

## DISCUSSION

Usage of Shoalwater Bay and adjacent waters is primarily determined by Defence operations<sup>18</sup>, favourable weather conditions and sea states, and the amount of leisure time available to users. The main users of the area were Yeppoon and Rockhampton residents as evidenced by expert opinion and survey responses. Vessels in-transit either north or south of the study area also visited and used the area.

The exact number of users of the Shoalwater Bay area was difficult to quantify as each of the methods of data collection produced differing totals and each method had various constraints and/or biases associated with data collection and analysis. Specifically, those constraints and biases were:

- expert opinions were asked to provide estimates of the percentage of users from the various towns within the drawing area for the sampling process not exact figures for management purposes;
- aerial surveillance involved incomplete data sets and different patterns of data collection each year and little identification of boat registration<sup>19</sup>, consequently, a boat owner may be counted several times throughout any one year;
- mail survey respondents were asked to recall usage over a year which involves memory bias and also non-users did not always return surveys thus inflating the number of users of the area;
- both club and self selection surveys used non-probability sampling; and
- the commercial operator study did not achieve a saturation sample.

It is recommended that these biases need to be taken into account when interpreting and using the data for management purposes. That being said, quantification of usage was attempted based on the patterns of usage expressed in each of the methods of data collection in order to provide an estimated range regarding local user numbers.

On the basis of expert opinion estimates for percentages of users from major towns in the study area (see Table 1), it may be suggested that there were approximately 369 boats from Mackay, 29 boats from Sarina, 337 boats from Yeppoon, 862 from Rockhampton and 261 boats from Gladstone who were users of the area, making a total of 1 858 boat owner users of the study area. However, it should be remembered that the experts were only providing estimates to apportion percentages for the stratified sampling not to predict user numbers. Any use of these figures for decision making must take into account this fact.

According to aerial surveillance data, between the period of September 1988 to September 1995, there was a minimum number of 1 854 recreational user sightings. This number when averaged across seven years, suggested that there were 264 user sightings per year. This number however, is least reliable given that data collection patterns differed each year, recording of observations varied depending on the observer<sup>20</sup> and that repeat visitation by a user was unable to be discerned within the data sets<sup>21</sup>.

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<sup>18</sup> During 1995, various sections within the Shoalwater Bay Defence area (see Appendix 17) were closed for army operations for a composite total of 178 days. Some sections which were closed were small and therefore did not affect the usage of other sections. Within the southern section of Shoalwater Bay (Survey Map 2, Section B, see Appendix 1) the area was closed for approximately 122 days while the area around Triangular Island was closed for an additional 49 days. The outer coastal areas (Sections C, D, E, Survey Map 2, see Appendix 1) were closed for a total of 58 days. The entire defence area was closed for 18 days. Data regarding closures were obtained from Army Base Administrative Support Centre (Rockhampton).

<sup>19</sup> This was primarily a result of the registration numbers not being visible to surveillance observers.

<sup>20</sup> Readers are referred to page 21 of this report in respect to the validity associated with the use of aerial surveillance to determine usage patterns.

<sup>21</sup> This is not related to the inefficiency of observers, rather to the fact that the size of vessel registration numbers on some vessels was unable to be determined at the height of the surveillance flights or may have been obscured or missing.

The mail survey which was based on a probability sample indicated that 64% of users sampled used the Shoalwater Bay area. Transferring this percentage to the population of registered boat owners in the towns of Mackay, Sarina, St Lawrence, Marlborough, Yeppoon, Rockhampton and Gladstone represented a potential for 6 537 registered boat owners to use the area (see Table 1). The validity of this number must be questioned when some registered boat owners who were sent surveys did not return 'non - use' responses, thereby inflating the percentage of users of the area. Further, given that Yeppoon and Rockhampton residents are the primary users, total registered boat ownership at March 1996 for both locations was 3 304, this means that more than 3 233 registered vessels must be drawn from the other locations, which given expert opinion and survey evidence is not valid. Further analysis of the mail survey data by cross tabulating usage by postcode address indicated that the various percentages of users of Shoalwater Bay and adjacent waters for each of the locations mentioned above was Mackay (9.5%), Sarina (15.8%), St Lawrence (60%), Marlborough (92.3%), Yeppoon (92.3%), Rockhampton (75.4%) and Gladstone (17.4%). These percentages do not accord with expert opinion and reflect the bias of mainly user respondents. However, applying these usage percentages to the number of registered boats at each location implied that there were 3 587 registered local boat owners who could be users of the Shoalwater Bay and adjacent waters.

Club usage was hard to determine as various clubs indicated that they did not wish to provide information regarding usage in case it was misused by managers. Thus the 38 club members who responded regarding usage of the area may not be considered as a representative number of all club users. Self selection survey respondents reported a high usage pattern of the study area, however, their numbers were unable to be extrapolated to determine the number of non-affiliated or non-boat owners who also used the Shoalwater Bay and adjacent waters area as the sampling procedure applied was a non-probability one. Of the eleven commercial operators who were sent surveys, six indicated that they used Shoalwater Bay and the adjacent waters for some of their activities. Their usage patterns again can not be inferred to the remaining five commercial operators who did not respond.

Thus, for the purposes of management, given the inherent constraints and biases associated with each of the sets of data, the range of 329 - 3 587 local recreationalists might be used as an estimate given the various data sources and their inherent biases. This range is based on mail, club and self selection survey respondents who were users of the area and mail survey respondents' usage by postcode. Based on the fact that most survey respondents noted that they were accompanied by other users, the lower limit range estimate might then be considered a rather conservative one. Expert opinion estimates suggested some 1 858 vessels access the study area.

While the actual number of users was difficult to establish other usage patterns were more self evident, such as the number of days of usage. In regard to the mail survey respondents, the total number of days Shoalwater Bay and the adjacent waters was visited during June 1995 and June 1996 was approximately 3 106 days (see Table 18). Total club survey respondents' usage was approximately 244 days (see Table 41), while total self selection respondents' usage for the same period was approximately 352 days (see Table 64). As none of the respondents in each of the three survey groups had completed a survey in any of the other survey groups, the cumulative number of usage days approximated 3 702. The six commercial operator respondents accessed the area for a total of 44 days. The approximate days of usage fell within the ranges reported by Fitzsimmons (1996: 8.1 and 8.4) who suggested that based on recreational mackerel fisher diaries, the study area was fished between 1 000 and 10 000 boat days and commercial operators visited the area between "35 - 120 boat days per year".

Other patterns of usage were similarly less problematic than the quantification of users. To continue with these patterns, the means by which the study area was accessed was reported as:

- vehicular access and vessel access [expert opinion];
- vessel access and vehicular access [aerial surveillance];
- own vessel (83.2%) and vehicular access (44.5%) [mail survey respondents];

- own vessel (78.9%), club boat (31.6%), a charter boat (23.7%) [club survey respondents];
- own vessel (83%) and vehicular access (26%) [self selection survey respondents];
- all commercial operator respondents used their own charter boat for operations.

Thus, the two main methods of accessing the study area were by own vessel and by vehicular access. The latter was also used to tow vessels to appropriate launching points.

The main departure points for users were:

- Rosslyn Bay (59.5%) and Corio Bay (21.5%) [mail survey respondents];
- Rosslyn Bay (81.6%), Rockhampton (36.8%) and Corio Bay area (18%) [club survey respondents];
- Rosslyn Bay (51%) and Stanage Bay (31%) [Self selection survey respondents];
- Rosslyn Bay (4 operators) and Gladstone (2 operators) [commercial operator survey respondents].

In reviewing all of the appropriate data sets, Rosslyn Bay was the main departure point for survey users to reach the study area.

In the order of popularity reported within each of the various means of data collection, the key areas of use were:

- Five Rocks area, Corio Bay, Port Clinton and Stanage Bay area and Island Head Creek [expert opinion];
- Section A of Shoalwater Bay (northern section of the bay), Island Head Creek, Section E, then Corio Bay and Port Clinton [aerial surveillance];
- Corio Bay, then Island Head Creek area and between Cape Manifold and Cape Clinton, with the area between Five Rocks and Cape Manifold being the lesser used areas of the three sets of locations [mail survey data];
- Corio Bay then Port Clinton and its immediate environs [club survey data];
- Island Head Creek, the northern section of Shoalwater Bay (Section A on Survey Map 2), the southern section of Shoalwater Bay (Section B on Survey Map 2), then Port Clinton [self selection survey data];
- Island Head Creek and Port Clinton [commercial operator survey data].

Given the number of times locations were referenced in the various data sets, Port Clinton followed by Island Head Creek were the main locations sought as recreational areas, then Corio Bay and Five Rocks, and the northern section of Shoalwater Bay including Stanage Bay. However, such a ranking has an inherent bias as not all data sets were collected in the same manner, nor were sample sizes the same. That being said, the six data sets provide evidence of a trend, that being that the afore nominated areas are the ones chosen as key recreational sites within the study area. This trend is similar to that reported by Fitzsimmons (1996: 8.1) who noted that the key recreational fishing locations were Corio Bay, Cape Manifold, and Port Clinton areas as well as Nine Mile Beach and Stanage Bay.

The reasons why those areas were chosen were:

- the quality of fish stocks (53.1%), amenity of the area (34.8%) and proximity to place of residence (23.8%) [mail survey respondents];
- the quality of fish stocks (39.5%) and amenity of the area (31.6%) [club survey respondents];
- the quality of the fish stocks (51%), amenity of the area (31%), proximity to place of residence (20%) and provision of safe anchorages (20%) [self selection survey respondents];
- provision of a safe anchorage (66.7%), appropriate for activities (66.7%) and amenity of the area (50%) [commercial operator survey respondents].

Thus, to summarise the main reasons for the use of Shoalwater Bay and adjacent waters were the quality of the fish stocks, the amenity of the area, the area's proximity to the user's place of residence and the provision of safe anchorages. The first two reasons or motivations supported

those reported by Dovers (1994: 103) who stated that the primary goal of recreational fishers was to catch a fish followed by non-catch related motivations. The non-catch related motivations reported in this study reflected the literature: to relax in the outdoors, to enjoy the environment, to get away from every day life and work (PA Management Consultants, 1984a: 38; PA Management Consultants, 1984b: 39; Gartside, 1986: 15; and Johnson and Orbach, 1986: 326).

The recreational activities engaged in within the study area were:

- recreational fishing (95.7%), boating (47.7%), camping (37.9%) and sightseeing (29.3%) [mail survey respondents];
- recreational fishing (97%) and boating (36.8%), sightseeing (21%) and camping (18%) [club survey respondents];
- recreational fishing (94%), boating (63%), sightseeing (51%), camping (31%) [self Selection survey respondents];
- recreational fishing (100%), tourist activities (66.7%), sightseeing (66.7%) and boating (50%) [commercial operator survey respondents].

The key recreational activities engaged in within the study area included recreational fishing, boating, sightseeing, camping and tourist activities.

The main recreational activity conducted in the area was recreational fishing:

- recreational fishing (74.9%) [mail survey respondents];
- recreational fishing (55.3%) [club survey respondents];
- recreational fishing (51%) [self selection survey respondents];
- recreational fishing (66.7%) [commercial operator survey respondents].

The periods of use of Shoalwater Bay and adjacent waters were reported as:

- weekends and holiday periods [expert opinion];
- weekends and holiday periods [aerial surveillance];
- weekends (61.7%), week days (38.7%) and holidays (30%) [mail survey];
- weekends (55%), holidays (26%) and week days (21%) [club survey respondents];
- weekends (54.3%), week days (43.6%) and holidays (42.9%) [self selection survey respondents];
- week days (50%), weekends (50%) and holidays (50%) [commercial operator survey respondents].

The chief period of usage reported was on weekends with week days and holidays appearing on parity as usage periods.

The mode response for frequency of use reported by various users groups was:

- 3 - 4 times per year [mail survey respondents];
- 3 - 4 time per year [club survey respondents];
- monthly [self selection survey respondents];
- 9 - 10 times per year [commercial operator survey respondents].

The minimum frequency of visitation for all groups was 1 - 2 times per year.

The last time that most respondents in the various user groups had accessed the study area was:

- April - June 1996 (65.9%) [mail survey respondents];
- April - June 1996 (31.6%) [club survey respondents];
- April - June 1996 (25.7%) [self selection survey respondents];
- June - July 1996 (83.3%) [commercial operator survey respondents].

Consequently, within the last three months of the study period the study area had been accessed by most user group types.

Some users have passengers accompany them on their trips to Shoalwater Bay and adjacent waters, those passengers may be categorised thus:

- friends (68.4%), family (62.1%) and relatives (20.7%) [mail survey respondents];
- club members (57.9%), family (36.8%) and friends (47.3%) [club survey respondents];
- family (68.6%), friends (51.4%) and co-workers (31.4%) [self selection survey respondents];
- tourists (83.3%) [commercial operator survey respondents].

Friends and family were reported as the two main categories of passengers who accompanied the user on her or his recreational trip in Shoalwater Bay and adjacent waters. This pattern reflected one of the non-catch related motivations of recreational fishing which was reported by PA Management Consultants (1984a: 38 - 39), that was to enjoy the company of others as well as the trend that men preferred the company of friends over family. This latter point was especially true of the mail and the club survey respondents - for as noted below the mode for gender in all surveys was men.

The socio-demographics of the recreational users, commencing with gender were:

- women (5.0%) and men (89.5%) [mail survey respondents];
- women (2.5%) and men (92.5%) [club survey respondents];
- women (17.9%) and men (82.1%) [self selection survey respondents];
- men (100%) [commercial operator survey respondents].

Men were the main users of the study area as reported by the survey data sets. The predominance of men mirrored the pattern which Dovers (1994: 104) reported at the national level, that men constituted 70% of recreational fishers.

The ages of the four user groups were:

- the 35 - 64 year old age bracket contained 70.3% of mail survey respondents with 40 - 49 year olds (30.1%) and 55 - 64 (19.4%) each containing approximately equal proportions of mail survey respondents [mail survey respondents];
- the 40 - 49 year age bracket contained 27.5 % of club survey respondents with proportions approaching parity in the 40 - 44 and 45 - 49 age brackets [club survey respondents];
- the majority of self selection respondents were located in the 35 - 59 year age bracket, with 45 - 49 and 50 - 54 year old age brackets each containing 15.4% of self selection respondents;
- the mode for commercial operator survey respondents was 45 - 49 year olds.

The mode response was 45 - 49 years of age for mail, club and commercial operator survey respondents, while the 35 - 39 year old bracket was the mode for self selection survey respondents. If the 45 - 49 year bracket remain residents in the study area, and consideration is given to the trend towards an increasingly ageing population within the study area (Stehlik and Bulis, 1996: 8 - 11) the future recreational needs of such groups will need to be accommodated within the recreational opportunity spectrum (see Stankey and Wood, 1982) developed for the study area. Especially given the fact that retirees will continue to participate in leisure activities which were established prior to retirement (Peppers, 1976: 445). When this fact is coupled with the fact that local recreationalists used the study area because of its proximity to respondents' residences, management must consider the future recreational needs and opportunities available for an ageing population - some of whom are marine recreational users who may become increasingly disadvantaged income-wise (Stehlik and Bulis, 1996: 14 - 15).

The occupations of the users groups were:

- skilled workers (37.5%), service industries (15.8%) and professional persons (10.5%) [mail survey respondents];
- skilled workers (25%), employers/managers and non manual labour and service industry workers each accounting for 10% of club survey respondents;
- service industries (33.3%), professionals (12.8%) and skilled workers (12.8%) [self selection survey respondents];

- self employed (100%) commercial operators.

Within the Mackay, Fitzroy and Central West Statistical Divisions<sup>22</sup>, employment in service industries accounted for 76.7% of total employment by industry as reported in May 1995 (Ryan, 1996). A further, 13.1% were in manufacturing and 13.1 % in agriculture and 3.1% in mining. The Queensland state percentages for employed persons by occupation according to the Census 1991 were managers and administrators (12.1%), professionals (10.6%), para-professionals (6.4%), tradespersons (13.8%), clerks (14.5%), service workers (14.7%), plant and machine operators and drivers (7.4%), labourers and related workers (13.8%) (Australian Bureau of Statistics, 1997). Skilled workers and service industry workers were the main occupational categories noted by survey respondents as well as the professional category. These categories reflect some of the regional and state occupational patterns.

The salary level of skilled workers and service industry workers may impact on the amount of discretionary income they have available. There needs to be adequate recreational opportunities provided within range of their normal place of residence which accommodate their expressed recreational demand<sup>23</sup>, specifically the demand to be able to recreate in a 'wilderness type' setting.

The postcode addresses of the user groups were:

- Yeppoon (35.4%) and Rockhampton (32.2%) [mail survey respondents];
- Rockhampton (77.5%) of club survey respondents;
- Rockhampton (43.6%) and Yeppoon (30.8%) [self selection survey respondents];
- Gladstone (33.3%), Rockhampton (33.3%) and Yeppoon (33.3%) [commercial operator survey respondents].

Therefore, Yeppoon and Rockhampton residents were deemed to be the primary user groups located within the study area.

The length of residencies in the postcode area were:

- the mode for mail survey respondents was 1 - 5 years (20.7%) followed by 6 - 10 years (13.7%), 16 - 20 years (10.8%) and 26 - 30 years (10.5%) [mail survey respondents];
- the mode was 6 - 10 years (15%), with 1 - 5 years and 11 - 15 years each accounting for 10% of club survey respondents length of residency at the nominated postcode;
- the mode was 6 - 10 years (25.6%) with 1 - 5 years of residency accounting for 20.5% of self selection survey respondents;
- the mode for the commercial operators was 11 - 15 years and 16 - 30 years.

The range of 1 - 10 years of residency was repeated in most survey data sets.

Part of the survey included a section which sought to gather information for management regarding recreational users' attitudes to the various activities noted on the zoning maps. The study area was divided into five sections: Sections A, B, C, D, and E (see Survey Map 2, Appendix 1). In regard to Section A, the northern area of Shoalwater Bay, all user groups surveyed (registered boat owners, club members, self selection users and commercial operator survey respondents) registered a negative attitude towards commercial collecting, trawling, spearfishing and three groups noted negative attitudes to commercial netting (mail, club and self selection) while two groups noted commercial line fishing as being inappropriate (mail and commercial operator survey respondents).

In Section B, the southern area of Shoalwater Bay, trawling, commercial collecting and spearfishing were considered as inappropriate by all survey users groups, three groups suggested that commercial netting was inappropriate (mail, club and self selection) and three groups

<sup>22</sup> These statistical divisions incorporate most of the drawing areas for the Shoalwater Bay and adjacent waters area.

<sup>23</sup> Expressed recreational demand is demand which '*currently exists*', sometimes referred to as current participation (Lipscombe, 1986: 3).

considered commercial line fishing was also inappropriate for Section B (mail, self selection and commercial operator survey respondents). Attitudes to indigenous activities were divided in three of the survey groups (mail, self selection and commercial operator surveys).

Activities which all user groups noted negative attitudes towards in Section C, Island Head Creek and environs, were commercial collecting and trawling. Three groups thought the following activities were not suitable in Section C, commercial line fishing (mail, self selection and commercial operator survey respondents) and commercial netting, (mail, club and self selection surveys). Attitudes to indigenous activities approximated division (mail, self selection and commercial operator surveys) while attitudes to spearfishing varied.

In Section D, Port Clinton and environs, commercial collecting and trawling were noted by all survey user groups as activities which should not be allowed within the section, while commercial netting (mail, club and self selection surveys), commercial line fishing (mail, self selection and commercial operator surveys), spearfishing (mail, club and self selection surveys) and commercial operator survey respondents were divided regarding spearfishing and camping. In relation to indigenous activities, commercial operator survey respondents were divided and mail survey respondents were close to division.

Activities which were considered inappropriate for Section E, Little Corio Bay to Cape Clinton, were commercial collecting, commercial netting and trawling for all user groups surveyed. Commercial line fishing received negative attitudes from mail survey respondents, club and commercial operator survey respondents, while opinions from self selection survey respondents were divided. The appropriateness of indigenous activities was again either close to being divided or divided (mail, club and commercial operators). Whilst mail survey respondents, club survey and self selection survey respondents believed that spearfishing should not be permitted in Section E, commercial operator respondents were divided in their opinions.

It is apparent that recreational users and commercial operators considered most commercial operations were inappropriate for the Sections A to E (see Survey Map 2, Appendix 1). This is further emphasised by the comments made by the user groups in regard to their choices of suitable and unsuitable activities for each of the Sections. Most comments were related to keeping the commercial fishers out followed by suggestions for activity controls in Shoalwater Bay and adjacent waters. Full transcriptions of these comments may be found in Appendix 12. It should also be noted that other extractive activities such as spearfishing and indigenous activities received either negative attitudes or mixed attitudes relating to the conduct of those activities in the study area. The negative attitude to other extractive activities apart from recreational fishing highlighted the point made by Jaakson (1989: 96) that having to share an area had the ability to detract from users' satisfaction. It also reiterated the points made by Gartside (1986: 17); Kenchington (1993: 8); and Dovers (1994: 106) regarding a conflict of interests between commercial and recreational activities and the continuous debate over whom is responsible for diminishing fish stocks.

General comments were made by some respondents in each of the four user groups who were surveyed. These comments related to commercial fishing operations (mail and club survey respondents), preservation issues (mail, club and self selection survey respondents), and comments concerning dugongs (club survey respondents) as well as the need for no more rules (commercial operator survey respondent). All comments made may be found in Appendix 13. The comments regarding commercial fishing operations and preservation issues reiterated newspaper report concerns and Gartside's point that recreational fishers expressed a desire to protect the marine environment and fishing stocks (1986: 17)<sup>24</sup>.

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<sup>24</sup> Gartside (1986: 17) also stated commercial fishers shared a similar desire.