

## METHODOLOGY

Through consultation with 'experts'<sup>11</sup>, several groups were identified as the primary users of the Shoalwater Bay area. These groups were recreational fishers, cruising and yachting folk and some local kayakers.

As the research brief specified quantification of recreational use of the Shoalwater Bay area, quantitative methods were predominantly used to determine the usage patterns of the above groups. The key methods used to gather the quantitative data were user surveys and secondary analysis of existing data bases and sources. Some qualitative methods were included in order to elaborate on usage patterns. The qualitative methods included open ended questions in the surveys and use of a modified version of the delphi technique (Moeller and Shafer, 1994: 475).

Preliminary discussions with the Great Barrier Reef Marine Park Authority (GBRMPA) and Rockhampton Department of Environment (QDoE) indicated that some secondary data bases and sources would not yield complete sets of secondary data sources. Furthermore, the timing of the data collection would confound the representation of in-transit cruising yachts to the area<sup>12</sup>. Consequently, up to five methods of data collection were developed for this study. This number allowed triangulation of analysed data from various perspectives. It should be noted however, that the use of triangulation was not applied in order to correct any bias nor to improve validity (Blaikie, 1991: 115). It was used primarily to achieve various perspectives regarding the recreational usage patterns of the Shoalwater Bay area.

A discussion of each of the methods of data collection follows.

### Quantitative Methodology: User surveys

Four types of user surveys were used: mail surveys; club surveys; self selection surveys and commercial operator surveys. Each of these surveys used the same structure and content [Refer to Appendix 1]. Each survey included a cover page, asked twenty questions and utilised maps to orient the respondent to the Shoalwater Bay study area. The questions ranged from forced choice questions which were measured at the nominal, interval and ordinal level to open ended questions. Questions relating to usage patterns and activities were measured primarily at the nominal level, several questions were posed as open ended in order to determine frequency of usage as well as the date of the last visit to the area. The respondents were also asked to locate their usage patterns on a map.

A second map was used to assist respondents in determining the types of activities which they believed were acceptable within various sections of the Shoalwater Bay area. The activities listed were taken from the 'Activities Guide' presented on the *Great Barrier Reef Marine Park Authority, Shoalwater Bay BRA Q120 Map*. The associated questions were measured at the ordinal level. The sections drawn on Map 2 were determined by the Planning Officer: Shoalwater Bay, the Project Officer: Shoalwater Bay and QDoE personnel. Each survey was accompanied by a cover letter printed on Central Queensland University letterhead [See Appendix 2].

The difference between each of the surveys relates to the implementation process. In the first type, the mail survey, local recreational users<sup>13</sup> were mailed a survey with a reply paid envelope included.

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<sup>11</sup> The 'experts' consulted were primarily selected by purposive sampling methods. Snowball sampling also occurred as 'experts' would nominate other 'experts' who had extensive local knowledge of the Shoalwater Bay and adjacent waters area. The 'experts' included recreational club executives and members, long term recreational users of the Shoalwater Bay and adjacent areas, as well as management agencies' representatives with first-hand knowledge of usage patterns developed over the years from work experience in the area.

<sup>12</sup> As the study was administered primarily during cyclone season, the number of cruising yachts in the Shoalwater Bay area would be reduced compared to the post-cyclone cruising season.

<sup>13</sup> Local users were considered to be those users located in coastal towns and cities along or east of the Pacific Highway commencing with Mackay in the north and Gladstone in the south.

The sample for this survey was framed from boat registration records held by the Queensland Department of Transport. The sampling frame was received in late March, 1996 and was up-to-date for the preceding six month period.

The second type of survey attempted to use a captive group survey technique with various recreational clubs. A captive group refers to a group of people belonging to an organisation/group who are targeted to respond to a survey at an organisation/group meeting following negotiation with the executive and/or members of the organisation/group (Veal, 1992, 117-118). Participants in this survey were asked if they had already participated in either a mail, a club or self-selection survey to avoid doubling up on data collected.

The third type of survey was the self selection survey. From discussions with 'experts', various locations were nominated as the sites for distribution of self selection surveys. After negotiation with managers/staff at the nominated sites and commercial businesses, surveys were left for the public to collect. The sites and businesses used were primarily bait and tackle shops, general stores and take-away shops, marinas and a coast guard office.

The fourth type of survey was the commercial operator survey. Again from discussions with 'experts' and GBRMPA and QDoE records, all possible known commercial operators of recreational marine activities were contacted by mail and asked to participate in the survey.

### ***Sampling information***

The following sampling procedures were applied for each type of survey.

#### **Mail surveys**

Mail surveys only targeted local users as 'experts' considered they were the primary users of the Shoalwater Bay area. During the study period, any non-local users of the area interested in participating in the study were able to do so through the completion of self-selection surveys (to be discussed later in this report)<sup>14</sup>. Boat registration records formed the basis of the sampling frame. The sampling frame was proportionately stratified based on experts' opinions regarding usage of the Shoalwater Bay area by recreationalists from the following drawing areas: Mackay; Sarina; St Lawrence; Marlborough; Yeppoon; Rockhampton and Gladstone. The largest drawing areas and subsequently the largest proportions were considered to be Yeppoon followed by Rockhampton. In the research proposal, the sampling frames were to be further stratified by vessel type, however, since a study of yachts and other non-local vessels was being undertaken elsewhere, the sampling frame for the mail survey was proportionately sampled by location only. However, it should be noted that the sampling frame did not exclude sail driven vessels, both motor and sail driven local vessels had an equal chance of being selected within the proportionately stratified sampling process.

As the mail survey used probability sampling, specifically proportionate stratified sampling, the proportions were determined by using the formula:

$$\text{Size} = \frac{pqZ^2}{E^2}$$

A confidence level of 95% was chosen for the study, making  $Z=1.96$  ( $Z^2=3.8146$ ). A deviation of no more than 5% from the true proportions was tolerated, making  $E=5$ .  $p$  was the percentage of recreational users from each of the nominated locations whom experts believed used the Shoalwater Bay and adjacent waters, whilst  $q=100-p$ . Table 1 below details experts' opinions values for 'p', as well as proportionate sample sizes and the adjusted sample sizes to make the overall sample size

<sup>14</sup> A study of non-local transient users supplements this study of local users of the Shoalwater Bay and adjacent areas. The non-local users study was conducted from July 1996 through to June 1997. This study aimed to develop a better understanding of non-local usage patterns of the Shoalwater Bay and adjacent waters area through the use of 'on-site' surveys distributed by various boating officers whilst on patrol and through self-selection surveys sent to various marinas and non-local boating club avenues.

1200. The size was set at 1200 as this would provide a 95% confidence interval for a finding of 50% of  $\pm 3.0\%$  (Veal, 1992: 155).

After the proportions were determined for each of the locations, each location was further proportionally stratified by suburbs. The sampling fraction ( $k=N/n$ ) was used to determine the interval between each sample unit for each suburb. Starting points on the sampling frame were found by randomly selecting a number from *A Random Table of Five Digit Numbers* (Neuman 1994: 468 - 471). Should the population of any location be in the thousands, the last four digits of the randomly selected number were used, if the population was in the hundreds, the last three digits of the randomly selected number were used as the starting point and so on down to the tens. If the randomly selected number was beyond the scope of the population, another random selection was made. In the case when there were only two units for any one suburb, a coin was flipped to determine the unit to be used in the sample. Heads equated with the first unit listed and Tails with the second unit listed.

#### Response rate

Of the 1200 surveys sent out, 50 were returned as a result of incorrect addresses, 50 telephone calls were received from people indicating that they did not use the area and would not be returning their surveys. Attempts were made to have these people return their surveys with responses to questions 1, as well as questions 14-20, some telephonees indicated they would respond to those questions and return the surveys, however, the majority of telephonees chose to use the telephone call as the means of identifying non-use of the area. Details of the latter were recorded on survey sheets and included in the analysis.

**Table 1: Summary of Proportionate Stratified Sampling Details**

Location	Registered Boat owners	Experts' opinion: value of 'p'	Value of 'q'	Proportionate sample size	Sample size
Mackay	3690	10	90	138	149
Sarina	579	5	95	73	76
St Lawrence	17	ALL*	-	17*	20
Marlborough	19	ALL*	-	19*	19
Yeppoon	842	40	60	366	406
Rockhampton**	2462	35	65	347	382
Gladstone	2605	10	-	137	148
<b>Total</b>	<b>10214</b>	<b>-</b>	<b>-</b>	<b>1034</b>	<b>1200</b>

\*\* Rockhampton has three postcode areas: 4700; 4701 and 4702. Due to the budget of this study limiting the overall sample size to 1200, only two of the three postcodes were used. The postcodes were decided by the lottery method, the postcodes 4700 and 4701 were used for this study.

\* As the population of registered boat owners in St Lawrence and Marlborough was small, all owners were included in the study.

To improve the response rate, a reminder card was sent approximately one week after the survey was posted. Survey recipients were advised in the initial cover letter accompanying the survey that a reminder card would be used. The reminder served as both a thank you and a reminder to those who had not yet returned the survey [See Appendix 3]. It should be noted that surveys and reminders for Rockhampton residents did not arrive a week apart as mail deliveries did not occur on two days of one week due to two public holidays resulting in some reminder cards arriving one or two days after receipt of the survey.

**Table 2: Response rates for Mail, Club and Self Selection Surveys**

Survey	No. distributed	Returns	Completed	Response rate
Mail	1200	50	400	33.0%
Club	290	20	40	13.8%
Self-selection	350	-	39	11.0%
Commercial operators	11	-	6	54.6%

Neuman (1994: 239) noted that a response rate of between 10 - 50% is common for mail surveys. Babbie (1994: 182) stated that 50% response rates are considered adequate for analysis and reporting. While Frey (1989: 50-51) noted that 25-30% response rates may be achieved without a

reminder and up to 50% with two or more reminders. Given the random sampling method undertaken, application of the results as being representative of the registered boat owners is problematic. Since 100% of the sample did not return their surveys, the findings may be argued as not being representative. On the other hand, given that the sample was randomly selected and 400 surveys were completed and returned, a sample of 400 provides a 95% confidence interval for a finding of 50% of  $\pm 5.0\%$  (Veal, 1992: 155). The proportions of the 400 respondents to the survey reflect the proportionate sampling set for the survey (Refer to p. 37). Any use of the mail survey findings of this study must take into account the response rate.

While the mail survey used probability sampling, two types of non-probability sampling were also employed in this study as well as a saturation survey. These other sampling methods included:

- \* Purposive sampling, specifically captive group surveys for the club surveys;
- \* Accidental sampling for the self selection surveys; and
- \* A saturation survey of commercial operators.

### **Club surveys**

The surveys of clubs was based on purposive sampling. That is, the sample frame was not designed to be statistically representative, rather it was viewed by the 'experts' consulted as being able to provide relevant data for the study (Sarantakos, 1993: 138). The clubs nominated were believed to be representative of recreational users of the study area who were also club members. All clubs identified by the 'experts' were approached by mail to participate in the study. The approach to all four groups of samples was by letter in order to remove any bias associated with the survey. A second letter was sent to thank clubs for participation and also to increase response rates (Refer to Appendix 5).

The clubs approached were local sailing, sea kayaking and fishing clubs (See Appendix 4). The executives were asked if they might distribute the surveys at a club meeting. After discussions within the various clubs, those in agreement were asked to participate in the study by completing the survey and then to return it in the reply paid envelope.

### **Response rate**

Of the 290 surveys sent to clubs, 20 were returned as incorrectly addressed, and 40 were completed giving a response rate of 13.8%. Returned surveys were not factored out of the calculation of the response rate. Refer to Table 2.

### **Self Selection Surveys**

Accidental sampling through self selection surveys was conducted at locations where experts believed the survey would be completed by users who were not club affiliated or who did not attend club meetings. The list of locations used is presented in Appendix 6.

As with purposive sampling, accidental sampling is not designed to be statistically representative. Being a non-probability sampling technique, it provides access to informants whose information could not have been accessed in any other way because of the study's limited funds, personnel and time.

### **Response rate**

Of the 350 self-selection surveys distributed to various locations, 39 were returned providing a response rate of 11.0%. Refer to Table 2.

### **Commercial operator surveys**

A saturation sample was attempted with the commercial operators. Based on GBRMPA database records and expert opinion, all known local recreational commercial operators using the Shoalwater Bay area were sent a survey. The number of commercial operators known to use the area was eleven (11). A follow-up letter was posted to increase response rates.

#### **Response rate**

Of the eleven surveys posted, six were returned providing a response rate of 54.6%.

#### ***Ethical Considerations***

The cover letters addressed ethical issues related to the study. Advertisements were also placed in local newspapers. (Morning Bulletin, Gladstone Observer) See Appendix 7.

#### **Quantitative Methodology: Secondary data sources**

GBRMPA and QDoE collect data on vessels in the Shoalwater Bay through aerial surveillance. These data sets were accessed and provided secondary data for this study. The Army was also approached regarding access to any records it may have of vessel sightings in the area, whilst co-operative, a database for the recording of such data was only being established early in 1996 and was not operational at the time of this study. Local coastguards were also approached and indicated a willingness to provide information regarding vessel usage of Shoalwater and adjacent waters. However, data were unable to be collected within the time frame of the study. Consequently, this study only reports on secondary data collected from the aerial surveillance databases of GBRMPA and QDoE. Data were analysed using content analysis in order to identify themes (Crandall, 1994: 420).

#### **Qualitative methodology**

Two types of qualitative data collection were used in this survey: open ended questions and a modified delphi technique. Open ended questions were included in each of the surveys and the modified delphi technique was used with experts to gather information and to gain feedback on the study's findings.

#### ***Open ended survey questions***

These questions allowed respondents to give their own views rather than being restricted to the survey instrument's selection of choices. The survey contained three questions which asked for comments by the respondents: Questions 11, 13 and 20 (refer to Appendix 1). A content analysis of the responses to these open ended questions was applied to determine themes, these themes were then tabulated and quantified for each survey type. Copies of the full text responses to these questions have been included in the Appendices 11, 12 and 13.

#### ***Modified Delphi Technique***

Initially it was hoped that a round of focus groups could be conducted at the conclusion of the study in order that 'local experts' might provide feedback on the findings obtained from the analysis of the surveys. However, given the difficulty experienced in contacting local experts initially and obtaining information and feedback within time frames set in the first stages of survey construction and sampling, it was decided that the application of a modified version of the delphi technique would be applied. One or two rounds of the technique had already been conducted during the initial stages of the study to gather information on usage patterns, the data were recorded from those rounds, a follow-up round was conducted after the analysis of all survey data. The delphi technique supported the findings of the survey research. Feedback from local experts, who were members from various peak user groups and local residents with a knowledge and familiarity of the study area, reiterated the same usage patterns. The technique was conducted by telephone and facsimile.

Primarily, the delphi technique involves several rounds of questioning experts in fields or areas related to the focus of a study. Usually, the questioning is directed at achieving consensus regarding future events. Between rounds, responses are collated and analysed. In summary:

*"The Delphi Technique is one well-known version of the consensus approach in which the opinions of experts are obtained iteratively in order of focus on most probable future conditions." (Ritchie in Ritchie and Goeldner, 1994: 19)*

In this study, the experts were asked to offer information on current usage patterns rather than future oriented events or issues.

### **Conclusion to Methodology Section**

By drawing on existing primary data sources (Department of Environment and GBRMPA data bases) and using these as secondary data sets for this study as well as collecting primary data through user surveys and a modified delphi technique, the study generated a broad base of data from which to determine usage patterns and trends in the Shoalwater Bay area. Moreover, in using a variety of methods, triangulation of the results was able to be applied in order to gain an overall perspective of the recreational usage patterns of Shoalwater Bay and its adjacent waters.