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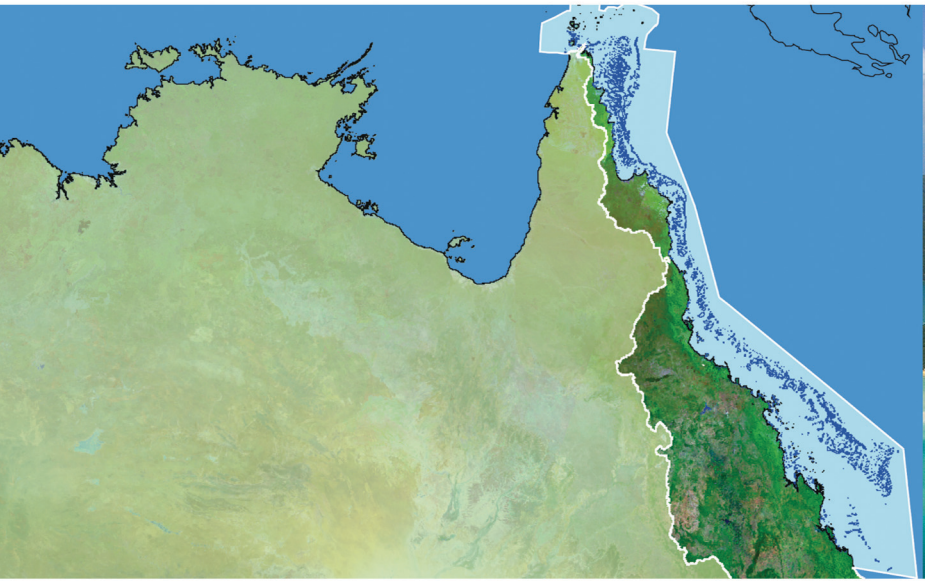
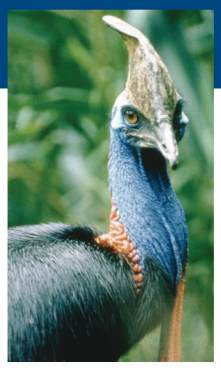
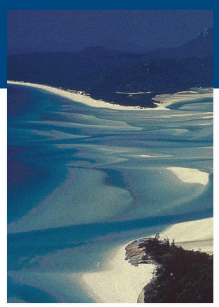


Recreational fishers' perceptions about the costs and benefits of the 2004 Great Barrier Reef Marine Park Zoning Plan

Stephen Sutton





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Department of the Environment, Water, Heritage and the Arts

Recreational fishers' perceptions about the costs and benefits of the 2004 Great Barrier Reef Marine Park Zoning Plan

Stephen Sutton

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James Cook University, Townsville

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RESEARCH CENTRE

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Executive Summary

A combination of telephone and postal survey methods was used to collect information from Great Barrier Reef Marine Park (GBRMP) recreational fishers regarding their demographic and fishing participation characteristics, their attitudes towards the 2004 Great Barrier Reef Marine Park Zoning Plan, the effects of the 2004 Zoning Plan on their recreational fishing activity, their beliefs about the 2004 Zoning Plan and management of the Great Barrier Reef, and their attitudes towards public consultation programs. The telephone survey contacted 13,435 households throughout the study area between February and March 2007. In total, 9,756 interviews were completed which provided household-level information (73% response rate). This resulted in 1,743 full interviews with active recreational fishers and a sample of 1,532 fishers who agreed to participate in the follow-up postal survey. Questionnaires were mailed to those fishers in May 2007. In total, 800 usable surveys were returned. After non-deliverables were eliminated, the effective response rate was 55%. A non-response bias check suggests that older and more committed fishers are slightly over-represented in the postal survey. Additionally, fishers who believe they have been negatively impacted by the 2004 Zoning Plan and the associated consultation process are slightly over-represented in the postal survey. This potential bias should be taken into consideration when viewing and using the results of this study.

Demographics and fishing experience characteristics

- Most (79%) Great Barrier Reef area recreational fishers were male with an average age of 43 years.
- Modal household income category was $30,000 to $59,000.
- Average total fishing experience was 29 years; average fishing experience on the Great Barrier Reef was 23 years.
- A majority of fishers (62%) reported that fishing is their first or second most important outdoor activity; most (67%) said that fishing is their most important activity in the Great Barrier Reef Marine Park.
- Respondents reported fishing an average of twenty days in total in the previous twelve months. Of those days, fourteen days were spent fishing in the Great Barrier Reef Marine Park.
- Overall, most fishers reported being either moderately (44%) or very (29%) satisfied with fishing in the Great Barrier Reef Marine Park.

Attitudes towards the 2004 Zoning Plan

- Most fishers (70%) believed that the rezoning of the Great Barrier Reef Marine Park was a good idea and 58% were supportive of the 2004 Zoning Plan.
- A plurality of respondents believed that there were too many green (no-take) zones (47%); just enough yellow zones (limited fishing – one hook and line only) (43%); just enough olive zones (buffer zones, limited fishing – trolling only) (42%); just enough pink zones (preservation zones – no entry) (40%); and not enough dark blue zones (habitat protection zones – no trawling) (48%) in the areas where they fish.
- Most fishers believed that yellow zones are a good idea (79%), that yellow zones will lead to better recreational fishing in the Great Barrier Reef Marine Park (59%), and that the benefits of restricted commercial fishing in yellow zones outweigh the costs to recreational fishers (64%).

Effects of the 2004 Zoning Plan on recreational fishing activity

- When asked about the overall effects of the new zoning plan, most fishers said that the plan either had no effect (50%) or had a positive effect (23%) on their recreational fishing activity.
- A majority of fishers reported that the new zoning plan had no effect on the frequency with which they go fishing (68%), the total amount of time they spend fishing (67%), the size of the fish they catch (57%) or the cost of going fishing (55%).
- A plurality of fishers reported that the plan had no effect on the number of fish they catch (47%) or their overall level of satisfaction with recreational fishing (47%).
- A majority of fishers reported that the new zoning plan has increased the protection of marine life in the park (66%) and increased their level of knowledge about the Marine Park (52%).
- A majority of fishers reported that the new zoning plan has increased the number of people fishing in areas that remain open (57%), and decreased their ability to access quality fishing areas in the Marine Park (54%).
- Fifty-seven percent of fishers reported that they lost at least one of their regular fishing locations due to the rezoning. Of those fishers who reported losing fishing areas under the new zoning plan, most (69%) reported that they compensated for this loss by fishing at new locations inside the Marine Park (63%), fishing more often at their other regular locations inside the Marine Park (58%), and/or fishing more often at locations outside the Marine Park (including freshwater) (48%).

Beliefs about the 2004 Zoning Plan and management of the Great Barrier Reef

- Fishers were asked to rate their level of agreement with a series of statements about the 2004 Zoning Plan and management of the Great Barrier Reef Marine Park. Statements receiving the strongest level of agreement were:
  - "Protecting the diversity of marine life is the most important goal of managing the Great Barrier Reef" (77%);
  - "Information about zoning in the Great Barrier Reef is readily available to recreational fishers" (77%);
  - "The 2004 Zoning Plan will help ensure the survival of the Great Barrier Reef" (59%);
  - "The 2004 Zoning Plan will help ensure sustainable fisheries in the Great Barrier Reef" (58%); and
  - "The 2004 Zoning Plan was necessary to maintain the Great Barrier Reef in a healthy condition" (56%).
- Statements receiving the strongest level of disagreement were:
  - "Recreational fishers should have been compensated in some way for areas closed to recreational fishing under the 2004 Zoning Plan" (54%);
  - "Recreational fishers were adequately consulted about the 2004 Zoning Plan" (44%);
  - "I trust the Great Barrier Reef Marine Park Authority to consider the concerns of recreational fishers when making decisions about management of the Marine Park" (44%);
  - "The 2004 Zoning Plan has reduced the impact of tourism on the Great Barrier Reef" (43%); and
  - "Compared to other groups, recreational fishers received fair treatment in the 2004 rezoning process" (36%).

Attitudes towards public consultation programs

- A majority (97%) of fishers believed that government agencies should consult the public about fisheries and Marine Park decisions.
- Attributes of public consultation programs that were rated as highly important by the highest number of fishers were that they:
  - "Follow a process that is easily understood by everyone" (88%);
  - "Result in the best outcome for the marine environment" (83%);
  - "Do not allow any one group to have too much influence in decisions" (82%);
  - "Give people a genuine opportunity to influence decisions" (76%);
  - "Allow citizens to express their opinions to resource managers" (75%); and
  - "Allow local concerns to be incorporated into decisions" (75%).
- Attributes/outcomes of public consultation programs that were rated as highly important by the lowest number of fishers were:
  - "Favour the group with the most at stake" (21%);
  - "Do not cost the government too much money" (25%); and
  - "Do not require too much time for people to participate" (33%).
- Public consultation/education techniques rated very useful by the highest number of fishers were "Public information displays" (82%), "Educational brochures and pamphlets" (76%) and "Engagement of recreational fishers in research" (60%).

Centrality-to-lifestyle effects

- Fishers were categorised as low-centrality (40%), medium-centrality (41%) or high-centrality (19%) based on the importance of fishing to their lifestyle.
- High-centrality fishers were more likely to be somewhat or very familiar with the 2004 Zoning Plan (90%) than medium-centrality (73%) or low-centrality (59%) fishers.
- Low-centrality fishers were more likely to believe that rezoning the Great Barrier Reef Marine Park was a good idea (77%) and were more likely to be supportive of the 2004 Zoning Plan (67%) than were medium-centrality fishers (good idea = 70%; support = 56%) or high-centrality fishers (good idea = 54%; support = 44%).
- High-centrality fishers (48%) were more likely to report that the overall effect of the 2004 Zoning Plan on their fishing activity was negative than were medium-centrality fishers (33%) and low-centrality fishers (20%).
- High-centrality fishers were the group most likely to report that the 2004 Zoning Plan reduced the number of fish they catch, their overall fishing satisfaction, and their ability to access quality fishing areas in the Marine Park.
- High-centrality fishers were also more likely to report that the 2004 Zoning Plan increased the cost of going fishing and the number of people fishing in areas of the Marine Park that remain open.
- In general, high-centrality fishers were less likely than medium-centrality and low-centrality fishers to believe that the new zoning plan was necessary, that the plan would help ensure the sustainability of the reef and reef fisheries, that the new plan has reduced the impact of fishing on the Great Barrier Reef, and that the Great Barrier Reef Marine Park Authority is doing a good job of managing the Great Barrier Reef.
- High-centrality fishers were less likely to believe that the Great Barrier Reef Marine Park Authority considers the concerns of recreational fishers in decision making, that recreational fishers received fair treatment in the rezoning process, and that recreational fishers were adequately consulted about the 2004 Zoning Plan.

- A higher proportion of high-centrality fishers (78%) reported losing at least one of their regular fishing locations due to the 2004 Zoning Plan than did medium-centrality (59%) and low-centrality (42%) fishers.
- A higher proportion of high-centrality fishers (65%) reported compensating for lost locations by fishing more at their other regular locations within the park than did medium-centrality fishers (59%) and low-centrality fishers (44%).

Regional effects

- Fishers in the Mackay region were the most likely to believe that rezoning the Great Barrier Reef was a good idea (78%), followed by Rockhampton (74%), Townsville (70%) and Cairns (64%).
- Fishers in the Rockhampton region were most supportive of the 2004 Zoning Plan (66%), followed by Mackay (60%), Townsville (58%) and Cairns (48%).
- Fishers in Cairns were more likely to report that the overall effect of the 2004 Zoning Plan on their fishing activity was negative (33%) followed by fishers in Townsville (28%), Mackay (25%) and Rockhampton (25%).
- In general, fishers in the Cairns region were the most likely to report negative impacts from the 2004 Zoning Plan (particularly reductions in number of fish caught, fishing satisfaction and amount of time spent fishing).
- Fishers in the Rockhampton region were the most likely to believe that the 2004 Zoning Plan will help ensure the sustainability of the Great Barrier Reef and its fisheries, that the 2004 Zoning Plan was necessary and was the best option for protecting the Great Barrier Reef, and that the 2004 Zoning Plan has reduced the impact of fisheries on the Reef.
- Fishers in Rockhampton were also the most likely to trust the Great Barrier Reef Marine Park Authority to manage the Great Barrier Reef and consider the concerns of recreational fishers in decision making.
- Fishers in Cairns were the least likely to hold positive beliefs about the 2004 Zoning Plan, to trust the Marine Park Authority, or to believe that recreational fishers received fair treatment in the rezoning process.
- The highest proportion of fishers who reported losing at least one of their regular fishing locations due to the 2004 Zoning Plan was in the Cairns region (65%), followed by Mackay (57%), Townsville (52%) and Rockhampton (50%).
- Fishers from the Rockhampton region (60%) were the most likely to report that they compensated for lost locations by fishing more at other locations outside of the Marine Park, followed by fishers from Townsville (51%), Mackay (40%) and Cairns (37%).

Conclusions

- Great Barrier Reef Marine Park recreational fishers believe there is a need to protect and conserve the Great Barrier Reef, and they are strong supporters of Marine Park management.
- Most fishers reported experiencing at least some negative impacts from the 2004 Zoning Plan. These impacts need to be considered when evaluating the overall costs and benefits of the 2004 Zoning Plan.
- Some sub-groups of the recreational fisher population perceive the costs and benefits of the 2004 Zoning Plan differently than the majority. In particular, high centrality-to-lifestyle fishers and fishers in the Cairns region had the least positive attitudes towards the Plan, and reported the most significant impacts on their fishing activity. This finding needs to be acknowledged when interpreting and disseminating the results of this study.

- As a result of the rezoning process, the level of trust of the Great Barrier Reef Marine Park Authority among recreational fishers is low, and may serve as a barrier to building and maintaining a productive relationship between resource managers and the recreational fishing community.
- Dissatisfaction with the rezoning and consultation process, rather than dissatisfaction with the outcomes of the 2004 Zoning Plan, may be a strong contributor to negative attitudes expressed publicly by recreational fishers towards the Zoning Plan and the Marine Park Authority.
- Continued monitoring of attitude and perception variables measured in this study, as well as investigation of additional impacts (e.g. fishing participation rates, economic impact and spatial changes in fishing effort) will be necessary to fully understand the long-term costs and benefits of the 2004 Zoning Plan to the recreational fishing community.
- Results highlight the importance of maintaining a strong and productive relationship between resource managers and the recreational fishing community, and the importance of ensuring meaningful engagement of recreational fishers in the management process.

Introduction

The Great Barrier Reef Marine Park (GBRMP) extends approximately 2,300 km along the northeast coast of Queensland, Australia and encompasses an area of approximately 345,000 km^2. The park is managed by the Great Barrier Reef Marine Park Authority (GBRMPA) with the primary goal of preserving and protecting the outstanding natural values of the Great Barrier Reef (GBR) while providing for wise use, understanding, and enjoyment of the region (Craik 1992).

Activities such as fishing, diving, boating, tourism and research are permitted in the Park but are regulated through a system of zoning and management plans. In July 2004, the GBRMPA implemented a new Zoning Plan for the GBRMP that increased "no-take" (i.e. no fishing) areas from 5% to 33% of the total Park area. The aim of the 2004 Zoning Plan was to increase the level of protection given to marine life in the Park. Implementation of the Plan was preceded by a consultation process that allowed members of the public to have input into the size and location of new zones and comment on draft zoning plans. Through the public consultation process the GBRMPA held approximately 360 public meetings and received over 31,000 written submissions.

Recreational fishing is a popular activity in the GBRMP, and the Park comprises a large percentage of the area available to recreational fishers in the local area. With over 180,000 active recreational fishers living in the region adjacent to the Park (McInnes 2006), the recreational fishing community was arguably the largest group to be potentially impacted in a negative way by the increase in no-fishing areas. Likewise, many recreational fishers stand to benefit should the increased no-fishing areas eventually result in improved recreational fishing in the Park.

The 2004 Great Barrier Reef Marine Park Zoning Plan was controversial among many stakeholders, including recreational fishers. Prior to implementation of the plan, anecdotal evidence from the public media, the recreational fishing media, and comments made at public meetings suggested that there was a high level of opposition among recreational fishers towards the concept of the rezoning and towards the Zoning Plan itself. However, no effort was made to confirm or deny this perception by surveying a representative sample of GBR recreational fishers. Likewise, comments from recreational fishers in the media since implementation of the Plan suggest that many recreational fishers have been highly impacted by the Zoning Plan and that a high level of dissatisfaction with the Plan remains within the recreational fishing community. The research reported here represents the first effort to quantify the attitudes and perceptions of recreational fishers regarding the 2004 Zoning Plan, the rezoning process, and the costs and benefits of the Plan to the recreational fishing community.

Why measure costs and benefits of the 2004 Zoning Plan?

Natural resource management actions such as the GBR rezoning come with a range of costs and benefits. The most desired outcome from such management actions is one that provides the desired ecological benefits while minimising the costs to society. Whereas the potential ecological benefits of implementing no-take Marine Protected Areas (MPA) are well documented, less is known about how various resource users perceive the costs and benefits of such actions. Consequently, it is difficult to fully evaluate the overall benefit of the 2004 Zoning Plan to society. At a more practical level, a better understanding of the costs and benefits of the 2004 Zoning Plan to recreational fishers will help identify negative impacts that may be remedied, and help build and maintain support among this important stakeholder group by assuring them that their interests are an important consideration in management decisions. Moreover, information on the costs and benefits of the 2004 Zoning

Plan will help inform future management decisions in the GBRMP as well as inform MPA planning and implementation processes elsewhere. Without accurate scientific information about recreational fishers' perceptions of the costs and benefits of the 2004 Zoning Plan, anecdotal information will take precedence. Unfortunately, anecdotal information is not useful for informing future management decisions, and the representativeness of such information is unclear.

About this study

In recognition of the need for information about the social impacts of the rezoning of the GBR, the CRC Reef Research Centre (with continuation funding from the Marine and Tropical Sciences Research Facility [MTSRF]) funded the Fishing and Fisheries Research Centre at James Cook University to examine recreational fishers' perceptions of the costs and benefits of the 2004 Zoning Plan. The study was conducted with the support of, and in consultation with, the GBRMPA and the recreational fishing community (through Sunfish Queensland and the Capricorn Reef Monitoring Program [CapReef]). Other elements of the MTSRF-funded project are currently examining the costs and benefits of the Zoning Plan to commercial fishers, charter fishers and tourism operators.

This report details the methodology and descriptive results for the recreational fisher study. Results are organised into five subsections: 1) Demographic and fishing experience characteristics; 2) Attitudes towards the 2004 Zoning Plan; 3) Effects of the 2004 Zoning Plan on recreational fishing activity; 4) Beliefs about the 2004 Zoning Plan and management of the GBR; and 5) Attitudes towards public consultation programs. A further two sections then explore whether perceptions about the costs and benefits of the 2004 Zoning Plan differ between: 1) fishers with different levels of personal attachment to recreational fishing; and 2) geographic regions along the GBR coast.

Methodology

Overview

Data were collected using a combination of telephone and postal survey methods. A list of active fishers in the GBR region was not available; therefore, a random household telephone survey was used to obtain a sample of GBR area residents who had been recreational fishing in Queensland over the preceding twelve months. Fishers identified through the telephone survey were asked to participate in a follow-up postal survey designed to collect information on the positive and negative effects of the 2004 Zoning Plan on their fishing activity. This methodology has been used previously to collect social data from recreational fishers in Queensland (Sutton 2006a).

Telephone survey

The target population for the survey was the GBR area (defined as the area encompassed by all postal codes that lie within fifty kilometres of the coast from the tip of Cape York to Bundaberg) residents aged 15 years or over who had been fishing, crabbing or prawning (hereafter referred to as 'fishing') in the Great Barrier Reef Marine Park between February 2006 and February 2007. A target of 1,800 completed telephone interviews with active recreational fishers was set. A random sample of telephone numbers (and suburbs where the households are located) was selected from each of the current White Pages covering the study area. Phone numbers associated with suburbs that fell outside of the study area were discarded. Up to six attempts were made to contact each selected household, after which the household was considered non-contactable and replaced with an alternative household.

The telephone survey was conducted during February and March 2007. On weekdays, calls were made from 1:00 pm to 4:00 pm and 5:00 pm to 8:00 pm. On weekends, calls were also made from 10:00 am to 1:00 pm. Individuals who answered the telephone were given a brief explanation of the research and asked for their cooperation in a brief survey. Individuals who agreed to participate in the survey were asked if anyone in the household had done any recreational fishing in the Great Barrier Reef Marine Park during the previous twelve months. If no one in the household had fished in the Marine Park during the previous twelve months, the number of people residing in the household was recorded and the survey concluded. In households where at least one person fished, one fisher was randomly selected for interviewing. When the selected fisher was not available, an appointment was made and the fisher was called back at the appointed time.

Fishers were administered a short survey about their fishing activity in the Great Barrier Reef Marine Park that included questions on their avidity (i.e. how frequently they fished each year) and number of years of fishing experience; importance of fishing as an outdoor activity; level of familiarity with the 2004 Zoning Plan; beliefs about the effects of the Zoning Plan on their fishing activity and the sustainability of the Great Barrier Reef; and opinion about the effectiveness of the consultation program at considering the concerns of recreational fishers (Appendix A). At the end of the survey, respondents were asked if they would be willing to participate in a follow-up mail survey, and names and addresses were collected from those who agreed.

In total, 13,435 households throughout the study area were contacted resulting in 9,756 interviews (73%) in which the respondent provided at least household-level information about fishing activity. This resulted in 1,743 full interviews with active recreational fishers and a sample of 1,532 fishers who agreed to participate in the follow-up mail survey.

Postal survey

An eleven-page self-administered questionnaire was developed in consultation with the Queensland Department of Primary Industries and Fisheries (DPI&F), the GBRMPA, and CapReef to collect information from fishers. The survey was designed to collect further data on fishers' opinions and beliefs about the 2004 Zoning Plan, its effects on their fishing activity, and fishers' beliefs and opinions about public consultation regarding fisheries issues (Appendix B).

Survey procedures were similar to those recommended by Salant and Dillman (1994) (with the exception that an introductory letter was not sent to fishers prior to the first survey because fishers had recently been contacted by telephone). Questionnaires were mailed to the sample of fishers in May 2007. A detailed letter explaining the purpose of the research was included with the questionnaire, as well as a postage-paid return envelope. A postcard reminder/thank you was sent one week after the mail out, and a second letter, questionnaire and postage-paid return envelope were sent to fishers who had not responded four weeks after the initial mailing.

In total, 800 completed mail surveys were returned. After excluding non-deliverable surveys (n=35) and individuals who contacted the project manager to inform us that they were unable to complete the survey because they did not fish in the Great Barrier Reef Marine Park (n=20), an effective response rate of 55% was achieved. Salant and Dillman (1994) suggest that mail surveys using the procedure used in this study should result in a response rate of 50-60%.

Non-response check

Survey respondents may not be representative of the target population if the probability of response is related to differences between subgroups within the population (i.e. if respondents differ somehow from non-respondents). Because data from the telephone survey were available for both respondents (n=800) and non-respondents (n=1,058 including telephone respondents who did not agree to participate in the postal survey) to the postal survey, it was possible to conduct a check for non-response bias in the postal survey. Significant differences between postal survey respondents and non-respondents were tested on the following variables measured in the telephone survey: 1) importance of fishing as an outdoor activity; 2) number of days recreationally fished in the GBR during the previous twelve months; 3) level of familiarity with the 2004 Zoning Plan; 4) opinion about whether rezoning the GBR was a good or bad idea; 5) opinion about the amount of no-take zones in the area where the fisher usually fishes; 6) perceived effect of the Zoning Plan on the fisher's fishing activity; 7) perceived effect of the Zoning Plan on the sustainability of the GBR; 8) opinion about the level of consideration given to the concerns of recreational fishers in the consultation process; 9) age; and 10) gender. T-tests were used for continuous variables and Kruskal-Wallis tests for ordinal variables. Level of statistical significance was set at alpha = 0.05.

Results of the non-response bias check revealed that non-respondents were younger (41.1 years vs. 46.5 years; $p<0.0001$), and were less likely to rate fishing as their most important outdoor activity (42% vs. 51%; $p=0.0003$) compared to respondents. Respondents were more likely than non-respondents to: 1) be very or somewhat familiar with the 2004 Zoning plan (73% vs. 57%; $p=0.0001$); 2) believe that the Zoning Plan had negatively affected their fishing activity (31% vs. 24%; $p=0.005$; and 3) disagree that the concerns of recreational fishers had been adequately considered in the rezoning process (49% vs. 40%; $p=0.0003$). These results suggest that older and more committed fishers may be slightly overrepresented in the mail survey. Likewise, fishers who believe they have been negatively

impacted by the Zoning Plan and the associated consultation process are slightly overrepresented in the mail survey. Because other variables measured in the survey may be related to these variables, some caution should be used when generalising the results of this study to the wider population of fishers in the GBR area.

Analysis

Data for all questions in the telephone and postal survey were analysed and presented descriptively. To aid interpretation, variables measured on 5-point response scales were collapsed into 3-point scales by combining the categories at each end of the scale (e.g. the 5-point agree-disagree scale was collapsed into categories "agree", "neutral", and "disagree" by combining agree with strongly agree and disagree with strongly disagree). A subset of questions from both surveys was analysed for differences across geographic regions, and across different levels of centrality-to-lifestyle for fishing. Questions analysed for regional and centrality-to-lifestyle effects included:1) level of familiarity with the 2004 Zoning Plan; 2) level of support for the idea of rezoning the GBR; 3) level of support for the 2004 Zoning Plan; 4) Beliefs about the specific impacts of the 2004 Zoning Plan; 5) amount of area lost to individual fishers due to the 2004 Zoning Plan; 6) strategies for compensating for lost areas; and 7) beliefs about the 2004 Zoning Plan, the associated consultation process, and management of the GBRMP in general.

For the purposes of the regional analysis, the study area was divided into four regions as follows: Rockhampton region (Bundaberg to (and including) St. Lawrence); Mackay region (north of St. Lawrence to (and including) Bowen); Townsville region (north of Bowen to (and including) Ingham); and Cairns region (all areas north of Ingham).

Centrality-to-lifestyle is defined as the extent to which a participant's lifestyle and social networks are connected to his or her pursuit of a given leisure activity (Kim *et al.* 1997). High centrality-to-lifestyle indicates a high level of commitment to fishing, and provides a strong motivation to maintain participation. Centrality-to-lifestyle was measured using a scale adapted to recreational fishing by Sutton (2003). Fishers were asked to rate their level of agreement (on a 5-point scale ranging from "strongly disagree" to "strongly agree") with nine statements related to the importance of fishing to their lifestyle. Cronbach's alpha of 0.89 indicated an acceptable level of reliability for the centrality-to-lifestyle index (Table 1). The nine variables were averaged and each fisher classified as either low-centrality (average scale score = 1 to 2.4), medium-centrality (average scale score = 2.5 to 3.4) or high-centrality (average scale score = 3.5 to 5).

In testing for significant differences across regions and centrality-to-lifestyle groups, t-tests were used on interval-scaled (i.e. continuous) variables, and chi-square tests of independence were used for nominal and ordinal variables. All tests were conducted using SAS Version 8 with level of statistical significance set at alpha=0.05.

Table 1: Descriptive statistics and reliability analysis for the centrality-to-lifestyle scale for GBR recreational fishers.

Centrality scale items (α = 0.89)	Mean[a]	SD	Item-total correlation	α if item deleted
If I stopped fishing, I would probably lose touch with a lot of my friends.	2.5	1.2	0.61	0.88
If I couldn't go fishing, I am not sure what I would do.	2.8	1.3	0.70	0.87
Because of fishing, I don't have time to spend participating in other leisure activities.	2.1	0.9	0.53	0.89
Most of my friends are in some way connected with fishing.	3.3	1.1	0.57	0.88
I consider myself to be somewhat expert at fishing.	2.8	1.0	0.57	0.88
I find that a lot of my life is organised around fishing.	2.7	1.1	0.76	0.87
Others would probably say I spend too much time fishing.	2.3	1.1	0.68	0.88
I would rather go fishing than do most anything else.	3.2	1.2	0.72	0.88
Other leisure activities don't interest me as much as fishing.	3.1	1.2	0.68	0.89

[a] Measured on a 5-point scale with response categories ranging from (1) strongly disagree to (5) strongly agree.

Results

Demographics and fishing experience characteristics

The majority of respondents were males (79%) between the ages of 31 and 60 (64%) (Figure 1). Average age was approximately 43 years. Household income ranged from under $30,000 to over $110,000; the modal household income category was $30,000 to $59,000 (Figure 2). Total fishing experience ranged from 1 year to 74 years whereas fishing experience in the GBR ranged from 1 year to 69 years. On average, fishers had approximately 29 years total fishing experience and 23 years experience fishing in the GBRMP.

Most respondents (62%) reported that fishing is their first or second most important outdoor activity, and most (67%) said that fishing is their most important activity in the GBRMP (Figure 3). When asked how often they go fishing, most fishers (76%) said they go once a month or less often. Fishers reported fishing an average of twenty days in total and fourteen days in the GBRMP in the previous twelve months. Most (70%) fishing trips in the GBRMP in the previous twelve months used a boat to access the Park. Ninety-one percent of fishers reported going line fishing, 36% reported going crabbing, 18% reported going prawning, and 14% reported going spear fishing in the GBR in the previous twelve months. Overall, most fishers reported being either moderately (44%) or very (29%) satisfied with fishing in the GBRMP (Figure 4).

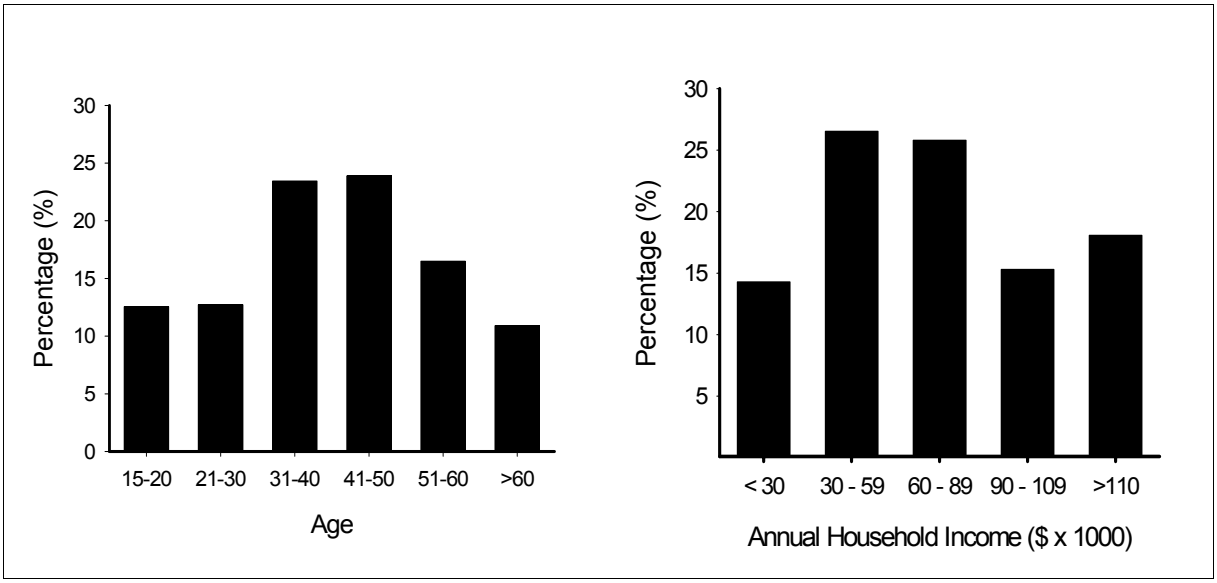

Figure 1: Age distribution of GBRMP recreational fishers.

Figure 2: Household income distribution of GBRMP recreational fishers.

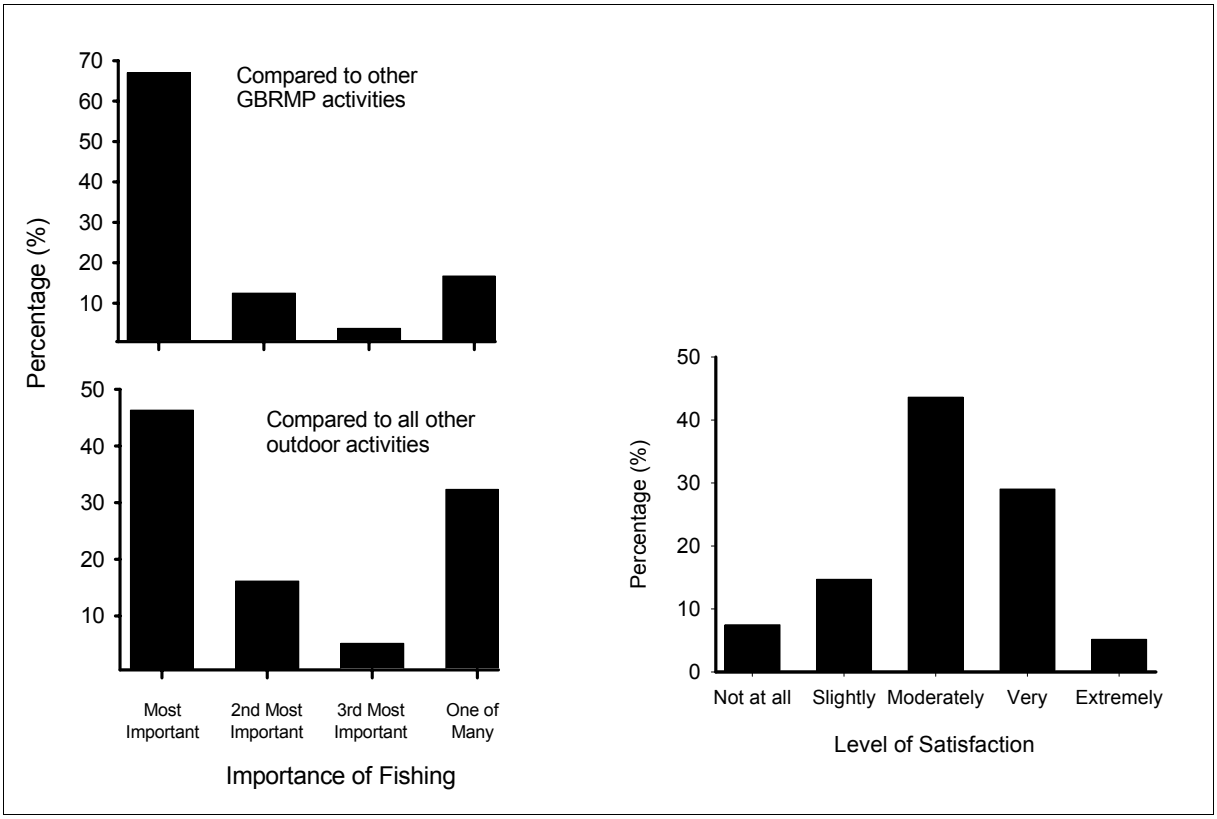

Figure 3: Relative importance of recreational fishing for GBRMP fishers.

Figure 4: Satisfaction with recreational fishing in the GBRMP.

Attitudes towards the 2004 Zoning Plan

Recreational fishers were asked, "In general, do you think the rezoning of the GBRMP was a good idea, a bad idea, or neither?" Most fishers (70%) believed that the rezoning was a good idea, whereas only 17% believed it was a bad idea (Figure 5). Fishers were asked to rate their opinions about the amount of area covered by each of the GBRMP zoning types in the area where they fish. A plurality of respondents believed that there were too many green (no-take) zones (47%), just enough yellow zones (limited fishing – one hook and line only) (43%), just enough olive zones (buffer zones, limited fishing – trolling only) (42%), just enough pink zones (preservation zones – no entry) (40%), and not enough dark blue zones (habitat protection – no trawling) (48%) in the areas where they fish (Table 2).

To measure level of support for the Zoning Plan and how level of support has changed since the Plan was first implemented in 2004, fishers were asked to: 1) think back to when the Zoning Plan was first implemented in 2004 and report their level of support for the Plan at that time; and 2) report their level of support for the Plan at the time of the survey. Fishers were evenly split between being supportive (41%) and opposed (42%) to the Plan in 2004. However, support for the Plan has increased since implementation, with 58% of fishers supporting the Plan at the time of the survey in 2007 (Figure 6).

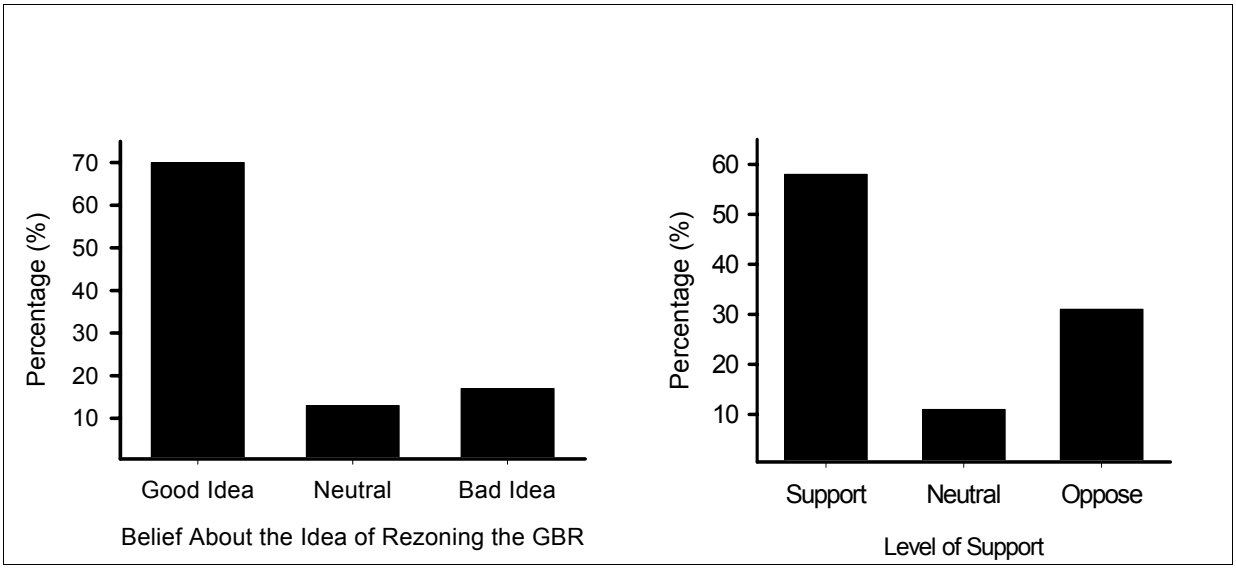

Figure 5: Recreational fishers' beliefs about the general idea of rezoning the GBRMP.

Figure 6: Recreational fishers' level of support for the 2004 Zoning Plan.

Table 2: Recreational fishers' opinions about the amount of area covered by each type of GBRMP Zone in the area where they usually fish.

Zone	Amount of Area Covered (Percentage of respondents)			
	Too Little	Just Enough	Too Much	Don't Know or N/A
Green zones (no fishing)	12	34	47	7
Yellow zones (limited fishing – one line and one hook only)	21	43	27	9
Olive zones (buffer zones, limited fishing – trolling only)	14	42	23	21
Orange zones (scientific research – no fishing)	16	42	19	23
Pink zones (preservation zones – no entry)	17	40	20	23
Dark blue zones (habitat protection – no trawling)	48	26	9	17

The amount of area covered by yellow zones within the GBRMP was increased under the 2004 Zoning Plan. Yellow zones place strong restrictions on commercial fishing (i.e. no netting, no trawling, limited crabbing, line fishing restricted to one line and one hook and a limit of one dory in use), but allow recreational fishing to occur as long as no more than one line and one hook is used per fisher. Recreational fishers were asked a series of questions to better understand their attitudes towards yellow zones. Most fishers (79%) believed that, in general, yellow zones are a good idea, and most (52%) reported that less than 25% of their GBRMP fishing activity over the previous twelve months occurred in yellow zones. Fishers' levels of agreement with a series of statements about yellow zones are presented in Table 3. A majority of fishers believe that yellow zones will lead to better recreational fishing in the GBRMP (59%), that yellow zones have reduced the impact of commercial fishing on the GBR (56%), and that the benefits of restricted commercial fishing in yellow zones outweigh the costs to recreational fishers (64%). A substantial number (41%) also believe that yellow zones have reduced the impact of recreational fishing on the GBR. Only a small

number of recreational fishers believe that yellow zones place too many restrictions on recreational fishers (24%) or commercial fishers (8%).

Table 3: Recreational fishers' levels of agreement with statements about yellow zones in the GBRMP.

Statement	Level of Agreement (Percentage of respondents)		
	Disagree	Neutral	Agree
Yellow zones place too many restrictions on recreational fishers.	47	29	24
Yellow zones place too many restrictions on commercial fishers.	72	20	8
Yellow zones will lead to better recreational fishing in the GBRMPA.	13	28	59
Yellow zones have reduced the impact of recreational fishing on the Great Barrier Reef.	21	38	41
Yellow zones have reduced the impact of commercial fishing on the Great Barrier Reef.	18	26	56
The restrictions on recreational fishing in yellow zones are worth it because of the restrictions on commercial fishing in these areas.	12	24	64

Effects of the 2004 Zoning Plan on recreational fishing activity

Fishers were presented with a series of statements about various aspects of their recreational fishing activity and asked whether they had initially (in 2004) expected the new Zoning Plan to increase, decrease or have no effect on each. Fishers were then presented with the same series of aspects and asked what effect the new Zoning Plan has actually had on each (Table 4). Most fishers had expected the new Zoning Plan to have no effect on the frequency with which they go fishing (67%), the total amount of time they spend fishing (64%), or the cost of going fishing (52%). Most fishers had expected the new Zoning Plan to increase the number of people fishing in the areas of the Park that remain open to fishing (61%), to increase protection of marine life in the Park (74%), and to decrease their ability to access quality fishing areas in the Park (62%). A plurality of fishers had expected the new plan to decrease the number of fish they catch (45%) and their overall satisfaction with recreational fishing (40%), to increase their level of knowledge about the Marine Park (46%), and to have no effect on the size of the fish they catch (47%).

Table 4: Effects of the 2004 Zoning Plan on various aspects of recreational fishing and sustainability in the GBR. Expected effects are fishers' beliefs about the eventual outcomes before the Zoning Plan was implemented. Actual effects are those experienced by fishers since 2004.

Aspect		Effect (Percentage of respondents)			
		Decrease	No Effect	Increase	Don't Know or N/A
The number of fish you catch.	Expected	45	30	22	3
	Actual	40	47	10	3
The size of fish you catch.	Expected	22	47	28	3
	Actual	26	57	14	3
Your overall satisfaction with recreational fishing.	Expected	40	38	19	3
	Actual	38	47	13	2
The total amount of time you spend fishing.	Expected	26	64	8	2
	Actual	26	67	5	2
The frequency with which you go fishing.	Expected	25	67	6	2
	Actual	26	68	4	2
The cost ($) of going fishing.	Expected	3	52	42	3
	Actual	4	55	39	2
The number of people fishing in areas of the Marine Park that remain open to fishing.	Expected	16	20	61	3
	Actual	10	26	57	7
Your ability to access quality fishing areas in the Marine Park.	Expected	62	24	11	3
	Actual	54	33	10	3
Your level of knowledge about the Marine Park and its management.	Expected	11	38	46	5
	Actual	8	34	52	6
The protection of marine life in the Marine Park.	Expected	4	19	74	3
	Actual	4	23	66	7

Overall, fishers reported that the actual negative effects of the 2004 Zoning Plan on their fishing activity were slightly less than they expected. A majority of fishers reported that the Zoning Plan had no effect on the frequency with which they go fishing (68%), the total amount of time they spend fishing (67%), the size of the fish they catch (57%), or the cost of going fishing (55%). Likewise, a plurality of fishers reported that the Zoning Plan had no affect on the number of fish they catch (47%) and their overall level of satisfaction with recreational fishing (47%). A majority of fishers reported that the new plan has increased the protection of marine life in the park (66%) and increased their level of knowledge about the Marine Park (52%). A majority of fishers reported that the new plan has increased the number of people fishing in areas that remain open (57%) and decreased their ability to access quality fishing areas in the Park (54%). When asked about the overall effects of the 2004 Zoning Plan, most fishers said that the plan either had no effect (50%) or a positive effect (23%) on their recreational fishing activity (Figure 7).

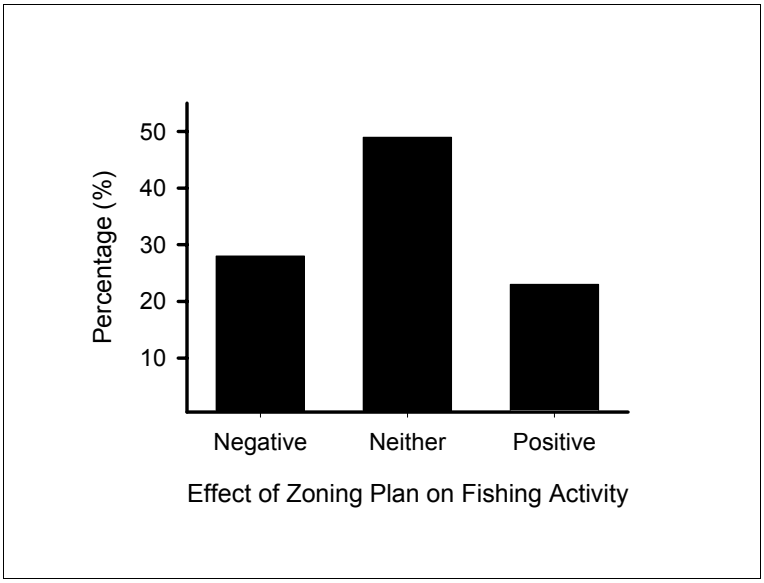

Figure 7: Recreational fishers' perceptions of the overall effects of the 2004 Zoning Plan on their recreational fishing activity.

Fishers were asked a series of questions about how many of their regular fishing locations were lost due to the new Zoning Plan, whether they had compensated for these lost locations by fishing at other locations, and the perceived quality of these replacement locations. Fifty seven percent of fishers reported that they lost at least one of their regular fishing locations due to the rezoning; the majority (57%) of these fishers reported losing three or fewer fishing locations (mean number of locations lost = 4.2). When asked, "What percentage of the area inside the Marine Park that you used to fish regularly was turned into green zones under the new Zoning Plan?", most fishers said it was either "less than 25%" (32%) or "25% to 50%" (38%). Of those fishers who reported losing fishing areas under the new Zoning Plan, most (69%) reported that they compensated for this loss by fishing at new locations inside the Marine Park (63%), by fishing more at their other regular locations inside the Park (58%), and/or by fishing more at locations outside the Park (including freshwater) (48%). Most fishers reported that their other regular locations within the Park (60%), new locations within the park (62%), and other locations outside the Park (68%) were of lower quality than the locations lost through the rezoning. Only about 7% of fishers thought that replacement locations were of better quality than those they lost.

Beliefs about the 2004 Zoning Plan and management of the Great Barrier Reef

Fishers were asked to rate their level of agreement with a series of statements about the 2004 Zoning Plan and management of the GBRMP. Statements receiving the strongest level of agreement were, "Protecting the diversity of marine life is the most important goal of managing the Great Barrier Reef" (77%), "Information about zoning in the Great Barrier Reef is readily available to recreational fishers" (77%), "The 2004 Zoning Plan will help ensure the survival of the Great Barrier Reef" (59%), "The 2004 Zoning Plan will help ensure sustainable fisheries in the Great Barrier Reef" (58%), and "The 2004 Zoning Plan was necessary to maintain the Great Barrier Reef in a healthy condition" (56%). Statements receiving the strongest level of disagreement were, "Recreational fishers should have been compensated in some way for areas closed to recreational fishing under the 2004 Zoning Plan" (54%),

"Recreational fishers were adequately consulted about the 2004 Zoning Plan" (44%), "I trust the Great Barrier Reef Marine Park Authority to consider the concerns of recreational fishers when making decisions about management of the Marine Park" (44%), "The 2004 Zoning Plan has reduced the impact of tourism on the Great Barrier Reef" (43%), and "Compared to other groups, recreational fishers received fair treatment in the 2004 rezoning process" (41%) (Table 5).

Fishers were presented with a series of potential threats to the GBR and asked whether they believed each one was a major threat, a minor threat, or no threat to the health of the Reef. In general, all of the potential threats were recognised by a majority of fishers as having potential to impact the health of the Great Barrier Reef. Overfishing by commercial fishers (77%), land-based pollution (65%), climate change/coral bleaching (58%) and marine pollution (53%) were seen as major threats by most recreational fishers. Marine tourism (56%) and overfishing by recreational fishers (54%) were seen as minor threats by a majority of fishers (Table 6).

Table 5: Recreational fishers' level of agreement with statements about the 2004 Zoning Plan, the consultation process and management of the GBRMP.

Statement	Level of Agreement (Percentage of respondents)		
	Disagree	Neutral	Agree
The 2004 Zoning Plan will help ensure the survival of the Great Barrier Reef.	13	18	59
The 2004 Zoning Plan will help ensure sustainable fisheries in the Great Barrier Reef.	13	19	58
The 2004 Zoning Plan was necessary to maintain the Great Barrier Reef in a healthy condition.	27	17	56
Protecting the diversity of marine life is the most important goal of managing the Great Barrier Reef.	9	14	77
Rezoning the Marine Park was the best option for long-term protection of the Great Barrier Reef.	28	18	54
The 2004 Zoning Plan has reduced the impact of recreational fishing on the Great Barrier Reef.	25	25	50
The 2004 Zoning Plan has reduced the impact of commercial fishing on the Great Barrier Reef.	30	18	52
The 2004 Zoning Plan has reduced the impact of tourism on the Great Barrier Reef.	43	41	16
I trust the Great Barrier Reef Marine Park Authority to do what is best for conservation of the Great Barrier Reef.	35	24	41
I trust the Great Barrier Reef Marine Park Authority to consider the concerns of recreational fishers when making decisions about management of the Marine Park.	44	18	38
The Great Barrier Reef Marine Park Authority is doing a good job of managing the Great Barrier Reef.	31	34	35
Compared to other groups (e.g. commercial fishers, tourism), recreational fishers received fair treatment in the 2004 rezoning process.	41	29	30
Recreational fishers were adequately consulted about the 2004 Zoning Plan.	44	31	25
Recreational fishers should have been compensated in some way for areas closed to recreational fishing under the 2004 Zoning Plan.	54	31	15
Zoning of the Great Barrier Reef is adequately enforced.	27	31	42
Information about zoning in the Great Barrier Reef is readily available to recreational fishers.	10	13	77

Table 6: Recreational fishers' perceptions of potential threats to the health of the Great Barrier Reef.

Threat	Level of Threat (Percentage)			
	No Threat	Minor Threat	Major Threat	Don't Know
Marine Pollution	5	38	53	4
Land-based pollution (run-off)	4	29	65	2
Over fishing by recreational fishers	27	54	17	2
Over fishing by commercial fishers	2	18	77	3
Marine tourism	25	56	16	3
Crown of thorns starfish	6	34	49	11
Climate change / coral bleaching	8	24	58	10
Coastal development	5	45	46	4
Aquaculture	29	47	10	14

Attitudes towards public consultation programs

Previous research has found that public consultation programs regarding fisheries and Marine Park management in Queensland may not adequately represent the views of the recreational fisher population (Sutton 2006b). To provide some further insights into how fishers can be better engaged in the management process, fishers were asked a series of questions about their attitudes and beliefs regarding public consultation and specific consultation techniques. When asked if government agencies should consult the public (including recreational fishers) about fisheries and Marine Park decisions, a majority of fishers (97%) responded affirmatively. Fishers who responded negatively (n = 21) were asked to rate their level of agreement/disagreement with a series of statements about why the public should not be consulted about fisheries-related issues. Statements receiving the highest level of agreement were, "Consulting the public allows some interest groups to have too much influence in decisions" (85%), "Fisheries and marine park managers know what is best for our natural resources" (66%), and "Consulting the public delays the implementation of important management changes" (65%) (Table 7).

Fishers who answered affirmatively to the question about whether the public should be consulted about fisheries and Marine Park issues were asked to rate the importance of eighteen possible outcomes and attributes of public consultation programs. Attributes/ outcomes of public consultation programs that were rated as highly important by the highest number of fishers were, "Follow a process that is easily understood by everyone" (88%), "Result in the best outcome for the marine environment" (83%), "Do not allow any one group to have too much influence in decisions" (82%), "Give people a genuine opportunity to influence decisions" (76%), "Allow citizens to express their opinions to resource managers" (75%), and "Allow local concerns to be incorporated into decisions" (75%). Attributes /outcomes of public consultation programs that were rated as highly important by the lowest number of fishers were, "Favour the group with the most at stake" (21%), "Do not cost the government too much money" (25%), and "Do not require too much time for people to participate" (33%) (Table 8).

Table 7: Recreational fishers' level of agreement with statements about reasons why government agencies should not consult the public about fisheries-related issues. (Only respondents who answered negatively to the question about whether the public should be consulted were asked this question [n = 21]).

Reason why the public should not be consulted	Level of Agreement (Percentage of respondents)		
	Disagree	Neutral	Agree
Consulting the public is too expensive.	35	35	30
Fisheries and marine park managers know what is best for our natural resources.	15	19	66
The public has little to add to decisions about fisheries and marine park management.	20	40	40
It is not possible to incorporate the views of the public in decisions.	45	35	20
Consulting the public delays the implementation of important management changes.	5	30	65
Consulting the public allows some interest groups to have too much influence in decisions.	5	10	85

Table 8: Recreational fishers' level of agreement with statements about important characteristics of public consultation programs.

Characteristic of consultation programs	Level of Importance (Percentage of respondents)		
	Low	Moderate	High
Give equal opportunity for all citizens to participate.	10	19	71
Result in the best outcome for recreational fishers.	14	27	59
Result in the best outcome for the marine environment.	4	13	83
Result in an outcome that is fair to all affected groups.	7	19	74
Allow resource mangers to express their opinions to citizens.	8	26	66
Allow citizens to express their opinions to resource managers.	5	20	75
Give people a genuine opportunity to influence decisions.	5	19	76
Improve the relationship between resource managers and citizens.	8	18	74
Do not cost the government too much money.	43	32	25
Do not require too much time for people to participate.	29	38	33
Do not cost people too much money to participate.	20	25	55
Favour the group with the most at stake.	53	26	21
Allow local concerns to be incorporated into decisions.	5	20	75
Involve the public at all stages of planning.	8	20	72
Do not delay the implementation of important management changes.	17	29	54
Do not allow any one group to have too much influence in decisions.	5	13	82
Follow a process that is easily understood by everyone.	2	10	88
Give special consideration to the concerns of recreational fishers.	20	28	52

All respondents were presented with a list of techniques that could be used to educate people about fisheries and Marine Park management issues and seek their input into decisions affecting recreational fishing, and asked to rate each one as either not at all useful, moderately useful, or very useful. Most fishers believed that all of the techniques were moderately or very useful. The techniques rated very useful by the highest number of fishers were, "Public information displays" (82%), "Educational brochures and pamphlets" (76%), and "Engagement of recreational fishers in research" (60%) (Table 9).

Table 9: Recreational fishers' perceptions about the usefulness of various techniques for consulting the public and educating them about fisheries and Marine Park management issues.

Technique	Perceived Usefulness (Percentage of respondents)			
	Not at all useful	Moderately useful	Very useful	Don't know
Public meetings.	5	41	52	2
Requests for formal written submissions.	12	49	34	5
Public hearings.	6	36	53	5
Public information displays (e.g.boat shows and fishing shows).	2	14	82	2
Educational brochures and pamphlets.	1	21	76	2
Agency branch offices in local communities.	10	37	48	5
Citizen advisory committees (e.g. Local Marine Advisory Committees – LMACs).	10	42	40	8
Surveys.	7	41	48	4
Interactive web sites for submission of comments.	5	37	53	5
Toll-free telephone number for submission of comments.	9	38	49	4
Engagement of recreational fishers in research (e.g. fish tagging programs, recreational fishing logbooks)	7	28	60	5

Centrality-to-lifestyle effects

Forty percent (n = 292) of fishers fell within the low centrality-to-lifestyle group; 41% of fishers (n = 300) in the medium-centrality group, and 19% of fishers (n=141) in the high-centrality group. There was a strong relationship between centrality-to-lifestyle, level of fishing experience and fishing avidity. On average, high-centrality fishers fished more days in the previous twelve months (mean days = 42) and had more years fishing experience (mean years = 26) than medium-centrality fishers (mean days = 26; mean years = 20) and low-centrality fishers (mean days = 15; mean years = 19). There was also a strong relationship between centrality-to-lifestyle and percentage of fishers who reported that fishing is their most important activity in the GBR (low-centrality = 45%; medium-centrality = 75%; high-centrality = 93%).

There were significant differences across centrality-to-lifestyle categories on many of the variables related to the effects of the 2004 Zoning Plan and attitudes towards the rezoning and management of the GBR. High-centrality fishers were more likely to be somewhat or very familiar with the 2004 Zoning Plan (90%) than were medium-centrality (73%) or low-centrality (59%) fishers. However, low-centrality fishers were more likely to believe that rezoning the GBR was a good idea (77%) and more likely to be supportive of the 2004 Zoning Plan (67%) than were medium-centrality fishers (good idea = 70%; support = 56%) or high-centrality fishers (good idea = 54%; support = 44%) (Figure 8 and Figure 9).

High-centrality fishers (48%) were more likely to report that the overall effect of the 2004 Zoning Plan on their fishing activity was negative than were medium-centrality fishers (33%) and low-centrality fishers (20%) (Figure 10). Fishers' perceptions of specific impacts of the 2004 Zoning Plan according to their level of centrality-to-lifestyle are presented in Table 10. In general, high-centrality fishers were the group most likely to report negative impacts (particularly reductions in the number if fish caught, overall fishing satisfaction, ability to access quality fishing areas, increases in the cost of going fishing and the number of people fishing in areas of the Marine Park that remain open), followed by medium-centrality and low-centrality fishers. Low-centrality fishers were more likely to believe the new zoning plan increased the protection of marine life in the park than were medium-centrality and high-centrality fishers.

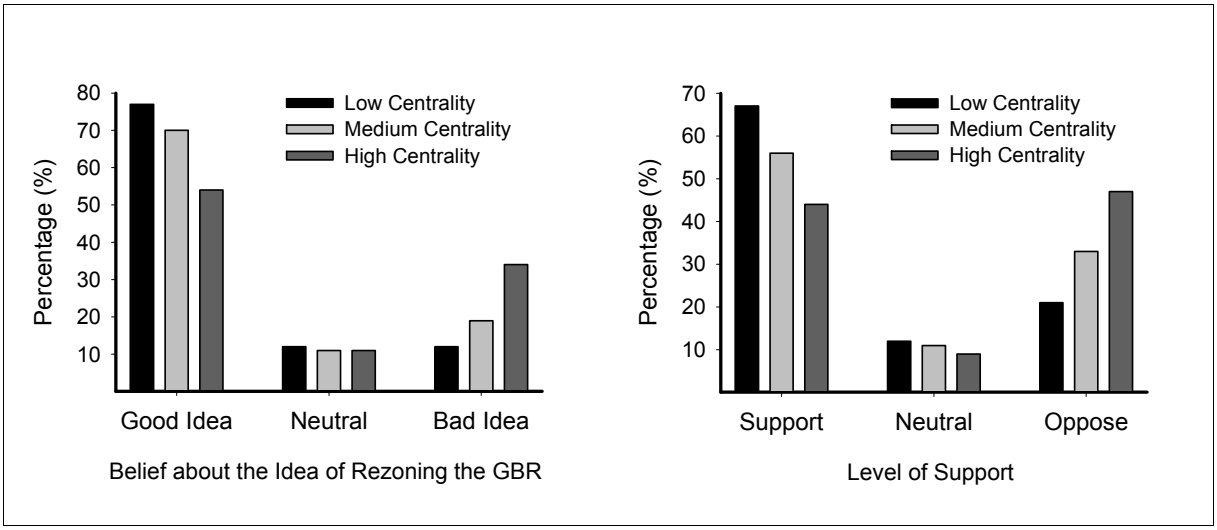

Figure 8: Recreational fishers' beliefs about the general idea of rezoning the GBRMP by level of centrality-to-lifestyle.

Figure 9: Recreational fishers' level of support for the 2004 Zoning Plan by level of centrality-to-lifestyle.

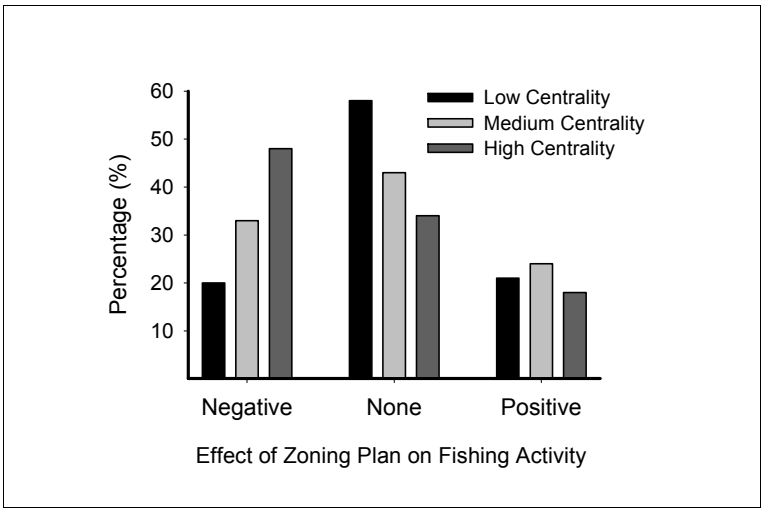

Figure 10: Recreational fishers' perceptions of the overall effects of the 2004 Zoning Plan on their recreational fishing activity by level of centrality-to-lifestyle.

Table 10: Effects of the 2004 Zoning Plan on various aspects of recreational fishing and GBR sustainability for recreational fishers, by centrality-to-lifestyle.

Dimensions	Centrality to lifestyle	Effect (Percentage of respondents)			
		Decreased	No Effect	Increased	Don't know
The number of fish you catch[a].	Low	32	55	9	4
	Medium	42	46	9	2
	High	52	31	16	1
The size of fish you catch[a].	Low	18	67	12	3
	Medium	27	57	15	2
	High	38	42	19	1
Your overall satisfaction with recreational fishing[a].	Low	28	57	13	3
	Medium	39	46	14	2
	High	55	29	16	0
The total amount of time you spend fishing[a].	Low	19	76	2	2
	Medium	28	65	6	1
	High	33	59	9	0
The frequency with which you go fishing[a].	Low	19	77	2	2
	Medium	26	67	6	1
	High	33	60	6	1
The cost ($) of going fishing[a].	Low	3	68	25	3
	Medium	4	51	43	2
	High	5	38	57	0
The number of people fishing in areas of the Marine Park that remain open to fishing[a].	Low	9	33	49	10
	Medium	10	24	59	7
	High	11	16	72	1
Your ability to access quality fishing areas in the Marine Park[a].	Low	45	42	8	4
	Medium	56	32	10	2
	High	66	18	16	0
Your level of knowledge about the Marine Park and its management.	Low	8	34	52	6
	Medium	7	35	51	7
	High	11	28	57	5
The protection of marine life in the Park[a].	Low	2	16	72	10
	Medium	7	26	62	5
	High	6	29	62	4

[a] Difference between centrality-to-lifestyle categories significant at $p<0.05$.

Fishers' level of agreement with statements about the new Zoning Plan and management of the GBRMP according to their level of centrality-to-lifestyle are presented in Table 11. In general, high-centrality fishers were less likely than medium-centrality and low-centrality fishers to believe that the new Zoning Plan was necessary, that the Plan would help ensure the sustainability of the Reef and reef fisheries, that the new Plan has reduced the impact of fishing on the GBR, and that the GBRMPA is doing a good job of managing the GBR. High-centrality fishers were also less likely to believe that the GBRMPA considers the concerns of recreational fishers in decision making, that recreational fishers received fair treatment in the rezoning process, and that recreational fishers were adequately consulted about the 2004 Zoning Plan.

Table 11: Recreational fishers' level of agreement with statements about the 2004 Zoning Plan, the consultation process and management of the GBRMP, by centrality-to-lifestyle.

Statement	Centrality to lifestyle	Level of Agreement (Percentage of respondents)		
		Disagree	Neutral	Agree
The 2004 Zoning Plan will help ensure the survival of the Great Barrier Reef[a].	Low	17	17	66
	Medium	22	19	59
	High	36	20	44
The 2004 Zoning Plan will help ensure sustainable fisheries in the Great Barrier Reef[a].	Low	16	18	66
	Medium	24	18	57
	High	33	21	46
The 2004 Zoning Plan was necessary to maintain the Great Barrier Reef in a healthy condition[a].	Low	19	17	64
	Medium	27	16	56
	High	40	19	40
Protecting the diversity of marine life is the most important goal of managing the Great Barrier Reef[a]	Low	6	13	81
	Medium	9	14	77
	High	15	16	69
Rezoning the Marine Park was the best option for long-term protection of the Great Barrier Reef[a].	Low	20	21	59
	Medium	26	19	55
	High	42	12	46
The 2004 Zoning Plan has reduced the impact of recreational fishing on the Great Barrier Reef[a].	Low	19	30	51
	Medium	27	23	50
	High	34	19	47
The 2004 Zoning Plan has reduced the impact of commercial fishing on the Great Barrier Reef[a].	Low	23	22	54
	Medium	33	16	52
	High	37	16	46
The 2004 Zoning Plan has reduced the impact of tourism on the Great Barrier Reef.	Low	38	45	17
	Medium	44	42	15
	High	51	34	15
I trust the Great Barrier Reef Marine Park Authority to do what is best for conservation of the Great Barrier Reef[a].	Low	25	24	51
	Medium	37	26	38
	High	51	21	28
I trust the Great Barrier Reef Marine Park Authority to consider the concerns of recreational fishers when making decisions about management of the Marine Park[a].	Low	32	22	46
	Medium	47	17	36
	High	61	13	26
The Great Barrier Reef Marine Park Authority is doing a good job of managing the Great Barrier Reef[a].	Low	23	34	43
	Medium	29	38	32
	High	48	26	26
Compared to other groups (e.g. commercial fishers, tourism), recreational fishers received fair treatment in the 2004 rezoning process[a].	Low	29	36	35
	Medium	44	27	29
	High	60	18	23
Recreational fishers were adequately consulted about the 2004 Zoning Plan[a].	Low	35	39	26
	Medium	46	29	24
	High	56	20	24
Recreational fishers should have been compensated in some what for areas closed to recreational fishing under the 2004 Zoning Plan[a].	Low	62	29	9
	Medium	52	33	15
	High	46	29	25

Statement	Centrality to lifestyle	Level of Agreement (Percentage of respondents)		
		Disagree	Neutral	Agree
Zoning of the Great Barrier Reef is adequately enforced[a].	Low	26	38	36
	Medium	29	25	46
	High	29	30	41
Information about the zoning in the Great Barrier Reef is readily available to recreational fishers.	Low	8	13	79
	Medium	9	11	79
	High	12	16	72

[a] Difference between centrality-to-lifestyle categories significant at $p<0.05$.

A higher proportion of high-centrality fishers (78%) reported losing at least one of their regular fishing locations due to the 2004 Zoning Plan than did medium-centrality (59%) and low-centrality (42%) fishers. Of those fishers who lost at least one location, high-centrality fishers reported losing 4.4 locations on average, compared to 3.8 locations for medium-centrality fishers and 2.9 locations for low-centrality fishers. A higher proportion of high-centrality fishers (65%) reported compensating for lost locations by fishing more at their other regular locations within the park than did medium-centrality fishers (59%) and low-centrality fishers (44%). However, there were no differences across centrality-to-lifestyle categories in the percentage of fishers who reported compensating for lost locations by finding new areas to fish either inside or outside of the Park.

Regional effects

Breakdown of the sample across the four geographic regions was as follows: 29% Rockhampton (n = 215); 22% Mackay (n = 164); 20% Townsville (n = 154); and 29% Cairns (n = 219). There were numerous significant differences across regions on variables related to the effects of the 2004 Zoning Plan and fishers' attitudes towards the rezoning and management of the GBR. Fishers in the Mackay region were the most likely to believe that rezoning the GBR was a good idea (78%), followed by Rockhampton (74%), Townsville (70%) and Cairns (64%) (Figure 11). Level of support for the 2004 Zoning Plan also differed by region with the highest support coming from the Rockhampton region (66%), followed by Mackay (60%), Townsville (58%) and Cairns (48%) (Figure 12). There was no difference in reported familiarity with the 2004 Zoning Plan across regions.

Fishers in Cairns were more likely to report that the overall effect of the 2004 Zoning Plan on their fishing activity was negative (33%) followed by fishers in Townsville (28%), Mackay (25%) and Rockhampton (25%) (Figure 13). Fishers' perceptions of specific impacts of the new Zoning Plan according to geographic region are presented in Table 12. In general, fishers in the Cairns region were the most likely to report negative impacts, particularly reductions in number of fish caught, fishing satisfaction and amount of time spent fishing. Fishers in the Cairns region were also least likely to report positive impacts from the 2004 Zoning Plan (i.e. increased their level of knowledge about the Marine Park and increased the protection of marine life in the Park).

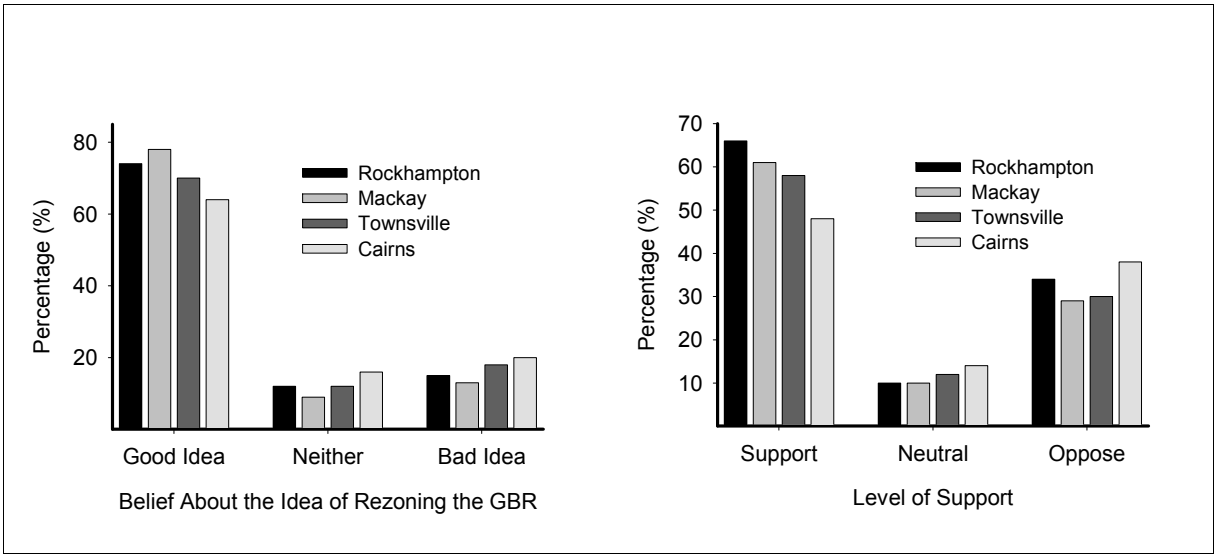

Figure 11: Recreational fishers' beliefs about the general idea of rezoning the GBRMP by region.

Figure 12: Recreational fishers' level of support for the 2004 Zoning Plan by region.

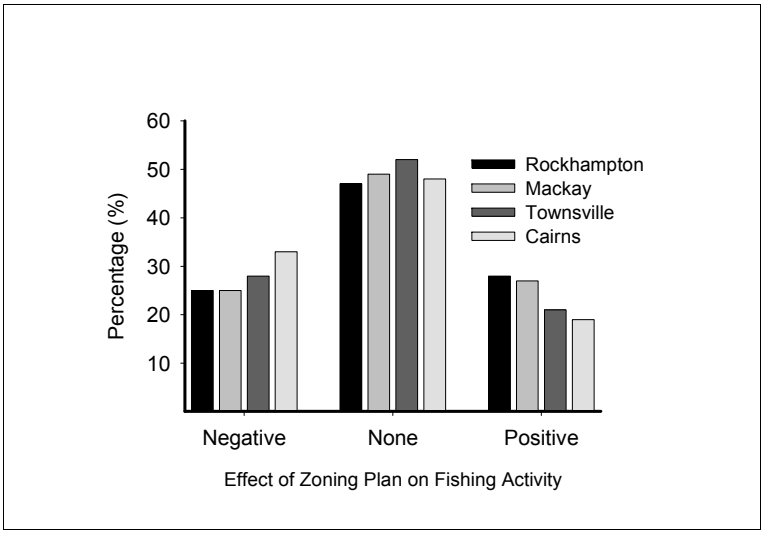

Figure 13: Recreational fishers' perceptions of the overall effects of the 2004 Zoning Plan on their recreational fishing activity by region.

Fishers' level of agreement with statements about the 2004 Zoning Plan and management of the GBRMP according region are presented in Table 13. Fishers in the Rockhampton region were the most likely to believe that the 2004 Zoning Plan will help ensure the sustainability of the GBR and its fisheries, that the 2004 Zoning Plan was necessary and was the best option for protecting the GBR, and that the 2004 Zoning Plan has reduced the impact of fisheries on the Reef. Fishers in Rockhampton were also the most likely to trust the GBRMPA to manage the GBR and consider the concerns of recreational fishers in decision making. Fishers in Cairns were the least likely to hold positive beliefs about the 2004 Zoning Plan, to trust the GBRMPA, or to believe that recreational fishers received fair treatment in the rezoning process.

Table 12: Effects of the 2004 Zoning Plan on various aspects of recreational fishing and GBR sustainability for recreational fishers, by region.

Dimensions	Region	Effect (Percentage of respondents)			
		Decreased	No Effect	Increased	Don't know
The number of fish you catch[a].	Rockhampton	36	48	11	6
	Mackay	42	47	11	0
	Townsville	37	51	10	2
	Cairns	46	44	7	3
The size of fish you catch[a].	Rockhampton	24	53	17	6
	Mackay	29	53	18	0
	Townsville	21	65	12	2
	Cairns	29	59	10	2
Your overall satisfaction with recreational fishing[a].	Rockhampton	34	48	14	4
	Mackay	35	43	21	0
	Townsville	38	51	9	1
	Cairns	44	45	9	2
The total amount of time you spend fishing[a].	Rockhampton	23	68	5	3
	Mackay	21	72	7	0
	Townsville	28	69	3	1
	Cairns	33	60	5	2
The frequency with which you go fishing.	Rockhampton	23	69	4	3
	Mackay	20	75	5	0
	Townsville	25	70	3	1
	Cairns	33	61	4	2
The cost ($) of going fishing.	Rockhampton	3	56	37	4
	Mackay	4	57	38	1
	Townsville	3	61	33	2
	Cairns	6	47	44	2
The number of people fishing in areas of the Marine Park that remain open to fishing[a].	Rockhampton	10	26	56	8
	Mackay	6	32	59	3
	Townsville	14	27	51	8
	Cairns	10	19	62	10
Your ability to access quality fishing areas in the Marine Park.	Rockhampton	50	36	10	4
	Mackay	48	39	12	1
	Townsville	56	31	9	3
	Cairns	59	28	9	3
Your level of knowledge about the Marine Park and its management[a].	Rockhampton	8	26	59	8
	Mackay	5	34	58	4
	Townsville	9	39	47	6
	Cairns	10	37	46	7
The protection of marine life in the park[a].	Rockhampton	5	15	73	7
	Mackay	4	23	69	4
	Townsville	2	26	66	7
	Cairns	6	29	57	8

[a] Difference between regions significant at $p<0.05$.

Table 13: Recreational fishers' level of agreement with statements about the 2004 Zoning Plan, the consultation process and management of the GBRMP, by region.

Statement	Region	Level of Agreement (Percentage of respondents)		
		Disagree	Neutral	Agree
The 2004 Zoning Plan will help ensure the survival of the Great Barrier Reef.	Rockhampton	21	13	66
	Mackay	24	17	59
	Townsville	19	24	56
	Cairns	27	20	53
The 2004 Zoning Plan will help ensure sustainable fisheries in the Great Barrier Reef[a].	Rockhampton	16	16	68
	Mackay	22	14	63
	Townsville	19	26	54
	Cairns	33	18	49
The 2004 Zoning Plan was necessary to maintain the Great Barrier Reef in a healthy condition[a].	Rockhampton	20	16	64
	Mackay	28	13	59
	Townsville	27	19	54
	Cairns	32	20	48
Protecting the diversity of marine life is the most important goal of managing the Great Barrier Reef.	Rockhampton	8	13	79
	Mackay	8	12	80
	Townsville	13	13	75
	Cairns	8	15	76
Rezoning the Marine Park was the best option for long-term protection of the Great Barrier Reef[a].	Rockhampton	18	18	64
	Mackay	33	10	56
	Townsville	26	23	50
	Cairns	32	20	48
The 2004 Zoning Plan has reduced the impact of recreational fishing on the Great Barrier Reef [a]	Rockhampton	17	29	54
	Mackay	31	18	51
	Townsville	21	30	49
	Cairns	31	23	46
The 2004 Zoning Plan has reduced the impact of commercial fishing on the Great Barrier Reef[a].	Rockhampton	20	21	59
	Mackay	37	10	53
	Townsville	20	25	55
	Cairns	40	18	41
The 2004 Zoning Plan has reduced the impact of tourism on the Great Barrier Reef[a].	Rockhampton	36	45	19
	Mackay	42	39	20
	Townsville	40	42	18
	Cairns	54	38	8
I trust the Great Barrier Reef Marine Park Authority to do what is best for conservation of the Great Barrier Reea.	Rockhampton	27	27	47
	Mackay	35	21	43
	Townsville	33	28	39
	Cairns	44	22	34
I trust the Great Barrier Reef Marine Park Authority to consider the concerns of recreational fishers when making decisions about management of the Marine Park[a].	Rockhampton	36	19	45
	Mackay	43	15	43
	Townsville	43	22	35
	Cairns	53	17	29

Statement	Region	Level of Agreement (Percentage of respondents)		
		Disagree	Neutral	Agree
The Great Barrier Reef Marine Park Authority is doing a good job of managing the Great Barrier Reef[a].	Rockhampton	23	38	39
	Mackay	30	32	39
	Townsville	29	36	35
	Cairns	39	31	30
Compared to other groups (e.g. commercial fishers, tourism), recreational fishers received fair treatment in the 2004 rezoning process[a].	Rockhampton	36	30	34
	Mackay	40	24	37
	Townsville	43	25	32
	Cairns	45	33	22
Recreational fishers were adequately consulted about the 2004 Zoning Plan.	Rockhampton	37	34	28
	Mackay	49	25	25
	Townsville	41	32	27
	Cairns	46	31	22
Recreational fishers should have been compensated in some way for areas closed to recreational fishing under the 2004 Zoning Plan.	Rockhampton	60	25	15
	Mackay	55	31	14
	Townsville	52	36	12
	Cairns	49	33	17
Zoning of the Great Barrier Reef is adequately enforced.	Rockhampton	31	26	43
	Mackay	29	29	43
	Townsville	23	40	38
	Cairns	27	30	42
Information about zoning in the Great Barrier Reef is readily available to recreational fishers.	Rockhampton	9	12	79
	Mackay	9	13	78
	Townsville	11	19	71
	Cairns	9	11	80

[a] Difference between regions significant at $p<0.05$.

The highest proportion of fishers who reported losing at least one of their regular fishing locations due to the 2004 Zoning Plan was in the Cairns region (65%), followed by Mackay (57%), Townsville (52%) and Rockhampton (50%). There was no difference in the average number of locations lost across regions (for those fishers who reported losing at least one location). Fishers from the Rockhampton region (60%) were the most likely to report that they compensated for lost locations by fishing more at other locations outside of the Marine Park, followed by fishers from Townsville (51%), Mackay (40%) and Cairns (37%). There were no differences across regions in the percentage of fishers who reported compensating for lost locations by fishing at other locations (either new locations or locations they fished previously) inside the Marine Park.

Discussion

Great Barrier Reef Marine Park recreational fishers believe there is a need to protect and conserve the Great Barrier Reef, and they are strong supporters of Marine Park management. Most fishers surveyed believed that the GBR needed to be rezoned, were supportive of the 2004 Zoning Plan, and believed its implementation will help ensure sustainability of the GBR and the fisheries it supports. These results are not surprising in light of a previous study which showed that recreational fishers in Queensland place high conservation, existence, bequest and educational values on aquatic resources (Sutton 2006a). Clearly, recreational fishers value the GBR for numerous reasons, and are highly dependent on the GBR for continuation of their recreational fishing activity. Consequently, recreational fishers have a strong stake in conservation and management of the Marine Park. These results highlight the importance of maintaining a strong and productive relationship between resource managers and the recreational fishing community, and the importance of ensuring meaningful engagement of recreational fishers in the management process.

Although most fishers were supportive of management of the GBR and the 2004 Zoning Plan, many also reported experiencing at least some negative impacts from the Plan. These impacts include: lost fishing areas, reduced catch, lower fishing satisfaction, increased crowding in open areas, and increased costs of fishing in the Marine Park. However, most fishers reported that overall the new Zoning Plan did not have serious negative impacts on their fishing activity, probably because many were able to compensate for lost areas to some extent, or because they perceived the conservation benefits of the Plan to outweigh the negative impacts. Nevertheless, the impacts identified in this study represent some of the costs of the rezoning that have been borne by recreational fishers that need to be considered when evaluating the overall costs and benefits of the 2004 Zoning Plan.

This study presented evidence that the negative impacts of the rezoning were not as severe as fishers expected, and that support for the 2004 Zoning Plan among fishers has increased over the three years since the Plan was implemented. It is likely those fishers' perceptions of the costs and benefits of the 2004 Zoning Plan will continue to change into the future as fishers continue to adapt to the Plan, and as the potential ecological benefits of the Plan are (or are not) realised. Continued monitoring of recreational fishers' attitudes, beliefs, and perceptions of recreational fishing in the Great Barrier Reef and management of the Park will be necessary to fully understand the long-term costs and benefits of the Zoning Plan to the recreational fishing community.

Most fishers did not believe that recreational fishers were adequately consulted about the 2004 Zoning Plan or that fishers received fair treatment in the rezoning process. Consequently, the level of trust in the GBRMPA among recreational fishers is low. This outcome might be of particularly concern to GBRMPA and other management agencies because these perceptions and attitudes likely serve as barriers to building and maintaining a productive relationship between resource managers and the recreational fishing community. Moreover, dissatisfaction with the rezoning and consultation process is probably a strong contributor to negative attitudes expressed publicly by recreational fishers towards the Zoning Plan and the GBRMPA. The observed difference in level of approval for the 2004 Zoning Plan and level of approval for the rezoning/consultation process demonstrates that fishers make a distinction between the decision-making process and the outcomes of that process. Consequently, it is possible for fishers who are dissatisfied with the process to hold and express negative opinions about management decisions even if they do not disapprove of the outcome or experience negative impacts (Loomis and Ditton 1993; Daigle *et al.* 1996). Recently, Sutton (2006b) demonstrated that the techniques used to seek public input into the 2004 Zoning Plan do not adequately represent the recreational fishing population. Finding

more effective ways of engaging the recreational fishing community in fisheries and Marine Park decision-making processes should be a priority for both management agencies and the recreational fishing community. Results of this study provide further insights into fishers' attitudes and opinions about consultation programs that should be useful in this regard.

Results demonstrate that some sub-groups of the recreational fisher population perceive the costs and benefits of the 2004 Zoning Plan differently than the majority. In particular, high centrality-to-lifestyle fishers and fishers in the Cairns region had the least positive attitudes towards the Plan, and reported the most significant impacts on their fishing activity. Although high-centrality fishers make up only 19% of the fishing population, they are also the most invested, avid and experienced fishers who likely catch a large proportion of the total recreational catch. High-centrality fishers and those with more negative opinions are also the most likely to become involved in fisheries and marine park management issues and to express their opinions at public meetings and through the media (Sutton 2006b). These results have a number of implications. First, it is likely that opinions expressed publicly by fishers are not representative of the overall recreational fisher population because those with the most negative opinions and perceptions of impacts are the individuals most likely to speak out. Second, and conversely, reporting results of studies such as this one at only the population level can obscure the fact that important segments of the recreational fisher population have different attitudes and perceptions about the costs, benefits, and impacts of management actions. The finding that certain segments of the population were more impacted by the 2004 Zoning Plan than others should be acknowledged when interpreting and disseminating the results of this study.

This report does not provide a comprehensive assessment of the full range of impacts of the 2004 Zoning Plan on the recreational fishing sector. Potential impacts not investigated in this study include: changes in recreational fishing participation rate, economic impact and other flow-on effects, changes in the spatial distribution of fishing effort in the Marine Park, and impacts on non-locals who travel to the GBR region and participate in recreational fishing in the Park. The extent to which each of these impacts has occurred is not yet known; however, two of these areas (changes in the spatial distribution of fishing effort and influences on recreational fishing participation) are currently under investigation by the Fishing and Fisheries Research Centre at James Cook University. Results from these studies will be available in the second half of 2008.

This report provides an understanding of recreational fishers' attitudes and perceptions regarding the 2004 Great Barrier Reef Marine Park Zoning Plan. The data provided here contribute to our understanding of the overall costs and benefits of the Plan and will be useful as a basis for further monitoring of social impacts on recreational fishers. Results of this study will also be useful for informing future management decisions in the GBRMP and efforts to implement and manage marine parks elsewhere. Results of this study should also contribute to efforts to incorporate the concerns of recreational fishers in decision-making and facilitate meaningful engagement of the recreational fishing community in the marine park management process.

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Appendix A: Telephone Survey Instrument

Queensland Recreational Fishing Telephone Survey

Good morning/afternoon/evening, this is _____ from James Cook University. We are doing some research on how the recent rezoning of the Great Barrier Reef has affected recreational fishers, and I was hoping to ask you a few questions. It will only take 3-4 minutes and all of the answers that you give will be strictly confidential.

Is there anyone in your household who is 15 or older that has done any recreational fishing in the Great Barrier Reef Marine Park in the last 12 months?

(Note to surveyors: The Great Barrier Reef Marine Park is the islands, and the waters from Bundaberg to the tip of Cape York, and the waters from and including the shoreline to beyond the edge of the reef. Creeks are generally not included in the Marine Park.)

NOT INTERESTED Thank you anyway. Have a good morning/afternoon/evening. *(End of survey.)*

NO Can I just ask how many people, including yourself, live in your household who are 15 or older? _____

Thank you very much for your time. Have a good morning/afternoon/evening. *(End of survey.)*

Why are there no further questions? The rest of the survey only involves households where someone 15 or older has fished in the Great Barrier Reef Marine Park in the last year.

YES How many?

_____

And, including yourself, how many people 15 years or older live in your household?

_____

If only one person in the household is 15 or older: *Go to Question 2.*
If more than one person in the household is 15 or older: Would it be possible for me to speak with the person who is 15 or older and has fished in the Great Barrier Reef Marine Park in the last year who has the next birthday? *(If it is the same person, go to Question 2.)*

If respondent does not want to continue or does not want us to speak with a new respondent – Thank you very much for your time. Have a good morning/afternoon/evening. *(End of survey.)*

If new respondent is not home — What would be a good time to reach him/her? What is his/her name? Thank you very much for your time. We'll call back at ___ on ___. *(Record name and appointment time on front sheet.)*

Why do we need to speak to the person who has the next birthday? – To ensure a random sample of fishers.

If a new respondent comes to the phone:
Good morning/afternoon/evening, this is _____ from James Cook University. We are doing some research on how the recent rezoning of the Great Barrier Reef has affected recreational fishers, and I just spoke with someone in your household who told us that you have been fishing in the Great Barrier Reef Marine Park in the last 12 months. Is this correct?

YES I would like to ask you some questions about fishing in the Great Barrier Reef Marine Park. It should only take 2-3 minutes and all of the answers that you give will be strictly confidential. *(Go to Question 2)*

If fisher is busy at the moment – When would be a better time to talk? And what is your name? Thank you very much for your time. We'll call back at ___ on ___. *(Record name and appointment time on front sheet.)*

If fisher is not willing to continue – Thank you anyway. Have a good morning/afternoon/evening. *(End of survey.)*

NO Is there anyone else in your household who is 15 or older and has fished in the Great Barrier Reef Marine Park in the last year? If there is more than one person, I'd like to talk with the person who has the next birthday.

If nobody else meets the criteria: Thank you very much for your time. Have a good morning/afternoon/evening. *(End of survey.)*
If a new respondent comes to the phone: *Repeat 'new respondent' introduction.*
If new respondent is not home: What would be a good time to reach them? What is their name? Thank you very much for your time. We'll call back at ___ on ___. *(Record name and appointment time on front sheet.)*

2. How often did you go fishing in the last 12 months?

   Read out answer categories and encourage best guess
   1 Weekly or more often
   2 Fortnightly
   3 Once a month
   4 Less often or on holidays
   5 *(Don't read)* Not sure

3. How many days did you go fishing in the past year? _____

4. How many days did you go fishing in the Great Barrier Reef Marine Park in the last year?
   _____

5. Compared to other outdoor activities that you participate in (like golf, tennis, camping, etc.) would you say fishing is:
   Read out answer categories
   1 Your most important outdoor activity
   2 Your second most important outdoor activity
   3 Your third most important outdoor activity
   4 Only one of many outdoor activities

6. How many years have you been fishing recreationally? _____

7. In 2003, a new zoning plan known as the Representative Areas Program or RAP increased the no-fishing areas of the Great Barrier Reef Marine Park from 3% to 33% of the Park area.
   How familiar are you with this zoning plan?:
   Read out answer categories
   1 Very familiar
   2 Somewhat familiar
   3 Vaguely familiar
   4 Not at all familiar

8. In general, do you think that rezoning the Great Barrier Reef Marine Park was a:
   Read out answer categories
   1 Very good idea
   2 Good idea
   3 Bad idea
   4 Very bad idea
   5 Neither a good nor bad idea

9. Thinking about the amount of green zones (that is, no fishing zones) in the *area where you usually fish*, do you think there is:
   Read out answer categories
   1 Way too much
   2 A bit too much
   3 Just enough
   4 A bit too little
   5 Way too little

10. Overall, would you say that the effects of the rezoning plan on your fishing activity have been:
   1 Very negative
   2 Negative
   3 Positive
   4 Very positive
   or
   5 Neither negative nor positive

11. Thinking about how well the new zoning plan helps to protect the Great Barrier Reef, do you:
   1 Strongly agree
   2 Agree
   3 Disagree
   4 Strongly disagree
   or
   5 Neither agree nor disagree

   that the new zoning plan will help maintain the Great Barrier Reef in a healthy condition?

12. Thinking about the level of consideration given to the concerns of recreational fishers in the rezoning process, do you:

   1 Strongly agree
   2 Agree
   3 Disagree
   4 Strongly disagree
   or
   5 Neither agree nor disagree

   that the concerns of recreational fishers were adequately considered in the rezoning process?

13. And what is your age? *If not willing to give age, ask for age group (15-20, 21-30, 31-40, 41-50, 51-60, over 60).*

14. Gender ***(don't ask!)***

1 Male
2 Female
3 Not sure

We have a lot more questions we'd like to ask about your attitudes towards the rezoning plan and how it has affected your fishing activity, but we would like to send you a survey in the mail that you can complete at your own convenience. Can I send you a mail survey?

NO OK, thank you again and have a good morning/afternoon/evening.

YES *Record name and address information on front sheet.*

Can I confirm your name and address details are correct? They are ___. You should be getting the survey in the next few weeks. Thank you and have a good morning/afternoon/evening.

How long it will take to fill out? About 20 minutes

What kinds of questions will be in the mail survey? There will be some more specific questions related to your recreational fishing activity and the rezoning plan. Information that will be collected includes why you go fishing, the benefits you get from fishing and your opinions on the rezoning of the marine park and other fisheries management changes that have taken place in the Great Barrier Reef in recent years.

I don't fish enough. We are trying to collect information from ALL fishers, whether you go fishing regularly or only once a year. Even if you don't fish regularly, the information you give us will still be important.

Why do you need more information? The data collected for this research will allow managers to be more aware of and responsive to the needs and concerns of the recreational angling community, and will provide a baseline for long-term monitoring of the social effects of natural resource management on the recreation sector. This survey also is important to identify the issues important to recreational fishers, leading to recreational fisher input into fisheries management.

What do you mean by 'strictly confidential'? Results will only be reported in aggregate so no participants can be identified with their answers.

Will it cost me anything? No, we will send you a reply paid envelope for you to return the survey to us.

Can I get a copy of the results? Results of the research will be available in about six months' time at the CRC Reef website (www.reef.crc.org.au). If you complete the mail survey, you can choose to have a copy of the results sent to you.

Appendix B: Mail Survey Instrument

Great Barrier Reef Marine Park

Recreational Fishing Survey

CONDUCTED BY::

Fishing and Fisheries Research Centre

James Cook University

Great Barrier Reef Marine Park Recreational Fishing Survey Page 1

Most of the questions in this survey are about recreational fishing in the Great Barrier Reef Marine Park. The Great Barrier Reef Marine Park consists of marine waters from the shoreline to beyond the edge of the reef from Bundaberg to the tip of Cape York. Creeks and rivers are <u>not</u> included in the Marine Park.

1. In the last 12 months, how many ***days*** did you go fishing (including line fishing, spear fishing, crabbing and prawning) in:

_____ the Great Barrier Reef Marine Park from a boat

_____ the Great Barrier Reef Marine Park from the shore

_____ waters outside of the Great Barrier Reef Marine Park (including freshwater)

2. In the last 12 months, how many days did you do each of the following in the Great Barrier Reef Marine Park

_____ Spear fishing

_____ Crabbing

_____ Prawning

_____ Line fishing

	Not at all Satisfied	Slightly Satisfied	Moderately Satisfied	Very Satisfied	Extremely Satisfied
3. Overall, how satisfied are you with fishing in the Great Barrier Reef Marine Park?	1	2	3	4	5

4. Compared to other recreation activities that you do in the Great Barrier Reef Marine Park (such as boating, diving, swimming, etc.), would you say fishing is:

1 Your most important Great Barrier Reef Marine Park activity
2 Your second most important Great Barrier Reef Marine Park activity
3 Your third most important Great Barrier Reef Marine Park activity
4 Only one of many Great Barrier Reef Marine Park activities

5. How many years have you been fishing in the Great Barrier Reef Marine Park?

_____Years

6. What species do you most prefer to catch when fishing in the Great Barrier Reef Marine Park?

_____ Most preferred species

_____ Second most preferred species

_____ Third most preferred species

Great Barrier Reef Marine Park Recreational Fishing Survey Page 2

7. Please indicate the extent to which you agree or disagree with each of the following statements about recreational fishing:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a) If I stopped fishing, I would probably lose touch with a lot of my friends	1	2	3	4	5
b) If I couldn't go fishing, I am not sure what I would do	1	2	3	4	5
c) Because of fishing, I don't have time to spend participating in other leisure activities	1	2	3	4	5
d) Most of my friends are in some way connected with fishing	1	2	3	4	5
e) I consider myself to be somewhat of an expert at fishing	1	2	3	4	5
f) I find that a lot of my life is organised around fishing	1	2	3	4	5
g) Others would probably say I spend too much time fishing	1	2	3	4	5
h) I would rather go fishing than do almost anything else	1	2	3	4	5
i) Other leisure activities don't interest me as much as fishing	1	2	3	4	5

In 2004, the Great Barrier Reef Marine Park Authority implemented a new zoning plan for the Great Barrier Reef Marine Park. The aim of the 2004 Zoning Plan was to increase the level of protection given to marine life in the Park. To help accomplish this, the 2004 Zoning Plan increased the amount of Green Zones (i.e., no-take areas) from 5% to 33% of the total Park area, and also changed the amount and location of Yellow Zones (i.e., limited fishing areas) in the Park. With the following questions we are interested in finding out what you think about the 2004 Zoning Plan, and what were the positive and negative effects of the Plan on your fishing activity.

8. How familiar are you with the new Great Barrier Reef Marine Park Zoning Plan that was implemented in 2004?

1 Not at all familiar
2 Vaguely familiar
3 Somewhat familiar
4 Very familiar

9. Please think back to when the new Zoning Plan was first implemented in 2004. In general, how supportive of the plan were you <u>at that time</u>?

1 Strongly supportive
2 Somewhat supportive
3 Neutral
4 Somewhat opposed
5 Strongly opposed
6 Don't know / Not applicable

Great Barrier Reef Marine Park Recreational Fishing Survey Page 3

10. Thinking back to when the new Great Barrier Reef Zoning Plan was about to be implemented in 2004, what effect did you *expect* the new Zoning Plan to have on:

	Strongly Decrease	Slightly Decrease	No effect	Slightly Increase	Strongly Increase	Don't know / Not applicable
a) The number of fish you catch	1	2	3	4	5	6
b) The size of fish you catch	1	2	3	4	5	6
c) Your overall satisfaction with recreational fishing	1	2	3	4	5	6
d) The total amount of time you spend fishing	1	2	3	4	5	6
e) The frequency with which you go fishing	1	2	3	4	5	6
f) The cost ($) of going fishing	1	2	3	4	5	6
g) The number of people fishing in areas of the Marine Park that remain open to fishing	1	2	3	4	5	6
h) Your ability to access quality fishing areas in the Marine Park	1	2	3	4	5	6
i) Your level of knowledge about the Marine Park and its management	1	2	3	4	5	6
j) The protection of marine life in the Park	1	2	3	4	5	6

11. In general, how supportive of the 2004 Great Barrier Reef Zoning Plan are you today?

1 Strongly supportive
2 Somewhat supportive
3 Neutral
4 Somewhat opposed
5 Strongly opposed
6 Don't know / Not applicable

12. Please tell us your opinion about the *amount of area* covered by each of these different types of zones in the area of the Great Barrier Reef Marine Park where you usually fish

	Way too Little	A bit too Little	Just Enough	A bit too Much	Way too Much	Don't know / Not applicable
a) Green Zones (no fishing)	1	2	3	4	5	6
b) Yellow Zones (limited fishing – one line and one hook only)	1	2	3	4	5	6
c) Olive Zones (buffer zones, limited fishing - trolling only)	1	2	3	4	5	6
d) Orange Zones (scientific research – no fishing)	1	2	3	4	5	6
e) Pink Zones (preservation zones – no entry)	1	2	3	4	5	6
f) Dark Blue Zones (habitat protection – no trawling)	1	2	3	4	5	6

Great Barrier Reef Marine Park Recreational Fishing Survey Page 4

13. Overall, what effect has the 2004 Great Barrier Reef Zoning Plan had on:

	Strongly Decreased	Slightly Decreased	No effect	Slightly Increased	Strongly Increased	Don't know / Not applicable
a) The number of fish you catch	1	2	3	4	5	6
b) The size of fish you catch	1	2	3	4	5	6
c) Your overall satisfaction with recreational fishing	1	2	3	4	5	6
d) The total amount of time you spend fishing	1	2	3	4	5	6
e) The frequency with which you go fishing	1	2	3	4	5	6
f) The cost ($) of going fishing	1	2	3	4	5	6
g) The number of people fishing in areas of the Marine Park that remain open to fishing	1	2	3	4	5	6
h) Your ability to access quality fishing areas in the Marine Park	1	2	3	4	5	6
i) Your level of knowledge about the Marine Park and its management	1	2	3	4	5	6
j) The protection of marine life in the Park	1	2	3	4	5	6

14. Are there any other ways in which the 2004 rezoning of the Great Barrier Reef Marine Park has affected you (positively or negatively)? If yes, please explain (use additional paper if necessary).

15. Please tell us how much of a <u>threat</u> you believe each of the following is to the health of the Great Barrier Reef:

	No Threat	Minor Threat	Major Threat	Don't Know
a) Marine pollution	1	2	3	4
b) Land-based pollution (run-off)	1	2	3	4
c) Over fishing by recreational fishers	1	2	3	4
d) Over fishing by commercial fishers	1	2	3	4
e) Marine tourism	1	2	3	4
f) Crown of thorns starfish	1	2	3	4
g) Climate change / coral bleaching	1	2	3	4
h) Coastal development	1	2	3	4
i) Aquaculture	1	2	3	4
j) Other (explain)_____	1	2	3	4

Great Barrier Reef Marine Park Recreational Fishing Survey Page 5

16. Please indicate the extent to which you agree or disagree with each of the following statements about management of the Great Barrier Reef Marine Park.:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a) The 2004 Zoning Plan will help ensure the survival of the Great Barrier Reef.	1	2	3	4	5
b) The 2004 Zoning Plan will help ensure sustainable fisheries in the Great Barrier Reef.	1	2	3	4	5
c) The 2004 Zoning Plan was necessary to maintain the Great Barrier Reef in a healthy condition	1	2	3	4	5
d) Protecting the diversity of marine life is the most important goal of managing the Great Barrier Reef	1	2	3	4	5
e) Rezoning the Marine Park was the best option for long-term protection of the Great Barrier Reef.	1	2	3	4	5
f) The 2004 Zoning Plan has reduced the impact of recreational fishing on the Great Barrier Reef.	1	2	3	4	5
g) The 2004 Zoning Plan has reduced the impact of commercial fishing on the Great Barrier Reef.	1	2	3	4	5
h) The 2004 Zoning Plan has reduced the impact of tourism on the Great Barrier Reef	1	2	3	4	5
i) I trust the Great Barrier Reef Marine Park Authority to do what is best for conservation of the Great Barrier Reef.	1	2	3	4	5
j) I trust the Great Barrier Reef Marine Park Authority to consider the concerns of recreational fishers when making decisions about management of the Marine Park.	1	2	3	4	5
k) The Great Barrier Reef Marine Park Authority is doing a good job of managing the Great Barrier Reef.	1	2	3	4	5
l) Compared to other groups (e.g., commercial fishers, tourism), recreational fishers received fair treatment in the 2004 rezoning process	1	2	3	4	5
m) Recreational fishers were adequately consulted about the 2004 Zoning Plan.	1	2	3	4	5
n) Recreational fishers should have been compensated in some way for areas closed to recreational fishing under the 2004 Zoning Plan.	1	2	3	4	5
o) Zoning of the Great Barrier Reef is adequately enforced	1	2	3	4	5
p) Information about zoning in the Great Barrier Reef is readily available to recreational fishers.	1	2	3	4	5

Great Barrier Reef Marine Park Recreational Fishing Survey Page 6

17. Are there any locations in the Great Barrier Reef Marine Park where you used to fish regularly but now can't because they were rezoned as Green Zones (i.e., no-take areas) under the 2004 zoning plan?

1 No → Please skip to **Question 21**
2 Yes

How many of your regular fishing locations were turned into Green Zones under the 2004 Zoning Plan?

_____ Locations

Approximately what percentage of the area inside the Marine Park that you used to fish regularly was turned into Green Zones under the 2004 Zoning Plan?

1 less than 25%
2 25% to 50%
3 51% to 75%
4 more than 75%
5 don't know

18. Have you compensated for the loss of access to new green zones by fishing at new locations inside the Marine Park that you did not fish prior to the rezoning?

1 No → Please skip to **Question 19**
2 Yes

Overall, how would you rate the quality of these locations compared to the locations you lost through the rezoning?

1 A lot better
2 Slightly better
3 About the same
4 Slightly worse
5 A lot worse

Great Barrier Reef Marine Park Recreational Fishing Survey Page 7

19. Have you compensated for the loss of access to new green zones by spending more time fishing at your other regular fishing locations inside the Marine Park?

1 No → Please skip to **Question 20**
2 Yes

Overall, how would you rate the quality of these locations compared to the locations you lost through the rezoning?

1 A lot better
2 Slightly better
3 About the same
4 Slightly worse
5 A lot worse

20. Have you compensated for the loss of access to new green zones by fishing more at locations outside the Marine Park (including creeks or freshwater)?

1 No → Please skip to **Question 21**
2 Yes

Overall, how would you rate the quality of these locations compared to the locations you lost through the rezoning?

1 A lot better
2 Slightly better
3 About the same
4 Slightly worse
5 A lot worse

21. In the Great Barrier Reef Marine Park, Yellow Zones are used to increase the protection and conservation of certain areas while providing opportunities for reasonable use and enjoyment of the Park. Yellow Zones place restrictions on commercial fishing (no netting, no trawling, limited crabbing), and also restrict both commercial and recreational fishers to using one line and one hook, except when trolling.

In general, do you think Yellow Zones are a:

1 Very good idea
2 Good idea
3 Neither a good nor bad idea
4 Bad idea
5 Very bad idea

Great Barrier Reef Marine Park Recreational Fishing Survey Page 8

22. Over the past 12 months, approximately how much of your fishing activity in the Great Barrier Reef Marine Park occurred in Yellow Zones?

1 less than 25%
2 25% to 50%
3 51% to 75%
4 more than 75%
5 don't know

23. **Please indicate the extent to which you agree or disagree with each of the following statements about <u>Yellow Zones</u> in the Great Barrier Reef Marine Park**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a) Yellow Zones place too many restrictions on recreational fishers	1	2	3	4	5
b) Yellow Zones place too many restrictions on commercial fishers	1	2	3	4	5
c) Yellow Zones will lead to better recreational fishing in the Park	1	2	3	4	5
d) Yellow Zones have reduced the impact of recreational fishing on the Great Barrier Reef	1	2	3	4	5
e) Yellow Zones have reduced the impact of commercial fishing on the Great Barrier Reef	1	2	3	4	5
f) The restrictions on recreational fishing in Yellow Zones are worth it because of the restrictions on commercial fishing in these areas	1	2	3	4	5

24. In Queensland, government agencies responsible for fisheries and marine park management regularly run public consultation programs to inform people about proposed fisheries and marine park management changes, and to obtain public input and feedback about proposed management changes.

Do you believe that government agencies should consult the public (including recreational fishers) about fisheries and marine park management decisions?

1 Yes ⟶ Please skip to **Question 26**
2 No

Great Barrier Reef Marine Park Recreational Fishing Survey Page 9

25. Please indicate the extent to which you agree or disagree with the following reasons why government agencies *should not* consult the public about fisheries and marine park management decisions

Agencies should not consult the public about fisheries issues because...

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a)...consulting the public is too expensive	1	2	3	4	5
b)...fisheries and marine park managers know what is best for our natural resources	1	2	3	4	5
c)...the public has little to add to decisions about fisheries and marine park management	1	2	3	4	5
d)...it is not possible to incorporate the views of the public in decisions	1	2	3	4	5
e)...consulting the public delays the implementation of important management changes	1	2	3	4	5
f)... consulting the public allows some interest groups to have too much influence in decisions	1	2	3	4	5

Please skip to Question 27

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26. Please indicate how important you believe each of the elements below is for effective public consultation about fisheries and marine park issues

How important is it that public consultation programs...

	Not at all Important	Slightly Important	Moderately Important	Very Important	Extremely Important
a)...give equal opportunity for all citizens to participate	1	2	3	4	5
b)...result in the best outcome for recreational fishers	1	2	3	4	5
c)...result in the best outcome for the marine environment	1	2	3	4	5
d)...result in an outcome that is fair to all affected groups	1	2	3	4	5
e)... allow resource managers to express their opinions to citizens	1	2	3	4	5
f)... allow citizens to express their opinions to resource managers	1	2	3	4	5
g)...give people a genuine opportunity to influence decisions	1	2	3	4	5
h)...improve the relationship between resource managers and citizens	1	2	3	4	5
i)...do not cost the government too much money	1	2	3	4	5
j)...do not require too much time for people to participate	1	2	3	4	5
k)...do not cost people too much money to participate	1	2	3	4	5
l)...favour the group with the most at stake	1	2	3	4	5
m)...allow local concerns to be incorporated into decisions	1	2	3	4	5
n)...involve the public at all stages of planning	1	2	3	4	5
o)...do not delay the implementation of important management changes	1	2	3	4	5
p)...do not allow any one group to have too much influence in decisions	1	2	3	4	5
q)... follow a process that is easily understood by everyone	1	2	3	4	5
r)... give special consideration to the concerns of recreational fishers	1	2	3	4	5

27. Please tell us how useful you think each of the techniques listed below is as a way for people to learn about fisheries and marine park management issues and have input into management decisions affecting recreational fishing.

	Not at all Useful	Moderately Useful	Very Useful	Don't know
a) Public meetings	1	2	3	4
b) Requests for formal written submissions	1	2	3	4
c) Public hearings	1	2	3	4
d) Public information displays (e.g., at boat shows and fishing shows)	1	2	3	4
e) Educational brochures and pamphlets	1	2	3	4
f) Agency branch offices in local communities	1	2	3	4
g) Citizen advisory committees (e.g., Local Marine Advisory Committees - LMACs)	1	2	3	4
h) Surveys	1	2	3	4
i) Interactive web sites for submission of comments	1	2	3	4
j) Toll-free telephone number for submission of comments	1	2	3	4
k) Engagement of recreational fishers in research (e.g., fish tagging programs, recreational fishing logbooks)	1	2	3	4
l) Other (explain)_____	1	2	3	4

28. Did you attend a public meeting or make a submission to the Great Barrier Reef Marine Park Authority concerning the 2004 rezoning of the Great Barrier Reef?

1 No
2 Yes

29. How much do you use each of the following types of maps or mapping tools in the course of your fishing activity?

	No Use	A Little Use	Moderate Use	A Lot of Use
a) Paper maps and / or nautical charts	1	2	3	4
b) Global Positioning System (GPS)	1	2	3	4
c) Chart plotter	1	2	3	4
d) Aerial photographs	1	2	3	4
e) Internet maps (e.g., Google Earth)	1	2	3	4
f) Great Barrier Reef zoning maps	1	2	3	4
g) Geographic Information Systems (GIS)	1	2	3	4
h) Interactive mapping applications (e.g., Coastal Habitat Resources Information System – CHRIS; Deep Blue mapping tool)	1	2	3	4

30. Are you:

1 Male
2 Female

31. What is your approximate annual ***household*** income before taxes?

Under $30,000 $30,000 to $59,000 $60,000 to $89,000 $90,000 to 109,999 $110,000 and above

32. Was this survey completed by the person to whom it was addressed?

1 Yes
2 No

Is there anything else you would like to share with us? (use additional paper if necessary)

Would you like a summary of the results of this survey?

Yes No

Your contribution of time to this study is greatly appreciated. Please return your completed questionnaire in the postage-paid return envelope as soon as possible. Thank you.

Queensland Recreational Fishing Survey
Reply Paid 109
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Further information

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