cases – specific racing rules, however the collision regulations take precedence.

40 Analysis of sailing vessels based on application of Tableau data visualisation software to Maritime operational Eagle database records as at 6 February 2019.

Figure 24: Potential issue – sailing vessels – at a glance



Sailing incident 'hot spots' over 10 years

Location/ area	Incidents
Syd. Harb - Double Bay to Bradleys Head	27
Syd. Harb - East of Cockatoo Island	27
Syd. Harb - Rushcutters Bay area	25
Syd. Harb - Camp Cove to Middle Head	24
Syd. Harb - North of Point Pipe	21
Average*	0.8

*average of the 862 Aquatic Management Areas in NSW. This table does not include sailing multihulls.

Key statistics

- Sailing vessels accounted for 9.8% of the vessels involved in fatal incidents, i.e. about 1 in 10 vessels.
- Lack of judgement (22.9%), weather conditions (19.6%) and no proper lookout (14.2)% were the most common causes associated with incident records pertaining to sailing vessels over the 10 years.
- The incident type collision with vessel (67.2%) accounted for a clear majority of incident records pertaining to sailing vessels, followed by groundings (6.0%) and collision with a fixed object (5.6%).
- The number of incidents involving sailing vessels has been fluctuating, without any overall trend.
- Incidents involving sailing vessels tend to be seasonal, with most occurring in the warmer months. The six month period October to March accounted for just under two-thirds of such incidents (66.6%).
- Sailing vessel incidents are concentrated on the lower reaches of Sydney Harbour. Sydney Harbour and nearby waters accounted for 52.8% of such incidents, followed by Hawkesbury R/ Broken Bay (essentially the Pittwater area) with 18.0%.
- Sailing yachts were associated with a large proportion of incidents where the activity was recorded as being "organised competition" (61.5% – see Section 7.4 below).

7.4 Organised competition

Organised competition involving vessels comes in many forms. However the most relevant in terms of boating safety are those that involve some form of racing. The three main types of racing activity that occur on the water are (1) towing racing, particularly waterskiing, (2) high speed powerboat racing and (3) sailboat racing.

In the Maritime operational incident database, "organised competition" is recorded under vessel operation – as are specific towing activities such as waterskiing and wakeboarding. Examination of the data (Figure 25) shows that incidents recorded as "organised competition" are generally related to sailing races, and that many of the competition incidents related to tow sports are instead recorded as "waterskiing", "wakeboarding" etc. With this in mind, some summary breakdowns of fatality incident data covering all forms of racing (based on CMS records) are also provided in Figure 25.

Racing events accounted for 16 (13.9%) of the 115 fatal recreational boating incidents recorded in the 10 years to 30 June 2018. Of these racing-related fatal incidents, nine (56.3%) related to waterskiing, four (25%) related to powerboat racing and three (18.8%) related to sailing.

Over the 10 years there were 93 boating incidents overall recorded under "organised competition", 2.9% of all boating incidents recorded over this period. There were 23 serious injury incidents related to organised competition, 4.3% of all serious injury incidents over this period.

In 2017–18, there was one racing related fatality incident, which involved a waterskiier. More generally, there were 16 overall incidents and seven serious injury incidents related to organised competition. Based on Maritime operational database records where the major party (vessel) was indicated, 61.5% of incidents recorded as being during organised competition related to a sailing vessel.

The overall number of incidents recorded under organised completion has fluctuated over the 10 year period to 30 June 2018, with a distinct dip in the middle of this period. The pattern of 'organised competition' incidents through time may reflect changes in reporting practices. Nevertheless, the number of incidents recorded under organised competition in 2017–18 (16) was significantly above the long-term (10 year) annual average of 9.3 incidents.

Figure 25 provides a snapshot of key data and statistics related to racing events and, more generally, to organised competition.

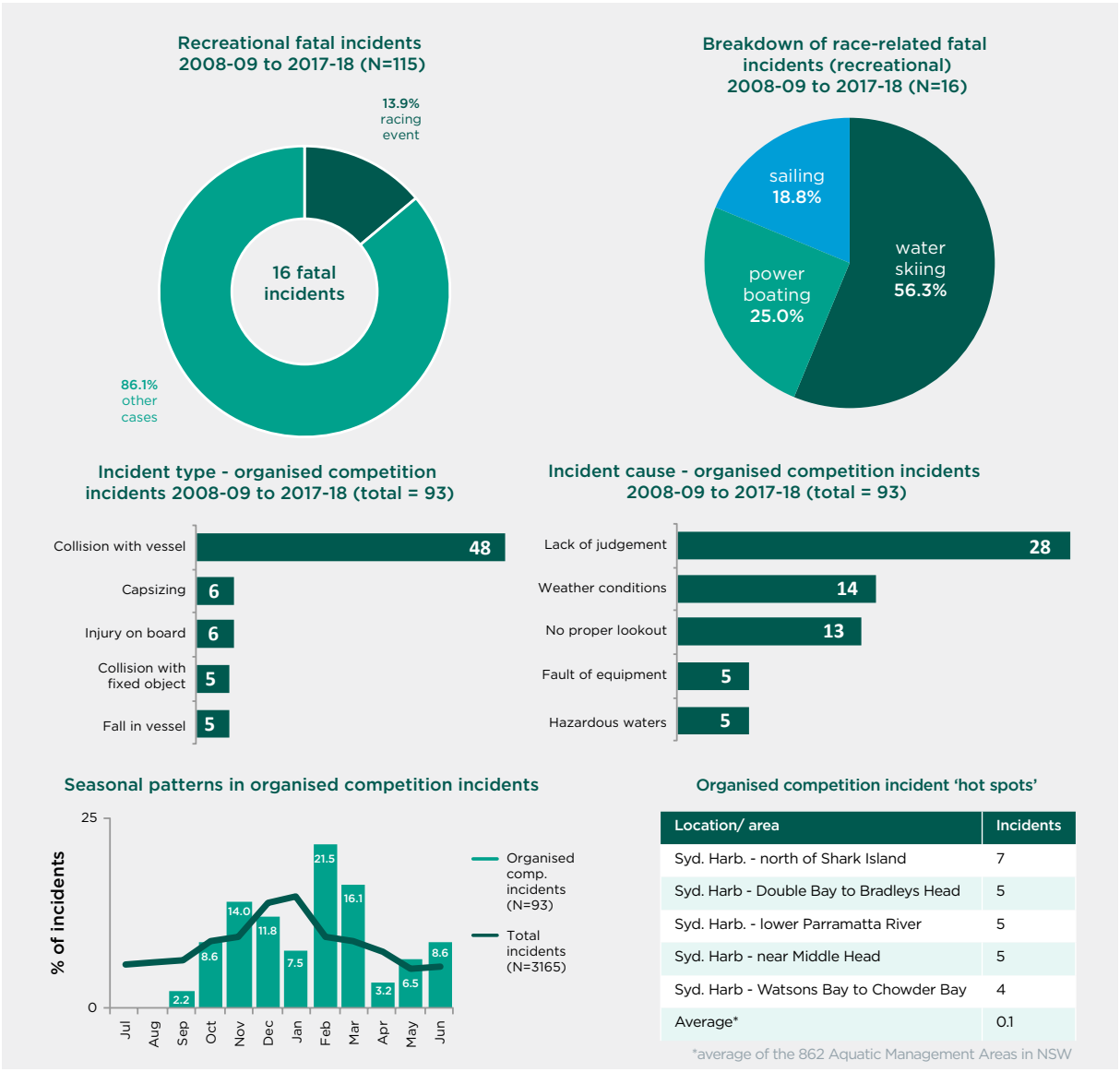
The three main types organised competition each carry very different areas of risk. With towing activities such as waterskiing, the issues mainly relate to the towed person falling at high speed – in such cases the water surface is effectively very 'hard' and serious injuries can result from a simple fall. The nature of tow racing incidents tends to be quite different from towing incidents generally, with serious injuries more likely to stem from the fall itself, as opposed to collision with a river bank or other hazard[41].

With high speed power boat racing, the issues often relate to a vessel losing control at high speed and the occupants being subject to heavy impact. Both tow-related and high speed power boat racing raise issues around vessel speed, vessel design and the personal protective equipment of the occupants and people being towed.

Sailing races raise issues related to keeping a lookout, collision avoidance and – if offshore – weather conditions, vessel design and equipment (re being swept overboard) and personal distress signalling (see also Section 6.3). In general, sailing racing involves tactics at close quarters where contact between vessels often occurs.

41 Unpublished data, Centre for Maritime Safety.

Figure 25: Potential issue – organised competition – at a glance



Key statistics

- About 1 in 7 fatal recreational boating incidents occur during a race event. In recent years, the majority of these incidents occurring in waterski race events.
- More than half (51.6%) of incidents recorded as being during organised competition involved a collision with another vessel.
- The most common incident cause associated with incidents during organised competition are lack of judgement (30.1%), weather conditions (15.1%) and no proper lookout (14.0%).
- The recording of incidents under "organised competition" by the Transport maritime cluster focuses on sailing events and sailing yachts accounted for nearly two-thirds of the major vessels involved in such incidents.
- Nearly 80% of incidents recorded as being during organised competition occurred in the six months October to March. However, seasonality appears to be affected by patterns in typical event calendars – there is a notable reduction in incidents during January, at which time school holidays would mean relatively few events would take place.
- The majority of incidents (54.8%) related to organised competition occurred on or near Sydney Harbour. A further 18.3% occurred on Pittwater and nearby waterways.

7.5 Secured vessels

Secured vessels include those that are at anchor, moored or berthed. Vessels in these circumstances are commonly regarded as being less at risk of an incident. While this is certainly true in many respects, the available data points to appreciable safety risks and a need to guard against complacency.

In the Maritime operational incident database, the vessel status "at anchor", "berthed" or "moored" is recorded under vessel operation.

Over the 10 year period to 30 June 2018, there were 17 fatal boating incidents recorded where one or more vessels involved was 'secured' – i.e. at anchor, moored or berthed. This represents 13.7% of all fatal incidents over this period.

Over the same period, there were 43 serious injury incidents (8.0% of all such incidents) in which one or more vessels involved was reportedly secured at the time. For overall incidents, one or more of the vessels involved were reportedly secured in 575 cases (18.2% of total incidents).

There has been a significant downward trend in the number of incidents involving a secured vessel (Figure 26). The number of such incidents in 2017–18 (43) was significantly below the long-term (10 year) annual average of 57.5.

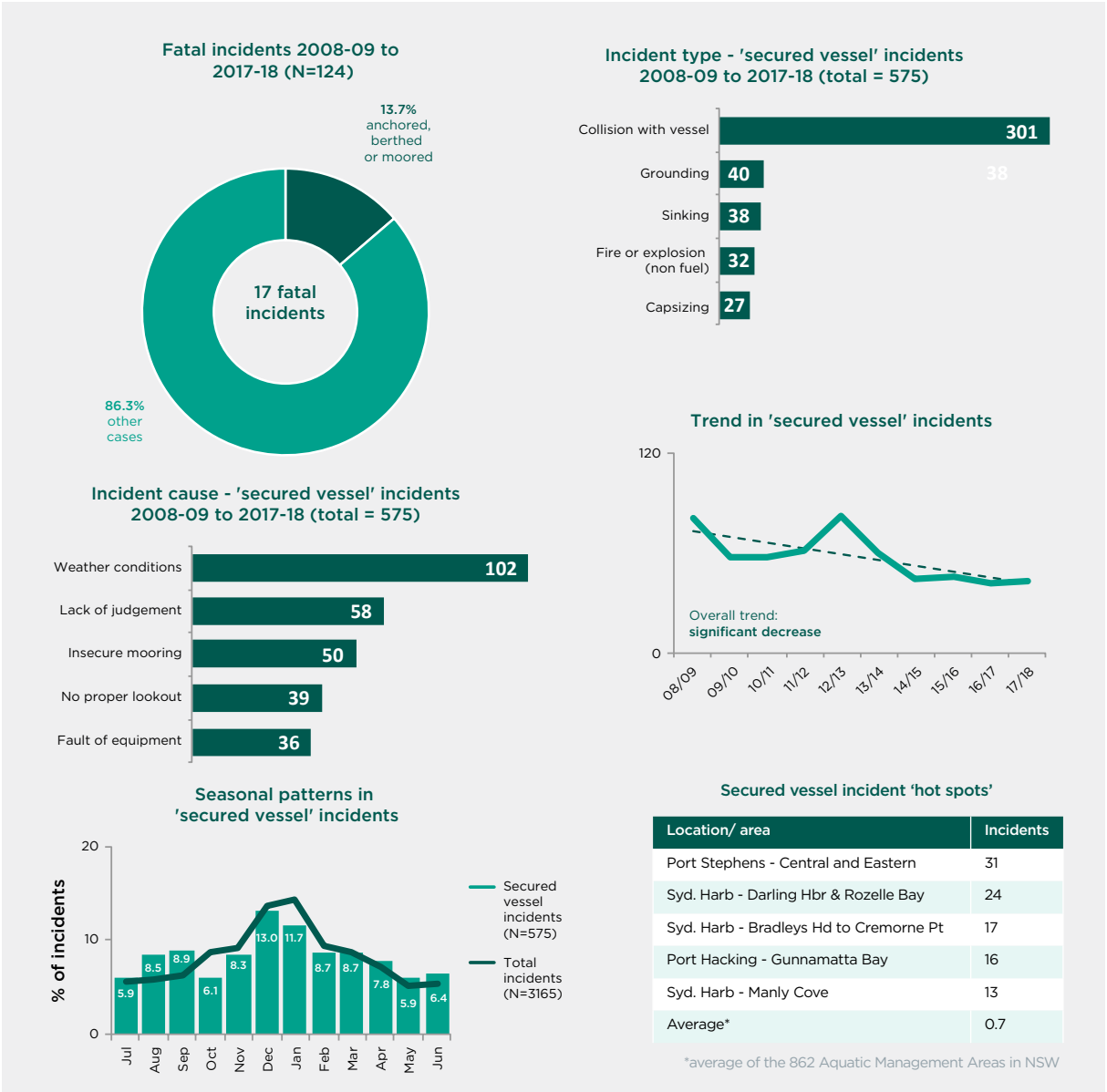
Figure 26 provides a snapshot of key data and statistics related to incidents involving secured vessels.

Incidents involving a 'secured' vessel generally occur in one of three ways:

- A person has fallen or jumped off an anchored, moored or berthed vessel. In many cases the incident has resulted in a fatality – often because the person has hit their head on part the vessel. Alcohol is often a factor in these types of incidents.
- An anchored or moored vessel has been hit by another vessel that was underway – usually because the other vessel did not have someone keeping an adequate lookout, and possibly because they the other vessel was travelling at an excessive speed. In most cases, the secured vessel was un-occupied at the time (e.g. on a mooring), meaning the main consequence was property damage rather than injury.
- A moored vessel is torn from its mooring, or caused to drag its mooring, due to strong winds, often in combination with large waves. In these cases, there is also rarely any injury, but often major property damage – to both the affected vessel, and any other nearby moored vessels in its path. Regular maintenance of a vessel's mooring apparatus is the main way to prevent these incidents. This scenario is reflected in the distinct August/ September peak in incidents involving a secured vessel – this is when strong westerly winds often cause moored vessels to break free or drag their mooring.

These three broad scenarios involve a wide variety of safety issues and potential mitigation measures – but the key over-arching theme is the need to guard against complacency. Secondary themes are risk taking (including around alcohol consumption) and proper vessel maintenance (particularly of the mooring apparatus).

Figure 26: Potential issue – secured vessels (those at anchor, berthed or moored) – at a glance



Location/ area	Incidents
Port Stephens - Central and Eastern	31
Syd. Harb - Darling Hbr & Rozelle Bay	24
Syd. Harb - Bradleys Hd to Cremorne Pt	17
Port Hacking - Gunnamatta Bay	16
Syd. Harb - Manly Cove	13
Average*	0.7

*average of the 862 Aquatic Management Areas in NSW

Key statistics

- About 1 in 7 fatal boating incidents involved a vessel that was secured in some way – i.e. at anchor, moored or berthed.
- More than half (52.3%) of incidents including a secured vessel involved a collision with another vessel.
- The most common incident cause associated with incidents involving a secured vessel was weather conditions (17.7%), followed by lack of judgement (10.1%) and an insecure mooring (8.7%).
- Based on incidents for which the major party was identified, sailing yachts accounted for 23.9% of incidents involving a secured vessel, followed by motor cruisers (23.2%) and open runabouts (15.9%).
- Incidents involving a secured vessel generally followed the seasonal pattern of boating incidents generally, with a peak in December/January (24.7% of secured vessel incidents). However, there was also a distinct peak in August/ September (17.4% of secured vessel incidents), which is significantly greater than the corresponding proportion of incidents generally (12.2%).
- Incidents involving a secured vessel occurred across a variety of locations, but with Sydney Harbour and Port Stephens prominent – along with locations such as Port Hacking and Lake Macquarie.

8 Conclusions

Continuing downward trends in both fatal incident rates and total reported incident rates paint an encouraging picture in terms of overall boating safety in NSW. In addition, incident outcomes are tracking favourably in relation to the 10 problem definitions contained in the Maritime Safety Plan 2017-21.

There are positive indications (generally in terms of comparisons with the applicable long-term average) for eight out of the 10 problem definition areas. In the case of the other two problem definition areas – personal watercraft and paddle safety – the results are more mixed: the rate of PWC involvement in serious injury incidents remains high – against both registration numbers and likely usage, and the number of paddle craft involved in boating incidents in 2017–18 was higher than in previous years. However, with paddle craft, their involvement in fatal and serious injury incidents appears to be low in comparison to their likely usage, and the anecdotal evidence of their growing popularity may partly explain the 2017–18 result.

In terms of the five potential additional issues identified in this report, there were positive outcomes in relation to three when compared with long-term averages. However, two others – age and gender, and organised competition – had less favourable outcomes. Older boaters continue to be over-represented in fatalities, and the number of incidents related to organised competition was relatively high in 2017–18.

While this report finds that there have been encouraging results across a wide range of boating safety issues, there are no grounds for complacency. Efforts to educate, advise and deliver compliance actions to the boating public should continue across all aspects of boating safety. However, the findings of this report suggest that the following aspects warrant particular focus:

Lifejacket wear

While wear rates are now much higher than they were a decade ago, they have recently plateaued at less than 50%. Continued efforts are needed in supporting the ongoing development of attractive and wearable designs in order to break down barriers to increased wear rates, as well as continued efforts in education and compliance. The cultural and behavioural factors behind the excellent wear rates on PWC and sailing dinghies (both above 90 per cent) need to be examined and applied where possible to other types of small vessel, especially tinnies and paddle craft. Changes to policy, strategy and/ or legislation should be considered.

Trauma (non drowning) related incidents

The rate of non-drowning fatalities has not changed at all over the last two and a half decades, despite a large decline in the rate of drowning fatalities. Non-drowning fatalities typically involve trauma brought about by sudden impact – commonly due to excessive speed or not keeping a proper lookout, or occurring as a result of a towing incident. While there have been positive outcomes with these factors individually, collectively they are still a major concern. There needs to be a strong focus on ‘safe navigation’ and towing safety, particularly in relation to:

- safe speeds, keeping a proper lookout and maintaining safe distances from hazards
- the extra care needed on narrow or busy waterways
- risks associated with high speed turns during towing activities.

Weather

Although the total number of weather related incidents was well down in 2017–18, the pervasive influence of weather (and associated sea conditions) on boating safety means that this issue should continue to receive a strong focus. Weather information has never been more accessible – with a range of user-friendly websites and phone apps now available. Boaters need to be encouraged to take full advantage of the latest information channels – so that regularly checking the weather becomes an automatic part of any boating experience. At the same time, the Centre for Maritime Safety should continue to work closely with the Bureau of Meteorology to ensure that the best possible information is available in a user-friendly form.

Personal watercraft

PWC are strongly over-represented in boating incidents, particularly in relation to serious injury incidents. Issues related to speed, behaviour and operation in proximity to other waterway users remain pressing concerns – particularly on the southern waterways of the Sydney area and on the Murray River. The current strong focus on education and compliance in areas popular with PWC should continue. Anecdotal and operational evidence suggests that it is a small minority of PWC users who account for most of the safety and amenity issues associated with these craft – for this group of users, 'normal' levels of compliance work might not be sufficient to drive positive change: innovative ways of creating the perception that rule breakers are at a high risk of being caught – wherever they are – are required. These might include, for example, greater collaboration with industry, increased co-ordination of on-water compliance, better real-time surveillance and greater intelligence sharing between not only the Transport maritime cluster and NSW Police, but also with other agencies that have a presence on or near the water – such as local Councils, NSW Department of Primary Industries and the Office of Environment and Heritage. The comparatively rapid growth in the popularity of PWC in recent years highlights the need for agencies to work together to improve on-water safety and to address potential user-conflicts on busier waterways.

Open runabouts

Open runabout also appear to be over-represented in serious injury and fatality incidents, based on the latest data related to vessel usage. Open runabouts are both small and fast. On one hand, they are vulnerable to immersion-related incidents associated with capsize, swamping or sinking, which might be caused by bad weather or sea conditions. On the other, they are usually capable of high speeds – and therefore susceptible to high speed collisions. This duel vulnerability makes them unique amongst the major vessel types. Open runabout safety involves nearly all of the 10 Problem Definitions identified in the Maritime Safety Plan 2017-21, and as such should remain a strong focus.

Older boaters

In recent years, older boaters have been strongly over-represented in boating fatalities. This is clearly evident with people aged over 70. Given the aging population, it is likely that more older people will participate in boating in coming years – meaning the potential for an increased number of fatalities in this age group. Tailored messages for older boaters need to be delivered to address three main issues: complacency, changing physical and mental abilities and medical conditions. Whilst the current boating statistics highlight the issue in boaters aged over 70, these safety messages are likely to relevant to boaters across a broader age group.

Vessel wash

Vessel wash causes a considerable number of boating incidents, including serious injury incidents, and contributes to infrastructure and environmental damage on various waterways. The issue of vessel wash is often poorly understood, and this is exacerbated by the fact that many of the impacts related to wash occur after the wash-making vessel has passed out of the immediate area, occur gradually (e.g. foreshore erosion) or are confounded with other processes (such as floods or riverbank clearing). The issue of wash potentially affects a wide range of vessels (either in terms of those that generate wash or those that are affected by it) and is relevant to most of the state's waterways.

A continued effort should be made to better educate boaters about wash – from the perspectives of both wash-generating vessels and vessels vulnerable to the effects of wash. Development of a state-wide wash strategy should be considered, along with any further research needed to better understand the impacts of vessel wash and how these might be mitigated.

Organised competition

Most of the fatalities that have occurred in organised competition in recent years have related to high speed competition – particularly water skiing and powerboat racing. At the speeds attained, any sort of fall or impact is likely to have serious consequences. In addition, the high speeds mean that it is easier for a vessel to lose control – due to either aerodynamic forces or even something as simple as wash from another vessel. While vessel design and personal protective equipment both have a major role in helping to mitigate the risk of serious injury, the fundamental issue is that of vessel speed.

Much work has already been done by racing bodies and the Transport maritime cluster to mitigate risks associated with vessel speed – for example by having graduated speed restrictions for different levels of competitor age and experience. Racing bodies have been also considering additional measures to further mitigate risks – such as introducing improved personal safety equipment and specific limits on vessel design and engine size or power. These considerations are continuing. Given that risks associated with speed link closely with the proximity of hazards, consideration is also being given to the suitability of different waterways for particular competition events. The width and size of a waterway, the presence of shoreline hazards and the risk of wash from other vessels are some of the factors being considered when assessing a waterway's suitability for high-speed powercraft competition.

Centre for Maritime Safety
PO Box K659 Haymarket NSW 1240
P 02 8265 7858
E maritime@transport.nsw.gov.au
W maritimemanagement.transport.nsw.gov.au

978-1-925891-37-9