Recreational Vessel Fatalities in Victoria

1999–2002

A joint initiative of The State Coroner’s Office, The Department of Human Services and Marine Safety Victoria
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Compiled by Lyndal Bugeja
Injury Prevention Research Officer

September 2003
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<td>Australian Standard</td>
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<td>ATC</td>
<td>Australian Transport Council</td>
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<td>ATG</td>
<td>Australian Transport Group</td>
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<td>AYF</td>
<td>Australian Yachting Federation</td>
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<td>Blood Alcohol Concentration</td>
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<td>Boating Industry Association of Victoria</td>
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<td>Computer Assisted Telephone Interviewing</td>
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<td>Coronal Services Centre</td>
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<td>Department of Human Services</td>
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<td>Inflatable Rescue Boat</td>
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<td>Local Case Management System</td>
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<td>Monash University Accident Research Centre</td>
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<td>NCIS</td>
<td>National Coroners Information System</td>
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<td>NZ</td>
<td>New Zealand</td>
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<td>OWLE</td>
<td>Open Water Learning Experience</td>
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<td>Personal Flotation Device</td>
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## Acknowledgements

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Executive summary

An Injury Prevention Research Officer position, funded by the Public Health Branch of the Department of Human Services (DHS), was established at the State Coroner’s Office (SCO) to conduct a number of projects across a range of topic areas on unintentional death. The first area under investigation was unintentional drowning. This report presents the findings of an investigation into drowning deaths of occupants of recreational vessels on Victorian waters between 1999 and 2002.

The purpose of the investigation was to identify factors contributing to these deaths and examine safety practices and behaviours of the individuals involved. The primary issue of interest was the availability and use of personal floatation devices (PFDs) by the individuals who died in recreational vessel incidents. The presence and prevalence of alcohol consumption, co-morbidity (pre-existing illnesses), and the prevailing environmental conditions were also considered.

Forty deaths occurred from 30 incidents between 1999 and 2002, primarily in vessels measuring less than 6.5 metres in length. Adult males were over-represented, particularly those aged between 20 and 29 (20 per cent) and 40 and 49 years (23 per cent). In most instances, these deaths resulted from a combination of three factors: hazardous environmental conditions; vessel occupants suddenly and unexpectedly entering the water; and absence of PFD use.

Absence of PFD use was found to be the most significant factor contributing to these deaths. Users of non-motorised and less than four metre motorised vessels were the group most likely not to carry the required PFD on board. In the cases where PFDs were on board, they were the ‘pillow’ style device comprising of tie straps for fastening (see Appendix C case number 2777/2002 and 2798/2002). These devices are suitable for emergency situations only, not constant wear. Given the nature of the emergencies experienced by occupants in recreational vessels during the four-year period, that is capsize and man overboard incidents, adequate time was not available to prepare for entry into the water. Furthermore, the ‘pillow’ style devices, as well as other Australian Standard approved PFD Type 1 devices, are below the level of safety required by comparative International Standards.

Based on these findings it was recommended that:

1. the National Marine Safety Committee (NMSC), as part of their Review of PFD Standards for Recreational Vessels, determine:
   a. whether Australian Standard 1512 for PFD Type 1 adequately provides for the safety of the user
   b. whether the PFDs that currently conform to Australian Standard 1512 are of a standard that allows users to wear them comfortably at all times or able to be easily fitted in the event of an emergency (that is, in the water)

2. in the event that Australian Standard 1512 is improved to at least the International Standard or the International Standard is adopted in Australia, Marine Safety Victoria (MSV) mandate compulsory wearing of PFDs in vessels measuring up to and including six metres in length

3. MSV enhance the education of vessel operators regarding their responsibility for passenger safety

4. MSV, the RLSSA and other water safety organisations raise awareness of the dangers of alcohol consumption in and around aquatic environments.
Introduction

This report is part of a joint project of the Department of Human Services (DHS) and the SCO to investigate the causes of unintentional deaths of Victorians in an effort to contribute to the prevention of future deaths and injuries. This report focuses specifically on unintentional drowning deaths from recreational boating in Victoria. MSV, who is the regulatory and safety agency responsible for this area, were invited as a partner organisation to assist in the compilation of expert information for this report.

Purpose and research questions

The purpose of the current study was to investigate fatal recreational vessel incidents in Victorian waters between January 1999 and December 2002. The study examined whether safety practices and behaviours were undertaken by vessel occupants, particularly in relation to the availability and use of PFDs. The study also examined the prevalence of co-morbidity (pre-existing illnesses), alcohol consumption and the prevailing environmental conditions. These issues were examined in order to gain an understanding of the role of these factors in recreational vessel incidents and deaths.

Definitions

Water vessels

For the purposes of the current study, MSV’s definition of a recreational vessel was, in part, applied. MSV defines a recreational vessel as:

(a) a vessel used or intended to be used wholly for the purpose of recreation or sport and not for hire or reward; or
(b) any vessel that is, or is of a class that is declared under subsection (3) (c) (of the Marine Act 1988) to be a recreational vessel or recreational vessels.

Although MSV define hire-and-drive vessels as commercial, fatalities involving these vessels were included in the current study if they were being used for the purposes of recreation at the time of the incident\(^1\). It was felt that these vessels were subject to similar risk factors as those associated with privately-owned recreational vessels.

Other definitions

Case inclusion in the current study was limited to individuals whose cause of death was attributed to, in whole or in part, drowning or immersion. Individuals who, according to the Coroner’s finding, intended to take their own life (suicide) or the life of another individual (homicide) were excluded from the study.

Within the current dataset, there were a number of single cases where more than one person died. To ensure that some of the contributing factors were not counted more than once, a distinction was made between the number of incidents and the number of deaths. ‘Incidents’ refers to the number of separate fatal events, and ‘deaths’ refers to the total number of individuals who died as a result of these events.

\(^1\) Note that MSV require Coastal Life jackets to be carried on board Hire and Drive vessels, not PFDs.
The role of the Coroner

In Australia, unexpected, unnatural, and violent deaths or deaths resulting from accident or injury are required by law to be reported to the Coroner for investigation. In Victoria, for example, the legislative requirements for reporting a death are outlined in the *Coroner’s Act 1985* (Vic). Section 15 (1) states that:

*A coroner has jurisdiction to investigate a death if it appears to the coroner that the death is or may be a reportable death*’

where a ‘reportable death’ is defined by Section 3 of the Act as:

a death:
  (a) where the body is in Victoria; or
  (b) that occurred in Victoria; or
  (c) the cause of which occurred in Victoria; or
  (d) of a person who ordinarily resided in Victoria at the time of death:

being a death:
  (e) that appears to have been unexpected, unnatural or violent or to have resulted, directly or indirectly, from accident or injury.

Section 19 of the *Coroner’s Act 1985* also stipulates that at the conclusion of an investigation into a death, the Coroner must make a finding in relation to the identity of the deceased, how the death occurred and the cause of death. The Coroner also has the power to make recommendations on public health and safety issues for the purposes of future prevention of deaths in similar circumstances. In accordance with the *Coroner’s Act 1985*, all drowning deaths are required to be reported to the Coroner for investigation.

Recreational boating in Victoria

Mandate

By virtue of the *Marine Act 1988*, MSV is the State’s marine safety agency. MSV is responsible for the administration of the *Marine Act 1988* and the Marine Regulations 1999. There are 150 designated waterways in Victoria managed by 59 authorities appointed as local authorities under Section 3 of the *Marine Act 1988*. Specific rules exist for each of these waterways, outlined in *Vessel Operating and Zoning Rules* (www.marinesafety.vic.gov.au).

According to the *Marine Act 1988*, the function of MSV is to:

- set safety standards for recreational vessels and zoning rules
- determine standards and procedures for navigation and maritime safety on State waters;
- develop appropriate standards for the provision and maintenance of navigational aids for State waters
- investigate marine incidents and accidents and implement appropriate action on the findings
- enforce and monitor compliance with prescribed standards
- promote education and training and promote guidance and information on marine safety matters
- commission and sponsor research into marine safety matters.
In the event of a marine incident that results in a fatal or serious injury, section 20 of the *Marine Act 1988* requires that:

(1) *If as a result of an accident involving a vessel on State waters any person is injured or dies or any property is damaged or destroyed, the person in charge of the vessel must:*

(a) immediately render any assistance that he or she can

(b) as soon as possible give his or her name and address of the owner of the vessel and any identifying number of the vessel to:

   (i) any person who has been injured, or who owns any property which has been damaged or destroyed, or to the representative of any such person or of a person who has died

   (ii) any member of the police force who is present

(c) if:

   (i) any person is injured or dies

   (ii) no member of the police force is present at the scene of the accident

   report, in person and without delay, full particulars of the accident at the police station that is most accessible to the scene of the accident if the station is open or, if it is not, at the next most accessible station that is open.

MSV is responsible for investigating marine incidents in order to identify deficiencies in operational procedures or vessel standards. MSV generally appoints an inspector to conduct an investigation if there is reason to believe that:

- a vessel has been involved in an accident; or
- a vessel has been involved in an incident tending to the loss or destruction of, or damage to, any vessel or other property or tending to endanger any person; or
- any pilot, pilot exempt master, harbour master, pilotage services provider or person holding a certificate of competency or service has acted incompetently in the course of his or her duties or in breach of the *Marine Act 1988* or the Marine Regulations 1999.

MSV is notified of an incident via an incident report form usually completed by Victoria Police's Water Police Squad (the Water Police). The information contained on this form relates to:

- incident description (including environmental conditions)
- vessel details
- person details (person at the helm, person in charge)
- passenger/witness details
- deceased/injured person details
- responding organisations
- contributing factors
- equipment and offences.

This information is then entered into MSV's Marine Incident Database (MID). Following any formal action that MSV may take in relation to an incident, public reports of investigations are published in order to make the causes of an accident known within the industry and to help prevent similar occurrences.
Safety requirements

MSV outlines the minimum safety equipment requirements for recreational vessels in the *Victorian Recreational Boating Safety Handbook*, July 2002 and also in Schedule 2 of the Marine Regulations 1999 (MSV, 2002). These requirements vary according to the length of the vessel and whether the vessel is being operated on coastal waters or inland waters (see Appendix B).

The requirements for use of PFDs in Victoria is outlined in MSV’s *2002 Boating Safety Handbook*. There are three types of PFDs: PFD Type 1; PFD Type 2; and PFD Type 3. Each PFD type is subject to a different Australian Standard, which is based on the level of protection given to the wearer (MSV, 2002).

PFD Type 1 provides the highest level of buoyancy, that is 87 newtons. It is designed to keep the wearer’s head above water and body in a safe floating position. PFD Type 2 is a buoyancy garment and provides sufficient buoyancy, that is 53 newtons, to keep the wearer’s head above water. PFD Type 1 and 2 are manufactured in high visibility colours with retro-reflective patches. PFD Type 3 is also a buoyancy garment and has the same buoyancy as PFD Type 2. PFD Type 3 is manufactured in colours other than the high-visibility safety colours.

On recreational vessels being used on Victorian waters, it is a compulsory safety requirement that a PFD Type 1 be carried on board for each person. Children under 10 years of age are required to wear an approved PFD Type 1, 2 or 3 at all times while the vessel is under way, unless they are inside a deckhouse, cabin, half-cabin or a secured enclosed space (MSV, 2002).

Growth in recreational vessel usage

According to MSV, there are currently 143,000 registered recreational power vessels in Victoria. This represents an increase of approximately 4 per cent on the previous year. There is no accurate estimate of the number of non-powered vessels which includes canoes, kayaks, off-the-beach yachts, windsurfers, rowing shells, kite surfers or rafts.

Drowning and alcohol

Determining the contribution of alcohol in drowning deaths is complicated by a number of factors, such as the time between when the incident occurred and the location of the body, putrefaction (decomposition) of the body and the extent of toxicological testing.

According to Plueckhahn (1984) alcohol affects humans physiologically in a number of ways:

> the effect of alcohol on the human body is the depression of the central nervous system which results in a decreased awareness of sensory stimuli, depression of conditioned reflexes and consequently a reduced ability to deal with unexpected situations or emergencies. (pp., 24)

Plueckhahn (1984), also argues that the effects of alcohol are exhibited when blood alcohol concentration (BAC) is as low as 0.02 g/100 mL or 4 mmol/L. Drummer and Odell (2001) argue that peak blood concentrations of alcohol occur between half an hour and two hours following consumption (Drummer and Odell, 2001). They also state that alcohol causes increased heat loss by dilation of skin capillaries and through increased sweating. Lowering of core body temperature is also possible when a person is exposed to the elements without sufficient protection (Drummer and Odell, 2001). The consequence of this is an increased risk of drowning following alcohol consumption, as the onset of hypothermia, and unconsciousness occurs faster.
Given the nature of recreational boating, drowning deaths from these incidents primarily occur in large open aquatic environments such as lakes, rivers, bays and the ocean. As a result, the body of the deceased may never be recovered and subsequently the blood alcohol concentration (BAC) of the deceased can never be ascertained. Unless there is a surviving witness to the incident it is impossible to determine the role of alcohol as a contributing factor in the death. Although statements from witnesses or survivors can provide some indication of alcohol consumption, this information should be interpreted with caution. Witness's/survivor's perception of the deceased's alcohol consumption and its effects may be incorrect or intentionally misconstrued for fear of future legal ramifications.

More often it is the case that the deceased is not recovered for two or more days. During this time body decomposition, also known as putrefaction, will commence and, in most instances, this leads to the formation of alcohol in body tissue and fluids (Drummer and Odell, 2001). The specimen most affected by this, and extensively sampled to determine whether alcohol has been consumed, is blood. The extent and rate at which this occurs depends on the amount of sugar in the blood/tissues, the temperature and the period of time between death and sampling (Drummer and Odell, 2001). Plueckhahn (1984) argues that a BAC is valid if the body is recovered within 24 hours following death. Other overseas research outlined below by Warner, Smith and Langley (2000) considered BAC valid if the body was recovered within 48 hours.

Decomposition makes accurate assessment of the level of alcohol at the time of death impossible, however significant alcohol production as a result of decomposition rarely exceeds 0.20 g/100mL (Ranson; personal communication, November 2002). As a result, levels greater than this in a decomposed body are strongly indicative of the presence of alcohol at the time of death (Ranson; personal communication, November 2002). Furthermore, there are particular specimens that are relatively unaffected by the process of decomposition, namely urine and the vitreous humour, that can also be tested to check the accuracy of the BAC.

The Victorian Institute of Forensic Medicine (VIFM) is responsible for conducting toxicological examinations for deaths reported to the SCO, Victoria. Specimens of tissue are taken by the Forensic Pathologist during the post-mortem examination, who then orders the toxicological tests required. There are protocols in place regarding the types of deaths that undergo full alcohol and drug screens, namely homicides, suicides, suspicious deaths, drug-related deaths, deaths where the cause is unknown and all deaths resulting from an ‘accident’ (VIFM, 2002). Drowning deaths fall into the category of ‘accidents’ and, therefore, a full toxicological examination is undertaken.

**Previous research**

**Australian findings**

In November 2002, MSV commissioned Quantum Market Research to undertake an evaluation of MSV’s Life Jacket and Licensing Campaign. The objective of the research was to evaluate the impact of the Life Jacket and Licensing Campaign on attitudes and behaviour of recreational vessel owners in Victoria. More specifically the research addressed the following:

- determined the target markets awareness of key issues in regards to licensing and wearing of life jackets
- determined attitudes and behaviour towards life jackets
- explored current boating behaviour
- determined advertising awareness of licensing and life-jacket campaigns.

Vitreous humour is the transparent gelatinous substance occupying the posterior and larger part of the eyeball (The Shorter Oxford English Dictionary, 1956).
Three-hundred and fifty-one telephone interviews were conducted with boat owners aged 17 years and over. Two-hundred and forty-six of the interviews were conducted in metropolitan Melbourne and 105 were conducted in regional and rural Victoria. A sample of boat owners was taken from the listings of registered boat owners supplied to Quantum by Vic Roads. The interview took approximately 10 minutes and were conducted using Quantum’s Computer Assisted Telephone Interviewing (CATI) facility. The interview period was from Friday, 22 November to Tuesday, 26 November 2002. The campaign launch was on Saturday, 30 November 2002. Quantum found that the typical registered boat owner in Victoria:

- was male
- owns a fishing boat or dingy (70 per cent) or ski boat (17 per cent), measuring 5.5 metres or less in length (82 per cent)
- uses their boat seasonally (51 per cent) compared to all year round (26 per cent) on inland lakes or rivers (59 per cent) or Port Phillip Bay (36 per cent)
- are experienced boat owners with most (77 per cent) owning a boat for more than 10 years.

In terms of PFDs, it was reported that:

- most carry a PFD Type 1, either fitted (33 per cent) or foam blocks (26 per cent), and 13 per cent don’t know
- most carry life jackets that are less than 10 years old (59 per cent)
- most never wear a life jacket (57 per cent), or do so on some occasions (26 per cent)
- bad weather signals that a life jacket should be worn (46 per cent), but awareness of other conditions or circumstances is very low
- just under half (44 per cent) at least occasionally go boating alone but few named this as a time to wear a life jacket
- just over half have been caught out in bad weather when they weren’t expecting it (53 per cent) and 21 per cent have been involved in an emergency where they have needed assistance.

Quantum concluded that use of PFDs by recreational boat owners in Victoria was low. Most never wore a PFD, they could not describe the type of PFD they should carry and could not name conditions where they should be worn. Quantum noted that it would be important to monitor whether the life-jacket campaign impacted on boat owners’ perceptions of when to wear one and whether they would wear one at least on some occasions.

In October 2002, MSV commissioned the Monash University Accident Research Centre (MUARC) to undertake an investigation into injuries and fatalities that occurred as a result of marine incidents on Victorian waterways. This investigation consisted of a statistical analysis of MSV’s Victorian Marine Incident Database (MID) between July 1999 and June 2002, the Victorian Admitted Episodes Dataset (VAED) between July 1987 and June 2001, and the Victorian Emergency Minimum Dataset (VEMD) between July 1999 and December 2001.

The Victorian MID recorded 2,217 marine incidents, 21 (approximately 1 per cent) of which were fatal. These 21 incidents resulted in 27 deaths. It was reported that all but one incident involved a single vessel, most of which occurred on inshore waters (43 per cent) or on inland waters (33 per cent) (MUARC, 2002). Forty-eight per cent of the incidents involved capsizeing and almost half the vessels were motorboats (MUARC, 2002).

Data from hospital admissions and emergency department (ED) presentations were examined to determine the nature and extent of injury that resulted from marine incidents. The VAED recorded
1,726 hospital admissions to Victorian public hospitals from water-transport-related injury between July 1987 and June 2001. This represented 123 admissions a year on average (MUARC, 2002). For the period July 1999 to June 2001, there were 214 hospital admissions (public and private) from recreational vessel incidents. Twenty-six per cent of these injuries involved personal watercraft (PWCs) and 21 per cent involved water skis (MUARC, 2002).

In terms of ED presentations, data from the VEMD was analysed for the period July 1999 to December 2001 (from 28 Victorian public hospital emergency departments). Six hundred and seventy-six ED presentations were recorded in the VEMD during this period. Thirty-seven per cent (n=253) of the presentations involved ‘boat’ injuries, closely followed by water skis (35 per cent) (MUARC, 2002).

MUARC concluded that there were a number of definitional variations that made direct comparison between injury and death rates problematic. Despite this, it was evident that the injury data recorded in the hospital data systems was almost 10 times higher than that recorded in MSV’s MID.

O’Connor conducted a recent investigation for the National Marine Safety Committee (NMSC) entitled Assessment of fatal and non-fatal injury due to boating in Australia (O’Connor, 2002). This study utilised death data from the Australian Bureau of Statistics (ABS) between 1979 and 1998, and hospital admission statistics from 1993–94 to 1997–98. It was found that, on average, there were 80 deaths and 1,000 hospital admissions each year in Australia as a result of boating incidents. Due to the nature of the data, it was not possible to distinguish between recreational and commercial boating incidents.

A rough distinction between the number of recreational and commercial deaths can be made by comparing data found on Victorian recreational deaths (average 10 a year) in the current study and Victorian commercial vessel deaths (average two a year) in Batchelor and Bugeja (2003). It can be seen that recreational vessel deaths account for the bulk of fatalities in Victoria each year and it can be assumed that similar ratios may apply in other Australian States and Territories.

O’Connor reported that while the trend in deaths appeared to decline over time, the trend in hospitalisation had not, fluctuating between 913 and 989 admissions a year. Forty-eight per cent of the deaths involved small powered vessels, and 93 per cent of the deceased were male (O’Connor, 2002). Sixty-eight per cent of the deaths occurred in the 20–54 year age group, with a peak in the 25–29 year age group (O’Connor, 2002). O’Connor recommended that more in-depth research using coronial data was required in order to determine the role of factors such as life jackets, environmental conditions, co-morbidity, alcohol and drug consumption and communication and rescue failure in these fatalities.

In 1999, Marine and Safety Tasmania (MAST) was directed to conduct a review of recreational boating safety. The terms of reference of this review consisted of:

- an examination of coronial findings between 1987 and 1999
- consultation with recreational boat users on their views regarding:
  - mandatory wearing of life jackets
  - boating standards
  - procedures for obtaining a motorboat licence.
- an examination of issues regarding compulsory wearing of life jackets;
- a review of current Australian and overseas legislation on boating safety equipment; and
- an examination of enforcement of boating rules.

The results of the coronial review illustrated that during the 12 year period there were 34 incidents resulting in 46 deaths, 45 of which were male (MAST, 2000). Seventeen per cent of the deaths involved
individuals in the 21–30 year age bracket (MAST, 2000). This age group represented only 5.7 per cent of registered boat owners (MAST, 2000). Thirty per cent of the deaths involved individuals aged more than 50 years, who represented 47.5 per cent of registered boat owners (MAST, 2000).

The majority of the vessels involved in incidents, mainly swamping and capsizing, were runabouts and dinghies (MAST, 2000). Twenty per cent of the incidents occurred in inland lakes and the majority occurred in the Spring and Summer months (MAST, 2000). Alcohol was found to be a factor in 25 per cent of the cases and the majority of the victims were not wearing PFDs (MAST, 2000).

Plueckhahn (1984) conducted a prospective study from 1959–83 on all accidental submersion deaths of individuals aged over 15 years in the Geelong Coroner’s District. It was found that during the 25-year period, 265 individuals drowned.

A valid BAC was able to be taken in 135 (122 males and 13 females) of the drowning deaths classified as ‘accidental’ (Plueckhahn, 1984). Plueckhahn (1984) reported that BACs exceeding 0.08 g/100mL were found in 8 per cent of the males aged between 15 and 29 years and 51 per cent of the males aged between 30 and 64 years. Plueckhahn (1984) observed that this result is the reverse of what is found among alcohol-related motor-vehicle accidents in Geelong. That is, a larger percentage of the younger victims killed in motor vehicle accidents had positive BACs, and at a higher concentration, than the older age group.

In relation to boating, it was found that 62 individuals (60 men and two women) drowned while using a water vessel (Plueckhahn, 1984). Twenty-nine of the 62 deceased, all males, were recovered within a time period that enabled a valid BAC test to be taken (Plueckhahn, 1984). Plueckhahn (1984) found in these cases that only one of the nine deceased aged 15–29 years had consumed alcohol, while nine of the 20 (45 per cent) aged over 30 years had consumed alcohol. It was further found that five of the nine individuals aged over 30 years, had BACs exceeding 0.08 g/100mL (Plueckhahn, 1984).

Plueckhahn (1984) concluded that 55 per cent of men aged over 20 years who accidentally drowned in the Geelong Coroner’s District between 1959 and 1983 had consumed alcohol. Almost 40 per cent of these individuals were found to have a BAC that exceeded the legal limit for driving a motor vehicle (Plueckhahn, 1984).

An earlier study by Plueckhahn (1977) reviewed the circumstances of 24 deaths of men aged 18 years and over who drowned while on board a water vessel between 1959 and 1974. It was found that 18 of the deceased were recovered within a time period that enabled a valid test of BAC to be undertaken. Thirteen of these 18 individuals (73 per cent) were found to have a positive BAC, 11 of which exceeded 0.15 g/100mL (Plueckhahn, 1977).

International findings

Canada

A study by Chochinov (1998) reported that the Canadian National Surveillance System for Water-Related Fatalities recorded 429 deaths associated with boating in its first two years of data collection. An examination of this data illustrated that these deaths were mostly of males operating motorboats for recreational purposes (Chochinov, 1998). Chochinov (1998) also reported that alcohol was detected in two-thirds of the individuals who drowned in boating-related incidents, and that it was most likely that these individuals were not wearing PFDs.

3 “accidental drowning” refers to deaths not arising from suicide or homicide. For the purposes of the current investigation these deaths are referred to as “unintentional”.

Chochinov (1998) states that, in Canada, operating a water vessel while intoxicated is prohibited, however it is poorly policed and rarely enforced. It is argued that society appears to have a greater tolerance for risk-taking in water vessels than they do for motor vehicles, particularly in relation to alcohol consumption. Chochinov (1998) suggests that the consumption of alcohol prior to or during the operation of a water vessel needs to become as socially unacceptable as operating a motor vehicle while intoxicated. It is also suggested that wearing PFDs should be likened to wearing seatbelts (Chochinov, 1998).

Finland
Lunetta, Pinttila and Sarna (1998) conducted an investigation into water-traffic accidents (WTAs) in Finland between 1969 and 1995. The aim of the investigation was to examine age and gender mortality rates and the contribution of alcohol. The authors note that in Finland a BAC limit of 1.5 per cent was introduced in 1976, which was reduced to 1.0 per cent in 1994.

It was found that during the 27-year study period 3,473 deaths occurred from WTAs. Approximately 95 per cent of these deaths were from drowning and, in 65 per cent, alcohol intoxication was found to be a contributing factor. Ninety-seven per cent of the deceased were aged 15 years or above, 41 per cent of which were aged between 25 and 44 years (Lunetta et al., 1998). However, the greatest proportion of these deaths occurred in the 45–64 year age group. The male to female ratio was 20:1 (Lunetta et al., 1998). Lunetta et al. (1998) noted that the contribution of alcohol was taken from the certificate of death, but that the Forensic Pathologist would have accounted for BAC validity when determining contribution.

It is concluded that, despite a decrease in WTAs during the study period, rates of death from such accidents in Finland continue to exceed those reported by other countries (Lunetta et al., 1998). Lunetta et al. (1998) recommended that a prevention campaign directed at operators and passengers be undertaken (Lunetta et al., 1998). Such a campaign should be directed at adult males and address the risks of alcohol abuse in aquatic environments and promote the use of buoyancy vests (Lunetta et al., 1998).

Germany
Herrmann and Stormer (1985) conducted an evaluation of 17 life jackets (largely of UK and European design) in order to determine the behaviour of such life jackets on unconscious individuals in heavy seas. Herrmann and Stormer (1985) argued that the ability to move in the water is lost quickly due to the effects of hypothermia, exhaustion and injury, which often result in a loss of consciousness. The design of the life jacket therefore becomes important for survival, in particular ensuring that the airway of the immersed individual is kept clear of water (Herrmann and Stormer, 1985).

An immersible dummy was constructed in order to test the likelihood of a person wearing a life jacket drowning, while drifting exhausted or unconscious in the water. The dummy was fitted with an ECG transmitter to send out test data, and a sensor in the mouth signaled when the oral cavity flooded (Herrmann and Stormer, 1985). Seas were simulated in a German Navy practice pool at a height of 80 cm (Herrmann and Stormer, 1985). The variables used to establish the life-saving function of the life jackets were: flooding frequency; the flooding period of the mouth; and the distance between the mouth and the surface of the water (Herrmann and Stormer, 1985).

It was found that a number of jackets formed water channels on the side and in the chest area, which allowed water to funnel directly up to the face of the dummy. This was also apparent with jackets fitted with buoyant protective collars (Herrmann and Stormer, 1985). Not only was the collar
inadequate in protecting the face from waves, but water was also retained in the area around the face (Herrmann and Stormer, 1985). It was also found that the British Royal Navy jacket was the most effective jacket in terms of flooding frequency and flooding time. Herrmann and Stormer (1985) concluded that despite the progress made in life-jacket design in recent years, a number of design improvements could be made to some current styles of life jackets in order to increase survival time.

**New Zealand**

A study by Warner, Smith and Langley (2000), reviewed the coronial files of all individuals aged 10 years and over who drowned in New Zealand between 1992 and 1994. Three hundred and twenty files were examined, 115 of which were BAC tested (Warner et al., 2000).

Due to the increased levels of alcohol in the blood produced during putrefaction, the BAC result was only considered valid if the body had been retrieved and tested within 48 hours. In addition to this, BAC was not routinely tested for in drowning deaths in New Zealand due to the absence of testing guidelines (Warner et al., 2000).

Warner et al. (2000) found that in 50 per cent of the tested cases, the BAC result showed the presence of alcohol. It was also reported that 271 of the cases were unintentional, 78 (29 per cent) of which involved a watercraft. In 12 of the 78 cases BAC was tested. In four of these cases (33 per cent) the BAC was found to be positive, three of which exceeded 100 mg/dL (Warner et al., 2000).

Warner et al. (2000) recommended that mandatory BAC testing should be considered for all drowning related deaths of individuals aged ten years and over in New Zealand. They also recommended that national guidelines be developed for BAC testing and recording (Warner et al., 2000).

**United States of America**

A study by Bell, Howland, Mangione and Senier (2000) examined the relationship between lack of formal boater training, drinking and boating, and other unsafe boating practices. Bell et al. (2000) reported that approximately 900 people die and 50,000 people are injured each year in the USA as a result of boating-related activities. They also reported that it had been estimated that boat operators without formal safety training were 16 times more likely to be involved in a boating accident (Bell et al., 2000). Bell et al. (2000) argued that an evaluation of the contents of most safety programs focused on navigational skills and knowledge of right-of-way skills, while issues such as the effects of alcohol consumption while boating received little attention.

In their study, Bell et al. (2000) conducted a telephone survey, from July to September 1991, of individuals aged over 16 years from the 15 continental states in the USA. Three-thousand and forty-two individuals were surveyed (70 per cent response rate), on items focused on recreational boating activity over the previous year, boating experience, training, and behaviours of boat owners and operators.

It was found that 73 per cent of the boaters surveyed had no formal training in how to operate the vessel (Bell et al., 2000). Despite this, formally trained boat operators were equally or more likely to consume alcohol prior to and during boating, and also failed to wear PFDs (Bell et al., 2000). Bell et al. (2000) inferred from these results that formal training was associated with unsafe boating practices. It was argued that a possible reason for this finding was that formal training and experience decreased boaters’ perception of risk (Bell et al., 2000). Bell et al. (2000) tested this hypothesis and found that formally trained boaters had a lower level of risk perception at all levels of experience than informally trained boaters.
Bell et al. (2000) concluded from their investigation that most of the boaters surveyed were passengers on the boats, which meant that safety practices such as the availability of PFDs and alcohol use by the operator were out of their control. This also meant that any intervention aimed at boat owners/operators would miss a large proportion of the boating population at risk of an accident (Bell et al., 2000). Despite this, Bell et al. (2000) made a number of recommendations in relation to boat operator training. They recommended that all boaters should undertake formal training, which they suggested could be achieved via boat operator licensing, with a skill-based exam. In order to maintain retention of information, Bell et al. (2000) suggested that re-accreditation be undertaken at least bi-annually. They also recommended that additions should be made to training material to address the risks of alcohol consumption while boating (Bell et al., 2000).

Logan, Sacks, Branche, Ryan and Bender (1999) conducted an investigation on alcohol-influenced recreational boat operation during 1994. A national telephone survey was administered to English- and Spanish-speaking individuals aged 18 years and over. Participants were asked questions regarding motorboat usage in the preceding 12 month period, frequency of alcohol consumption in the two hours prior to boating and other questions regarding motor-vehicle safety practices to assess associated risk-taking behaviour (Logan et al., 1999).

Of the 5,238 responses obtained, 1,136 reported motorboating in the previous 12-month period (Logan et al., 1999). Five hundred and ninety-seven of these 1,136 individuals reported operating the motorboat at the time (Logan et al., 1999). Thirty-one per cent of these operators reported consuming alcohol within the two-hour period prior to boating (Logan et al., 1999). Logan et al. (1999) also found that the group of respondents most likely to consume alcohol prior to boating, were also most likely to be male, aged 25–34 years, engage in alcohol-influenced driving and drive without wearing a seatbelt.

It was concluded from the investigation that the current approach to preventing alcohol-impaired boating was inadequate (Logan et al., 1999). Logan et al. (1999) recommended that further research be undertaken to examine the effectiveness and acceptability of random BAC testing and a zero tolerance approach to alcohol intoxication. It was also suggested that future prevention strategies focus on all boat users (Logan et al., 1999).

Quan, Bennett, Cummings, Trusty and Treser (1998) conducted an investigation to determine the extent of PFD use by recreational boaters in the USA. It was reported in the article that boating-related deaths represent 40 per cent of the drowning deaths in Washington State (Quan et al., 1998).

Observations were made at 19 aquatic sites where boating recreation in vessels less than 19 feet in length was frequently undertaken (Quan et al., 1998). Thirty to 90-minute observations were made on Fridays, Saturdays and Sundays between April and June in 1995 (Quan et al., 1998). The information collected consisted of age, gender, vessel type, environmental conditions and whether the occupant was wearing a PFD (Quan et al., 1998).

Four thousand one hundred and eighty-one complete observations were made at 17 lakes, eight rivers and four salt water locations (Quan et al., 1998). Quan et al. (1998) found that PFD usage was high in children aged less than five years (91 per cent). The percentage was less frequent in those aged 5–14 years (63 per cent), and it was found to vary according to the type of vessel (Quan et al., 1998). Observations of individuals aged over 14 years wearing PFDs were only 13 per cent.
Quan et al. (1998) also found that when one of the occupants aged over 14 years wore a PFD, occupants in the other two younger age categories were also more likely to wear one, that is 95 per cent for children under five years and 65 per cent for children aged 5–14 years. Seventy-eight per cent of kayakers were observed to wear PFDs, while occupants in motorboats were the least likely group to wear them (Quan et al., 1998).

The study revealed different PFD use patterns between different types of boats, which Quan et al. (1998) argued may indicate different knowledge, attitudes and levels of risk perception. Quan et al. (1998) concluded from this that further investigation into the relationship between boating activities and PFD use would assist in the development of more targeted PFD messages.

Treser, Trusty and Yang (1997) conducted an investigation into the effectiveness of an educational campaign on PFD usage in King County, Washington. Observations were conducted for six weeks in Spring 1992 to determine the baseline level of PFD usage prior to the initiation of educational activities. Observations of PFD usage were made at 12 different sites (10 freshwater and two saltwater), three times per week (one weekday and both days on the weekends for 30 minutes) for boats 16 feet (five metres) or less. The data collected consisted of time, day, site, weather conditions, water conditions, boat type, age and gender of boaters and whether or not a PFD was worn by each individual. The educational campaign included a boating safety video for use in elementary schools, a life jacket loaner program for local beaches, community events, flyers, brochures and celebrity sports cards.

In 1994, a follow-up study was conducted in order to gauge the effectiveness of the educational campaign. It was found that PFD usage increased substantially from 19.9 per cent of all boaters in 1992 to 31.3 per cent in 1994. An increase in usage by adults was more significant (14.2 per cent to 24.7 per cent) than by children (68.2 per cent to 70.5 per cent). The findings also reported that use by adolescents and young adults was rare. Treser et al. (1997) argued that this was important because this age group had the highest fatality rate.

The report concluded that there was an increase in PFD usage following the educational campaign, with every category of data showing some increase between 1992 and 1994. Treser et al. (1997) recommended replication of their study in other settings to confirm these findings.

Copeland (1986) conducted a study on 23 recreational boating fatalities that occurred in Dade County, Florida between 1980 and 1984. A number of issues were examined, which included: age; sex; cause of death; the role of alcohol and drugs; and contributing risk factors (Copeland, 1986). Copeland (1986) found that 91.3 per cent of the victims were male and 26 per cent were aged between 26 and 30 years. Sixty-five per cent of the incidents occurred in the afternoon and 34 per cent occurred in the ocean (Copeland, 1986). Blood alcohol concentration was found to be positive in 30.4 per cent and greater than or equal to 0.1 per cent in 21.7 per cent of cases (Copeland, 1986).

Copeland (1986) also found that a review of the cases illustrated that human error, inexperience and ethanol (alcohol) use were critical risk factors in the deaths. It is noted that during the study period, licensing of boat operators and water safety/boating instruction classes were not required (Copeland, 1986). Copeland (1986) concluded that while recreational boating fatalities were rare, they shared some common features of young males, alcohol consumption and stupidity, which have been found to be prevalent factors in other recreational deaths.
Method

Case identification

Deaths from recreational vessel incidents were identified and verified by searching electronic data collected and stored by the Coronial Services Centre (CSC) and MSV. To overcome the possibility of missing cases, multiple methods of case identification were utilised. These methods are outlined below:

1) keyword search on TOPIC database, which contains electronically stored police report summaries and coronial findings
2) incident code search of the SCO Local Case Management System (LCMS) where incident code equalled ‘DRW’ (drowning) or ‘SUS’ (suspected death) for period 1999–2002 (inclusive)
3) SCO LCMS case selected where manner of death codes equalled ‘drowning’ or ‘boat accident’ for period 1989 onwards
4) verification of cases identified using the National Coroners Information System (NCIS) for all deaths where the mechanism of death = threats to breathing, drowning and immersion and the object involved in the death = watercraft and means of transport
5) comparison with fatal incidents recorded in MSV’s Marine Incident Database (MID) for the period 1999–2002 (inclusive).

These searches involved:

1. Topic

Electronic versions of police report summaries (known as ‘Form 83 circumstances text’) and coronial findings were searched using keywords such as fishermen; boat; vessel; drown; drowned and drowning. These documents are stored on a database called ‘TOPIC’, which allows for multiple-term searching. TOPIC contains data from 1988 onwards. However, the reports are not available for all cases, particularly deaths that occurred in rural jurisdictions between 1989 and 1999.

2. State Coroner’s Office Local Case Management System

When a death is reported to the Coroner, it is entered onto the SCO LCMS, which dates back to 1989. At the time of being entered, a code is assigned to the case that relates to the type of incident that has occurred. One such incident code is ‘DRW’ (drowning). All cases coded as drowning from 1999–2002 were selected and police report summaries obtained for each case. These summaries were subsequently interrogated to determine whether inclusion was warranted.

3. Structured Query Language

An SQL (structured query language) search was conducted to identify all cases that were coded as ‘drowning’ or ‘boat accident’. This was done using the ‘manner of death’ codes reclassified by a research officer at the Victorian Institute of Forensic Medicine (VIFM) for the period 1988 onwards.

4 TOPIC is maintained by the Victorian Institute of Forensic Medicine (VIFM) for use by Coronial Services Centre staff.
4. National Coroners Information System
Recreational vessel fatalities that occurred between July 2000 to December 2002 in Victoria were extracted from the National Coroners Information System (NCIS), a national database of all coronial deaths in Australia. Victorian cases were identified for the purposes of verification.

5. Marine Incident Database
The list of recreational boating fatalities compiled using the above methods was compared with the fatal incidents recorded on the MID at MSV for the purposes of verification.

Data collection
For the purposes of accuracy, it was important that the death investigation had been completed by the SCO. As of June 2003, a coroner had made a finding in all 30 incidents (see Appendix A for list of recommendations). In Victoria, police are required to submit a Report of Death Form (commonly referred to as the Form 83) to the SCO within 24 hours of the death being reported, so that a determination can be made as to the necessary post-mortem procedures. Within the first 24 hours, the information regarding the incident may be largely unknown and it is therefore not until the SCO receives a brief of evidence (commonly referred to as the Inquest Brief [the brief]) from the police that the full and correct details of the death are presented. This brief can take between a month and a year to be submitted.

There are incidents where there is conflicting evidence in the brief and it is not until an inquest is held that a determination can be made as to the actual circumstances surrounding the death. An inquest can also take between two months and two years to be held.

Each file generally contained the following information:

- initial police report of death to the Coroner (Victoria Police Form 83)
- post-mortem examination reports:
  - autopsy report
  - toxicology report.
- inquest brief:
  - investigating police officer’s summary of events from statements
  - witness statements
  - expert reports from MSV and/or the Victorian Water Police
  - MSV’s Marine Incident Form
  - Bureau of Meteorology Report on weather conditions in the area at the time of the incident
  - photographs
  - maps.
- coronial finding.

A list of data items for collection from each case was identified from previous Australian and overseas research into the area of recreational and commercial vessel fatalities, and from a review of the cases. These data items were entered into a Microsoft Excel Spreadsheet and are listed below in Table 1.

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5 An inquest is a public hearing by which a Coroner concludes an investigation into a death. The rules of evidence are not applicable, however a Coroner is required to apply the rules of natural justice. For more information see Selby, H. (Ed), (1992) The Aftermath of Death. Sydney: The Federation Press.
TABLE 1. List of data items

<table>
<thead>
<tr>
<th>Name</th>
<th>Data Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pre-existing Illnesses (co-morbidity)</td>
</tr>
<tr>
<td>Case status (open/completed)</td>
<td>Evidence of alcohol or drugs</td>
</tr>
<tr>
<td>Occupation</td>
<td>Body recovered</td>
</tr>
<tr>
<td>Gender</td>
<td>Number of people on board at the time of the incident</td>
</tr>
<tr>
<td>Age</td>
<td>Maximum carrying capacity</td>
</tr>
<tr>
<td>Suburb of usual residence</td>
<td>Related fatality</td>
</tr>
<tr>
<td>Date of incident</td>
<td>Environmental conditions</td>
</tr>
<tr>
<td>Time of day</td>
<td>Weather conditions (for example, cloudy)</td>
</tr>
<tr>
<td>Day of incident</td>
<td>Water conditions (for example, choppy)</td>
</tr>
<tr>
<td>Season</td>
<td>Wind (for example, moderate 10–15 knots)</td>
</tr>
<tr>
<td>Operator or passenger</td>
<td>Visibility (for example, good)</td>
</tr>
<tr>
<td>Experience</td>
<td>Operation at the time of the incident (for example, under way)</td>
</tr>
<tr>
<td>Location</td>
<td>Contributing factors</td>
</tr>
<tr>
<td>Type of incident (for example, capsize)</td>
<td>Was weather forecast obtained</td>
</tr>
<tr>
<td>Activity</td>
<td>Were PFDs/buoyancy vests available on the vessel?</td>
</tr>
<tr>
<td>Vessel type (for example, motorised)</td>
<td>Were PFDs/buoyancy vests worn</td>
</tr>
<tr>
<td>Vessel size</td>
<td>Why no PFD was worn</td>
</tr>
<tr>
<td>Vessel hull material (for example, fibreglass)</td>
<td>PFD type</td>
</tr>
<tr>
<td>Vessel hired (yes/no)</td>
<td>Presence of other safety equipment</td>
</tr>
<tr>
<td>Vessel name and registration</td>
<td>How was distress indicated</td>
</tr>
<tr>
<td>Number of vessels involved</td>
<td>What help was rendered</td>
</tr>
<tr>
<td>Method of propulsion (for example, outboard)</td>
<td>Was a radio carried</td>
</tr>
<tr>
<td>Size of motor</td>
<td>Notes from coronial finding/investigation</td>
</tr>
<tr>
<td>Medical cause of death</td>
<td>Circumstances</td>
</tr>
</tbody>
</table>

A second review of the cases was undertaken for the purposes of data entry. Some data items could not be completed for all cases, either because the information was not contained in the coronial file or the data item was not relevant to the particular case. In some cases data was required to be validated from the investigating police officers and MSV.

Data analysis

Each case was allocated to one of four groups according to the length and type of the vessel involved (non-motorised vessels, < 4-metre motorised vessels, 4–8 metre motorised vessels and > 8-metre vessels/yachts). Two of the four incidents involving yachts were less than 8 metres in length, however for the purposes of data analysis they were considered a distinct category.

The Auto Filter function on Microsoft Excel was utilised to view cases by category. For each category of cases the presence or absence of the following issues were considered:

- availability, use of and type of PFD
- evidence of alcohol consumption
- pre-existing illnesses/co-morbidity
- natural environmental conditions immediately prior to the incident.

Similarities and differences among the cases in each category and between the cases in each category were examined in order to develop a typology or set of common factors.
Limitations

Data source

The data source utilised in the current study consisted of information submitted to the SCO for the purposes of death investigation. As the electronic system of data storage and retrieval is based on case management needs, it has limitations for research purposes.

Electronic case coding and identification

There are a number of limitations in relation to case identification using the electronic coronial databases. Deaths that occur in rural Victoria are often handled by the local magistrate/s, who can act as coroners. Once the case is completed, that is the coroner has made a finding, the documents are sent to Melbourne and stored at the Coronial Services Centre. The electronic textual information (police summary of circumstances and coroner’s findings) for cases completed in rural Victoria prior to 2000 are not all stored on the SCO LCMS. As a result a keyword search using TOPIC would miss these cases.

The accuracy of textual information is also problematic, particularly in terms of the police Form 83 circumstances text. The Form 83 is required to be submitted to the coroner within 24 hours of the death occurring in order to inform the forensic procedures and further investigation. Often information is scarce in the first 24 hours of the death and it is not until the investigation is well under way or completed that the events leading to the death are documented with any accuracy. This process can take days or even months. From a research perspective this information should be interpreted only as a guide.

Coding of coronial data is also not designed with research in mind. A case can only be coded under one incident type code, for example a recreational vessel death might be coded as either a ‘DRW’ (drowning death), ‘SUS’ (suspected death) or ‘REP’ (reportable death). The REP code is often used when the circumstances surrounding a death are unclear or there is no relevant code already in existence. Incident codes are also attributed to cases when they are first reported to the SCO, and as more details are known about the case, the code used may become inappropriate.

Insufficient information available

In the current study there were cases where there were no survivors to the incident, no witnesses to the incident and the body of the deceased was never recovered. In these cases it was difficult to determine how or why the incident occurred, even when expert bodies such as the Water Police and MSV investigated.

There were also cases where no expert investigation was undertaken by the Water Police or MSV. This meant that a limited amount of information was available regarding the cause of the incident or the contributing factors to the incident.

Absence of injury and exposure data

The current study was limited to an examination of fatal recreational vessel incidents primarily due to the nature of the information available in the coronial file. The current study was unable to determine accurately the nature and extent of injury to surviving occupants of the incident. MUARC, in their study titled Marine Safety in Victoria (2002), examined injury and raised the issue of underreporting. MUARC (2002) also raised the issue of the lack of exposure data available, impeding the ability to measure risk of injury and death.
Results

Trend over time
The frequency of recreational vessel incidents and deaths between 1999 and 2002 (inclusive) is shown in Figure 1. It can be seen that in total there were 40 deaths from 30 separate incidents. The number of deaths and incidents remained fairly even over the four-year period. There was a small decrease in the number of deaths in 2001 and a similar decrease in incidents in 2002.

FIGURE 1. Frequency of deaths and incidents in Victoria 1999–2002

![Bar chart showing frequency of deaths and incidents from 1999 to 2002.]

Age and gender
The age and gender distribution of the deceased is shown in Figure 2. The median age of this group was 46 years and the mode was 45 years. It can be seen the 23 per cent were aged between 40 and 49 years and 20 per cent were aged between 20 and 29 years. Only one of the 40 deceased was female, who was 63 years of age.

FIGURE 2. Deaths by age and gender

![Bar chart showing deaths by age group from 0–9 to 80–89.]

6 Error due to rounding in total percentage.
Operators/Passengers

There was a relatively even distribution between the number of deceased who were the operator of the vessel at the time of the incident and the number of deceased who were passengers. Figure 3 illustrates that 52 per cent (n=21 of 40) of the deceased were the vessel operator and 48 per cent (n=19) were passengers.7

FIGURE 3. Distribution of deaths where the deceased was the operator or passenger

Time of day

Eleven (37 per cent) of the incidents occurred between 1200 and 1459 hours and eight (27 per cent) of the incidents occurred between 1500 and 1759 hours. It should be noted that some of the times reported were estimated.

FIGURE 4. Frequency of deaths and incidents by time of day

7 Note that there were two incidents where more than one passenger died in an incident and the operator survived and one other incident where the operator and two passengers died.
Day of week

Fifteen (50 per cent) of the incidents occurred on the weekend, 11 of which occurred on a Saturday.

FIGURE 5. Frequency of deaths and incidents by day of week

Time of day and day of week

The number of fatal recreational vessel incidents by time of day and day of week is illustrated in Table 2. It can be seen that 11 (37 per cent) of the incidents occurred on a Saturday. It can also be seen that 11 (37 per cent) of the incidents occurred between 1200 and 1459 hours. Five (17 per cent) incidents occurred on this day and during this time period.

TABLE 2. Number of fatal recreational vessel incidents by time of day and day of week

<table>
<thead>
<tr>
<th>Day</th>
<th>06:00–08:59</th>
<th>09:00–11:59</th>
<th>12:00–14:59</th>
<th>15:00–17:59</th>
<th>18:00–20:59</th>
<th>21:00–23:59</th>
<th>Not Known</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Tuesday</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Wednesday</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Thursday</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Friday</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Saturday</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Sunday</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>4</td>
<td>11</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>30</td>
</tr>
</tbody>
</table>
Month of year
The distribution of deaths and incidents according to the month of the year is illustrated in Figure 6. It can be seen that the greatest number of deaths and incidents occurred in the warmer months of the year – January to March.

FIGURE 6. Frequency of deaths and incidents by month of the year

Season
The percentage of fatal recreational vessel incidents according to season is illustrated in Figure 7. It can be seen that 40 per cent of the incidents occurred in Summer and 30 per cent occurred in Autumn.

FIGURE 7. Incidents by season
Body of water

The percentage of incidents by the body of water is illustrated in Figure 8 (see Appendix B for definitions). It can be seen that 60 per cent of the incidents occurred in an inland waterway.8

**FIGURE 8. Incidents by body of water**

![Pie chart showing 60% inland and 40% coastal.](image)

Intended activity

The activity the vessel was being used for at the time of the incident is illustrated in Figure 9. It can be seen that in 47 per cent (n=14) of the incidents, the vessel was being used for boating. This included sailing in yachts (n=4/14), canoeing (n=1/14), kayaking (n=2/14) and driving a PWC (n=1/14). In 40 per cent (n=12) of the incidents, the vessel was being used for fishing. It should be noted that in 16 of the 30 cases, the vessel was under way when the incident occurred. In 5 of the 30 cases, this information was unknown as there were no witnesses or survivors.

**FIGURE 9. Incidents by intended activity**

![Pie chart showing 47% boating, 40% fishing, 7% duck shooting, 3% working, and 3% swimming from vessel.](image)

8 Note: body of water was classified according to the definitions of MSV for the purposes of carrying safety equipment. Enclosed waterways such as Tamboon Inlet and some parts of Corner Inlet are classified as “inland” in these definitions.
Incident type

The type of incident that occurred is illustrated in Figure 10. It can be seen that 50 per cent (n=15) of the incidents resulted from the vessel capsizing and just under 20 per cent resulted from a man overboard incident. This demonstrates that in almost 70 per cent of the incidents, occupants entered the water unexpectedly.

FIGURE 10.9 Incidents by incident type

A more in-depth examination of capsize incidents was undertaken in order to determine the contributing factors. This information is summarised in Table 3. It can be seen that two-thirds (66 per cent) of the incidents occurred in inland\textsuperscript{10} waters and that, where the information was available (n=11 incidents), only 45 per cent (n=5) of the operators were considered to be experienced\textsuperscript{11}.

\textsuperscript{9} Error due to rounding in total percentage.
\textsuperscript{10} Note: body of water was classified according to the definitions of MSV for the purposes of carrying safety equipment. Enclosed waterways such as Tamboon Inlet (incident 10 in Table 3) are classified as ‘inland’ in these definitions.
\textsuperscript{11} Operator experience was used instead of ‘skill’ as there was no objective measure of competency, such as a licence, to illustrate that the operator had demonstrated an understanding of basic vessel safety. Requirements that operators of motorised vessels obtain a licence came into force in February 2003, which was after the data collection period.
TABLE 3. Summary of capsize incidents – operator experience, conditions and contributing factors

<table>
<thead>
<tr>
<th>#</th>
<th>Waters</th>
<th>survive</th>
<th>Environmental conditions</th>
<th>Contributing factors to capsize incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inland</td>
<td>No</td>
<td>20 knot winds resulting in large waves that capsized the vessel.</td>
<td>Environmental conditions</td>
</tr>
<tr>
<td>2</td>
<td>Inland</td>
<td>No</td>
<td>20 knot wind gusts overturned the vessel.</td>
<td>Environmental conditions</td>
</tr>
<tr>
<td>3</td>
<td>Inland</td>
<td>No</td>
<td>Strong wind gusts, 30 cm waves, and overloading resulting in vessel instability.</td>
<td>Environmental conditions and overloading</td>
</tr>
<tr>
<td>4</td>
<td>Inland</td>
<td>No</td>
<td>Treacherous weather conditions (strong wind gales creating waves up to 1 metre). Vessel inappropriate for conditions.</td>
<td>Environmental conditions</td>
</tr>
<tr>
<td>5</td>
<td>Coastal</td>
<td>Yes</td>
<td>Sudden wind strengthening up to 30 knots, creating rough seas with waves of 1 metre</td>
<td>Inexperience and environmental conditions</td>
</tr>
<tr>
<td>6</td>
<td>Inland</td>
<td>No</td>
<td>Wind strength of between 10–15 knots, seas up to 1 metre high</td>
<td>Inexperience and environmental conditions</td>
</tr>
<tr>
<td>7</td>
<td>Coastal</td>
<td>Yes</td>
<td>Calm water, light wind and clear weather</td>
<td>Inexperience (positioned vessel parallel to breaking waves)</td>
</tr>
<tr>
<td>8</td>
<td>Inland</td>
<td>No</td>
<td>Strong winds, heavy rain and rough water with waves up to 1 metre. Vessel inappropriate for conditions.</td>
<td>Environmental conditions and inappropriate use of vessel for conditions</td>
</tr>
<tr>
<td>9</td>
<td>Inland</td>
<td>No</td>
<td>Vessels condition had deteriorated with use and was not considered suitable for the conditions at the time. Strong winds and rough water.</td>
<td>Environmental conditions and inappropriate use of vessel for conditions</td>
</tr>
<tr>
<td>10</td>
<td>Inland</td>
<td>Yes</td>
<td>Inlet opening into the sea creating treacherous conditions.</td>
<td>Environmental conditions</td>
</tr>
<tr>
<td>11</td>
<td>Coastal</td>
<td>Yes</td>
<td>The prevailing southerly swell made conditions in the ‘entrance’ (Lakes Entrance) treacherous. Flood tide running at 2–2.5 knots. A half tide which is running at its fastest.</td>
<td>Environmental conditions</td>
</tr>
<tr>
<td>12</td>
<td>Coastal</td>
<td>No</td>
<td>Weather and sea conditions reported to be rough outside the ‘entrance’ (Lakes Entrance) in the afternoon when the incident occurred.</td>
<td>Environmental conditions and inexperience with unfamiliar route crossing the ‘Bar’</td>
</tr>
<tr>
<td>13</td>
<td>Coastal</td>
<td>Yes</td>
<td>Sea conditions were described as particularly hazardous. Large swell with waves (2–3 metres). Experienced lifesavers onboard found the conditions life threatening.</td>
<td>Environmental conditions and stalled vessel</td>
</tr>
<tr>
<td>14</td>
<td>Inland</td>
<td>Yes</td>
<td>Clear weather, choppy waters and light wind.</td>
<td>Wash of own or passing vessel</td>
</tr>
<tr>
<td>15</td>
<td>Inland</td>
<td>No</td>
<td>The tide ebbing strongly from the river together with the swell and the wind from the south-east, would have contributed to making the conditions at the bar extremely dangerous.</td>
<td>Environmental conditions and inappropriate use of vessel for conditions</td>
</tr>
</tbody>
</table>
It appears clear from these cases that the prevailing and/or developing environmental conditions, combined with either inexperience or errors in judgement resulted in nearly all of these capsize incidents. These results illustrate the importance of thorough trip preparation including obtaining accurate and up-to-date information on weather and water conditions.

The role of alcohol

In the current study, 12 of the 40 (30 per cent) deceased were never recovered. Five from inland waterways (Gellibrand River; Lake Dartmouth, Lake Eildon and two in Tamboon Inlet) and seven from coastal waterways (Corner Inlet, Point Hicks, Port Albert and four in Port Phillip Bay). In two of these 12 deaths (one incident) it was reported by a survivor that the deceased men had consumed two beers each prior to the vessel capsizing.

Seven of the 40 (17.5 per cent) deceased were found, at post mortem, to have alcohol present in their body. Table 4 illustrates the vessel type, deceased’s age, the body of water, the deceased’s level of alcohol and the period of time between when the incident occurred and when the deceased’s body was located.

TABLE 4. Individuals with a positive alcohol concentration and period of time between the incident and discovery of body by vessel type

<table>
<thead>
<tr>
<th>Vessel type</th>
<th>Age</th>
<th>Specimens received</th>
<th>Time between incident and recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Blood (leg) Urine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>no specimen no specimen</td>
<td></td>
</tr>
<tr>
<td>Tinny</td>
<td>75</td>
<td>0.01 g/100mL</td>
<td>7 days</td>
</tr>
<tr>
<td>Tinny</td>
<td>65</td>
<td>0.01 g/100mL</td>
<td>7 days</td>
</tr>
<tr>
<td>Yacht</td>
<td>56</td>
<td>0.02 g/100mL</td>
<td>1.5 days</td>
</tr>
<tr>
<td>4–8 m motorboat (F)*</td>
<td>52</td>
<td>0.22 g/100mL</td>
<td>21 days</td>
</tr>
<tr>
<td>4–8 m ski boat</td>
<td>35</td>
<td>0.01 g/100mL</td>
<td>1 day</td>
</tr>
<tr>
<td>4–8 m motorboat (A)*</td>
<td>41</td>
<td>0.08 g/100mL</td>
<td>7 hours</td>
</tr>
</tbody>
</table>

* F = fibreglass construction, A = aluminium construction

It can be seen from Table 4 that the BAC in five of the seven deaths (deaths numbered 1, 2, 3, 6 and 7) was between 0.01 g/100mL and 0.08 g/100mL. In three of these five deaths (5, 6 and 7) the deceased was located within 24 hours of the incident occurring. This indicates that the BAC was likely to be a result of alcohol consumption as opposed to the effects of putrefaction. In two of these cases (numbered 5 and 6) it was also reported by a survivor that the deceased had consumed alcohol prior to the incident.

In the remaining two of the five cases (numbered 1 and 2), the two deceased were not located until a week after the incident. Given the small level of alcohol detected and the considerable amount of time that had elapsed, it is unlikely that this finding was a result of alcohol consumption.
As it has been outlined above that BAC resulting from putrefaction would rarely exceed 0.20 g/100mL, it is likely that in cases 4 and 5 alcohol consumption had occurred and to excess. In case 4 the deceased was a known alcoholic and was reported to have consumed alcohol while on board the kayak. The Coroner in this case noted:

No person should go onto water in any canoe, kayak, boat, yacht or other similar vessel unless wearing a life jacket and be free of the effects of alcohol. [2454/2000]

In case 5 the Forensic Pathologist stated one of the causes of death as ‘associated ingestion of alcohol and benzodiazepines’.

**Vessel type**

Figure 11 illustrates the size and type of vessel involved in the incidents in the current study. It can be seen that in 50 per cent of the incidents the vessel involved was a motorised vessel measuring between four and eight metres in length. One-third of the incidents involved tinnys.

The following sections examine in depth the incidents and deaths according to the size and type of the vessel involved. In particular, this section reports on the contribution of factors related to the availability and use of PFDs, and the role of alcohol, pre-existing medical conditions and the prevailing environmental conditions.

**Non-motorised vessels**

There were three incidents, resulting in three deaths, involving paddleboats. In two incidents the vessel was a kayak and in one the vessel was a canoe. In all cases the main contributing factor was the prevailing environmental conditions. One of the kayaks and the canoe were under way when moderate to strong winds and half to one-metre waves caused the vessel to capsize. Neither occupant remained with the vessel and they were not wearing a PFD. The kayaker was also found to have a BAC of 0.20 g/100mL.

In the remaining incident, an experienced kayaker became trapped under a larger rock while negotiating a rapid in an inland waterway. The strong current and turbulent rapids made it impossible for him to free himself. The deceased was wearing a PFD and was not affected by alcohol.
Recreational Vessel Fatalities in Victoria: 1999–2002

< 4-metre motorised vessels

There were 14 deaths from 10 incidents that involved vessels less than four metres in length. Table 4 illustrates that 79 per cent of these vessels were constructed from aluminium and were fitted with an outboard motor.

For the purposes of the data analysis, the inflatable dingy fatality was combined with the analysis of the incidents involving tinnies. The data analysis for the yacht was combined with the other three incidents involving yachts and the incident involving a PWC was considered in isolation. The number and percentage of these deaths and incidents is illustrated in Table 5.

TABLE 5. Number and per cent of deaths and incidents by type in vessels < 4 metres in length

<table>
<thead>
<tr>
<th>Vessel type</th>
<th>Deaths</th>
<th>Percentage</th>
<th>Incidents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium motorboat (outboard)</td>
<td>11</td>
<td>79</td>
<td>7</td>
<td>70</td>
</tr>
<tr>
<td>Yacht</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Inflatable dinghy (outboard)</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>PWC</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>100</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

Tinnies

Motorised vessels constructed from aluminium measuring four metres or less in length accounted for seven incidents and 11 deaths. There was also one incident involving an inflatable motorboat fitted with an outboard motor. Together this represented 27 per cent of the total recreational vessel incidents and 30 per cent of deaths during this time period. Six of the deaths (five incidents) occurred in 1999, three deaths (one incident) occurred in 2000, one death occurred in 2001, and two deaths (one incident) occurred in 2002.

The average length of these vessels was 3.5 metres. In 63 per cent of the incidents (n=5/8), the intended activity of the deceased was fishing. In two of the three remaining incidents the activity was duck shooting. The average age of the deceased using these vessels was 49 years (range 6 to 81 years), with the average age of the individuals whose intended activity was fishing being 60 years (range 20 to 81 years), and the average age for the duck shooters was 35 years (range 6 to 64 years).

In 33 per cent (n=4/12) of the incidents, the vessel capsized, which accounted for seven of the 12 deaths from these incidents. All four capsize incidents occurred in inland lakes (Lake Mokan, Toolondo Lake, Lake Cairn Curran, and Lake Dartmouth).

Two of the four remaining incidents resulted from a man overboard incident in Port Phillip Bay and Gunbower Creek. In the remaining two incidents in the Gellibrand River and Corner Inlet, it was unknown how or why the deceased entered the water.

Table 6 illustrates the presence of four factors found to be associated with recreational vessel fatalities. These are specified for each incident and death involving motorised vessels (aluminium and inflatable) measuring less than four metres in length. ‘Presence of Alcohol’ is defined as the deceased’s post-mortem blood alcohol concentration (BAC) measured in grams per 100 millilitres (g/100 mL). ‘Co-Morbidity’ refers to the presence of natural disease, such as a heart condition. This does not infer that the presence of this illness directly contributed to the death unless otherwise specified. ‘PFD use’ refers
to whether the deceased was wearing a PFD prior to the incident occurring or was found with a PFD fitted.\textsuperscript{12} ‘Conditions’ refers to whether the prevailing environmental conditions immediately prior to the incident contributed to the incident. This does not include such things as the wash of a passing vessel.

**TABLE 6. Presence of contributing factors in < 4 metre vessels**

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Incident</th>
<th>Presence of alcohol</th>
<th>Co-morbidity*</th>
<th>Use of PFD</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>✓</td>
<td>✓</td>
<td>n/s</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0.01 g/100mL</td>
<td>✓</td>
<td>n/s</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>0.01 g/100mL</td>
<td>n/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>n/k</td>
<td>✓</td>
<td>n/k</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>n/a</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>n/k</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>n/k</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>n/k</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>n/k</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>n/k</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n/s = not specified, n/k = not known, n/a = not applicable
* = presence of natural disease only

In five of the 12 cases (one of whom was a child), alcohol and/or drugs were not detected by the toxicological examination. The bodies of four of the 12 deceased were never recovered, which meant a toxicological examination could not be undertaken. In one of the cases a toxicological examination was unable to be performed. In the remaining two cases, the deceased were found to have a BAC of 0.01 g/100mL. In these cases, the bodies of the deceased were not recovered for seven days, and the only specimen taken for testing was leg blood. It is most likely that the presence of alcohol detected was a result of putrefaction rather than alcohol consumption (Drummer, 2002).

In six of the 12 deaths involving tinnies, a PFD was available to the deceased. For reasons unknown, only three of these six deceased were found to have fitted a PFD prior to or following the incident (see Appendix C). In one of these cases the Coroner noted in his finding that:

> The evidence in these matters led me to the conclusion that the deceased were, at the time of their deaths, wearing life jackets, but where we have no details of what caused this tragic accident and the fact that the evidence establishes the involvement of a shark, or sharks, little can be derived from exploring this issue further in this matter. In spite of what occurred here, it is clear that ones prospect of survival is infinitely greater if wearing a life jacket appropriate to the circumstances and properly fitted. [Coroner's Finding – 2777/2002 and 2798/2002]

\textsuperscript{12} This does not infer that the PFD was fitted correctly in all cases.
In another four of the 12 deaths (two incidents), PFDs and safety equipment were not available on board the vessel. In one of these incidents the occupants on board the vessel included a child under the age of 10 years who was required by law to be provided with and wear a PFD at all times while the vessel was under way. In the other incident, the PFDs were later located in the boot of the deceased’s car. In this case the following comments were made regarding the safety practices of the deceased.

In the times that I have been with DECEASED on a boat he normally takes life jackets with him. DECEASED was not intending to go far in the boat on this day and he was only going to test the motor. This is the only reason I can think of for him not to take a life jacket with him. [girlfriend’s statement – 2135/1999]

I believe it would be prudent for an operator of this type of vessel (IRB) to wear some form of buoyancy garment, preferably a life jacket and to have leash to the kill switch attached, particularly when operating alone or in the prevailing conditions of that day (that is, the engine has provision for a lanyard that is designed to be attached to the operators wrist so if the operator is to fall out of the vessel the engine would stop. It appears that this safety lanyard was not attached to the operator as the vessel was found under way and making way). [police statement – 2135/1999]

In the remaining two of the 12 deaths (one incident), it was not specified whether a PFD was available in the vessel.

In relation to co-morbidity, three of the 12 deceased were never recovered. Four of the 12, including a child under 10 years, were not found to have any significant natural disease. In another four of the 12 deaths, the deceased was found to have some kind of heart condition, specified as: severe triple vessel coronary atherosclerotic disease (75 years); heart fibrillation (67 years); heart condition (81 years); and cardiac enlargement (33 years). Although these conditions were found to be present, it was not specified whether they contributed to the cause of death. In all cases the cause of death was certified as drowning.

The environmental conditions at the time of the incident were not specified in one of the eight incidents and not a factor in one other incident. In the six remaining incidents (75 per cent), environmental conditions were found to be a significant contributing factor. In four of these six cases, it was noted during the coronial investigation that the vessel was inappropriate for the prevailing environmental conditions.

My personal opinion is that DECEASED should not have been out on the water in that weather in that boat. [step-son’s statement – 1666/1999]

I consider myself an experienced sailor and I would not have considered going out in the conditions on that day. [witness statement – 2135/1999]

…conditions at the time were not suitable for a small vessel. In strong winds and large waves this type of craft becomes difficult to handle with one person aboard. [2135/1999]

In my opinion, it (the vessel) was totally inadequate and dangerous [due to its lack of size and structure] for the prevailing water and weather conditions. [witness (policeman) statement – 2918/2001]
These types of vessels are common throughout inland waters and are used by fishermen. The shape of the hull and bow are designed for easy penetration of the hull in choppy conditions, resulting in a smoother ride for occupants. A drawback with this hull is that they are unstable when loaded with excessive weight. I note in the statement by SURVIVOR that the vessel had filled with water after a ‘wave had pushed the nose down’. This is consistent when a vessel is travelling headlong into waves at either too fast or too slow a speed and while the ‘bow down altitude’ the wave can broach into the vessel and in this type of vessel, when full of water, can become unstable, resulting in capsize. [witness (policemen) statement – 2918/2001]

WITNESS, who located the outboard motor in December, a professional fisherman very au fait with these waters, stated in evidence

I remember the 6th September 2002 it was blowing a bit in the morning and the weather warnings were out by the weather bureau. I remember the weather was very overcast in the afternoon and the winds got up and were very strong in the afternoon. I don’t know what they were clocked at, but they were very strong and I would not have went (sic) out. I think there was only one professional boat that went out from Port Franklin that day. The other nine professional boats stayed in and didn’t fish.

He went on to say:

With my experience with boats and fishing in the Corner Inlet area over a period of 25 years, I would confidently say that I would not have gone out into Corner Inlet on the 6th day of September 2002.

In answer to a question from me, WITNESS clarified that statement, indicating that what he meant to convey was that while conditions in the morning were moderate it was the forecast of what was likely to follow later in the day that led him to the view it was a day not to be on the water.

On the available evidence I am unable to say whether the deceased men heard a weather forecast for this day, or made any other enquiries as to what weather (and hence sea conditions) may have been in store. It is imperative that mariners proposing to venture out onto potentially treacherous waters make it their business to check weather forecasts. [Coroner’s Finding – 2777/2002 and 2798/2002]

Other factors regarding overloading of the vessel and the wearing of waders were also found to contribute to one of the incidents that resulted in three deaths. In this case the Coroner made the following recommendations:

That manufacturers of recreational vessels affix appropriate signage to their product, stipulating the recommended maximum number of passengers to be carried for the size of the vessel. [0832/2000, 0855/2000 and 0856/2000]

Manufactures of waterproof waders affix a warning label to the garment, addressing the danger associated with wearing them in water greater than standing depth. That the Department of Natural Resources and Environment, when issuing Duck Shooters’ Licences, distribute warning material addressing the danger associated with wearing waterproof
waders in water greater than standing depth. That the Marine Board (now MSV) and or Boating Council give consideration to banning the wearing of waterproof waders in recreational vessels or alternatively, permit the garment be worn only in conjunction with the wearing of an appropriate buoyancy vest or personal flotation device. [0832/2000, 0855/2000 and 0856/2000]

Personal water craft

There was one incident involving a PWC. The deceased was going for a ride up the Goulburn River when he collided with another vessel (a ski boat). The deceased suffered a head injury and was unconscious when he was thrown into the water. The deceased was wearing a PFD at the time of the incident and alcohol had not been consumed.

An investigation by the water police concluded that the incident was a result of human error, primarily inexperience and excessive speed. The investigating police member noted the following in part:

1. Contrary to the practices of good seamanship, the operator of the PWC [deceased] did fail to maintain sufficient throttle, thereby reducing his vessel’s ability to manoeuvre and avoid collision with vessel …;

2. Contrary to the practices of good seamanship, the operator of the PWC [deceased] did fail to make proper allowances for his inexperience on these high performance craft in that he failed to maintain minimum vessel separation;

3. Contrary to the provisions of the Marine Act, Schedule 1, Rule 7, Section (a), (International Collision Regulations), the operator [deceased] did fail to use all means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists before executing a turning manoeuvre. If there is any doubt, such risk shall be deemed to exist;

4. Contrary to the provisions of Notice No. 1, under Section 15(2) of the Marine Act 1988, the operator of PWC [deceased] did fail to operate his vessel at a speed not exceeding 5 knots within 50 metres of another vessel.

4–8 metre motorised vessels

Vessels measuring between four and eight metres in length were involved in 15 incidents that resulted in 21 deaths. This comprised 50 per cent of total incidents and 52 per cent of deaths. It was found that all of these vessels, including the yacht, measured less than 6.5 metres in length. The types of vessels involved in these incidents are outlined in Table 7.

<table>
<thead>
<tr>
<th>Vessel type</th>
<th>Deaths Number</th>
<th>Deaths Percentage</th>
<th>Incidents Number</th>
<th>Incidents Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorboat (outboard)*</td>
<td>12</td>
<td>57</td>
<td>8</td>
<td>53</td>
</tr>
<tr>
<td>Motorboat (unknown motor)</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Inflatable dinghy (outboard)</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Ski boat (Inboard)</td>
<td>5</td>
<td>24</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Yacht</td>
<td>2</td>
<td>9</td>
<td>1</td>
<td>7</td>
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<td>Total</td>
<td>21</td>
<td>100</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

* three of these twelve deaths and two of the eight incidents involved hire-and-drive vessels.
For the purposes of data analysis the incident involving the inflatable dingy and the unknown motorboat was combined with the analysis of the other vessels fitted with an outboard motor. The data analysis for the yacht was combined with the other three incidents involving yachts.

**Outboard motorboats**

Table 6 illustrates that 10 of the 15 (67 per cent) incidents involved a vessel fitted with an outboard motor. Six of these vessels were constructed from aluminium, three were constructed from fibreglass and one was inflatable. The average age of the deceased onboard these vessels was 45 years (range 26 to 64 years).

The average length of these vessels was 5.14 metres including the hire-and-drive vessels and 5.25 metres not including the hire-and-drive vessels. On average this was 1.64 meters (including hire-and-drive) and 1.75 meters (not including hire-and-drive) longer than the tinnies.

In two of the 10 incidents, the vessel was hired for recreational boating purposes. In one of these cases the vessel was taken out on an inland waterway (Lake Eildon) where the deceased engaged in swimming from the boat without the aid of a PFD. The deceased was not a strong swimmer and consequently drowned. Environmental conditions and alcohol were not contributing factors in this incident.

In the other case, the vessel was taken out into Port Phillip Bay where it broke down. Two of the occupants attempted to swim to shore, one of whom was wearing a PFD. As MSV define hire-and-drive vessels as commercial, they are required to carry on board coastal life jackets rather than a PFD Type 1 (see Appendix D for example). In this case, the coastal life jackets on board were a ‘pillow’-style device secured with tie straps for use around the waist. The deceased wearing this life jacket was found hanging out of the device with the straps tangled.

> We then headed over to the jacket and as we approached it I could see a body hanging from underneath it. It appeared that it was caught around his arm. [Skipper, Volunteer Marine Rescue statement – 0252/2002 and 1245/2002]

> ... the life jacket straps were wrapped around his left wrist and right shoulder. [Water Police statement – 0252/2002 and 1245/2002]

An investigation revealed that the vessel’s outboard motor was in a severe state of disrepair and there was also evidence that the vessel was not properly maintained. Environmental conditions did not contribute to this incident however, the deceased whose body was recovered (referred to below as DECEASED 2) was found to have a BAC of 0.08 g/100mL and a range of other drugs were detected by the toxicological examination.

> ... I think DECEASED 1 and DECEASED 2 would have had about three beers each while we watched Optus Vision TV. I had nothing to drink and SURVIVOR didn’t drink at all. Nobody had any type of drug except DECEASED 2, who had prescription Valium, which he had taken that morning... From there we walked to the Vines Hotel where DECEASED 1 bought some beer and used the Eftpos to get some cash for the boat hire. [survivor’s statement 0252/2002 and 1245/2002].

> The male appeared to be on something, I don’t know what. I said ‘I hope you are not driving’. He said ‘Someone else will drive’. [Hire Boat Assistant statement – 0252/2002 and 1245/2002]
Recreational Vessel Fatalities in Victoria: 1999–2002

Common sense tells me the deceaseds’ ill-advised actions in consuming alcohol while boating and in leaving the boat were the primary causes of their deaths. [Coroner’s finding – 0252/2002 and 1245/2002]

Similarly, in one of the eight remaining cases the vessel was taken out on Port Phillip Bay for a test run as it had been recently returned from the mechanic. The vessel broke down and one of the occupants on board decided to swim to shore. A PFD was worn, however it was removed 20 metres from shore. Neither the weather conditions nor alcohol consumption were contributing factors to this incident. A surviving witness reported the following in his statement:

Before I knew it he had grabbed a life jacket, secured it, ripped his jeans into shorts and said, he’d get us back in, and jumped into the water. We had attempted to talk him out of it. We told him that he knew better, stay with the boat. He started swimming and we realised that he wasn’t going to come back. ... Suddenly DECEASED said to me that he could touch the bottom, I couldn’t touch it. I told him I couldn’t touch it. I kept hold of him and kept swimming. He started ripping his life jacket over his head saying that he was alright and he could make it on his own now. I kept hold of his jacket, shirt, anything to stop him from taking the jacket off. We struggled for a few minutes before he broke free. I could see that his head was starting to go under and he was thrashing around. [survivor’s statement – 3905/2001]

In five of the other seven incidents the vessel was taken out for the purposes of fishing when the vessel was swamped (one incident) or capsized (four incidents) as a result of the water conditions. In the capsize incident near Point Ricardo, the occupants attempted to swim to shore. The deceased was unable to swim and was assisted by the skipper of the vessel. The capsize incident was a result of inexperience of the skipper who was operating the vessel in a dangerous position in the water. According to a witness:

The boat was travelling very slowly running parallel to the waves on the outer breaking wave. I thought that the persons in the boat were stupid to be in that position, to be actually on the rolling waves in a small boat. I definitely wouldn’t put myself in that position, I used to be a fisheries officer and have worked with boats and know the danger of operating a boat where this one was. [witness statement – 1712/2001]

In one of the two remaining incidents, the vessel was taken out on coastal waters to show the deceased the coastline as part of a tour for work. The vessel capsized when struck by a series of waves as the engine had fouled on rocks close to the shore. In this case the Coroner found that a failure by the Surf Life Saving Club to provide the deceased with a life jacket may have contributed to his death. The Coroner stated the following in her finding:

There was a failure to provide the deceased with an inflatable life jacket coupled with a failure to provide him with appropriate instruction in relation to the use of such a life jacket represented a significant risk factor. It is possible to speculate that his chances of survival would have been enhanced had he been wearing a life jacket and had he been provided with appropriate instruction in relation to its use. [Coroner’s finding – 2338/2001]

That other than in an emergency or rescue situation all passengers aboard or related craft operated by a surf life saving club or agency be required to wear a life jacket at all times. [Coroner’s recommendation – 2338/2001]
This finding was made despite evidence suggesting that inherently buoyant life jackets are dangerous in the conditions experienced on the day of the incident.

*The wearing of conventional life jackets in a surf environment is hazardous and for this reason, surfers, surf ski operators and lifesavers alike, do not wear them. The Marine Act acknowledges this by not making it a requirement to wear them, when engaged in these activities.* [witness statement – 2338/2001]

In nearly all of these six incidents (n=5) one or more of the occupants onboard was not only reported to be experienced but also had a lot of local knowledge of the particular waterway. Furthermore, in all six incidents the weather was reported to be fine or cloudy, with calm to choppy waters and no to moderate winds when the party set out. The unpredictable and changeable nature of the environmental conditions resulted in the vessel becoming located in dangerous waters. Alcohol was not detected in any of the deceased persons recovered (six of the nine deceased). In five of the six incidents PFDs were available on the vessel, however they were not worn.

*I didn’t have my life vest on because I didn’t think it was warranted because I was only having a look [at the entrance].* [skipper’s statement – 1222/1999]

*Secondly, I adopt the comments of WATER POLICE OFFICER, to the effect that life jackets or PFDs, securely stowed in an area which is not immediately accessible, are completely useless. Even when a life jacket or PFD is readily accessible there is a resistance felt by some people to actually putting them on. This may be from a desire not to appear timid, because of over confidence or ignorance, or even from a belief in their own vulnerability. But there will always be conditions in which prudence should dictate that some form of flotation device should be worn. That is not to say that I believe that a PFD or similar should be worn on all occasions, but there must be a general awareness that a life jacket is only going to be of assistance if someone is wearing it. Clearly in this case had the deceased been wearing such a flotation device there is every reason to believe he would have survived the capsize of his boat.* [Coroner’s finding – 0498/2002] (see Appendix C, case number 0498/2002 for location of PFDs following the recovery of the vessel)

In the remaining incident, the deceased and a friend went out boating on Lake Hume. Due to the weather conditions, the pair decided to take the boat in. As the boat neared the ramp the engine stopped for no apparent reason and the deceased was unable to restart it. The deceased jumped out of the vessel and into the water to grab hold of the rope attached to the front of the vessel and drag it back into shore. When the deceased’s friend tried to locate the deceased he had disappeared under water.

In this case the deceased entered the water without a PFD and was later found to have a BAC of 0.22 g/100mL and a vitreous humour alcohol result of 0.20 g/100mL. The deceased was also found to have natural disease in the form of myocardial arrhythmia. The Forensic Pathologist considered that this disease, the ingestion of alcohol and benzodiazepines, and drowning caused the death in this case.

**Inboard ski-boats**

Four of the 15 (26 per cent) incidents, resulting in five deaths, involved 4-8 metre fibreglass ski-boats fitted with an inboard motor. The average age of the deceased was 42 years (range 34–57 years). The average length of the vessels was 5.7 metres. Three of the five deceased were operating the vessel at the time of the incident, and the remaining two were passengers.
One of the four incidents occurred while fishing in Port Phillip Bay. Following a fire on the vessel, caused by a leaking fuel line, the deceased abandoned it and attempted to swim to shore. The deceased was wearing a PFD, however, it was incorrectly secured. It was worn in such a manner that it would have required a conscious effort to hold down the jacket with both hands to prevent it from choking him. When consciousness was lost, most likely due to hypothermia, the life jacket floated over the deceased’s head and no longer provided the appropriate support to prevent him from drowning. While not contributing to the death, the vessel was not recommended for use in salt-water environments. The vessel was also not considered appropriate for the prevailing environmental conditions.

The remaining three incidents, resulting in four deaths, occurred while boating in Lake Eildon where the deceased were visiting from the eastern suburbs of Melbourne. In one incident, which resulted in two deaths, the men were thrown overboard while they were not wearing PFDs. The vessel continued running, circling the occupants in the water six or seven times before it collided with the bank of the lake. The two witnesses to the incident were unable to assist the men in time as they were unable to operate the life raft or the houseboat from where the ski-boat had been launched. The Coroner concluded that the two men were ejected from the vessel as a result of what he referred to as ‘an extreme manoeuvre’ executed by the vessel operator. The Coroner recommended that:

\[\text{MSV, as the regulating body of the safety equipment required to be carried on board recreational vessels in Victoria, should seek to have amended the Marine Act 1988 and Marine Regulations 1999 to require occupants of recreational vessels in Victoria to wear PFD Type 1 at all times in the event that PFD Type 1 standards are raised to at least the level of the International Standard.}\]

An investigation by the Water Police also reported that the runaway vessel could have collided with other vessels or swimmers. The Water Police recommended to the Coroner that in future, vessels with an inboard motor should be constructed so that the throttle is of the ‘self returning’ (to idle) type or fitted with a ‘dead man switch’. It is noted that the only way to achieve this would be via legislation that requires manufacturers and importers to incorporate this safety feature. In relation to this issue the Coroner further recommended that:

\[\text{As is apparently the case with outboard motors I recommend recreational vessels with inboard motors be fitted with a ‘dead man switch’.}\]

In one of the two remaining incidents, the vessel capsized when it struck the wash of another vessel. The deceased, a passenger in the vessel, was not wearing the PFD available. It also appears from the photographs that the PFD available was a PFD Type 3, not the required PFD Type 1 (see Appendix D, case number 0073/2002).

In the remaining case, the vessel had undergone a recent modification, which involved relocation of the gearshift lever to a position adjacent to another lever identical in appearance. The deceased failed to distinguish between these two levers and inadvertently placed the vessel into reverse while it was under way. This had the effect of bringing the vessel to an almost instant stop and the vessel launched itself to a near vertical altitude with the stern raised, resulting in all occupants being thrown into the water.
All four deceased were not wearing PFDs when they were thrown into the water, two of whom were unconscious from a blow to the head. Alcohol was not detected by the toxicological examination in two of the four deceased, one had a BAC of 0.01 g/100mL, and the other deceased was never recovered, although a witness reported that he consumed a glass of champagne prior to the incident. The environmental conditions at the time of the incident were generally clear weather, choppy waters and light to moderate winds. These conditions were not found to contribute to any of these deaths.

**TABLE 8. Presence of contributing factors in 4–8 metre vessels**

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Incident</th>
<th>Presence of alcohol</th>
<th>Co-morbidity*</th>
<th>Use of PFD</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outboard motorboat</td>
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</tr>
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Inboard ski-boats

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Incident</th>
<th>Presence of alcohol</th>
<th>Co-morbidity*</th>
<th>Use of PFD</th>
<th>Conditions</th>
</tr>
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<td>5</td>
<td></td>
<td>n/k</td>
<td>n/k</td>
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<td></td>
</tr>
</tbody>
</table>

n/s = not specified, n/k = not known, n/a = not applicable

> 8 metre vessels

Two of the 30 incidents involved vessels greater than eight metres in length. Both of these vessels were yachts, one 8.5 metres and one 12 metres. For the purposes of the data analysis, these two incidents were considered with the other two incidents involving yachts.

**Yachts**

Four of the 30 (13 per cent) incidents involved yachts, which varied in size from 3.8 metres to 12 metres in length. Three of the incidents, resulting in four deaths, occurred in coastal waters (Port Phillip Bay and Point Hicks) and one occurred in inland waters (Lake Mokoan). The average age of the deceased was 44 years.
Two of the incidents, three deaths, occurred when the vessel capsized and the other two were man overboard incidents. Table 9 outlines the presence of contributing factors associated with these incidents.

**TABLE 9. Presence of contributing factors in yachts**

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Incident</th>
<th>Presence of alcohol</th>
<th>Co-morbidity*</th>
<th>Use of PFD</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
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<td>4</td>
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<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

# deceased reported to have consumed alcohol prior to the incident
n/s = not specified, n/k = not known, n/a = not applicable
* = presence of natural disease only

Three of the men had consumed alcohol prior to the incident, which was either reported by a survivor to the incident or detected in the toxicological examination. None of the five deceased were wearing PFDs at the time of the incident. In two of the four incidents, the following was stated in evidence.

_The other life jacket was still in the boat. I asked DECEASED if he was going to put on the jacket and he said that he wasn’t going to put it on because he couldn’t fit under the bottom pole of the sail with it on. We had only been in the boat again for 30 seconds or so when it tipped again. We fell out again and this time when DECEASED corrected it, I could see the other life jacket drifting off. We got back in and I asked DECEASED if we were going to try and get the other life jacket. He said we would and started heading towards it._ [survivor’s statement – 0201/2000]

_Deceased always had life jackets on board, I know he has two and think it was three that he had. When we went out we didn’t wear the life jackets but they were in a hatch on the left hand side as you got into the cabin. I know DECEASED didn’t have an emergency beacon because I had discussed him getting one but he didn’t want one because he thought everything would be OK. I also know that DECEASED didn’t use a harness to attach himself to the safety line._ [fiancée’s statement – 0467/2000]

_Enquiries with the fiancée of DECEASED, established that DECEASED did not wear a life jacket when sailing, did not have an emergency beacon and did not have a safety line should he fall overboard._

_While it is mandatory to carry life jackets on board it is not mandatory to wear them though it is strongly recommended, particularly when sailing alone._

_The wearing of a safety line is also not mandatory, but strongly recommended. It is mandatory to carry an emergency beacon if you are sailing further than two nautical miles from shore and from the navigation system on board it can be seen that the deceased did sail further then two miles from time to time. A check was also made with Australian Search and Rescue Authority (AUSSAR) and found that DECEASED did not lodge a notification of_
his trip intention with them or any of the local coastal patrols, which while not mandatory is again strongly recommended and common practice among experienced sailors. [Coroner’s finding – 0467/2000]

In one of the two other incidents, the Coroner made an extensive finding including a recommendation that the wearing of PFDs become mandatory while sailing in the State of Victoria (see Appendix A Case Number 4205/2000).

**Recommendation 1**

That in circumstances where yacht crews are required to work on the deck of a yacht, the wearing of PFDs (as a minimum safety requirement) should be a mandatory requirement and not left to the skill and good judgement of a skipper or individual crew member. This should occur for recreational sailing, in flat water, on bay and ocean racing.

To ensure that the yachting community accept the mandatory wearing of PFDs, it is essential that simple, easy-to-wear and purpose-built, affordable PFDs be recommended for use in the various yachting operations. Where modifications are required to meet the need it may necessitate the yachting community working with the manufacturers of PFDs to ensure that any solutions that enhance the usefulness and value of this equipment are adopted. Examples of the types of practical PFDs already on the market that could possibly be mandated as a minimum are shown in Appendix A.

Other examples to consider would be the more modern jacket or vest style (there are a number of the these types of units currently available, manufactured by a variety of companies and complying with AS 1512 – some also have harnesses and lines complying with AS 2227).

Designs should include utility pockets with provision for a lanyard ring.

A harness combination (complying with AS 2227) should be considered as mandatory with all PFDs required to be used in yachting. A retractable crotch strap should also be considered (see also sub-heading ‘The use of harnesses and PFD combination’ below).

The yachting community should also work with the National Marine Safety Committee, PFD manufacturers and Australian Standards to ensure that the design and standards are appropriate for safety (it is understood that the National Marine Safety Committee is currently conducting a review of a national standards for recreational boat safety equipment). [Coroner’s finding – 4205/2000]

Ideal conditions for yachting differ from other forms of recreation involving water vessels, particularly in terms of wind strength. Despite this, like with the < 4-metre vessel incidents, the prevailing environmental conditions were found to be a contributing factor.

An hour into the trip the wind built up in strength to 15 knots (from the north) resulting in the sea becoming very choppy. At 1.30 pm a front came through from the west with the wind strengthening suddenly up to 30 knots, creating rough seas with waves of 1 metre. [3313/1999 and 3314/1999]
... the deceased and his companion took a 3.8 metre yacht out on Lake Mokoan...At the time the wind was gusting to about 20 knots per hour and the yacht overturned on four occasions. The deceased uprighted the yacht on the first three occasions and on the fourth occasion the deceased tried to swim back to shore. [Coroner’s finding – 0201/2000]

It appears that the Spirit of Downunder was hit by what has been described as a ‘microburst’ of weather. Two sudden gusts of wind caused the yacht to heel over and, during the second gust, DECEASED was swept overboard. [Coroner’s finding, 4205/2000].

These cases illustrated that, regardless of whether the body of water was inland or coastal, the weather changed quickly resulting in dangerous conditions. It is acknowledged that environmental conditions need to be considered in the context of the seaworthiness, size and type of vessel and experience of the operator. Despite this consideration, in this group of cases there was an example of both extremes in experience in the same body of water (Port Phillip Bay) when the conditions suddenly changed and became treacherous. The following excerpt from the Coroner’s finding illustrates one operator’s limited experience sailing yachts.

The owner/operator’s experience with his yacht was limited having sailed it approximately eight times in the eight months he had owned it. Prior to acquiring the yacht, he had no prior experience of sailing. [Coroner’s finding – 3313/1999 and 3314/1999]

Another excerpt illustrates the other operator’s extensive experience.

According to the submission on the part of OPERATOR:

DECEASED and OPERATOR were the most experienced sailors on board having competed in many ocean races. This included the 1998 Sydney to Hobart that they successfully completed together as part of the crew on Spirit of Downunder. OPERATOR later successfully completed the 1999 Melbourne to Osaka Two-handed....

On the evidence it does appear that OPERATOR and his crew had considerable experience in yachting and yacht racing. Yet, as can be seen, even this experience did not prepare the skipper and crew for the emergency rescue that was required to save DECEASED. [Coroner’s finding – 4205/2000]

These cases reinforce the need for operators of all types of vessels, and all levels of experience, to adequately appraise the conditions to determine the appropriateness of their vessel for such conditions or potential conditions. Operators should also be sufficiently knowledgeable to determine the circumstances in which safety equipment, in particular PFDs, should be utilised. MSV advise that a PFD should be worn in the following circumstances:

- if you are a weak swimmer
- when crossing a bar or rip
- in an emergency situation
- at night or in periods of restricted visibility
- when operating in unfamiliar waters
- when boating alone
- at the first sign of bad weather.
Discussion

The results of the current investigation into 40 deaths from 30 recreational vessels incidents in Victorian waters between 1999 and 2002 revealed that, in most instances, these deaths resulted from a combination of three factors:

- hazardous environmental conditions
- vessel occupants suddenly and unexpectedly entering the water
- absence of PFD use.

The contribution of these factors and the presence or absence of alcohol and co-morbidity is summarised below by vessel type and size.

**Vessel type**

**Non-motorised vessels**

Deaths involving non-motorised vessels resulted mainly from incidents where the vessel was considered inappropriate for the prevailing environmental conditions and where the occupant was not wearing a PFD. MSV requires that occupants on board these vessels either wear a PFD Type 1, 2 or 3 or carry one on board. Only one of the three deceased was wearing a PFD, which was unable to assist in his survival. In the other two cases, a PFD was not carried on board the vessel. Co-morbidity was not a factor in these cases and alcohol was only present in one of the cases.

It is difficult to draw conclusions from such a small number of cases, however previous US research by Quan et al. (1998) reported that 78 per cent of kayakers were observed to wear PFDs, while occupants in motorboats were the least likely group to wear them. MSV’s public awareness and licensing campaigns focused primarily on motorised vessels and therefore were not captured or addressed by Quantum’s evaluation study. Furthermore, these vessels are not required to be registered in Victoria or part of MSV’s new licensing procedures. Further work by kayaking and canoeing associations and MSV is therefore required to ensure users of these vessels are aware of PFD requirements and the environmental conditions suitable for use.

**< Four-metre vessels**

Fatal incidents involving motorised vessels measuring less than four metres in length occurred mainly in inland waterways (75 per cent), and largely resulted from the vessel capsizing. Alcohol did not appear to be a factor in these deaths, however an accurate picture of the contribution of alcohol could not be determined, as 40 per cent of the deceased were never recovered. Absence of PFD use appeared to be a significant contributing factor in these cases. Where the information was available, n=10, only three of the deceased were wearing a PFD. A further three had a PFD on board the vessel, but for reasons unknown they were not worn. In the remaining four cases, three in one incident, a PFD was not available on board the vessel as required by MSV.

Co-morbidity, in the form of heart disease, was present in a third of the deceased (all but one aged between 65 and 81 years). Although disease was present in these cases, the Forensic Pathologist did not mention that it was a contributing factor in the death. The other significant contributing factor in these cases was the prevailing environmental conditions. Investigations into these incidents revealed that the vessel was being operated in conditions, both water and weather, that were inappropriate for small vessels.
4–8 metre vessels

Motorised vessels measuring between four and eight metres in length accounted for approximately 50 per cent of deaths and incidents. The vessels involved in these incidents were primarily constructed from aluminium and fibreglass. Sixty-seven per cent were fitted with an outboard motor and 26 per cent were ski-boats fitted with an inboard motor. Although this category accounted for vessels up to eight metres in length, the maximum vessel length was only 6.4 metres. Nearly all of the vessels in this category, with the exception of two, were under six metres in length and by definition would be considered small vessels.

Unlike the other two categories of vessels, the prevailing environmental conditions did not appear to be a significant factor. In the cases where environmental conditions were a factor, the vessel was engaged in known hazardous operations such as crossing a bar, operating the vessel parallel to breaking waves and natural events such as an inlet breaking out to the sea. This was a different scenario to the less than four-metre vessels, where it was found that operators were taking vessels out in unsuitable conditions.

Like the non-motorised and less than four-metre motorised vessels, the major contributing factor involving the 4–8 metre vessels was that the deceased were not wearing PFDs. Unlike the other three categories of vessels (including yachts), PFDs were available in all but one of the cases. Despite this, there were only two cases where the deceased was wearing a PFD. In one other case a PFD was fitted and later removed 20 metres from shore. In all three cases the vessel broke down, the deceased had time to fit a PFD and entered the water intentionally to swim to shore. There were also two deaths where it was likely that the deceased was unconscious from a head injury when they entered the water. In both cases the deceased was not wearing a PFD.

Yachts

In the cases involving yachts, the two major contributing factors were the prevailing environmental conditions and no use of the available PFDs. Like the non-motorised vessels, the number of deaths and incidents in this category were small, making it difficult to draw conclusions. This small number may be a result of the fact that yacht owners are often members of or affiliated with yacht clubs. Operating a yacht requires a greater degree of knowledge than operating a ‘motorboat’. This knowledge is often acquired through sailing schools at yacht clubs. Part of this training includes appropriate safety equipment, including in what circumstances to wear a PFD.

Personal floatation devices

Despite vessel type, it was evident from the results that fatalities nearly always involved small vessels. The results also demonstrated that the deceased most often entered the water suddenly and unexpectedly, frequently as a result of a capsize (50 per cent) or man overboard (17 per cent) incident.

Vessel occupants were not adequately prepared for unexpected water entry by wearing a PFD. PFDs were either not carried on board the vessel, as required by MSV, or stowed out of reach. In the incidents where PFDs were worn (n=8/40), it was often in circumstances where the nature of the emergency allowed occupants time to fit one, such as a broken down vessel (n=4). Photographic evidence from the cases also revealed that the type of PFDs carried onboard, and in some cases worn, were of a design inappropriate to be worn at all times (see Appendix C case numbers 2918/2001, 2777/2002 and 2798/2002). These devices were the inherently buoyant ‘pillow’ style PFDs that are fitted by tying two straps around the wearer’s waist. Deceased found wearing these devices were often tangled in the straps and the collar of the device had come over the deceased’s head. The inherently buoyant ‘pillow’-
style devices are available for between $16 and $20 and given the relatively ‘inexpensive’ nature of most of the vessels involved in the incidents, it may be the case that these devices were carried on board in order to comply with the legal requirements of MSV rather than as an essential piece of safety equipment.

In order to be effective as a drowning prevention measure, PFDs need to be able to be comfortably worn at all times. This is a measure that has been recommended by Coroners who have investigated recreational vessel fatalities since 1988.

The Motor Boating (General Regulations) 1984 made pursuant to the Motor Boating Act 1961 provide for the provision of life jackets on open sailing boats but do not provide for the provision for the compulsory use of life jackets. In this case the fact that the deceased was not wearing a life jacket contributed to his death.

Accordingly the legislature should consider compulsory wearing of either life jackets or buoyancy vests in all open boat situations. [Coroner’s finding – 0144/1988]

and

This case further highlights the danger of not wearing life jackets in the open boat situation and it is further recommended the authorities consider –

(a) the introduction of compulsory wearing of life jackets for inflatable rubber boats in view of the evidence of the police in this case as to the unstable nature of such boats and of the Police Department’s requirements for its members to wear life jackets in all weather conditions when using inflatable rubber boats; ... [Coroner’s finding – 0465/1989]

also

There is divided opinion on the wisdom of any mandatory requirement regarding the wearing of life jackets in powerboats. Children under 10 are required to wear them, but there is otherwise no requirement affecting the type of boat involved in this incident. There are grounds to support the belief that the wearing of a life jacket in some circumstances may be dangerous, although it is possible that if the deceased in this case had been wearing one and had been thrown clear, a life jacket would have kept her afloat on the surface, face up. [Coroner’s finding – 4784/1990]

In the late 1980s and early 1990s, there may have been some validity to the argument that there was not a life jacket/PFD available on the market that could be comfortably worn at all times. There are now inflatable (manual and automatic) PFDs available on the market in the form of vests and yokes that are lightweight and comfortable, however they are more expensive than the inherently buoyant designs. This issue was addressed in a recent finding made by the State Coroner Graeme Johnstone into the death of a yachtsman in 2000:

It is noted that deaths associated with the lack of wearing of PFDs also occur in recreational boating and commercial fishing. As with yachting, these types of deaths are not uncommon and equally preventable by the wearing of PFDs. Of course, there is a necessity to ensure that the type of device worn is practical for the type of operation, comfortable to wear at all times (and weather conditions) while working on deck, and affordable. Apparently, notwithstanding the existing safety philosophy and yacht-racing rules, there is a view that in general, the cheaper PFDs currently available, do not necessarily meet with these, not
unreasonable, expectations. Also the applicable Australian Standard (AS 1512) does not have a particularly high bar for modern safety design as compared with other comparable International Standards. That having been said, there are more expensive PFDs (jackets, vests and horseshoes) that do comply with Australian Standard AS 1512 and provide many of the solutions such as practicability, wearability the option of harnesses (with crotch straps) and some have pockets for survival equipment. [Coroner’s finding – 4205/2000]

The issue appears to be that the current Australian Standard 1512 for PFDs allows for the approval of substandard Type 1 PFDs. In particular, the ‘pillow’-style devices found on board the vessels involved in the current study. According to MSV, these devices are almost impossible to put on in the water, have ineffective fastening systems and do not allow occupants to wear them comfortably at all times.

An initiative by the National Marine Safety Committee (NMSC) to review PFD standards for recreational vessels, is an attempt to address this issue. In December 2002, the NMSC released for public comment a document entitled Review of PFD Standards for Recreational Vessels (the PFD Review). This developed from an earlier review by the NMSC on a proposed national standard for recreational boating safety equipment. The PFD Review proposes to extend the range of PFDs beyond those complying with Australian Standards by including those that comply with International Standards. In particular, it is proposed that International Standards of PFDs be recognised in Australia as they exceed the level of safety required in Australia.

In light of the evidence that the PFDs carried on board recreational vessels involved in fatal incidents were the inherently buoyant ‘pillow’-style device, and the anecdotal evidence that these devices are substandard, it may also be beneficial to review Australian Standard 1512. Alternatively, Australia could adopt the International Standard instead of, or in addition to, allowing the use of internationally-approved PFDs that equal or exceed the Australian Standard. Any improvements to PFD standards should be in the areas of:

- the level of buoyancy
- the fastening device
- functionality and comfort
- ensuring the device remains on the wearer during water entry.

Once improvements have been made to the standards of PFDs in Australia, it would then be appropriate for MSV to mandate compulsory wearing of PFDs. Such legislation was passed in Tasmania in 2000, which required operators and passengers in motorised recreational vessels measuring six metres or less in length to wear a PFD Type 1 compliant with Australian Standard 1512 at all times while the vessel is under way. This legislation came into effect in January 2001 and was passed despite recommendations by MAST in their 2000 Review of Recreational Boating Safety that compulsory wearing of PFDs should not be introduced in Tasmania.

In the year following this legislation, only one fatal recreation boating incident occurred (Hopkins; personal communication, January 2003). This represented a significant reduction from 12 deaths in the preceding year (Hopkins; personal communication, January 2003). According to MAST, the response from the recreational boating community has been extremely positive (Hopkins; personal communication, January 2003).

13 Such as the European Standard EN 396.
14 There are horseshoe PFDs available for about $136 as compared with the cheaper type of PFD, also complying with the Standard for $15–20.
In terms of enforcement of this legislation, MAST has three officers who target ‘hot spots’ on weekends all year round (Hopkins; personal communication, January 30 2003).

That is not to propose that amending requirements regarding PFDs will eradicate incidents of injury and death associated with recreational boating. Wearing PFDs does not ensure survival, they merely increase survival time in the water and subsequently the likelihood of being rescued. Issues surrounding alerting distress to rescue services, the effects of alcohol consumption and risks of boating alone also need to be addressed.

Furthermore, PFD requirements may have no effect on reducing the number of injuries resulting from recreational vessel incidents. MUARC’s study demonstrated that fatality data revealed little about non-fatal injury, particularly in relation to the activity at the time of the incident. Although injury data is limited to hospital presentations and admissions, it is important for marine authorities to access and assess this information on an ongoing basis in order to develop suitable prevention measures.

**Alcohol and co-morbidity**

The issue of the contribution of alcohol was problematic in the current study due to the large number of individuals who were never recovered or recovered after a 24-hour period resulting in putrefaction increasing the BAC level. This resulted in a small number of valid BACs. It is therefore difficult to conclude with any certainty that the role of alcohol in water-related deaths has declined in Victoria from that reported by Plueckhahn in the mid-1980s. Research with a larger number of cases, possibly on a national basis, may be required to determine more accurately the role of alcohol in these deaths.

Similarly the role of co-morbidity was hindered by the lack of body recovery and uncertainty in relation to the contribution of disease to the cause of death. Drowning is a notoriously difficult cause to determine and it is often noted by Forensic Pathologists that the circumstances surrounding the death led them to conclude that the death resulted from drowning. This is further complicated by arguments surrounding the occurrence of sudden death following immersion in cold water. Plueckhahn (1986) contends that persons with pre-existing coronary artery disease are at added risk when they are submerged in cold water. He states in one article that:

*Dipping one hand into ice cold water is enough in some individuals to cause a coronary artery spasm* (Plueckhahn, 1986).

As with the role of alcohol, further research with larger numbers of cases by medically trained personnel may be able to assess this issue more accurately.

**Environmental conditions**

In relation to environmental factors, it appeared that many individuals were complacent regarding safety behaviours due to the fine and sunny weather when they set out. Victoria experiences weather conditions that are difficult to predict accurately and change quickly, in particular wind strength.

Weather impacts on water conditions in many ways, depending on such things as the depth of the water, the direction and speed of the wind and surrounding land masses. Adequate consideration was often not given to these conditions, as well as how quickly conditions could change. It was frequently the case that a party would be gone for three to five hours in which time the tide had changed or the
wind speed had increased and as a result waves became larger. It then became difficult for vessels to return safely to shore. This was particularly prevalent with the less than four-metre vessels.

The Bureau of Meteorology (BOM) provides the following information on their web site regarding environmental issues to consider before boating (http://www1.ho.bom.gov.au/info/marine/marpamp.shtml)

1. Know the local factors that influence sea conditions and know where to reach shelter quickly.
2. Learn how to read the weather map (pamphlet available).
3. Be aware that the weather map in the morning newspaper was drawn the day before.
4. Always check the latest forecast and warnings before going to sea and know what conditions exceed your safety limits.
5. Beware of rapidly darkening and lowering cloud – squalls may be imminent.
6. When at sea, listen to the weather reports on public or marine radio provided by BOM, Telstra or your State/Territory marine safety agency.
7. Be flexible – change your plans if necessary.

The results illustrated that a combination of the prevailing environmental conditions and operator error, either inexperience or poor judgement, caused many of the capsize incidents. According to MSV, increased buoyancy may assist in the event of a capsize. The NMSC are currently developing compliance plate standards, which is the first step towards developing a national standard for the construction of recreational vessels. The standard will specify: buoyancy; horse-power rating; maximum loading; and an indication of appropriate weather conditions for vessel operation. If there is a level of reserve buoyancy and the vessel capsizes, there will still be a platform for occupants to hold on to. There are also products available to increase the level of buoyancy in a vessel in order to prevent a capsize even if the vessel is full of water.

Passenger safety

One other factor that arose from the current study was the number of passengers who died as a result of a recreational vessel incident. The results revealed that there was an even distribution between the number of operators versus the number of passengers who died. It is argued in the literature that education and heightened awareness of safety issues in the population of individuals ‘at risk’, can be an effective prevention strategy (Pearn, 1986). In the case of recreation boating, identifying the population ‘at risk’ is problematic. MSV’s initiative to introduce mandatory boating licences for recreational boat operators is an effective way to educate boat owners and operators, however, it does not ensure that all passengers on board these vessels are equally aware of safety issues.

As a result, a proportion of the boating public may go ‘uneducated’. While the safety of passengers on board vessels is morally the responsibility of the operator, it cannot be assumed that the operator would have the ability or the inclination to pass on pertinent safety information. Public awareness media campaigns focusing on particular safety issues such as MSV’s Life Jackets Save Lives campaign, may raise awareness in the general public, however they cannot address the full range of risk factors and safety information addressed by the licensing procedure. Some means of reinforcing operators’ responsibility in terms of passenger safety is required.
Conclusions

What is clear from this investigation is that deaths resulting from recreational vessel incidents are preventable. More specifically, in most cases a securely fitted and appropriately designed PFD and means of indicating distress within a timely manner would have meant a large number of these deaths may not have occurred. MSV’s media campaign increased awareness of safety issues, however this has not been reflected in behaviour. Already in 2003, seven men have lost their lives in Victorian waters\textsuperscript{15} and two other Victorians have died in Tasmanian and New South Wales\textsuperscript{16} waters from recreational vessel incidents.

\textsuperscript{15} Source: files from the State Coroner’s Office, Victoria.

\textsuperscript{16} Source: \textit{Fishing trip turns to tragedy as one dies, three rescued and Missing man may have stopped at remote bay} The Age, Friday 14 March 2003.
Recommendations

Based on these findings it is recommended that:

1. the NMSC, as part of their *Review of PFD Standards for Recreational Vessels*, determine:
   a. whether Australian Standard 1512 for PFD Type 1 adequately provides for the safety of the user
   b. whether the PFDs that currently conform to Australian Standard 1512 are of a standard that allows users to wear them comfortably at all times or able to be easily fitted in the event of an emergency (that is, in the water).

2. in the event that Australian Standard 1512 is improved to at least the International Standard or the International Standard is adopted in Australia, MSV mandate compulsory wearing of PFDs in vessels measuring up to and including six metres in length.

3. MSV enhance education of vessel operators regarding their responsibility for passenger safety.

4. MSV, the RLSSA and other water safety organisations raise awareness of the dangers of alcohol consumption in and around aquatic environments.
References


Web sites

Australian Yachting Federation
www.yachting.org.au

Boating Industry Association of Victoria
www.biavic.com.au

Department of Human Services

Marine Safety Victoria
www.marinesafety.vic.gov.au

Marine and Safety Tasmania
www.mast.tas.gov.au

Monash University Accident Research Centre
www.general.monash.edu.au/muarc

Monash University National Centre for Coronial Information
www.ncis.org.au

National Marine Safety Committee
www.nmsc.gov.au

Royal Life Saving Society Australia, Victoria Branch
www.rlssa.org.au/vic

State Coroners Office, Victoria
www.coronerscourt.vic.gov.au

Yachting Victoria
www.yachtingvictoria.com.au
Coroner West, 29 March 2000

COMMENTS

Enquiries with the fiancée of DECEASED\(^{18}\), established that DECEASED did not wear a life jacket when sailing, did not have an emergency beacon and did not have a safety line should he fall overboard. It is believed that after falling overboard that DECEASED has drowned.

This incident does not seem to highlight any deficiencies in existing safety procedures however highlights the need to observe them. While it is mandatory to carry life jackets on board it is not mandatory to wear them though it is strongly recommended, particularly when sailing alone.

The wearing of a safety line is also not mandatory, but strongly recommended. It is mandatory to carry an emergency beacon if you are sailing further than two nautical miles from shore and from the navigation system on board it can be seen that DECEASED did sail further then two miles from time to time. A check was also made with Australian Search and Rescue Authority (AUSSAR) and found that DECEASED did not lodge a notification of his trip intention with them or any of the local coastal patrols, which while not mandatory is again strongly recommended and common practice among experienced sailors.

Coroner Lewis, 29 May 2002

COMMENTS AND RECOMMENDATIONS

That manufacturers of waterproof waders affix a warning label to the garment, addressing the danger associated with wearing them in water greater than standing depth. That the Department of Natural Resources and Environment, when issuing Duck Shooters’ Licences, distribute warning material addressing the danger associated with wearing waterproof waders in water greater than standing depth. That the Marine Board and or Boating Council give consideration to banning the wearing of waterproof waders in recreational vessels or, alternatively, permit the garment be worn only in conjunction with the wearing of an appropriate buoyancy vest or PFD.

That boat owners remain vigilant in carrying the prescribed safety equipment in their vessels and that they ensure when transporting children under the age of 10 years, that a life jacket or PFD is worn by the child, at all times while the vessel in under way. That manufacturers of recreational vessels affix

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17 Recommendations are not made in every case. This Appendix contains exerts of relevant comments and recommendations.

18 Capitalisation indicates where the name of the deceased, next of kin or witness was published in the original finding. Although this information is public record, all names of such individuals were removed.
appropriate signage to their product, stipulating the recommended maximum number of passengers to be carried for the size of the vessel.

Coroner West, 21 November 2001
Case Number: 2454/2000

COMMENT
No person should go onto water in any canoe, kayak, boat, yacht or other similar vessel unless wearing a life jacket and be free of the effects of alcohol.

Coroner Moloney, 20 April 2001
Case Number: 4205/2000

COMMENTS AND RECOMMENDATIONS
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The sport of yachting has some element of danger and, whether the yachting community is desirous of further improving safety is ultimately a matter for it.

The organising body, the Australian Yachting Federation (called AYF or the Federation), already regulates issues such as the types of PFDs available to be used in racing19 and harnesses, and provides for some guidance in relation to ‘man overboard’ procedures. It has developed safety courses and undertaken other safety related work since the 1998 Sydney to Hobart yacht-racing disaster. Having taken steps such as these, the yachting community has already recognised the need to manage and reduce the risk of drowning. It is a question for yachtsmen whether they are prepared to mandate the use of existing equipment and procedures in order to approach the issues far more proactively to further reduce the risk.

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DECEASED’s death was preventable. His death follows other deaths in recreational yacht racing where a competitor and/or crew member accidentally falls overboard as a result of a sudden squall or an incident on deck during the race, survives for a short time, and drowns because fellow sailors are unable to reach the yachtsman in time.20 As with other cases, DECEASED’S death could have been avoided by the use of an easy-to-use (and purpose-made), comfortable PFD worn by yachtsmen at all times while on deck during a race. Even more importantly, DECEASED probably would not have fallen overboard if he had been wearing a harness and a connected line.

However, as a rule, yachtsmen do not wear PFDs at all times when working above deck while sailing. It appears that they also do not, as a rule, wear harnesses at all times. Simply put, in certain categories of racing, they are not required to be worn as part of the AYF’s Racing Rules of Sailing.

It is noted that deaths associated with the lack of wearing of PFDs also occur in recreational boating and commercial fishing. As with yachting, these types of deaths are not uncommon and equally preventable by the wearing of PFDs. Of course, there is a necessity to ensure that the type of device

19 Equipment (PFDs) complying with the European Standard (EN 396) is able to be used in racing, provided the PFDs are equivalent to or in excess of the Australian Standards and this may also mean that other PFDs complying with the Australian Standard AS 1512 are on board (to ensure compliance with the Victorian Marine Regulations).

20 See Coroner’s Case Number 2234/95. Obviously, there will be cases where hypothermia takes a toll where the downed crewmember remains in the water for a considerable time.
worn is practical for the type of operation, comfortable to wear at all times (and weather conditions)
while working on deck, and affordable. Apparently, notwithstanding the existing safety philosophy
and yacht racing rules, there is a view that in general, the cheaper PFDs currently available, do not
necessarily meet with these, not unreasonable expectations. Also the applicable Australian Standard
(AS 1512) does not have a particularly high bar for modern safety design as compared with other
comparable international standards.\textsuperscript{21} That having been said, there are more expensive PFDs (jackets,
vests and horseshoes)\textsuperscript{22} that do comply with Australian Standard AS 1512 and provide many of the
solutions such as practicability, wearability, the option of harnesses (with crotch straps) and some have
pockets for survival equipment.

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For any number of reasons the assessment of the need to wear flotation devices may not happen in
time, or at all. The skipper may be below decks, not be listening to weather broadcasts or not aware
of a rapid change in conditions, a crew-member may accidentally fall or be washed overboard during
a change of tack, be struck by a boom or slip on a wet deck. Also something may go wrong with the
\textit{‘man overboard’} procedure. By way of example, in this case, at some stage during the incident, the
yacht was without power and, following the propeller fouling by a spinnaker line as a result, the boat
was making between 6 and 8 knots away from DECEASED’S position. Earlier it had partially lost
steerage as a result of damage to the helm column. In any over-the-side rescue process \textit{‘recovery time
is of the essence’} without a PFD being worn by an individual sailor the time from identification of a
man overboard to rescue this time is even more critical, and because of weather, sea conditions or other
difficulties, may not be possible to control. DECEASED’S death is but a telling example of how things
can go wrong.

A requirement that PFDs be worn in all yachting activities (while crew are on deck) would significantly
reduce the risk of drowning. Once a person is in the water it is often too late.

Many types of PFDs are very difficult to don once the individual is in the water (exhaustion or the need
to keep afloat takes over). Practices aimed at testing and training sailors to don PFDs when in the
water, while an appropriate risk management technique for those who are not wearing the equipment
and end up in the water, essentially miss the point. Sensible risk management should aim at eliminating
the difficulties associated with donning PFDs in water by providing for the wearing of such devices in
anticipation of the risk of going in the water. \textit{DECEASED’S death serves to illustrate just some of the
surprises that even experienced sailors can encounter in apparently normal conditions.}

The Yacht Squadron appears to be of the view that compulsory wearing of PFDs is not required.
However, as indicated, if this safety philosophy is not revised then preventable deaths of individual
yachtsmen like DECEASED will continue to occur. Surviving families and fellow crew will continue to
suffer from the emotional trauma of loss. Considerable time and resources of police and rescue
authorities will be at risk with, in spite of their repeated efforts, the real potential of the tragic
outcomes being unaltered. It is noted that the commercial fishing industry (as a result of recent deaths
and coronial research) is appropriately reviewing the approach to the wearing of PFDs and working
with the manufacturers of PFDs and regulators in order to come up with more suitable and generally
usable products.

\textsuperscript{21} Such as the European Standard EN 396.
\textsuperscript{22} There are horseshoe PFDs available for about $136 as compared with the cheaper type of PFD, also complying with the
Historically, coroners have investigated deaths associated with recreational boating and yachting for a considerable number of years. While recommendations by coroners for improvements in the design of PFDs and improvements in Standards (so that they are affordable, practical, purpose designed and comfortable enough to facilitate all-round wear) are only relatively recent origin, the technology has also only recently been sufficiently robust enough to be able to come up with potential solutions.

The problem in the case under investigation is that the PFD was not there when it was ‘needed the most’ when DECEASED was fatigued and needed the device to save his life. In addition, a number of things went wrong during the failed rescue attempt, which had the effect of not optimising the chances of a successful outcome. All, or for that matter any, of these errors (or different errors) could occur in any rescue situation where the potential for difficulties multiplies as a result of the pressure of the need to recover an individual from the water.

In the sport of yacht racing, deaths will no doubt continue in circumstances where they are preventable unless crew are required either by legislators or the sport’s own rules to wear PFDs when working or relaxing above decks. This would equally apply to recreational sailing, in flat water, bay and ocean racing.

For any number of reasons, a requirement that the wearing of PFDs should be left to the skipper or individual members of the crew, is not satisfactory for the management of the risk. These comments are not unusual as in various forms, similar remarks have been made in other coronial inquiries (although it is noted not in the Sydney-Hobart). As clearly indicated, deaths in the sport of yachting have occurred for years in circumstances where they are preventable and relatively simple countermeasures are available in order to reduce the risk of death by drowning (harnesses and lines/PFDs). No doubt the argument that PFDs are bulky, uncomfortable and restrict movement at one stage had some limited merit in persuading the yachting community that the wearing of such devices should be left to when the danger was obvious or to the last moment. Also Standards that provide a low bar for safety and wearability in design may have tempered an approach by the yachting industry to develop and adopt more user-friendly, affordable and modern personal flotation equipment.

International standards have, in some cases, been more flexible and provided for the use of a far more satisfactory product (combining comfort, wearability and practicality). New materials and innovative design, in the context of a constantly changing safety environment have apparently not been embraced by the entire yachting community in a way which has forced a change to the relevant Australian Standards. Had this occurred it may have eventually encouraged the development, manufacture and sale of suitable equipment resulting in more widespread use by the entire yachting community. As indicated, in the area of commercial fishing PFD manufacturers are now working with fishermen to develop more suitable products for all-round wearing.

In any new design brief for PFDs, consideration would need to be given to providing utility pockets for safety and survival equipment such as: a personal EPIRB; strobe light/torch; a knife. The pockets would also need to include lanyard rings (so that the survival item could be attached by a lanyard and therefore would not be lost while in the water). Currently, in accordance with the new requirements
of the AYF individuals are required to have these items ‘on deck’ – they all should be lightweight and kept in worn PFDs.

Also, ideally, PFDs should be designed with a harness combination (in accordance with AS 2227) with crotch or thigh straps as required by the new AYF rules. With crotch straps, it may be useful to consider designing a retractable system for comfort and convenience.

It is noted that MSV is responsible for the regulation of marine safety in this State by virtue of the Marine Act 1988 and Marine Regulations 1999. Ultimately, the mandating of PFD wearing rests with MSV but it cannot successfully change the safety approach without the co-operation of the yachting community, in particular the AYF. Changes to Australian Standards also require the cooperation of the yachting community.

pp. 58, 59

Recommendation 1

That in circumstances where yacht crews are required to work on the deck of a yacht, the wearing of PFDs (as a minimum safety requirement) should be a mandatory requirement and not left to the skill and good judgement of a skipper or individual crew member. This should occur for recreational sailing, in flat water, on bay and ocean racing.

To ensure that the yachting community accept the mandatory wearing of PFDs, it is essential that simple, easy-to-wear and purpose-built, affordable PFDs be recommended for use in the various yachting operations. Where modifications are required to meet the need it may necessitate the yachting community working with the manufacturers of PFDs to ensure that any solutions that enhance the usefulness and value of this equipment are adopted. Examples of the types of practical PFDs already on the market that could possibly be mandated as a minimum are shown in Appendix A.

pp. 59

Other examples to consider would be the more modern jacket or vest style (there are a number of these types of units currently available, manufactured by a variety of companies and complying with AS 1512 – some also have harnesses and lines complying with AS 2227).

Designs should include utility pockets with provision for a lanyard ring.

A harness combination (complying with AS 2227) should be considered as mandatory with all PFDs required to be used in yachting. A retractable crotch strap should also be considered (see also sub-heading ‘The use of harnesses and PFD combination’ below).

The yachting community should also work with the NMSC, PFD manufacturers and Australian Standards to ensure that the design and standards are appropriate for safety (it is understood that the NMSC is currently conducting a review of a national standards for recreational boat safety equipment).
Recreational Vessel Fatalities in Victoria: 1999–2002

Recommendation 2
That the Australian Standard (AS 1512) be reviewed in relation to the design and style of PFDs required to be carried on yachts for use by crew (in the light of Recommendation 1 and the general comments in this case). By way of example, some of the issues to be considered in this review would be:

- ensuring the PFD remains on the wearer in most water entry situations (considering distance from vessel to water)
- the unit is functional and comfortable for wear at all times (in most weather and/or work situations)
- appropriate contemporary fastening devices
- level of buoyancy (as compared with the European Standard).

Coroner Johnstone, 21 May 2003

Case Number: 2338/2001

RECOMMENDATIONS

The following recommendations are referred to the appropriate agencies for consideration.

(a) That other than in an emergency or rescue situation all passengers aboard or related craft operated by a surf life saving club or agency be required to wear a life jacket at all times.

(b) That Surf Life Saving Victoria and its affiliate associations and clubs undertake a review of their risk management procedures and training to ensure that an appropriate emphasis is placed on passenger safety.

(c) That appropriate protocols be established between Victoria Police and MSV to promote a more cooperative approach in relation to the investigation of any boating incident involving a fatality.

Coroner Bolger, 9 September 2002


COMMENTS AND RECOMMENDATIONS

The circumstances of the capsize were such that the occupants of the boat, neither the three deceased, nor the survivor, had time to don the life jackets carried on the boat. It could, I suppose, be suggested that at night it would be prudent to don them anyway, but the hazard that claimed them was not appreciated and save for the breach, it would, in all likelihood, have been an uneventful night. …

I do add however, that Senior Constable WATER POLICE, a vastly experienced member of the Water Police, pointed out that in his view 90 per cent of those who drown would probably not have done so had they been wearing approved, properly fitted life jackets – a sobering thought! Regrettably, for reasons I do not comprehend, it is a message that has been sounded for years which seems to go largely unheeded. …

I recommend the erection at the various jetties from which boats depart onto the waterways, warning or hazard notices alerting people to the potential pitfalls of going into that danger area near a breach between the inlet and the sea. The fact is it is a phenomenon which attracts people to the immediate
location. The hazard signs should, I suggest, alert boat owners to the strong and dangerous currents that the breach creates and advise extreme caution.

Coroner Byrne, 4 March 2003
Case Number: 0498/2002

COMMENTS
It is imperative when engaged in any form of boating activity but particularly recreational boating where a person is not engaged on a daily basis in the sea and operations on the sea, to be aware of the limitations of the boat that they are in and to exercise caution at all stages of any operation on the water. Bravado or a desire to achieve a particular end must not be allowed to impact upon the safety of the vessel, any vessel and any of its occupants. Secondly, I adopt the comments of WATER POLICE MAN, to the effect that life jackets of PFDs, securely stowed in an area which is not immediately accessible, are completely useless. Even when a life jacket or PFDs are readily accessible there is a resistance felt by some people to actually putting them on. This may be from a desire not to appear timid, because of over confidence or ignorance, or even from a belief in their own invulnerability.

But there will always be conditions in which prudence should dictate that some form of flotation device should be worn. That is not to say that I believe that a PFD or similar should be worn on all occasions, but there must be a general awareness that a life jacket is only going to be of assistance if someone is wearing it. Clearly, in this case, had the deceased been wearing such a flotation device there is every reason to believe he would have survived the capsize of his boat.

Coroner Klestadt, 29 November 2002
Case Number: 2777/2002 and 2798/2002

COMMENTS AND RECOMMENDATIONS
On the available evidence, I am unable to say whether the deceased men heard a weather forecast for this day, or made any other enquiries as to what weather (and hence sea conditions) may have been in store. It is imperative that mariners proposing to venture out onto potentially treacherous waters make it their business to check weather forecasts.

I recommend, in the interests of clarity, indeed certainty, that that part of Corner Inlet west of the line previously referred to be specifically included (along with Port Phillip and Western Port Bays) in the definition of ‘Coastal waters’. Whether the area east of the line requires specific reference in the definition on ‘Inland waters’ I express no view.

Coroner Byrne, 5 May 2003
Case Number: 0252/2002 and 1245/2002

COMMENTS AND RECOMMENDATIONS
This is one of those cases, unlike many, where after the emergency arose there was time to properly fit life jackets, yet at least one passenger did not. The regulations treat hire-and-drive vessels as ‘commercial vessels’ with more stringent, minimum safety requirements. In particular, coastal life jackets are required to be provided for each person aboard – on the face, a sensible requirement. Research tends to confirm the anecdotal material that in practice very often occupants tend to don this form of life jacket only after an emergency arises and often that is too late, especially to fit the device
properly. It could be argued if the life jackets provided were less bulky and cumbersome and more aesthetically pleasing there may well be a greater tendency towards constant wear. In relation to coastal (multifit) life jackets, I very much doubt even if it was considered appropriate, if mandatory constant wear was regulated whether compliance would follow. It could reasonable be contended that boaters would be more receptive to constant wear if a PFD Type 1 was provided. I understand the issue of the Australian Standard for PFD 1 is currently under review as the Australian Standard is apparently considered somewhat below the International Standard.

In a recent finding, in the context of yachting, the State Coroner Johnstone, made a number of recommendations. In part he stated:

‘To ensure that the yachting community accept the mandatory wearing of PFDs it is essential that safe, simply, easy to wear and purpose built, affordable personal flotation devices be recommended for use in the various yachting operations.’

I adopt and commend, with the necessary modification, his recommendation. A similar rationale applies to the recreational boating community. If acceptance of the prudence of constant wear is to be anticipated equipment must be user friendly.

If that higher standard is approved and adopted, I recommend MSV consider revising the life jacket requirements substituting PFD Type 1 for the current coastal life jacket.

Coroner Byrne, 6 June 2003

Case Number: 2769/2003 and 2813/2002

COMMENTS

There is every reason to believe both DECEASED 1 and DECEASED 2 would have survived this accident had they been wearing life jackets. The post mortem examination on the body of the DECEASED 2 established no injuries of consequence and no fractures; he drowned. While I concede it involves a degree of speculation, as his body was not recovered, I believe DECEASED 1 drowned and may not have done so had he been wearing a life jacket.

I observed in a recent finding (2777/2002 and 2798/2002):

‘ones prospect of survival is infinitely greater if wearing a life jacket appropriate to the circumstances and fitted properly.’

In a recent finding the State Coroner Graeme Johnstone made the following recommendation:

‘To ensure that the yachting community accept the mandatory wearing of PFDs it is essential that safe, simple, easy to wear and purpose built, affordable PDFs be recommended for use in the various yachting operations.’

In another recent finding (0252/2002 and 1245/2002) I commented:

‘I adopt and commend, with the necessary modification his recommendation. A similar rational applies to the recreational boating community. If acceptance of the prudence of constant wear is to be anticipated, equipment must be user friendly. If that higher standard is approved and adopted, I recommend MSV consider revising the life jacket requirements substituting PFD Type 1 for the current coastal life jacket.’
I think the time has come for very serious consideration being given to legislating for mandatory wearing of PFD Type 1 by all aboard recreational vessels. Some resistance can be expected but the wide acceptance of seatbelt legislation demonstrates acceptance can ultimately be achieved and many lives saved.

RECOMMENDATIONS:

MSV, as the regulating body of the safety equipment required to be carried on board recreational vessels in Victoria, should seek to have amended the Marine Act 1988 and Marine Regulations 1999 to require occupants of recreational vessels in Victoria to wear PFD Type 1 at all times in the event that PFD Type 1 standards are raised to at least the level of the International Standard.

As is apparently the case with outboard motors I recommend recreational vessels with inboard motors be fitted with a ‘dead man switch’.

Coroner Byrne, 7 July 2003
Appendix B

Victorian Recreational Boating Safety Handbook

Safety equipment
The information in this section sets out the minimum requirements for boat owners and operators.

For complete knowledge of boating laws in Victoria you should refer directly to the Marine Act 1988, Marine Regulations. Copies of the legislation can be obtained from:

  Victorian Government Information Centre
  356 Collins Street, Melbourne VIC 3000
  (03) 1300 366 356

As well as complying with the appropriate Victorian boating legislation and requirements, it is important to find out if there are any special local rules when you are away from your home waters. If boating interstate, you are required to adhere to the safety and operating rules and regulations imposed by that State.

The table below details the minimum safety equipment requirements for recreational craft operating in Victorian waters. All safety equipment and fire extinguishers must be kept in good working order and stored in easily accessible points on the craft.

The term ‘rowing boats’ refers also to duck punts and rafts, but not tenders (dinghy or pram). It does not include racing shells. There are certain exemptions for sailing boats with permanently enclosed hulls, and for PWCs.
### Minimum Safety Equipment Requirements

<table>
<thead>
<tr>
<th>Safety Equipment</th>
<th>Rowing Boats C.W.</th>
<th>I.W.</th>
<th>&lt; 5m C.W.</th>
<th>&lt; 8m I.W.</th>
<th>5m to &lt; 12m C.W.</th>
<th>12m or more C.W.</th>
<th>&lt; 12m I.W.</th>
<th>12m or more I.W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved life jacket or PFD-1 for each person on board, or being towed at all times</td>
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<tr>
<td>Two paddles or two oars fitted with rowlocks</td>
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<td>Bailer, manual pump or other efficient bilge pumping arrangements</td>
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<td>Efficient bilge pumping arrangements</td>
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<td>Bucket(s) with lanyard(s) attached</td>
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<tr>
<td>Approved fire extinguisher(s) where any fuel is carried (incl. cooking appliances)</td>
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<td>Waterproof torch or lantern in working order</td>
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<tr>
<td>Anchor(s) with not less than (metres as indicated) of cable or rope</td>
<td>35m</td>
<td>45m</td>
<td>50m</td>
<td>55m</td>
<td>•</td>
<td>2 x 70m</td>
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<tr>
<td>Two hand-held red flares and two hand-held orange smoke flares of an approved type</td>
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<tr>
<td>Efficient compass</td>
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<tr>
<td>Approved lifebuoys</td>
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<td>•</td>
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<tr>
<td>Dinghy or life raft</td>
<td>•</td>
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<tr>
<td>Approved EPIRB (all vessels travelling over two nautical miles from coast, excluding embayments)</td>
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</table>

**Inland waters (I.W.)**

All inland waters including rivers, creeks, canals, lakes, reservoirs, etc. either naturally formed or man-made and which are privately or publicly owned. The Yarra and Maribyrnong Rivers (upstream of the Port), Barwon Heads (upstream of the bridges), inside the entrance of the Ports of Anderson Inlet, Corner Inlet/Port Albert (east of a line between the Port Welshpool shipping pier and Bentley Point – inside the entrance), Gippsland Lakes, Mallacoota, Portland, Port Fairy, Shallow Inlet and Snowy River, and the waters inside the seaward entrance of any rivers, streams and creeks.

**Coastal waters (C.W.)**

All other waters along the Victorian coastline, including Port Phillip Bay and Western Port.
PFDs/Life jackets

An approved PFD 1 or approved life jacket must be provided for every person on board your boat, including persons being towed. It is compulsory for all PFD 1s/life jackets, purchased after 1 December 1989 and carried in recreational craft, to be fitted with retro-reflective tape. This is to help rescuers see people in the water at night.

PFDs are available in a large range of brands and styles. The ones you choose must be approved by the Australian Standards Association or MSV. Look for the approval tag before you buy.

All children under the age of 10 years must wear an approved life jacket, or buoyancy vest/garment, or PFD-1, 2 or 3 while in a recreation boat that is under way, unless the child is within a deckhouse, cabin, half-cabin or a secure enclosed space. There are three different Australian Standards for PFDs, based on the level of protection given to the wearer.

PFD Type 1:
Provides a high level of buoyancy and is designed to keep you in a safe floating position, that is, with the body inclined back from the vertical, with nose and mouth clear of the water. They are commonly called life jackets and must be carried on all boats in all waters.

PFD Type 2:
Provides less buoyancy than a Type 1, but sufficient to keep your head above water. A PFD Type 2 is also known as a ‘buoyancy vest’.

PFD Type 3:
Has similar buoyancy to that of a Type 2, but is manufactured in a wider range of colours than the high-visibility safety colours stipulated for Types 1 and 2. A PFD Type 3 is also known as a ‘buoyancy garment’.

Remember, while PFD Types 2 and 3 may be worn, all boats must also carry one PFD Type 1/Life jacket for each person on board.
Appendix C

Part 1
PFD/Life jacket available and worn

2918/2001 – Type of PFD Type 1 apparently worn by deceased following the capsize of the vessel pictured. Deceased never recovered.

2777/2002 and 2798/2002 – PFD Type 1 apparently worn by two deceased following an unknown event in Corner Inlet. One deceased never recovered.
0252/2002 and 1345/2002 – Type of life jacket worn by the two deceased. As this vessel was a hire-and-drive vessel, it was required to have on board coastal life jackets as opposed to an approved PFD Type 1.

Part 2

PFD/Life jacket available and not worn/unknown if worn

1017/00 and 1078/00 – PFDs carried on board. Complies with current Australian Standard 1512 for PFD Type 1.
0073/2002 – PFD onboard the vessel. Appears to be a PFD Type 3, which is not the type of PFD required to be carried on board the vessel involved in the incident.

0498/2002 – PFD under the cabin of the vessel following vessel recovery.
Appendix D

Coastal life jacket
Appendix E

Vessels involved in the incidents

0274/1999 – Single fatality in Lake Eildon [4–8 m aluminium motorboat [hire-and-drive]].

1824/1999 – Single fatality in Gellibrand River [< 4 m aluminium motorboat].
Recreational Vessel Fatalities in Victoria: 1999–2002

2135/1999 – Single fatality in Port Phillip Bay [< 4 m inflatable dinghy].

3313/1999 and 3314/1999 – Double fatality in Port Phillip Bay [4–8 m fibreglass yacht].
0467/2000 – Single fatality in Bass Strait [8.5 m yacht].

0839/2000 – Single fatality in Port Phillip Bay [4–8 m fibreglass ski-boat].

Recreational Vessel Fatalities in Victoria: 1999–2002

3962/2000 – Single fatality in Lake Eildon [4–8 m fibreglass ski-boat].

4205/2000 – Single fatality in Port Phillip Bay [8–12 m yacht].
0216/2001 – Single fatality in Goulburn River, PWC.

2918/2001 – Single fatality in Lake Dartmouth [<4m aluminium motorboat].

3322/2001 – Single fatality in Cobungra River [kayak].

2777/2002 and 2798/2002 – Double fatality in Corner Inlet [< 4 m aluminium motorboat].
Appendix F

Boating safety initiatives
Victoria

Marine Safety Victoria\textsuperscript{23} undertook a number of initiatives in 2002–03 aimed at raising public awareness of safety issues in order to assist in the prevention death and injury from water vessel incidents. These initiatives included:

- 2002 public awareness campaign
  - *Life Jackets Save Lives* media campaign
- boat safety equipment checks
- PWC Courtesy Rider program
- vessel operating and zoning review of Port Phillip Bay
- distribution of recreational boating safety publications and resources
- publication of *Marine Safety in Victoria*, an investigation of marine incidents in Victorian waters
- provision of boating safety funding for community education, navigational aids, boating safety signage and search and rescue vessels.

Public awareness campaign

MSV conducted a major recreational boating media campaign over the 2002–03 Summer, focusing on the wearing of PFDs. This campaign aimed to educate recreational boaters when and in what conditions they should wear a PFD.

MSV developed the media campaign *Life Jackets Save Lives* in direct response to the 27 people that drowned in recreational boating incidents between July 1999 and June 2002, of which only three were wearing a PFD. A number of the drowning incidents may have been prevented if the occupants had been wearing a PFD.

The program shaped itself on the Transport Accident Commission’s (TAC) approach to television commercials and other mass media. It focused on the theme *Life Jackets Save Lives*, in order to educate recreational boaters when and in what conditions they should wear a PFD. In particular, when they cross bars, are boating at night, boating in unfamiliar waters, boating alone, boating in poor weather, if the boater is a poor or non-swimmer, and in any emergency.

MSV engaged advertising agency Clemenger BBDO to produce the advertisements and Quantum Market Research to undertake focus group testing with recreational vessel users. The focus groups were conducted in order to determine what style of advertisement would be most effective in ‘getting the message home’. The overwhelming message from the focus group participants was that they wanted a hard-hitting ad with strong messages. As a result of this research, the campaign developed depicts a drowned boater and features an emotive narrative from the drowned man.

MSV anticipated that the campaign might be distressing to some viewers and possibly cause some complaint telephone calls from those that disagreed with the campaign or were distressed by the content of the advertisements.

\textsuperscript{23} This information was provided by Peter Corcoran (Manager, Recreational Boating), Marine Safety Victoria.
MSV developed a comprehensive strategy for dealing with complaints and distressed persons, including training on how to deal with the calls, distributing FACTS sheets, educational materials and advertising schedules as well as directing distressed callers on to appropriate counselling services.

**Boat safety equipment checks**

Boat safety equipment checks were conducted by MSV and local waterway authorities at boat ramps across Victoria throughout the 2002–03 Summer. Checks were conducted at more than 300 key boating destinations and over 4,000 vessels were checked. The focus was on popular waterways and those where fatalities had previously occurred.

Each boater who participated in the Boat Safety Equipment Check program received a report on the adequacy of their safety equipment, in particular, whether it was appropriate for the type and size of vessel, its condition, and whether it was appropriately stowed.

Participants in the Boat Ramp Safety Check program received a Marine Safety Grab Bag in recognition of their involvement in the program. The bag consisted of a waterproof floating bag printed with key safety messages and was equipped with the following safety equipment:

- v-sheet
- light stick
- emergency waterproof light
- signal mirror
- whistle
- information on safe boating.

**PWC Courtesy Rider program**

The operation of PWCs continues to be the most topical recreational boating issue in the eyes of the general public. MSV conducted a PWC Courtesy Rider program throughout the 2002–03 summer in conjunction with the Victorian Police.

The PWC Courtesy Rider program was designed to educate PWC riders of their operational and behavioural responsibilities by establishing face to face contact with the operator, either on the beach or on the water. The PWC Courtesy Rider Team operated with dedicated officers from MSV and the Water Police in consultation with local authorities.

The Water Police will continue to undertake enforcement activities designed to curb inappropriate PWC operating behaviour and ensure all operators are licensed.

**Vessel operating and zoning review of Port Phillip Bay**

MSV and Parks Victoria are currently undertaking a review of vessel operating and zoning rules on Port Phillip Bay in order to: improve and standardise existing boating zones; simplify interpretation of boating zones; and ensure user safety and congruent coexistence of different user groups.

The zones include: no boating; speed limits; no PWC; no sailboards; sailboard only; and a range of other vessel operating zones. The project will seek to validate the zones and the assessment criteria for the identification and delineation of boating zones as well as provide opportunities for members of the public and key stakeholders to make comments on the criteria for the identification and delineation of boating zones and their application to Port Phillip Bay.
Recreational boating safety publications and resources

MSV has developed and distributed a comprehensive range of recreational boating safety publications for distribution to the public (in both print and electronic formats).

The range of publications include:

- **Victorian Recreational Boating Safety Handbook**
  [Available in print, CD disk and on our web site in the following languages: English, Arabic, Chinese (Mandarin), Vietnamese, Turkish, Croatian, Greek, Italian and Maltese];

- **Where to go boating** web site (located at www.marinesafety.vic.gov.au); and

- brochures/stickers on topical boating safety issues such as life jackets, crossing bars, vessel maintenance, etc.

Marine Safety in Victoria – an investigation of marine incidents in Victorian waters

As reported earlier, in October 2002, the Monash University Accident Research Centre (MUARC) was commissioned by MSV to compile a set of statistics on injuries and fatalities that occurred on Victorian waterways between 1999–2000 and 2001–02. This study provided MSV with key indicators for future safety promotion programs.

Although the number of fatalities was relatively small, there were a large number of people who were injured in boating and related activities. It was found that a significant proportion of these injuries were not reported to MSV, and it was only through MUARC’s hospital admissions data that MSV was able to fully appreciate the extent of injuries.

The two major themes that emerged from the fatalities study was that deceased were not wearing life jackets at appropriate times, and boaters were not staying with their boat until help arrived if the vessel was swamped or overturned.

MSV intends to use the key indicators to inform future work in order to reduce the number of fatalities and injuries. With the assistance of injury experts, MSV also intends to produce a fatality and injury report annually. It is hoped that this information will provide a good basis to address safe boating across the State.

Recreational Boating Safety Funding program

The Boating Safety Funding program was established to improve recreational boating safety and is a direct result of the introduction of recreational boat operator licensing in Victoria. Revenue from boat operator licensing fees will be reinvested back into the boating community, with $15.9 million committed over five years, between 2001–02 and 2005–06.

The program will fund projects initiated either by MSV or stakeholder groups. Key projects initiated by MSV are larger projects, which will address specific issues that affect all recreational waterway users in Victoria.

In addition to these, the community is invited to nominate projects for funding assistance. The externally initiated segment of the program aims to improve recreational boating safety and education through encouraging the boating and wider community to become more active in undertaking recreational boating safety initiatives, and through the provision of equipment and infrastructure necessary to ensure adequate levels of boating safety on Victorian waterways.
Projects that are funded through the program are expected to have strong local support and to benefit a broad cross-section of the boating community. They are not necessarily associated with specific types of boaters, that is, aimed exclusively at powerboat operators or sailing vessels.

The emphasis will be on providing the opportunity to be innovative, to strengthen partnerships and to compliment State and local government programs already in existence.

Funding was made available in the areas of:

- marine search and rescue
- education and training
- special needs
- regional initiatives
- navigation aids and signage
- safe access.

The general objectives of the program were to:

- decrease boating incidents and fatalities – promoting increased safety, education and training which highlights the importance of vessel maintenance and operating knowledge
- improve boating safety services – supporting search and rescue services around the State through the provision of vessels and equipment to allow them to adequately undertake their duties
- involve communities – support the long-term involvement of community groups and local organisations in the planning, implementation and management of marine safety projects
- improve boating navigation facilities – to improve existing facilities and implement new navigation aids and signage, to ensure safe access to waterways.

Boating Industry Association of Victoria

The Boating Industry Association (BIA) is the peak recreational boating body in Victoria. It is a non-profit, non-government organisation representing more than 90 per cent of the recreational boating industry in the State and includes the majority of interstate suppliers of goods and services to the marine industry. BIA’s members include manufacturing, wholesale, retail and service businesses covering boat builders, boat dealers, engine distributors, yacht brokers, trailer manufacturers, ship’s Chandlers, hire and charter boat operators, marinas, shipwrights, and mechanical and electrical engineers – all of which are dedicated to the continuous improvement and regulation of the boating industry.

BIA’s mission is to promote safe boating and increase boating facilities through industry leadership and to develop and promote professional standards and services for their members and the boating public.

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24 This information was provided by the Boating Industry Association of Victoria
They aim to:

- promote recreational boating, in all its forms, as a safe and environmentally responsible activity for families and individuals
- develop and promote professional standards and services for its members and the boating public
- take an advisory role in ensuring boating regulations are relevant and current
- forge strong working links with all relevant government agencies and associated organisations
- promote and encourage increased boating facilities throughout Victoria including coastal and inland waters
- co-ordinate Come and Try days in summer – providing opportunities for the public to try sailing, water-skiing and powerboating.

For more information telephone (03) 9328 4855 or visit their web site: www.biavic.com.au

Royal Life Saving Society Australia, Victoria Branch
The RLSSA promotes and educates the wearing of PFDs in a number of ways.

Aquatic Facility Education programs

Programs:

- Swim and Survive
  Swimming and Water Safety education program – levels 4–7
- Bronze Rescue series of awards.

Target audiences:

- teachers
- school students
- lifesavers.

These awards incorporate the practical application of PFDs in an aquatic environment. The Swim and Survive program and the Bronze Rescue award series develops the use of PFDs in the early stages of both programs. Skills in the use of PFDs are initiated at the early stages of both programs, from the basic principles of PFDs to a more detailed understanding, including the putting on and removal of PFDs while immersed, in the higher levels.

School-based education programs

Meet a Lifeguard

The RLSSA-V Meet a Lifeguard program is a school-based education program designed to promote water safety to those who may not have access to an aquatic or open water facility. Trained lifesavers incorporate interactive activities involving PFDs in this program (for example, PFD relays and PFD tiggy) to instil the use of PFDs in and around the water.

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25 This information was provided by Norman Farmer (Chief Executive Officer) Royal Life Saving Society Australia, Victoria Branch.
Open Water Learning Experience (OWLE)

The OWLE allows participants to receive valuable water safety education at their local open water venue (lake, river dam or beach). During these sessions, participants receive valuable experience in the practical application of PFDs and the advantages of their use. This is particularly effective given the nature of some of these aquatic environments.

Yachting Victoria and the Australian Yachting Federation

Yachting Victoria (YV) is the coordinating body for organised sailing in Victoria with representation from the majority of yacht clubs in the State. YV is nationally affiliated with the Australian Yachting Federation (AYF).

Yachting administration is well aware of the possibility for trauma arising from boating mishaps and has developed a graduated set of regulations to cover from beginner sailing through to ocean racing. These are to be found in the Special Regulations section of the *Racing Rules of Sailing* book that is published by the AYF. These regulations are continuously under review by a specialist group of the AYF, including representatives from YV. As any need for amendment is noted, whether by an exposed deficiency or by the advance of technology making changes relevant, the best wording is nationally agreed and implemented. This peer group analysis by experienced sailors ensures that any change is both warranted and workable.

In addition, the AYF has an accreditation program for sailing schools where newcomers may learn the finer points of the sport and advance up a ladder of courses as their interests advance. For the future a competency-based accreditation scheme is planned along federal government approved guidelines. YV also encourages clubs to conduct specialised training in subjects of interest to their members and to publish articles in their newsletters.

National

National Marine Safety Committee

The NMSC was established in 1996 as part of a strategic response to a report on national marine safety undertaken for the Australian Transport Group (ATG) by Thompson Clarke. This report identified a number of deficiencies in the administration of marine safety by States and the Northern Territory. Most significantly the report highlighted the lack of consistency between the jurisdictions in the application and administration of standards for commercial vessels, and the lack of marine safety data.

In June 1996 the Australian Transport Council (ATC) endorsed a Draft National Marine Safety Strategy and agreed to the formation of the NMSC to implement the strategy. Implementation began in April 1997 with the establishment of the NMSC Secretariat. The NMSC was formalised by an Intergovernmental Agreement (IGA) signed on 7 November 1997 by the Prime Minister, State Premiers and the Chief Minister of the Northern Territory.

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26 This information was provided by Tony Mooney from the Australian Yachting Federation and Rob Cook from Yachting Victoria.
In March 1999 a project-based approach was adopted to facilitate and implement the National Marine Safety Strategy. The project-based approach resulted in the formation of more than 20 separate projects across four program areas. The program areas being addressed consist of:

- **Program 1** Mutual Recognition and National Consistency;
- **Program 2** Commercial Vessels Safety – Technical;
- **Program 3** Commercial Vessels Safety – Operations and Training; and
- **Program 4** Recreational Boat Safety.

NMSC is comprised of senior executives of marine safety agencies throughout Australia, with the New Zealand Maritime Safety Agency having observer status. The committee is supported by a small secretariat based in Sydney. The NMSC consults widely with industry and invites industry members to sit on a range of reference, advisory and professional panels. The committee meets formally three to four times a year to review progress, set priorities, and to endorse the outcomes of the projects, and to provide recommendations to the ATC through the Australian Maritime Group.

The draft *National Standard for Recreational Boat Safety Equipment* was released for public comment in September 2001 with a closing date of 1 February 2002. The draft standard was developed to provide nationally consistent safety equipment standards for recreational boats. In developing the draft standard a review was undertaken of the safety equipment requirements specified by all Australian marine authorities. It was found that while there was a good deal of commonality between jurisdictions, there were also some significant discrepancies.

The new national standard will have the most benefit for boats which operate in more than one jurisdiction as there will be less necessity to know the requirements of more than one marine authority and less likelihood on inadvertent non-compliance. The new national standard will provide similar benefits to manufacturers of boats and safety equipment. The draft *National Standard for Recreational Boat Safety Equipment* is not entirely consistent with current requirements for recreational boat safety equipment in Victoria. However, an equivalent level of safety is maintained. An NMSC reference group recently considered public comment on the draft standard and is proceeding to produce a final draft of the standard for approval by the NMSC.

The incorporation of a broader range of standards for PFDs has been published on the NMSC web site for public comment titled *Review of PFD Standards for Recreational Vessels*. Victorian legislation will be changed to reflect the new standard but will not come into force until 2004.
Appendix G

Location Map of Incidents
West (of Wilsons Promontory)
East (of Wilsons Promontory)