Development and Piloting a Log Book to Determine the Level of Exposure to the Risk of Injury among Recreational Boaters

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Title
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Abstract
The development of marine safety measures for recreational boaters is in some way hampered by the absence of reliable exposure data in relation to the amount of time spent boating. There are two aspects to this issue: the number of boaters in the community and the amount of time that is spent on the water. While there are data indicating the number of registered vessels, there are no data in relation to the number of boats or the number of boaters within the community. This was a pilot study to investigate the use of a logbook to collect boating exposure information from recreational boaters. The boaters were recruited at boat ramps and boat shows in metropolitan and rural areas of Western Australia. Two versions of a boating diary were piloted among 55 recreational boaters between August 2005 and January 2006. Participants were asked to record five items of information for each boating trip they made over a consecutive 6 month period and to return the diary information on a monthly basis. Recruiting at boat shows, using a paper based boating diary and contacting participants through email were the most effective methods for collecting the boating exposure information. A larger study would allow more accurate calculations of the risk of injury among recreational boaters in Western Australia.

Keywords
Marine safety, Recreational boating, Risk exposure
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EXECUTIVE SUMMARY

Objectives
Recreational boating exposure information is necessary for determining the risk of injury and could be used as the basis for targeting marine safety measures. However, a problem faced in marine safety research is the lack of reliable exposure data for recreational boaters which takes into account how often and for long boaters spend on the water. This study investigated the development of a diary instrument for measuring exposure among this group. The objectives of the study were:

- To pilot two different boating diary methods for measuring the frequency and duration of vessel use among recreational boaters in Western Australia and determine the most successful, appropriate and feasible method for collecting the information; and
- To determine how frequently different vessels are used by boaters, on what day vessels are used, the length of time that the vessel was used on the water, the type of activities the vessel was used for, and the number of passengers on board the vessel during each trip.

Methods
A total of 55 recreational boaters were recruited at boat ramps and boat shows and asked to complete a boating diary for a consecutive six month period. The sample of boaters were randomly assigned one of two boating diaries, a paper diary or a fridge diary, and given the option of being contacted by telephone or email for the duration of the study. Participants were asked to complete a diary entry upon return from each boating trip they made during the period. They were then contacted on a monthly basis to retrieve diary records or remind participants to return their paper diary records. A post-diary telephone interview was conducted at the end of the study to gather feedback on the two methods.

Results
The overall recruitment rate was 49%. The retention rate was 72.7%, with a completion rate of 91.1%. The participants found the diary easy to use, although they did not always enter their information into the diary after each trip. A total of 54.2% of participants went boating during the six month period together totalling 535 trips and 2821.5 hours on the water. Forty seven percent of these trips were made on weekdays, while 56% of the trips were for fishing. The weather was reported by the participants as uncharacteristic and this influenced the number of trips they undertook during the six months.
Discussion
The boating diary was an effective method for collecting boating information and was used with ease by participants. Recruitment was the most significant challenge for the study, however once the recreational boaters initially agreed to participate in the boating diary and returned data for the first month, they tended to remain in the study and continue sending diary records until the end. The success of the boating diary can be credited to the collection of information from boaters on a regular basis, and using a contact method which met the individual needs of participants.

Recommendations
Based on the results of this study, recruiting at boat shows, using a paper diary format and contacting participants through email were the most timely and cost effective methods and would be recommended for collecting the boating exposure information on a larger scale over a longer time period.
ABBREVIATIONS

**DPI:** Department for Planning and Infrastructure  
**RTO:** Regional Transport Officer  
**UWA:** University of Western Australia  
**nm:** nautical miles

DEFINITIONS

**Boating exposure:** the amount of time spent boating on the water (includes time spent moving, drifting, or at anchor) while boat occupants (operator and passengers) are on board the vessel.

**Completion rate:** the ratio of completed diaries to the total number of diaries which were expected to be completed.

**Recruitment rate:** the ratio of people who agreed to participate in the study to the total number of people who were approached.

**Retention rate:** the ratio of people who stayed in the study for the duration of the study to the total number of people who agreed to participate in the study.
ACKNOWLEDGEMENTS

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- The Department for Planning and Infrastructure Regional Transport Officers, Paul Costarella and Troy Easter for their help with recruitment.
- Alison Coates for providing advice.

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1. INTRODUCTION

As identified in a recent report published by the Injury Research Centre, one of the important issues in the area of marine-related injuries and incidents is the lack of exposure data in relation to the amount of time spent boating (Pikora and Cercarelli, 2004). While there are data indicating the number of registered vessels in Western Australia (WA), there is no data to reflect how often people use their vessels and the amount of time boaters spend on the water. It is therefore important to conduct boating usage surveys to collect this information which will be useful in assessing the risk of injury and fatality among recreational boaters and could be used as the basis for targeting marine safety measures.

One method to measure boating exposure would be to conduct a survey asking recreational boaters to either recall or predict their boating activity over a given period of time. In a US study, professional and recreational boat captains were interviewed at boat harbours and a popular restaurant (Ciraulo, Smith & Ciraulo, 2000). Participants were asked to estimate the number of days per year they spent boating, however the reliability of the answers was not reported. A survey of this nature introduces retrospective recall bias because respondents are asked to recall the details of an event over a long period of time. Ideally, if boaters documented their activities immediately after the event, this would reduce the effects of recall error. Therefore a boating diary was developed to document the boating activities among recreational boaters.

There were two aims to the project:

1. To pilot two different boating diary methods over a 6-month period to measure the frequency and duration of vessel use among recreational boaters in WA and determine the most successful, appropriate and feasible method for collecting the information; and

2. To determine how frequently different vessels are used by boaters, on what day vessels are used, the length of time that the vessel was used on the water, the type of activities the vessel was used for, and the number of passengers on board the vessel during each trip.
In this report exposure is defined as the amount of time spent boating on the water (includes time spent moving, drifting, or at anchor) while boat occupants (operator and passengers) are on board the vessel. Exposure information combined with injury and fatality data allows an assessment of an individual’s risk of being involved in a boating accident through the division of injuries/fatalities per hour of exposure.
2. METHODS

2.1 Recruitment

Fifty-five recreational boaters were recruited from both metropolitan and regional areas of WA between July and November 2005. Boaters were recruited at boat ramps and at two boat shows held in Perth and Mandurah. Recruitment at metropolitan boat ramps and boat shows was performed by researchers from the University of Western Australia (UWA). Recruitment at regional boat ramps and boat shows was performed by personnel from the Marine Safety Directorate at the Department for Planning and Infrastructure (DPI) who were given a recruitment strategy to ensure consistency with the strategies employed by UWA researchers. As part of the recruitment strategy boaters were provided with verbal and written information about the study (see Appendix 1). The recruitment protocol was approved by the UWA Human Research Ethics Committee.

The inclusion criteria for the study were ownership of a recreational vessel and being a resident of Western Australia. People who were approached, met the inclusion criteria and showed interest in participating in the study, were asked to sign a consent form and provide their full name and a contact telephone number. Participants who were recruited by UWA researchers were asked to sign a written consent form at the time of recruitment. Participants who were recruited by DPI personnel were given a consent form and reply paid envelope and asked to post their signed consent form back to UWA researchers. The DPI personnel forwarded the participant names and contact telephone numbers to UWA researchers for follow-up. Information about refusals and non-respondents was noted during the recruitment process.

Within 10 days of recruitment, participants were contacted by telephone and an interview was conducted (see Appendix 2 for the interview schedule). The telephone interview provided a medium for researchers to tell participants more about the study, survey them on their demographic characteristics (age, gender, level of boating education and years of experience operating a vessel), collect information about their vessel(s) (type, length and registration number) and obtain their mailing address. Where participants owned more than one vessel they were asked to provide information about the two vessels they used most often. The telephone contact
provided an opportunity for participants to discuss the diary and ask any questions about the study. Participants were also asked to nominate whether they would prefer to be contacted by telephone (and the preferred time for contact) or email for the duration of the study. On completion of the interview, a boating diary kit was mailed to the address provided. The boating diary kit contained a covering letter (to establish survey legitimacy), a boating diary (see Appendix 3) with instructions for use, and an example of how to fill out the diary.

2.2 The Boating Diary
Participants were asked to fill out the diary for six consecutive months in order to obtain representative results of the boating done in winter, spring and summer. At the telephone interview stage, boaters were randomly assigned into two equally sized groups in order to test two methods for collecting the information. The first group received a six page paper diary booklet and six prepaid business reply envelopes which they used to return their diary information on a monthly basis. The second group received a laminated fridge diary with a magnet on the back to place on their fridge or somewhere else convenient and a white board pen for marking on the diary. This group were instructed to record trip information for the relevant month and, once they had reported their information, to wipe the board clean for the next month’s trip information.

The diary allowed boaters to fill out information for the two vessels which they use most often. The boating diary collected information about every trip made within the six month period. For each trip, participants were asked to record the day of the week, how long they spent on the water, the boating activity they were involved in, where they went and how many people were onboard. Participants were encouraged to complete a diary entry upon return from a boating trip to reduce recall error. They were also informed that researchers would contact them to collect their information on a monthly basis.

2.3 Follow-up methods
At the beginning of each month, participants were contacted through the preferred method they had nominated – phone or email. With the paper diary group telephone contact was made if within the first week of the next month the diary page had not
been mailed back. With the fridge diary group, the contact was made straight away in order to retrieve the information. Those with fridge and paper diaries who wished to be contacted by email were sent an electronic version of the diary as an attachment to make returning the information more convenient. The project researcher kept a record of all returned diaries and where participants failed to complete, made phone or email contact to investigate why this had occurred. Participants were contacted to return their data no more than three times for the one month. Microsoft Access was used as a contact database and to record whether participants had returned their diary information for each month. A newsletter was distributed half way through the study to motivate boaters to stay involved (see Appendix 4).

A post-diary interview was conducted to determine whether participants considered the boating information they had reported to be representative of their usual boating activity during the period and the types of things which influenced whether they went out on their vessel. They were also asked about the ease of use of the diary method and whether they had actually recorded information in the diary or whether they recorded information through other means.

All data were coded and cleaned prior to data entry. Descriptive statistics were used to describe the characteristics of the sample using SPSS (version 12 for Windows). The exposure data was analysed using a multiple response method.
3. RESULTS

3.1 Recruitment

The study had an overall recruitment rate (i.e., the total number of people approached who agreed to participate) of 49%. Recruitment at boat shows gave a higher refusal rate than recruitment at boat ramps (51% and 18% respectively). Of the 59 people who initially agreed to participate in the study, four withdrew from the study before any information was collected or were unable to be contacted (a maximum of four attempts were made).

3.2 Boater and vessel characteristics

In total, 55 boaters were recruited into the study (30 regional and 25 metropolitan residents), each of whom agreed to complete monthly diaries between August 2005 and January 2006. The majority of respondents were male ($n = 51, 93\%$); the mean age of participants was 45 years with a range of ages between 19 and 70 years (see Table 3.1). Forty-nine percent had not completed any type of boating education course. Of those that had completed a boating education course, the majority of these (54%) had completed a TL3 or proficiency in small craft safety course. One-half of all participants (51%) reported to have over 20 years of experience operating a vessel (see Table 3.1).

As shown in Table 3.1, a range of vessel types were included in the study. The most common vessels owned by participants were runabouts (25%) and dinghies (16%). One-half (53%) of the vessels used most often were between 5-10m in length; 40% were less than 5m in length. Seventy-two percent of participants had owned the vessel they use most often for less than three years (see Table 3.1). Twenty-five percent of participants also owned a second vessel.
Table 3.1  Characteristics of the boating diary participants and their vessels

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>93.7</td>
</tr>
<tr>
<td>Female</td>
<td>7.3</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>18-34 years</td>
<td>14.5</td>
</tr>
<tr>
<td>35-44 years</td>
<td>23.6</td>
</tr>
<tr>
<td>45-54 years</td>
<td>29.1</td>
</tr>
<tr>
<td>55+ years</td>
<td>32.7</td>
</tr>
<tr>
<td>Geographical location</td>
<td></td>
</tr>
<tr>
<td>Metropolitan</td>
<td>45.5</td>
</tr>
<tr>
<td>Regional</td>
<td>54.5</td>
</tr>
<tr>
<td>Boating education</td>
<td></td>
</tr>
<tr>
<td>Some</td>
<td>50.9</td>
</tr>
<tr>
<td>None</td>
<td>49.1</td>
</tr>
<tr>
<td>Years of experience boating**</td>
<td></td>
</tr>
<tr>
<td>1-5 years</td>
<td>32.1</td>
</tr>
<tr>
<td>6-19 years</td>
<td>15.1</td>
</tr>
<tr>
<td>20+ years</td>
<td>52.8</td>
</tr>
<tr>
<td>Boat type 1 (used most often)</td>
<td></td>
</tr>
<tr>
<td>Runabout</td>
<td>30.9</td>
</tr>
<tr>
<td>Open boat</td>
<td>18.2</td>
</tr>
<tr>
<td>Cabin cruiser</td>
<td>10.9</td>
</tr>
<tr>
<td>Dinghy</td>
<td>9.1</td>
</tr>
<tr>
<td>Half cabin</td>
<td>9.1</td>
</tr>
<tr>
<td>Yacht</td>
<td>9.1</td>
</tr>
<tr>
<td>Centre console</td>
<td>3.6</td>
</tr>
<tr>
<td>Ski boat</td>
<td>3.6</td>
</tr>
<tr>
<td>Kayak</td>
<td>1.8</td>
</tr>
<tr>
<td>Other</td>
<td>3.6</td>
</tr>
<tr>
<td>Length of vessel (used most often)</td>
<td></td>
</tr>
<tr>
<td>&lt;5 metres</td>
<td>40.0</td>
</tr>
<tr>
<td>5-10 metres</td>
<td>52.7</td>
</tr>
<tr>
<td>10-20 metres</td>
<td>7.3</td>
</tr>
<tr>
<td>Length of ownership of vessel (used most often)**</td>
<td></td>
</tr>
<tr>
<td>0-2 years</td>
<td>71.7</td>
</tr>
<tr>
<td>3-10 years</td>
<td>24.5</td>
</tr>
<tr>
<td>11-20 years</td>
<td>3.8</td>
</tr>
</tbody>
</table>

* n = 55; ** Missing = 2

3.3 Retention and completion of the boating diary

The retention rate of boaters in the study was 72.7% (ie, 55 boaters recruited and 40 completed and returned their final diary). In total, 267 completed diaries were returned out of a possible 293. This represents a completion rate of 91.1%. There was no difference between the type of diary and the completion rate among the boaters. Several boaters withdrew from the study for a range of reasons including moving interstate, selling their vessel, having their vessel stolen, and becoming ill. In addition, some participants joined the study late and therefore provided less than six months of data. Three participants did not return any data for the duration of the
study and were classified as non-responders. Several respondents returned some, but not all diary information and this is reflected in the completion rate.

A post-diary interview was conducted among a small number (n=15) of the participants, including those who withdrew from the study. When asked whether they considered the information provided was representative of their usual boating activities and what issues influenced their behaviour during this time, the majority mentioned that the weather was not “typical” for the time of the year. Another common theme was that they were very busy with work and other activities that left little time for boating.

They were also asked how easy they found using the diary. All indicated that they found both versions of the diary easy to use and did not have any problems with completing the requested information. When asked whether they completed the diary after each trip several respondents indicated that they did not use the diary this way. Rather, they obtained their information when contacted by the researchers through several other means including their personal diaries, racing schedules, or that they recalled the information when contacted each month. The main reason suggested by those participants who did not complete and return all their diaries was that they were too busy.

3.4 Boating diary information

Overall, 54.2% of participants went boating during the six months of the study together totalling 535 trips and 2,821.5 hours on the water. As shown in Table 3.2, the most number of trips over the six months occurred during December and January when more people take summer holidays. September had the lowest number of trips as well as the least number of hours and people on board.
Table 3.2  Number of trips, hours, and people on board for each month

<table>
<thead>
<tr>
<th>Month</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>47</td>
<td>45</td>
<td>50</td>
<td>48</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td><strong>Number of trips:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>84</td>
<td>58</td>
<td>74</td>
<td>73</td>
<td>128</td>
<td>110</td>
</tr>
<tr>
<td>Mean</td>
<td>1.53</td>
<td>1.05</td>
<td>1.35</td>
<td>1.40</td>
<td>2.33</td>
<td>2.00</td>
</tr>
<tr>
<td>Range</td>
<td>0 – 9</td>
<td>0 – 7</td>
<td>0 – 7</td>
<td>0 – 9</td>
<td>0 - 30</td>
<td>0 – 10</td>
</tr>
<tr>
<td><strong>Number of hours:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>436.5</td>
<td>282.0</td>
<td>349.0</td>
<td>552.5</td>
<td>609.5</td>
<td>533.0</td>
</tr>
<tr>
<td>Range</td>
<td>2.5 – 59.5</td>
<td>2 – 40</td>
<td>1 – 50</td>
<td>2 – 152</td>
<td>2 – 85</td>
<td>1 – 72</td>
</tr>
<tr>
<td><strong>Number of people:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>196</td>
<td>155</td>
<td>203</td>
<td>220</td>
<td>275</td>
<td>341</td>
</tr>
<tr>
<td>Mean</td>
<td>7.26</td>
<td>7.38</td>
<td>10.15</td>
<td>8.46</td>
<td>11.00</td>
<td>12.18</td>
</tr>
<tr>
<td>Range</td>
<td>2 – 20</td>
<td>1 – 23</td>
<td>1 – 44</td>
<td>1 – 24</td>
<td>1 – 35</td>
<td>1 – 42</td>
</tr>
<tr>
<td>% went boating</td>
<td>57.4</td>
<td>48.9</td>
<td>44.0</td>
<td>56.2</td>
<td>51.0</td>
<td>57.1</td>
</tr>
</tbody>
</table>

As shown in Table 3.3, more boaters reported using their vessel on a weekday (46%) than either a Saturday or Sunday although may have been the result of collecting the data during the summer holiday period. There was no difference between weekday and weekend boat use (46% and 50% respectively). The two most common reasons for boating were fishing (56%) and cruising (30%). Overall, 34% of all trips were spent in sheltered waters while 24% were spent in open waters close to shore (ie, open sea within 2nm of mainland)

Table 3.3  Day, purpose and location for each month and total

<table>
<thead>
<tr>
<th>Month</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>47</td>
<td>45</td>
<td>50</td>
<td>48</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Day</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekday</td>
<td>27</td>
<td>25</td>
<td>30</td>
<td>32</td>
<td>72</td>
<td>55</td>
<td>241</td>
</tr>
<tr>
<td>Saturday</td>
<td>24</td>
<td>13</td>
<td>22</td>
<td>29</td>
<td>17</td>
<td>28</td>
<td>133</td>
</tr>
<tr>
<td>Sunday</td>
<td>33</td>
<td>21</td>
<td>22</td>
<td>20</td>
<td>18</td>
<td>14</td>
<td>128</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td><strong>Purpose of trip</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing</td>
<td>62</td>
<td>38</td>
<td>35</td>
<td>38</td>
<td>74</td>
<td>53</td>
<td>300</td>
</tr>
<tr>
<td>Cruising</td>
<td>14</td>
<td>14</td>
<td>26</td>
<td>27</td>
<td>38</td>
<td>42</td>
<td>161</td>
</tr>
<tr>
<td>Racing</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>6</td>
<td>27</td>
</tr>
<tr>
<td>Scuba diving</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Water ski/towing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>24</td>
</tr>
<tr>
<td><strong>Where did they go</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>River</td>
<td>21</td>
<td>10</td>
<td>12</td>
<td>3</td>
<td>12</td>
<td>14</td>
<td>72</td>
</tr>
<tr>
<td>Lake or dam</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Inlet, estuary, bay/sheltered waters</td>
<td>20</td>
<td>24</td>
<td>20</td>
<td>29</td>
<td>39</td>
<td>46</td>
<td>178</td>
</tr>
<tr>
<td>Open sea within 2nm of mainland</td>
<td>13</td>
<td>7</td>
<td>22</td>
<td>25</td>
<td>46</td>
<td>13</td>
<td>126</td>
</tr>
<tr>
<td>Open sea 2nm - 5nm from mainland</td>
<td>11</td>
<td>7</td>
<td>13</td>
<td>5</td>
<td>4</td>
<td>21</td>
<td>61</td>
</tr>
<tr>
<td>Open sea over 5nm from mainland</td>
<td>19</td>
<td>9</td>
<td>7</td>
<td>12</td>
<td>16</td>
<td>16</td>
<td>80</td>
</tr>
</tbody>
</table>

n = 47; n = 45; n = 50; n = 48; n = 49; n = ; * multiple responses allowed
Figure 3.1 shows the average number of trips, hours per trip and persons per trip separately for vessel type. However, due to the low numbers, these results should be interpreted with caution and further investigation with a larger study is recommended. As shown, there were more trips reported by yachts. This may reflect that these boaters are members of a yacht club and participate in weekly social cruising on a regular basis.

Figure 3.1 Average number of trips, hours per trip and persons on board per trip by vessel type
4. DISCUSSION

4.1 Findings

The purpose of this study was to determine the most appropriate method for collecting exposure information from recreational boaters in WA. In addition, five data items were collected for each trip made by participants and this exposure data summarised.

In comparison to registered recreational vessels WA (for 2004), our sample reflected the proportions of both the type and length of vessels owned by Western Australians. Open boats, runabouts and cabin cruisers were the most commonly owned vessels both in the registered recreational vessels data base and in our sample. Participants in our study were characterised by their male gender, middle age range, large amount of experience in operating a vessel and their ownership of smaller rather than larger vessels (however this may be a reflection of the method of using boat ramps to recruit boaters). Very few females were involved in the study generating more evidence that few females operate and own vessels. The age of our boaters was similar to the ages of boaters in another study and overall years of experience operating a vessel was also remarkably similar (Department for Planning and Infrastructure, 2003). The only noticeable difference was that participants in our sample had owned their vessels for a shorter period of time compared to participants in the DPI study. A possible explanation for this is that recruitment began during the cooler winter/spring months and new vessel owners may have been more likely to be boating during this period due to the ‘novelty’ factor.

In terms of exposure information, 46% of participants did not use their boat at all during the six month period. Of those that did use their boats they spent an average of 64.1 hours on the water and made an average of 9.7 trips each month. There is little recreational boating exposure literature to compare our results with. A prospective survey of professional and recreational boaters conducted by Ciraulo, Smith and Ciraulo (2000) estimated that recreational boaters spent a mean of 75.8 days boating per year. It is difficult to calculate an annual number in this study as we only collected six months worth of data and it is not appropriate to extrapolate these for the autumn and winter months.
Recruitment was the most significant challenge for this study, however once the recreational boaters initially agreed to participate in the study and returned their diary data for the first month, they tended to remain in the study until the end. Recruitment at boat ramps (18%) gave a lower refusal rate than recruiting at boat shows (51%). Despite this, recruiting at boat shows proved to be more time efficient and allowed access to a larger and more random sample of boaters (and vessels) from both metropolitan and regional areas.

In addition to collecting exposure information, the pilot was also designed to trial compliance and ease of use of two types of boating diary and to test different methods of collection (mail, phone and email). The advantage of the fridge diary was that it would act as a visual reminder to boaters, as one of the perceived challenges of the study was getting boaters to routinely remember to fill out their diaries. However the fridge diary only allowed participants to fill out details for one month and had to be erased before the next month’s information could be recorded. Anecdotal information suggested that some participants did not place the diary on their fridge. The advantage of the paper diary was that it could be kept as a logbook and participants appeared to get into a routine with regards to sending the records back, whereas fridge diary participants awaited a telephone call. Getting the timing right for fridge participants to report then erase the month’s data ready for the next month was difficult and would not be possible or practical in a much larger study.

The boating diary was an effective method for collecting boating information and was used with ease by participants. All participants recorded their information correctly and little clarification was required by researchers. Being mindful that the duration of a six month diary may induce respondent fatigue, reminders were given at the beginning of each month, followed by phone contact if necessary. Without contact, it is anticipated that diary completion rates would have been much lower. Email reminders were successful and inexpensive and could be used as a monitoring tool to see when the email was read by using the ‘read receipt’ function. Telephone reminders improved completion rates, particularly for those who had been sent two emails previously. With time, participants became more at ease with the diary process, some no longer requiring their monthly reminder. While there were no
inducements or financial incentives offered to the participants a newsletter was sent half way through the study to motivate boaters to stay involved.

This was a pilot to test the methods for recruitment and data collection. A much larger study would be necessary to provide representative data for exposure. However, to illustrate the use of exposure information:

1. Average number of days per 6 months a boater was on the water = 9.5 days
2. Average number of hours per day spent on the water = 6.6
3. Average number of boat occupants per outing = 3.2
4. Number of registered vessels in WA = 74,000

We can calculate that there were 1.28 trips per 10,000 registered vessels and that there were 0.89 hours per trip spent on the water during the six months per 10,000 registered vessels. Using a larger sample across a range of vessels, annual estimates can be calculated based on vessel type.

4.2 Limitations

The sample size was very small with only 55 recreational boaters providing information. This is in no way representative of the 74,000 registered recreational vessels in WA. However this was a pilot of the methods, and the data did give some indication of the boating activities of a sample of recreational boaters. A much larger study would need to be undertaken to draw any firm conclusions from the exposure information.

In the post-diary interview, participants were asked if they considered their boating during the six months of data collection to be representative of what they would consider their normal boating during those months. The weather during the six month period was uncharacteristic and may have resulted in participants making fewer boating trips. The general consensus was they would normally do more boating than what had been reported during the study, with the weather having the greatest influence on their boating behaviour as well as being busy with work and other activities. No other factors were consistently mentioned as contributing to not boating. Damaged vessels (two boaters) and a local boat ramp which was unusable for several months (one boater) were other issues that prevented boating activities.
While participants were asked to complete a trip entry immediately after they had been boating, there was evidence from the post-diary interview that this was not always the case. Several participants indicated that they did not enter their information for some time after the occasion and perhaps only when they received the reminder from the research team. Even if the diary had been forgotten, boating activity that had not been recorded in the diary could still be collected over the telephone with minimal concern about recall bias influences. With the diary records retrieved on a monthly basis, participants could more easily recall data. The participants indicated that they found the diary easy to use.

4.3 Conclusions
The aim of the boating diary tool was to collect valid boating exposure information by maximizing recall accuracy. The success of the boating diary depended on collecting information from boaters on a regular basis and using a contact method which would meet the individual needs of participants. Recruiting at boat shows, using a paper based boating diary and contacting participants either on the telephone or through email using a ‘read receipt’ function were the most effective methods for collecting the boating exposure information. The most important issue was to ensure that the method suited the participant.

4.4 Recommendations
This was a pilot of a boating diary method for collecting recreational boating exposure, and although the sample was deliberately very small, the characteristics of the sample were reasonably representative of boaters across the State. A much larger study would be required if any meaningful analysis of exposure data was to be performed. Therefore the recommendations from this study for the further collection of exposure information would include:

- the use of professional recruiters at boat show events;
- a paper-based diary format;
- using contact methods flexible to the needs of participants, with email being the most time and cost-effective for both the participant and the researcher; and
- the collection of data for a minimum time period of 2 years.
While the exposure data in this study is less reliable due to such a small sample, if the study was repeated on a much larger scale, the resulting data could be used to further explore exposure across different types of vessels.
REFERENCES


Pikora, T. & Cercarelli, L.R. (2004) Quantifying boating-related fatalities, injuries and incidents in Western Australia. Perth, Western Australia, Injury Research Centre, School of Population Health, the University of Western Australia.
APPENDIX 1 – Boating Diary Participant Information Sheet
Participant Information Sheet

Boating Diary Study

You are invited to participate in a study on Marine Safety being conducted by researchers from the Injury Research Centre at the University of Western Australia. You have been asked to participate because you are a recreational boater.

As part of this study we are asking recreational boaters to complete a Boating Diary each time they go boating over a six month period. The Boating Diary collects information about the day of the week you use your vessel, the length of time you use your vessel on the water, where you go, how many people are on each trip, and the type of activities that the vessel is used for (eg. fishing, cruising). This information will help us to understand the risk of injury among recreational boaters.

For this study we require your full name and contact telephone number and you will also need to sign a consent form. We will telephone you and ask you for a postal address to mail a Boating Diary kit. We will also conduct a 5-minute survey. In this survey we will ask some questions about your vessel(s) and how you use your vessel(s).

This study gives you an opportunity to find out how often you use your vessel(s). You will also be contributing to a research project which aims to improve marine safety for recreational boaters in Western Australia. A summary of the findings will be sent to you upon completion of the study.

All information you provide is confidential and you will not be able to be identified. You will be free to withdraw from this study at any time without needing to give a reason for your decision.

This project is supported by funding from the Marine Safety Directorate at the Department for Planning and Infrastructure Western Australia and has received ethics approval from the University of Western Australia.

Should you have any questions please contact Heather Williams on (08) 6488-1672 or Dr Terri Pikora on (08) 6488-7057.
APPENDIX 2 – Telephone Interview
Telephone Survey
Boating Diary Study

Good morning/afternoon/evening. My name is ___________________ and I am calling from the Injury Research Centre at the University of Western Australia. Could I speak to [name on consent form]?

If person not home/available ask when is the best time to catch them.

Good morning/afternoon/evening. My name is ___________________ and I’m calling from the Injury Research Centre at the University of Western Australia. We are doing a study on Marine Safety and have been recruiting boaters at boat ramps/the boat show for our study. You kindly agreed to participate in the study and signed a consent form. Providing you are still interested in participating I would like to tell you a bit more about the study and run through a quick survey.

Is now a convenient time for you? Is there a more convenient time I can call you? (if not make a date and time for the interview, check contact details, thank participant and end call).

We are undertaking a program of research into marine safety to help us understand the risk of injury among recreational boaters. We are interested in finding out the days that you go boating, when and how often you take your vessel out, how long you spend on the water, where you go and how many people are on each trip. To do this we would like to ask you a few questions today and then send you a Boating Diary. We are asking you to use this Diary to record information about your boating trips for the next 6 months.

Today’s survey will take about 5 minutes of your time. Your participation is voluntary. None of the questions are compulsory and you are free to stop the interview whenever you wish. Your responses are confidential and the interview will not be tape-recorded.

Would you mind answering some questions now please?

SECTION A – THE BOATER

The survey starts with just a few questions about you…

A1: [Note down gender]
Male 1
Female 2

A2: Can you tell me how old you are? __________ years

A3: What boating education courses have you completed?
- BoatSmart certificate 1
- TL3/ Proficiency in small craft safety course 2
  (includes small craft safety course, national powerboat handling course & small boat proficiency course)
  - Commercial course 3
  - Other 4
  - None 5
A4: How many years have you been operating a boat? _________ years

SECTION B – THE VESSEL

The next set of questions are about the vessels in your household. When I say vessel I mean any kind of boat, ship or other craft, designed for operation on water, regardless of size or means of propulsion. For example, open boats, yachts, inflatables, canoes and kayaks are all included under the term vessel.

**B1:** What type of vessel or vessels do you have in your household? *Prompt from the list of vessels on the table*

**B2:** What is the length of that vessel?

- Less than 5 metres (less than 15 feet) 1
- 5 to 10 metres (15 to 30 feet) 2
- 10 to 20 metres (30 to 65 feet) 3
- Over 20 metres (over 65 feet) 4

**B3:** Can you tell me the registration number of that vessel?

*If respondent is hesitant assure them - we are not checking to see if your vessel is registered. We are independent researchers and the research we do remains confidential.*

<table>
<thead>
<tr>
<th>B1: Vessel type</th>
<th>B2: Size (metres/feet)</th>
<th>B3: Registration number</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Open boat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Runabout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Cabin cruiser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Half cabin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Yacht</td>
<td></td>
<td>If no motor, N/A</td>
</tr>
<tr>
<td>☐ PWC (jet ski)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Centre console</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Ski boat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Inflatable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Multihull</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Fishing boat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Dinghy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>☐ Houseboat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Racing boat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Launch (displacement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Canoe</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>☐ Kayak</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>☐ Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B4:** Of the vessels you have told me about, how many have you used in the last 12 months? _________

**B5:** Which vessel/s do you use most often? __________________________

**B6:** How long have you had this vessel?

**SECTION C – DETAILS FOR BOATING DIARY**

I’d now like to collect some information from you that will make contacting you during the rest of the study a little bit easier.

**C1:** How would you prefer we contact you in future, by phone or by email?

Email address___________________________________

**C2a:** *If by phone:* is this the best telephone number we can contact you on?

Yes

**C2b:** *If not:* is there an alternative contact telephone number we can contact you on?

Alternative contact______________________________

**C3:** Can you please tell me your postal address so that I can mail out the Boating Diary Kit to you?

_____________________________________________________________

_____________________________________________________________

The Boating Diary should be filled out by yourself and is about the boating that you do. The Boating Diary allows you to fill out information for up to two vessels. We would suggest that you fill it out for your ___vessel type____ and your ___vessel type___ as they appear to be the vessels that you use the most.
Randomly assign the respondent to either Group 1 or Group 2.
[Read out Group 1 or Group 2]

| Group 1 |
The Boating Diary can be placed on your fridge or somewhere else convenient and a whiteboard pen is included with the Kit. We recommend that each time you go boating you fill out the Diary. At the beginning of each month we will contact you and ask you to provide us with the information you recorded for the previous month.

| Group 2 |
The Boating Diary has a page for each month. Each time you go boating you will need to fill out the diary and when the month is over, tear off the page and mail it back to us in the envelopes we provide.

The Boating Diary kit will contain an information letter and an example, but you are free to contact us at any time if you are unsure of what to do or if you want some more information about this study.

(Name of interviewee) ____________ this completes all the questions I need to ask you. Please expect your Boating Diary Kit to arrive in the mail in the next couple of weeks. Thank you very much for your time. Your continued participation in the study is very important to us.
Month

vessel type and size

<table>
<thead>
<tr>
<th>Day of the week (eg. Sat)</th>
<th>Trip 1</th>
<th>Trip 2</th>
<th>Trip 3</th>
<th>Trip 4</th>
<th>Trip 5</th>
<th>Trip 6</th>
<th>Trip 7</th>
<th>Trip 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of hours spent on the water?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose of the trip?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where did you go?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of people on board?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Purpose of the trip:  
1 - Fishing  
2 - Cruising  
3 - Racing  
4 - Scuba diving  
5 - Water ski/towing  
6 - Other (specify in box)

2Where did you go:  
1 - River  
2 - Lake or dam  
3 - Inlet, estuary, bay or sheltered waters  
4 - Open sea within 2 Nautical Miles from the mainland  
5 - Open sea between 2 and 5 Nautical Miles from the mainland  
6 - Open sea over 5 Nautical Miles from the mainland
Thank you for being part of the Boating Diary pilot study. This is an update to let you know what’s been happening with the study. We also wanted to show the type of information we have been collecting over the past four months and how this information can be used.

First of all, just a bit of housekeeping ... a couple of people have sold their boats so we would like to thank them for participating in the study while they were boat owners. We’d also like to welcome the boaters who joined us in October.

A reminder that the study will finish at the end of January - so hang in there; only two months to go! Remember, it’s never too late to send back your diary information if it’s lying around. We’re always happy to receive it.

Who is in the study?

We have 55 recreational boaters involved in the study across the state:
- 93% of these are male
- 62% are aged over 40 years; with a range of ages between 19 and 70 years
- 25 reside in the metropolitan area, while 30 are regional residents
- 49% have not completed any type of boating education course
- 51% have more than 20 years experience operating a vessel
- 31% of vessels owned by our participants are runabouts; 18% are open boats. There are a small number of other vessels including cabin cruisers, half cabins, yachts, centre consoles, ski boats, dinghies, jet skis and kayaks.
- 54% of participants have owned their vessel for more than one year
A snapshot of the results so far ...

August
60% of participants went boating during August. Of those that did go boating, there were a total of 84 trips and a total of 436 hours were spent on the water. 51% of these trips were made in the open sea; 74% of the trips were for fishing.

September
49% of participants went boating during September. Of those that did go boating there were a total of 57 trips and a total of 282 hours were spent on the water. 58% of these trips were in rivers, inlets, estuaries, sheltered waters and bays; 65% of the trips were for fishing.

October
48% of participants went boating during October. Of those that did go boating there were a total of 66 trips and a total of 335 hours spent on the water. 55% of these trips were made in the open sea; 44% of the trips were for fishing.

Overall results for August, September and October
52% of participants went boating during the 3 month period; 63% either went boating alone or took one other person with them; 62% spent their time fishing and 25% cruising; 49% went out to sea while 30% stayed in inlets, estuaries, bays or sheltered waters.

Thank you for your time and participation. Wishing you safe and happy boating over the holiday period.

Terri Pikora and Heather Williams