

# A SOCIO-ECONOMIC ASSESSMENT OF THE TASMANIAN RECREATIONAL ROCK LOBSTER FISHERY

*S. Frijlink & J.M. Lyle*

*March 2010*



*Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Private Bag 49,  
Hobart, Tasmania 7001. E-mail: [Jeremy.Lyle@utas.edu.au](mailto:Jeremy.Lyle@utas.edu.au)*

*Ph. (03) 6227 7277 Fax (03) 6227 8035*

The opinions expressed in this report are those of the author(s) and are not necessarily those of the Tasmanian Aquaculture and Fisheries Institute.

*© Tasmanian Aquaculture and Fisheries Institute, University of Tasmania 2010*

Copyright protects this publication. Except for purposes permitted by the Copyright Act, reproduction by whatever means is prohibited without the prior written permission of the Tasmanian Aquaculture and Fisheries Institute.

# A socio-economic assessment of the Tasmanian recreational rock lobster fishery

*S. Frijlink & J.M. Lyle*

## **EXECUTIVE SUMMARY**

A self-administered mail questionnaire was used to collect social and economic data from Tasmanian rock lobster licence holders. Questions pertained to fisher's demographic characteristics, fishing participation patterns and preferences, fishing attitudes and experience preferences, and expenditure relating to rock lobster fishing. The survey was sent to 967 lobster fishers at the end of the 2006/07 lobster fishing season; 379 usable questionnaires were returned. Accounting for non-deliverables, an effective response rate of 40% was achieved. The number of usable questionnaires was sufficient to structure the results in terms of comparisons between three licence class groups; (1) pot licence only fishers, (2) dive licence only fishers, and (3) owners of multiple lobster licences. The small number of ring-only licence holders ( $n=5$ ) precluded using a separate group for these fishers. Calibration against the demographic profile of licence-holders indicated that respondents were over represented by older fishers. Furthermore, cross-referencing with data collected for a sub-set of respondents who also participated in the 2006/07 phone/diary survey suggested that reported activity levels (avidity) by respondents was inflated by recall bias and, to a lesser extent, sampling bias, with a positive bias towards more avid respondents. These biases should be taken into account when viewing survey results. Catch and effort estimates for rock lobster fishers over the same period are provided in Lyle (2008).

### **Demographic Characteristics**

- Most respondents were male (90%). Multiple licence holders (95%) had the highest proportion of males followed by dive-only fishers (92%) and pot-only fishers (81%).
- The mean age of all three licence group respondents was, on average, older than the mean of all licensed lobster fishers on the 2006/07 registration database. Mean age of pot-only, dive-only and multiple licence fishers were 50.5, 44.0 and 44.9 years, respectively for respondents which compares with 46.0, 38.6 and 41.8 years for all licence holders.
- The median personal income group for all respondents was between \$50,000 and \$60,000.
- 71% of all respondents were employed full-time or self-employed. A significantly higher proportion of pensioners were observed among pot-only fishers.

- In order of prominence, the highest level of education attained by respondents was; trade qualification (37%), some high school (not graduated) (21%), University Degree (16%), graduated HCS/matriculation (15%), and Diploma (11%).

### **Fishing Participation Patterns and Preferences**

- Overall, respondents reported an average of 35.5 days per year participating in fishing activities other than lobster fishing. Multiple licence fishers were significantly more avid (40.3 days) than dive-only fishers (30.7 days) and pot-only fishers (29.9 days).
- The mean annual days fished for rock lobster by pot-only, dive-only and multiple licence fishers were 21.0, 13.6 and 19.0 during 2006/07. The comparable effort based on the phone/diary survey for these groups was 7.3, 4.0 and 6.8 days, indicating the combined effects of recall (over-estimation of previous activity) and sampling biases (over representation of more avid fishers) in the respondent group.
- The average number of years experience participating in lobster fishing was 19.3.
- 38.8% of respondents regarded fishing as their most important outdoor activity.
- 18.5% of all respondents regarded lobster fishing as their most important type of fishing. Dive-only fishers were significantly more inclined to rate lobster fishing as their most important fishing type (24.5%) than multiple licence fishers (18.3%) and pot-only fishers (16.4%).
- When fishing on trips targeting lobster in addition to other species, 23.7% of all fishers rated lobster as their most important species.
- The social group most often fished with was friends followed by family, friends and family together and lastly, alone. However, pot-only fishers fished with family more often and friends less often than both dive fishers and multiple licence fishers.

### **Fishing Attitudes and Experience Preferences**

- Overall, the three most important factors that were considered when deciding where to go lobster fishing were weather conditions, safety, and familiarity with the location.
- Overall, 82.3% of respondents indicated that there were factors restraining them from fishing for lobster as often as they would like. The two most important factors restraining participation of all three licence groups were weather/sea conditions and other time commitments. The restrictiveness of fisheries rules and regulations was, on average, more important as a limiting factor for pot-only and multiple licence fishers than for dive-only fishers.
- Overall, the five most important motivations were relaxation, socializing with friends, catching lobster to eat, experiencing nature and the experience of catching lobster. In comparing groups, catching lobster to eat was less important for dive-

only fishers while experiencing nature and the challenge/sport of lobster fishing were relatively less important motivating factors for pot-only fishers.

- Multiple licence fishers were more oriented to catching higher numbers of lobsters while dive-only fishers were more oriented to catching large lobsters.
- Centrality to lifestyle index analysis suggested that the lifestyles and social networks of multiple licence fishers were more closely connected to lobster fishing than for pot-only and dive-only fishers.

### **Attitudes to Management and Fishery Related Issues**

- For most hypothetically proposed management options<sup>1</sup>, dive fishers favoured more restrictive options than pot fishers and multiple licence fishers.
- Of nine proposed management options, the two most popular were limiting the number of recreationally caught lobsters taken out of Tasmania and the introduction of separate fishing areas for recreational and commercial fishers. The least popular option was decreasing the minimum size limit for lobsters in southern Tasmania.
- Urban fishers were generally more supportive of more restrictive management initiatives than rural fishers.
- Less avid respondents were more supportive of management options that are more restrictive than the current arrangements than more avid respondents
- Overall, issues relating to management and compliance, and resource sustainability were the most important fishery-related issues to respondents. In comparing groups, dive-only fishers expressed relatively greater concern for sustainability related issues while pot-only fishers expressed relatively greater concern about conflict with other recreational lobster fishers.

### **Boat Characteristics and Expenditure**

- Overall, 55.5% of respondents reported owning at least one boat from which they fished for lobster. The rate of boat ownership for dive-only fishers was considerably lower (38.5%).
- The mean estimated current market value of boats was \$30,054. On average, respondents indicated using their boats for lobster fishing approximately one third of the total days used.
- On average, pot fishers, dive fishers and multiple licence fishers spent \$478, \$471 and \$1,003 respectively on annual (non-trip related) lobster fishing expenses.

---

<sup>1</sup> None of the management options used in this study were being considered at the time of the survey; management options were designed to facilitate a greater understanding of fisher's attitudes to various policy tools that could be exercised to address stock related issues.

- Total annual (non-trip related) expenditures were estimated to be in the order of \$18M for all licence holders. By licence group, this was \$6.8M, \$2.1M and \$9.2M for pot-only fishers, dive-only fishers and multiple licence fishers, respectively.
- For trip-related costs, the average daily expenditure attributed to lobster fishing was \$35 for pot fishers, \$46 for dive fishers and \$70 for multiple licence fishers.
- Total trip-related expenditures attributed to lobster fishing were estimated to be in the order of \$6M. By licence group, this was \$1.7M for pot fishers, \$0.4M for dive fishers, and \$3.9M for multiple licence fishers.

## TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1 INTRODUCTION	1
1.1 Objectives	2
2 METHODS	3
2.1 Questionnaire Development and Design	3
2.2 Sampling Design and Mailing Procedures	3
2.3 Data Analysis	4
<i>Group Differences</i>	4
<i>Section 1 – Demographic Characteristics</i>	4
<i>Section 2 – Fishing Participation and Preferences</i>	4
<i>Section 3 – Fishing Attitudes and Experience Preferences</i>	5
<i>Section 4 - Attitudes to Management and Fishery Related Issues</i>	6
<i>Section 5 – Boat Characteristics and Expenditure</i>	6
2.4 Non-Response bias checks	7
3 RESULTS AND DISCUSSION	9
3.1 Characteristics of Lobster Fishers	9
<i>Gender</i>	9
<i>Age</i>	9
<i>Income</i>	10
<i>Employment</i>	10
<i>Education</i>	11
3.2 Fishing Participation Patterns and Preferences	12
<i>Non-lobster Fishing Activity Profiles</i>	12
<i>Lobster Fishing Activity Profiles</i>	12
<i>Participation in Other Fishing Activities on Lobster Fishing Trips</i>	13
<i>Lobster Fishing Experience</i>	14
<i>Importance of General Fishing and Lobster Fishing</i>	14
<i>Social Participation</i>	15
3.3 Fishing Attitudes and Experience Preferences	16
<i>Site Preferences</i>	16
<i>Constraints to Lobster Fishing</i>	17
<i>Motivations</i>	17
<i>Consumptive Orientation</i>	21
<i>Centrality to Lifestyle</i>	21
<i>Attitudes to Management</i>	24
3.4 Boat Characteristics and Expenditure	27
<i>Boat Characteristics</i>	27
<i>Non-Trip Related Expenditure</i>	28
<i>Trip Related Expenditure</i>	32
4 CONCLUSIONS AND RECOMMENDATIONS	37
4.1 Overview	37
4.2 Methodological Issues and Implications for Future Research	38
ACKNOWLEDGEMENTS	40
REFERENCES	41



## 1 INTRODUCTION

While rock lobsters have long been regarded as a highly prized species by recreational fishers in Tasmania, the popularity of lobster fishing has increased markedly in recent years. Since the present recreational licensing system was introduced in 1995, the number of licensed fishers has more than doubled. Currently, more than 4% of all Tasmanians possess a licence to fish for lobsters by one or more of the following methods; pots, ring nets, and dive collection. The diversity of fishing experiences enabled by the range of fishing methods is likely to be a factor underpinning the popularity of rock lobster fishing.

Since 1996, six comprehensive biennial catch and effort surveys of the recreational fishery have been conducted. However, no assessments have previously been undertaken on the human dimensions of the fishery. The potential benefits of obtaining information of this nature have been recognized in the objectives of the Rock Lobster Fishery Policy Document (1997) and in Schedule 1 of the *Living Marine Resources Management Act 1995*<sup>2</sup>. The latter prescribes that Tasmanian fisheries need to be managed in a way “which enables people and communities to provide for their social, economic and cultural well-being”. These objectives, which have been developed to inform the decision making process for the rock lobster fishery and Tasmanian managed fisheries in general, respectively, are consistent with the core objectives and guiding principles of Ecologically Sustainable Development (ESD) (Commonwealth of Australia 1992).

The value of an integrated management approach that incorporates social and economic information into the decision making process has been recognized by an increasing number of fisheries, both in Australia and abroad. An understanding of behavior, motivations, values and expectations of fishery participants will better equip managers when attempting to maximise community benefits from the distribution of publicly owned fisheries resources. Understanding fishers may also allow managers to distribute management resources more effectively, facilitate a greater degree of compliance to regulations and reduce uncertainty associated with policy changes. Furthermore, insights into the constituency may inform effective development and delivery of education and awareness programs associated with changes in regulations and resource conditions.

While the results from this study may have direct implications for the management of the Tasmanian recreational rock lobster fishery, they also serve as a baseline for future social and economic studies of the fishery. Expansion of the fishery in recent years (Lyle *et al.*, 2005) plus anticipated changes in the demographic constituency of fishers suggests that social and economic dimensions will not remain static. Inter-seasonal fluctuations in stock abundance may require periodic reassessments of what is necessary to maximise satisfaction and benefits among recreational lobster fishers.

Despite the increased use of socioeconomic information in modern fisheries management, there is a lack of published information available for non-scalefish fisheries. While the reasons for this are unclear, the dearth of published material may reflect a perception that recreational shellfish and crustacean fisheries are wholly harvest oriented and therefore lack the diversity of motivations, values, expectations and attitudes associated with ‘sport

---

<sup>2</sup> A revised Rock Lobster Fishery Policy Document was being drafted at time of writing

fisheries'. The focus of many authors on exploring diversity associated with consumptive orientation and issues surrounding catch and release behaviour supports this assumption. Despite the consumptive focus in fisheries such as the Tasmanian recreational rock lobster fishery, it is reasonable to expect the existence of diverse motivations, values, expectations and attitudes among participants. After all, in addition to the importance of catching fish for food, the breadth of socio-cultural values generally ascribed to outdoor recreational activities should also be applicable to lobster fishing. Based on fundamental differences in the ways that lobster are targeted by fishers, it is also reasonable to expect that assessing differences among fishers according to fishing methods employed would be a useful starting point to explore diversity within the fishery. Consequently, this report presents results separately for different licence groups in addition to presenting aggregated results for all respondents.

## 1.1 Objectives

The primary objective of this study was to provide a social and economic characterization of Tasmania's recreational rock lobster fishers<sup>3</sup>. In doing so, variables pertaining to the following categories were assessed in aggregate for all respondents, and according to fisher licence type.

- I. Demographic characteristics
- II. Fishing participation patterns and preferences
- III. Fishing attitudes and experience preferences
- IV. Attitudes and opinions to management and fishery related issues
- V. Boat characteristics and expenditure

Differences and/or similarities between licence groups will be discussed in terms of managerial relevance. Recommendations for future research will be discussed in light of the results.

---

<sup>3</sup> Catch and effort data was not collected for this survey: see Lyle (2008) for catch and effort data collected over the same survey period i.e. 2006/07

## 2 METHODS

The primary goal of this study was to obtain social and economic information about Tasmanian recreational lobster fishers.

### 2.1 Questionnaire Development and Design

A self-administered mail questionnaire was developed to collect social and economic information from recreational rock lobster licence holders (see Appendix A). The majority of the questions were close-ended and collected quantitative data; however two open-ended questions provided respondents the opportunity to comment on contentious issues. Questions pertained to aspects of fishers' general involvement in lobster fishing, as well as details specific to fishing during the 2006/07 season (November 2006-August 2007).

The questionnaire was divided into five sections: (1) demographic characteristics, (2) fishing participation and preferences, (3) fishing attitudes and experience preferences, (4) attitudes to management and fishery related issues, and (5) boat characteristics and expenditure. The survey contained questions that have proven effective in previous social and economic evaluation studies of fishers, in addition to questions specific to the Tasmanian lobster fishery.

### 2.2 Sampling Design and Mailing Procedures

Questionnaires were mailed to respondents in September 2007, at the end of the 2006/07 recreational lobster fishing season. Identical questionnaires were sent to two groups of recreational rock lobster licence-holders. The first group (Group A) consisted of 317 fishers who participated in 2006/07 recreational lobster and abalone survey (Lyle, 2008), which was stratified to survey a disproportionately higher proportion of dive licence-holders. During the final interview of that study, respondents were asked if they were willing to accept a mail questionnaire about social and economic dimensions of their lobster fishing. For the second group (Group B), 650 randomly selected rock lobster licence-holders were selected from the 2006/07 registration database. Again, the sampling design was stratified to survey a disproportionately higher percentage of dive licence-holders. Only respondents aged 18 years or older were included in the samples.

Questionnaires were prefaced with an invitation to complete the survey, information about the nature of the research, potential benefits for recreational lobster fishers, ethics approval and contact details of the survey investigators (Appendix A). Questionnaires were sent with pre-paid, self-addressed envelopes. Three weeks after the questionnaires were sent, a reminder letter was sent to all recipients who had not returned their questionnaires (see Appendix B).

In an effort to improve response rates, an article on the survey was published in the October/November 2007 edition of *Tasmanian Fishing and Boating News*. Another measure used to improve response rates was the use of prizes as inducements for completed questionnaires. Five fishers who satisfactorily completed the survey each won

a prize (with a retail value between \$100 and \$150 each) randomly drawn in a lottery at the end of the survey period. Respondents were asked whether they were willing to be contacted by telephone, if required, to clarify their answers. Eighty-two percent gave their consent, and 56 (15% of respondents) were contacted for further information.

## 2.3 Data Analysis

### *Group Differences*

Respondents were grouped into three categories based on the licence type(s) held: (1) pot-only licence holders; (2) dive-only licence holders; and (3) multiple licence holders. The respective numbers of respondents in each of the categories were 125, 52 and 197. The small number of ring-only licence holders ( $n=5$ ) precluded using a separate group for these fishers; however, data for ring-only fishers were included in all analyses based on the entire sample of respondents ( $n=379$ ).

For each variable, or group of variables analysed, results were compared between licence groups for statistical differences. One-way ANOVA tests for independence were used for continuous variables, Mann Whitney-U tests were used for ordinal variables, and Chi-square tests for independence were used for nominal variables. In the following section, the analysis applied to each group of variables used in the study is outlined.

### *Section 1 – Demographic Characteristics*

This section was designed to construct a demographic profile of respondents including age, gender, employment status, level of employment, income and fishing club/association membership. Depending on the nature of the data, licence groups were compared using one-way ANOVA tests, Chi-square test or Mann Whitney U-tests.

### *Section 2 – Fishing Participation and Preferences*

Non-Lobster Fishing Activity Profiles. Respondents were asked to provide the number of days they spent participating in fishing activities other than lobster fishing over the previous 12-month period. For each activity, mean days fished were compared between licence groups using one-way ANOVA tests.

Lobster fishing Activity Profiles. Respondents were asked to estimate the number of days they had spent fishing for rock lobster fishing during the 2006/07 season. Data were collected separately for one-day trips and multiple-day trips. Single day trips were defined as trips whereby fishers left and returned to their primary residence on the same day. Conversely, multiple day trips were defined as trips that involved one or more nights spent away from the respondent's primary residence, whether or not lobster fishing was the main reason for making the trip. Mean days fished (i.e. avidity) for each licence group were compared using one-way ANOVA tests.

Participation in Other Fishing Activities on Lobster Fishing Trips. Survey respondents were asked how often they participated in the following four types of fishing when fishing for lobster: line fishing, net fishing, dive collection for species other than lobster, and spearfishing. Frequency of participation was measured on a four point scale, from

“never” to “always”. Comparisons were made between licence groups using one-way ANOVA tests.

Lobster Fishing Experience. As a measure of experience, respondents were asked to identify their age when they first started lobster fishing and the number of years that they had been actively involved in lobster fishing. Mean values of both measures were compared between licence groups using one-way ANOVA tests.

Importance of General Fishing and Lobster Fishing. Respondents were asked about the importance of their fishing activities compared with other outdoor activities, the importance of lobster fishing compared with other fishing activities, and the relative importance of lobster fishing when fishing on trips involving other types of fishing. For each measure, importance was indicated by nominating the appropriate response category. Response patterns were compared between groups using Chi-square tests.

Peer Group Participation. Respondents were asked about their frequency by which they spent lobster fishing with four social groups: “alone”, “with friends”, “with family” and “with friends and family together”. For each social group category, Chi-square tests for independence were used to detect differences among licence holder groups in participation frequency indicated by nominating one of the following four categories: “always”, “often”, “sometimes”, and “never”.

### *Section 3 – Fishing Attitudes and Experience Preferences*

Site Preferences. Respondents were asked to rate the importance of 11 location-specific factors when deciding where to go fishing. This was done by ascribing a value between one and five to each factor; from “not at all important” to “extremely important”. For each factor, mean values were compared between licence groups using one-way ANOVA tests.

Constraints to Lobster Fishing. Respondents were asked whether there were any factors restraining them from fishing for lobster as often as they would like. If they indicated the presence of constraints, they were further asked to rate the importance of 12 factors in limiting their participation on a scale of 1 to 5. For each constraint, mean values were compared between licence groups using one-way ANOVA tests.

Motivations. Motivations for lobster fishing were measured on a scale developed and refined by Driver (1977) and Driver and Cooksey (1977) to understand the benefits fishers expect to receive from recreational fishing. The scale consists of eighteen items and was adapted for lobster fishers by slight changes to the wording of some items. Respondents were asked to rate the importance of each item as motivating factors to fish for lobsters by ascribing values between one and five to each factor; from “not at all important” to “extremely important”. The importance of motivation items was compared between licence groups using one-way ANOVA tests.

Consumptive orientation. Consumptive orientation is the degree to which fishers value the catch-related aspects of the fishing experience. The concept was originally measured on a scale developed by Graefe (1980) and refined in subsequent studies (Ditton and Fedler, 1984; Fedler and Ditton, 1986; Fisher, 1997). The scale has been further modified for this study to consist of nine statements measuring three consumptive orientation

dimensions – (1) “attitudes to catching lobster”, (2) “attitudes to catching numbers of lobster” and (3) “attitudes to catching large lobsters”. The three dimensions were measured as agreement levels (on a Likert-type scale) to statements relating to each dimension; specifically, there were four, two and three statements pertaining to dimensions 1, 2 and 3, respectively. To indicate level of agreement to each statement, respondents ascribed a value between one and five on an ascending scale; from “strongly disagree” to “strongly agree”. Scores were compared between licence groups using one-way ANOVA tests.

Centrality to Lifestyle. The extent to which lobster fisher’s lifestyles and social networks are connected to their involvement in lobster fishing was measured using a scale originally developed by Kim *et al.* (1997) for bird watchers and modified for recreational fishing by Sutton (2003). In the current study, ten statements were presented to respondents relating to the “centrality to lifestyle” of rock lobster fishing. The statements were very similar to those used by Sutton (2003), though an additional statement was added relating to the importance of lobster fishing to Tasmanian holidaymakers. To measure centrality to lifestyle, respondents were asked to rate their level of agreement on a 5-point scale with ten statements. One-way ANOVA tests were used to compare scores between licence groups.

#### *Section 4 - Attitudes to Management and Fishery Related Issues*

Attitudes to Management. Respondents were asked to rate their level of agreement with nine hypothetical management options<sup>4</sup> on a 5-point scale and responses between licence groups was compared using one-way ANOVA tests.

Lobster Fishery Issues. Respondents were asked the open-ended question, “What do you think is the most important issue facing the recreational lobster fishery in Tasmania”. Responses were classified into one of eight categories; (1) Management and Compliance, (2) Resource Sustainability, (3) Marine Protected Areas, (4) Costs Associated with Lobster Fishing, (5) Facilities and Access, (6) Conflict with other Recreational Lobster Fishers, (7) Conflict with Commercial Lobster Fishers, and (8) Safety. The pattern of responses was compared between licence groups.

#### *Section 5 – Boat Characteristics and Expenditure*

Boat Characteristics. Data were collected to better understand details of boat ownership amongst lobster fishers. Boat details included age, purchase price, current market value and the proportion of time boats were used for lobster fishing compared with other activities. The latter was determined by asking respondents about the number of days their boat/s were used for lobster fishing, other fishing types and non-fishing activities over 12 months, regardless of whether different activities occurred on the same day. Analysis was conducted for up to two boats per respondent.

Non-Trip Related Expenditure. Respondents provided estimations of their expenditure on durable (i.e. non-trip related) items relating to lobster fishing over the previous 12 months. Such items included lobster fishing equipment purchases and maintenance costs.

---

<sup>4</sup> None of the proposed management options were being considered by management at time of the survey.

For items that may be used for activities other than lobster fishing (i.e. diving equipment), respondents were asked to approximate the percentage of the cost they thought could be attributed to lobster fishing in consideration of all other activities that the equipment may be used for. Data were also collected regarding boat-related expenses (i.e. insurance, registration, fittings and modifications) over the 2006/07 season. Boat depreciation costs were calculated at 7.5% of the original boat purchase price (as used by Ernst and Young, 2004). For all boat related expenditure, the proportion of costs attributed to lobster fishing was estimated by establishing the proportion of days in which boats were used for lobster fishing relative to other activities. For dive equipment purchases and boat related expenses, attributions were made at the individual level based on the attribution provided by the respondent rather than by applying a mean attribution figure generated from all respondents.

**Trip Related Expenditure.** Trip related expenditure refers to costs incurred for items consumed during lobster fishing trips. Respondents were asked for expenditure details regarding their most recent lobster fishing trip. If they could not accurately recall details of their last fishing trip, they were requested to provide details of the last fishing trip that they could remember clearly. If they still had problems recalling information, fishers were asked to base their responses on what they “would normally do and spend on an average lobster fishing trip”. For survey purposes, a lobster fishing trip was defined as any trip made in which lobster fishing occurred, regardless of whether lobster fishing was the main reason for making the trip. The length of the trip was further defined as the time from which the fisher left his or her primary residence to when he or she returned. Accordingly, some trips were “one day trips” whilst other trips were “multiple day trips”. One day trips and multiple trips were assessed separately due to the differing nature of some of the costs involved.

Trip related expenditure data was collected in three categories; “lobster fishing expenses”, “diving expenses”, and “general expenses”. Lobster fishing expenses (ie. lobster bait) were expenses that were wholly attributed to lobster fishing. Diving expenses were expenses that may also be partially attributed to diving for reasons other than lobster collection (e.g. abalone collection, underwater photography, pleasure dives). Similarly, general expenses were costs incurred that may also be partially attributed to other activities, depending on the nature of the trip. If respondents indicated that they would have still made the trip even if they had not planned to go lobster fishing, diving and general expenses were subject to lobster fishing attribution. This attribution was determined by asking respondents what percentage of each of the expense categories they considered was incurred by fishing or diving for lobster.

## **2.4 Non-Response bias checks**

Of the 317 and 650 questionnaires sent to fishers from Groups A and B, respectively, 148 and 231 usable questionnaires were returned. This equates to response rates of 46.8% for Group A and 35.5% for Group B. When non-deliverables were excluded (Group A = 4, Group B = 24), the effective response rates were 47.3% for Group A and 36.6% for Group B.

Survey respondents may not be representative of the target population if respondents differ from non-respondents. To check for potential response bias, respondents were

compared with respect to age and gender with values recorded on the database of licence holders. Comparisons were made separately for the three licence groups. Independent samples T-tests demonstrated that respondents were significantly older than the general licenced population for each of the three licence groups (pot-only fishers;  $M = 50.5$  vs  $46.0$ ,  $t = 3.556$ ,  $p = 0.001$ ; dive-only fishers;  $M = 44.0$  vs  $38.6$ ,  $t = 3.434$ ,  $p = 0.001$ ; multiple licence fishers;  $M = 44.9$  vs  $41.8$ ,  $t = 3.339$ ,  $p = 0.001$ ). The over-representation of survey participants with mean ages higher than the average age of the target population is not uncommon in mail surveys. Chi-square tests for independence demonstrated that the gender ratios for survey respondents were not significantly different to the gender ratios for the general population for all three licence groups (pot-only,  $X^2 = 0.19$ ,  $p = 0.890$ ,  $\phi = -0.003$ ; dive-only;  $X^2 = 1.178$ ,  $p = 0.182$ ,  $\phi = -0.091$ ; multiple licence,  $X^2 = 0.000$ ,  $p = 1.000$ ,  $\phi = 0.000$ ).

Non-response bias was also assessed by comparing avidity (days fished during 2006/07) of questionnaire respondents to avidity reported by diarists in the 2006/07 phone/diary survey. Due to the very high response rates for the phone/diary survey (94.4%; Lyle, 2008), data collected were assumed to be largely unaffected by non-response bias. Including individuals who reported no fishing activity, the mean number of days fished for lobster over the 2006/07 season was 18.9 for the questionnaire and 6.5 for the phone/diary survey. When proportionally weighted to account for stratification, the mean avidity value determined from phone/diary data for the entire population of licence holders was 7.2 days per year (Lyle, 2008). To determine whether these differences were due to response and/or recall biases, the number of days fished for Group A respondents who participated in both surveys was compared for the same reporting period (i.e. the 2006/07 lobster fishing season). Accordingly, Group A respondents reported fishing an average of 19.2 days in the mail questionnaire whereas these same respondents reported 8.5 days in the phone/diary survey, suggesting a significant recall bias impact. These findings are not unexpected as there is a large body of evidence to indicate that recalled activity levels, particularly over periods in excess of two months, will be significantly inflated due to recall bias.

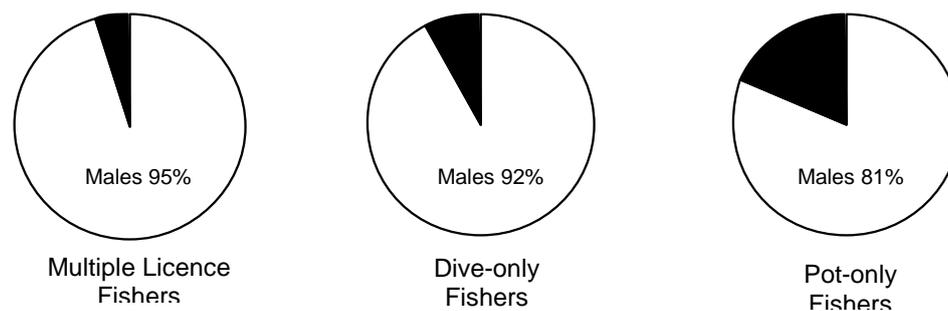
To determine the magnitude of any response bias, and consequently the degree to which Group A respondents represented the broader phone/diary survey population, avidity values observed for Group A in the phone/diary survey (mean 8.5 days) were compared with avidity values for those diarists who chose not to participate in the current survey (mean 5.3 days). An independent samples T-test demonstrated these values to be significantly different ( $t = 2.992$ ,  $p = 0.003$ ), confirming that respondents were more likely to be more avid lobster fishers than non-respondents.

### 3 RESULTS AND DISCUSSION

#### 3.1 Characteristics of Lobster Fishers

##### *Gender*

Respondents were overwhelmingly dominated by males, who represented 90.0% of the survey population. By licence type, the proportion of males was 94.9% for multiple licence holders, 92.1% for dive-only fishers and 81.4% for pot-only fishers. All three proportions were significantly different from each other (see Appendix C1). In the non-response check (in the previous section), it was demonstrated that gender ratios for survey respondents were not significantly different to the gender ratios for the general population for all three licence groups. To contextualize the results among the wider recreational fishing population in Tasmania, the 2007/08 recreational fishing survey in (Lyle *et al.*, 2009) reported that males comprised 67% of the ‘general’ Tasmanian fishing population.



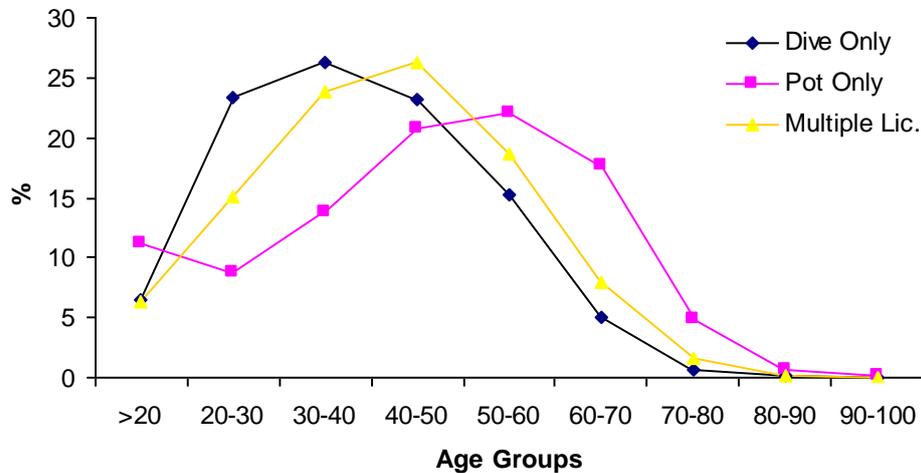
**Figure 1.** Percentage of males among multiple licence fishers, diver-only and pot-only fishers.

##### *Age*

Respondents were significantly older than the general population of lobster fishers for each of the licence groups. Mean ages of pot fishers, dive fishers and multiple licence fishers were 50.5, 44.0 and 44.9 years, respectively. By comparison, the mean ages of pot, dive and multiple licence holders in 2006/07 were 46.0, 38.6 and 41.8 years. Statistical comparisons between licence groups from the 2006/07 database demonstrate significant differences between all three groups (see Appendix C2). The same tests applied to survey respondents demonstrated that pot fishers were significantly older than both divers and multiple licence respondents (Appendix C3). This pattern is illustrated for 2006/07 licence holders in Figure 2.

The data suggest the existence of a transitional state of licence ownership for some fishers. While this has not been empirically tested, it is possible that fishers may dive for lobsters earlier in their fishing careers (when they are more focused on excitement and adventure), purchase an extra licence to increase their likelihood of success at a later stage, and then abandon diving due to age-related issues (i.e. health, change in focus from adventure to relaxation). A better understanding of this supposed succession of licence

ownership may assist in predicting future participation, particularly in view of anticipated demographic changes associated with an ageing population. If deemed important, further work, including assessment of licence holdings over time based on existing recreational licence databases, could be undertaken to investigate this perceived phenomenon.



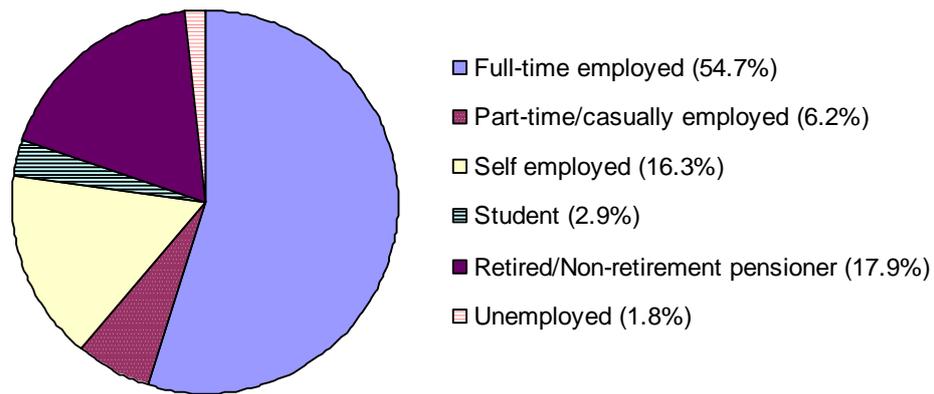
**Figure 2.** Percentage distribution of age groups among multiple licence, dive-only and pot-only licence-holders (based on 2006/07 licence database).

### *Income*

The median income group for all respondents was between \$50,000 and \$60,000. By licence group, pot fishers had a median income between \$40,000 and \$50,000, dive fishers had a median personal income between \$55,000 and \$65,000 and multiple licence fishers had a median personal income between \$50,000 and \$60,000. Median incomes for pot-only fishers were significantly lower than median incomes for dive-only fishers and multiple licence fishers (Appendix C4).

### *Employment*

Of all survey respondents, 54.7% were employed full-time. In the next most numerous category, 16.3% of fishers were reported to be self employed. Significant differences between the licence groups were detected for both full-time employed fishers and fishers who reported being retired or on a non-retirement pension (Appendix C5). Only 39.7% of pot-only fishers worked full time compared to 62.8% and 59.6% of multiple licence fishers and dive-only fishers, respectively. In contrast, pot-only fishers had the highest percentage (31.4%) of retired or non-retirement pensioners, compared to 11.7% and 9.6% of multiple licence fishers and dive-only fishers, respectively.

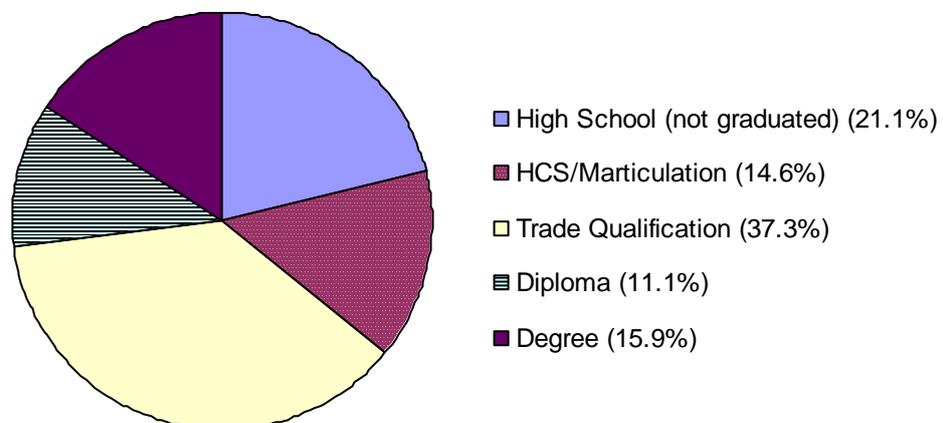


**Figure 3.** Percentage of all lobster fishers belonging to employment categories

### Education

Respondents were asked to disclose the highest level of education they had attained. Of the five categories offered, significant differences between licence groups were evident for four categories (see Appendix C6):

- the proportion of pot-only licence holders who had not finished high school (39.7%) was significantly higher than for multiple licence fishers (16.9%) or dive-only fishers (9.6%);
- the proportion of pot-only fishers who nominated graduating high school as their highest educational achievement (20.3%) was significantly greater than for dive-only fishers (5.8%);
- a significantly higher percentage of multiple licence fishers nominated trade qualification (46.7%) compared with pot-only (26.0%) or dive-only (28.8%) respondents; and
- a significantly higher proportion of dive-only fishers had attained a university degree (42.3%) than for either pot-only (9.8%) or multiple licence (12.8%) fishers.

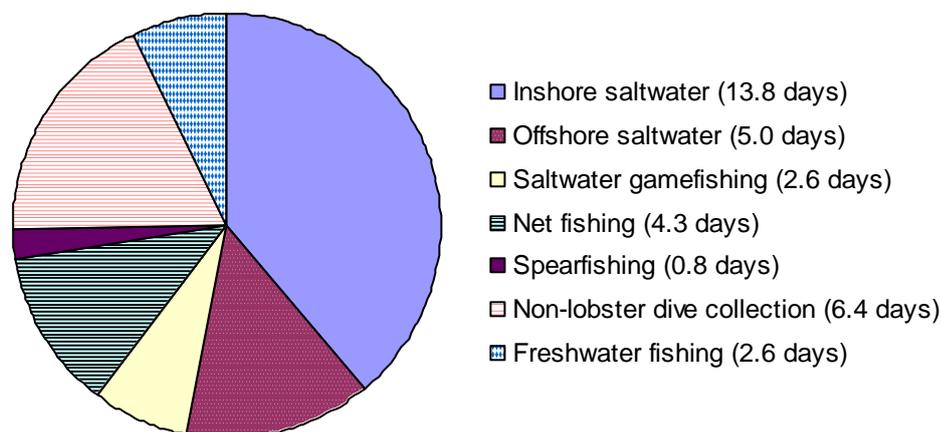


**Figure 4.** Percentage of all respondents according to highest level of education attained.

### 3.2 Fishing Participation Patterns and Preferences

#### *Non-lobster Fishing Activity Profiles*

Overall, respondents reported an average of 35.5 days participating in non-lobster related fishing activities. It is likely that lobster fishing was also undertaken on many of those days, particularly while line and/or netting fishing. A comparison between the lobster licence groups reveals that multiple licence fishers were significantly more avid (40.3 days) than dive fishers (30.7 days) and pot fishers (29.9 days). Significant differences were also detected between four of the seven fishing modes used in the survey. Multiple licence fishers spent more days saltwater gamefishing (3.4 days) and net fishing (5.4 days) than dive fishers (0.9 days; 1.6 days) or pot fishers (1.7 days; 3.6 days). Dive-only fishers spent more days involved in non-lobster dive collection (13.0 days) than multiple licence (7.7 days) or pot-only (1.6 days) fishers. Dive-only (1.2 days) and multiple licence (1.0 days) fishers spent more days spear fishing than pot-only fishers (0.2 days). See Appendix C7 for more details on statistical comparisons between licence groups.



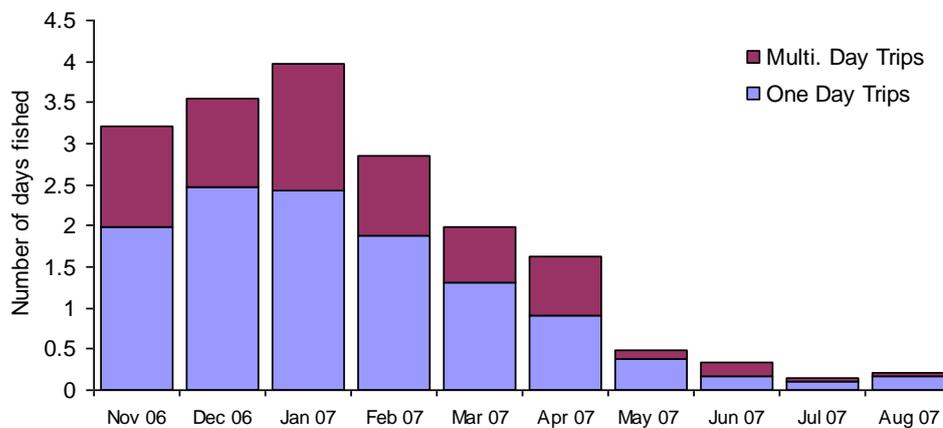
**Figure 5.** Mean number of day's participation in fishing activities other than rock lobster for all licence groups.

#### *Lobster Fishing Activity Profiles*

Including respondents who reported no fishing activity, the mean number of days fished observed for the current study (18.9) is considerably higher than the mean days fished observed in the 2006/07 phone diary survey (6.5 days: Lyle, 2008), suggesting a strong recall bias effect. Based on the questionnaire data, mean avidity rates were significantly less for dive-only fishers (13.6 days) compared with both pot-only (21.0 days) and multiple licence (19.1 days) fishers. Using data for all 2006/07 phone/diary respondents, a similar trend was observed; mean days fished for pot-only fishers was 7.3, mean days fished for dive-only fishers was 4.0 and mean days fished for multiple licence fishers was 6.8 (see Appendix C8). However, in the current study, a significant difference (at  $p < 0.05$ ) was observed only between pot-only fishers and dive-only fishers (a significant difference between dive fishers and multiple licence fishers was observed at  $p < 0.1$ ). Therefore, despite the effect of recall bias and sampling bias inflating absolute numbers,

trends in the relative differences between licence groups in the current study reflect those observed by Lyle (2008).

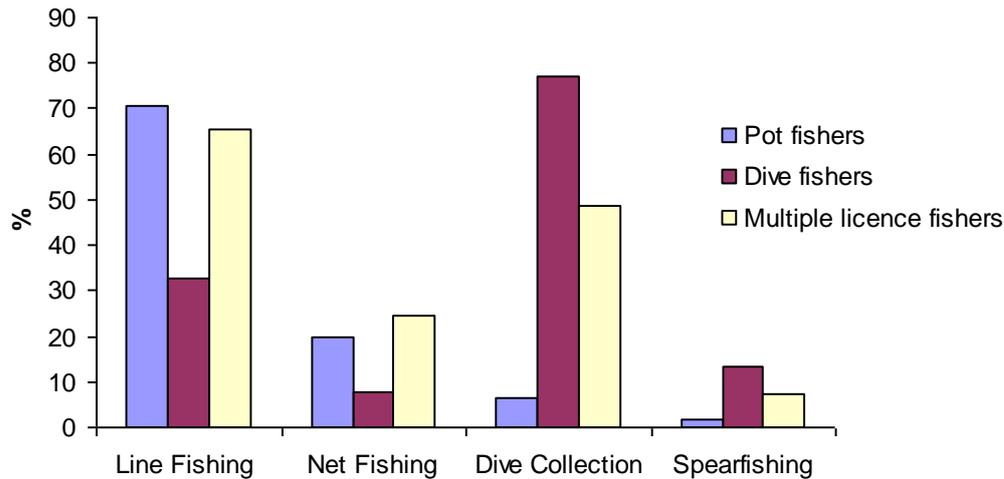
Overall, 64.5% of fishing activity was reported to occur on single day trips whilst 35.5% of fishing activity was reported for trips that involved one or more nights away from home. Dive-only fishers were more inclined to fish for lobster on single day trips (74.2% of trips) than pot-only fishers (65.9%) and multiple licence fishers (61.8%). The pattern of seasonal activity observed is consistent with that observed from the phone/diary surveys reported by Lyle *et al.* (2005) and Lyle (2008). Three distinct periods of activity were observed: highest levels of effort (58.5% of total effort) between November and January, intermediate levels (35.1% of total effort) between February and April, and low activity levels (6.4% of total effort) between May and August. The months with the highest proportion of multiple day trips were January and April which coincided with holiday periods.



**Figure 6.** Monthly distribution of fishing effort of all respondents over the 2006/07 lobster fishing season.

### *Participation in Other Fishing Activities on Lobster Fishing Trips*

Significant differences between licence groups were observed for each fishing type (see Appendix C9). Pot fishers and multiple licence fishers indicated a greater rate of participation in both line and net fishing than dive-only fishers. Dive fishers participated in dive collection for other species more often than multiple licence fishers, who in turn participated more often than pot-only fishers. While spearfishing was uncommon for all sectors, both dive fishers and multiple licence fishers participated in spearfishing more often than pot-only fishers.



**Figure 7.** Percentage of lobster fishers who participated “always” or “often” in other types of fishing when fishing for lobster.

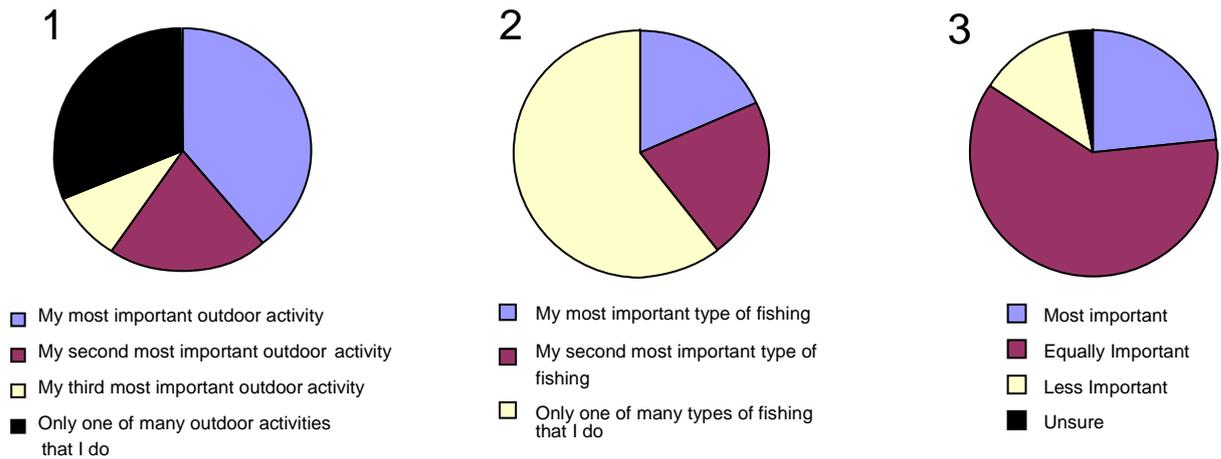
### *Lobster Fishing Experience*

The mean age that respondents commenced lobster fishing was 23 years for pooled data. Multiple licence fishers started fishing at a significantly younger age (21 years) than pot-only fishers (26 years). The average number of years of experience participating in lobster fishing for all fishers was 19.3. There were no significant differences observed between the licence groups.

### *Importance of General Fishing and Lobster Fishing*

Overall, 38.8% of respondents regarded fishing as their most important outdoor activity. No significant differences were observed between the three licence groups (see Appendix C10). In regards to the importance of lobster fishing compared to other fishing types, 18.5% of respondents regarded lobster fishing as their most important type of fishing (see Appendix C11). However, dive-only fishers were significantly more inclined to rate lobster fishing as their most important fishing type (24.5%) than multiple licence (18.3%) and pot-only (16.4%) fishers.

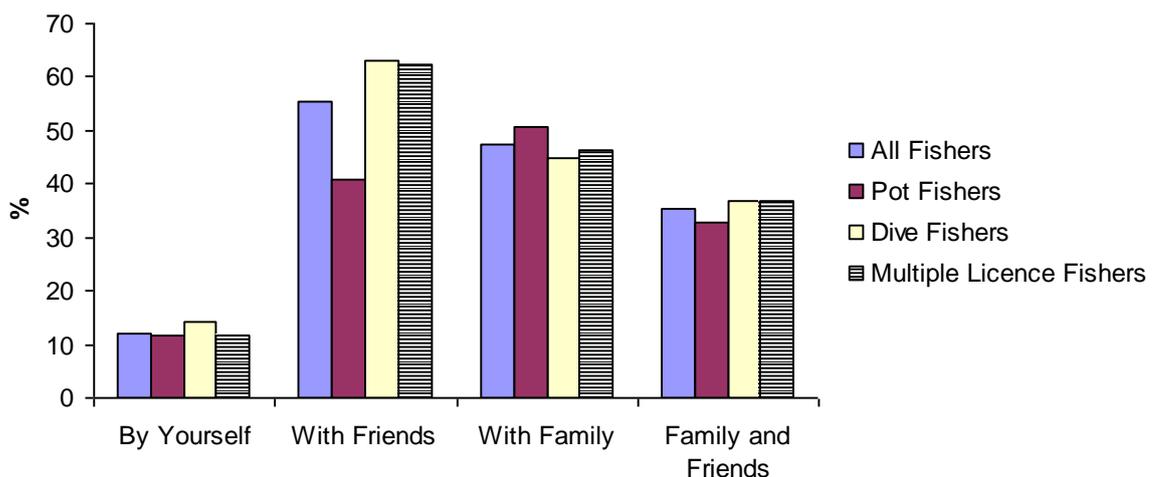
When asked about the importance of lobster fishing relative to other fishing types on trips targeting lobster in addition to other species, the most popular response category for all three licence groups was “equally important” (see Appendix C12). For the second most popular category, 23.7% of respondents rated lobster fishing as the “most important” type of fishing. A significantly higher proportion (35.3%) of dive-only fishers nominated this category compared with multiple licence (26.5%) and pot-only (14.5%) fishers. This result reflects a culture of pot fishing whereby other species are generally pursued after setting or retrieving pots. This is supported by the results of the preceding section which illustrated that line and net fishing were undertaken less frequently by dive-only fishers on lobster fishing trips.



**Figure 8.** Importance of general fishing and lobster fishing for all licence types. (1) Importance of fishing compared to other outdoor activities. (2) Importance of lobster fishing compared to other fishing types. (3) Relative importance of fishing for lobster on ‘compound’ trips.

### Social Participation

Overall, the social group that respondents fished with most often was friends, followed by family, friends and family together, and lastly, alone. For pooled data, 55.5% of respondents indicated fishing with friends either “always” or “often”. Between groups, pot-only, multiple licence and dive-only fishers indicated fishing with friends “always” or “often” 40.9%, 62.5% and 63.2% of the time, respectively. Two significant differences between licence groups suggest that pot-only respondents fished for lobsters more frequently with family and less often with friends compared with dive-only fishers and multiple licence fishers (see Appendix C13).



**Figure 9.** Percentage of lobster fishers who fished with each of the four social groups either “always” or “often”.

### 3.3 Fishing Attitudes and Experience Preferences

#### *Site Preferences*

For pooled data, the three most important factors in deciding where to go fishing were prevailing weather conditions (4.3), safety (3.9) and familiarity with the fishing location (3.5). The factors presented in Table 1 are in rank order of importance for pooled data. There were, however, differences in the importance rankings between the licence groups. Significant differences in the mean values of six site preference factors were evident between groups. Pot fishers rated the following four factors significantly higher than the other two groups: (1) “the safety of the location for lobster fishing”, (2) “you are familiar with that place”, (3) “the location is a good place to take the family”, and (4) “you have access to accommodation there”. Pot fishers also rated the presence of amenities and facilities at fishing locations to be a more important factor than did multiple licence fishers. These results were not surprising in light of the need to retrieve pots the following day for many lobster fishers. They were also consistent with higher mean ages for pot-only fishers and the observed tendency for pot fishers to fish with family members more often the other licence groups.

Dive fishers rated the importance of water clarity significantly higher than pot fishers and multiple licence fishers. Items related to the perceived status of lobster stocks - abundance of lobsters and the size of lobsters - were ranked as the fourth and seventh most important factors, respectively. For detailed statistical comparisons between groups, see Appendix C14.

**Table 1. Site preference importance mean values and rankings**

Site Preference Factors	All Fishers	Pot Fishers	Dive Fishers	Multi. Lic. Fishers
	Mean	Mean	Mean	Mean
Prevailing weather conditions at that location	4.3	4.4	4.2	4.2
The safety of the location for lobster fishing	3.9	4.2	3.7	3.9
You are familiar with that place	3.5	3.7	3.2	3.4
The amount of available lobsters there	3.3	3.1	3.5	3.4
Prevailing water clarity at that location	3.1	3.0	3.6	3.0
Close/convenient to where you live	3.0	3.0	2.9	3.0
The size of available lobsters there	2.9	2.8	3.1	3.0
The location is a good place to take the family	2.8	3.1	2.3	2.7
The number of other lobster fishers likely to be there	2.6	2.4	2.7	2.7
You have access to accommodation there	2.3	2.7	1.9	2.2
The facilities and amenities there	2.2	2.4	2.1	2.0

Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

### *Constraints to Lobster Fishing*

The existence of restraints was indicated by 76% of pot fishers, 83% of dive fishers and 85% of multiple licence fishers. Two items were of considerably greater importance for all groups, namely sea and weather conditions, and other time commitments. Mean scores for the remaining items, suggested that, on average, they were slightly or moderately important factors in restraining respondents from fishing as often as they would like. However, the existence of four significant differences and standard deviation up to 1.9 suggest considerable variability in responses between and within licence groups. The item with the highest level of inter-group significance was water clarity. Dive fishers rated this item higher than the other two groups; a finding consistent with that identified in influencing where to go fishing. Dive fishers also rated competing leisure activities to be more important, and the restrictiveness of rules and regulations to be less important, than both pot fishers and multiple licence fishers. For the other significant difference between items, multiple licence fishers considered that the cost of going lobster fishing was a more important restraint than dive-only fishers. For detailed statistical comparisons between groups, see Appendix C15.

**Table 2. Mean values and rankings of factors restraining participation**

<b>Constraints</b>	<b>All Fishers</b>	<b>Pot Fishers</b>	<b>rank</b>	<b>Dive Fishers</b>	<b>rank</b>	<b>Multi. Lic. Fishers</b>	<b>rank</b>
	Mean	Mean		Mean		Mean	
Weather/sea conditions	4.3	4.3	1	4.2	1	4.2	1
Other time commitments (work, family etc)	4.1	3.9	2	4.2	1	4.0	2
Water clarity	2.9	2.8	3	3.4	2	2.7	3
Personal health and/or fitness	2.8	2.8	3	2.6	4	2.5	5
The distance of lobster fishing areas from where I live	2.7	2.7	4	2.4	5	2.7	3
Competing leisure activities	2.6	2.2	7	3.0	3	2.5	5
The state of fishing facilities (boat ramps, jetties etc)	2.6	2.7	4	2.2	6	2.4	6
The cost of going lobster fishing	2.5	2.3	6	2.0	8	2.5	5
The restrictiveness of rules and regulations	2.5	2.5	5	1.9	9	2.6	4
Finding people to go lobster fishing with	2.3	2.1	8	2.2	6	2.3	7
The cost of lobster fishing equipment	2.1	1.9	9	1.8	10	2.2	8
Access to a boat	2.0	2.2	7	2.1	7	1.9	9

Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

### *Motivations*

After conducting reliability analysis to examine the relationships between similar items that were assumed to be measuring the same underlying theme (see Appendix C16), some items were condensed and presented as one item. For example, the items “to get away from the demands of other people”, “to get away from the regular routine” and “to get away from other people” were collapsed into one item that was labeled “escapism”. Accordingly, the original eighteen items were condensed into twelve items, each measuring a unique motivational component (see Appendix C17). Five items were “catch-related” while the remaining seven items were “non-catch related”.

For aggregated data, the five most important motivations in descending order were relaxation, socializing with friends, catching lobster to eat, experiencing nature and the experience of catching lobster (Figure 10). Fishing to catch a large/trophy lobster was the least important motive for all three groups. Significant differences between licence groups were observed for five items. Socialising with friends was less important for pot-only fishers than for multiple licence fishers. Catching lobster to eat was more important for both pot fishers and multiple licence fishers than for dive-only fishers. Experiencing nature and the challenge or sport of lobster fishing were less important motivators for pot fishers than for both divers and multiple licence fishers. Finally, adventure and excitement were rated more highly for multiple licence fishers than for pot-only fishers.

While very little work has been done on assessing motivations in non-finish recreational fisheries, the high value that lobster fishers ascribed to relaxation in this study is consistent with most motivational studies on anglers (Fedler and Ditton, 1994; Calvert, 2002). Also consistent is the relatively high importance given to social recreation with friends and experiencing/interacting with nature. Furthermore, the two items ranked lowest overall - developing skills and catching large or trophy sized fish - also consistently rank low across (non-tournament) angler studies. Catching fish for consumption also ranks consistently low across angler studies; however, this was not evident for lobster fishers. In fact, for pot-only fishers, catching lobster to eat was the highest ranked item. This suggests that the Tasmanian lobster fishery has, in relative terms, a strong consumptive focus, particularly for pot fishers.

**Figure 10.** Mean and distribution of importance of motivational factors

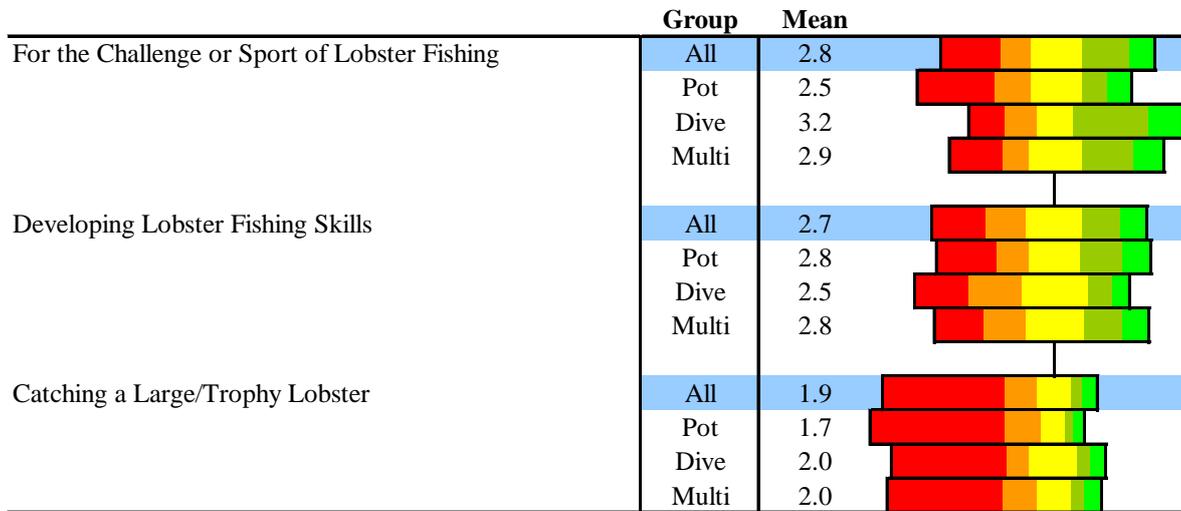
Not at all Important ■ Slightly Important ■ Moderately Important ■ Very Important ■ Extremely Important ■



Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

**Figure 10 (continued).** Mean and distribution of importance of motivational factors

Not at all Important ■ Slightly Important ■ Moderately Important ■ Very Important ■ Extremely Important ■



Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

### *Consumptive Orientation*

Reliability analyses for all three dimensions suggested that statements within each dimension were ‘reliable’ and were therefore measuring the same underlying construct (see Appendix C18 for dimension statements and reliability statistics). Accordingly, mean values of all statements within individual dimensions were collapsed in order to measure each dimension.

**Table 3. Mean agreement levels relating to three dimensions of consumptive orientation**

	<b>All Fishers</b>	<b>Pot Fishers</b>	<b>Dive Fishers</b>	<b>Multi. Lic. Fishers</b>
<b>Consumptive Orientation Domains</b>	Mean	Mean	Mean	Mean
Attitudes to Catching Lobster	2.7	2.6	2.4	2.7
Attitudes to Catching Numbers of Lobsters	2.9	2.9	2.6	3.0
Attitudes to Catching Large lobsters	2.8	2.6	3.1	2.9

Mean scores for all items were based on responses to the following response categories; 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Significant differences were observed between licence groups for two domains – “Attitudes to Catching Numbers of Lobsters” and “Attitudes to Catching Large lobsters”. Multiple licence fishers demonstrated attitudes significantly more oriented to catching higher numbers of lobster than dive-only fishers, while dive-only and multiple licence fishers were more oriented to catching large lobsters than pot-only fishers (see Appendix C19 for more detailed statistical analysis). The findings are not surprising and concur with the ability of dive-only fishers and multiple licence fishers to target larger lobsters whilst diving. Conversely, the ability of pot-only fishers to target larger lobsters is limited to decisions about where to go fishing. By virtue of participating in both diving and pot fishing, the results also reflect the ability of multiple licence holders to focus on both lobster size and numbers.

The dimension “attitudes to catching lobster” is an indication of how fishers regard catching lobster as a measure of success or satisfaction of the overall fishing experience. While no significant differences were detected between the licence groups, the mean values for this dimension suggest that a significant difference between dive fishers and the other two groups may become evident through the use of a larger sample size for divers. Such a result would be consistent with the significantly less importance ascribed to catching lobster to eat and the significantly greater importance placed on experiencing nature by dive-only fishers in the preceding section.

### *Centrality to Lifestyle*

Reliability analyses for responses suggested that data for all ten statements were ‘reliable’ and were therefore measuring the same underlying construct (see Appendix C20 for questions and reliability statistics). Accordingly, response values were collapsed to calculate a mean value for each licence group.

In comparing the overall mean indexed values, multiple licence fishers had a mean value significantly higher than pot-only fishers (Table 4). This suggests that the lifestyles and social networks of multiple licence fishers are, on average, more connected to lobster fishing than for pot-only fishers. Dive-only fishers had the same mean value as pot-only fishers; however, it was not sufficient to be statistically different to multiple licence fishers due to a lower sample size for this group. Therefore, it is likely that the results for dive-only fishers would also be significantly different to multiple licence fishers with a larger sample.

In relation to individual statements, the two highest rated statements for all groups were “I consider myself to be somewhat expert at catching lobster” and “most of my friends are in some way connected with lobster fishing” (Figure 11). For five of the ten statements, significantly different results between groups were observed (see Appendix C21). For three of these statements - “others would probably say I spend too much time lobster fishing”, “other leisure activities don’t interest me as much as lobster fishing” and “lobster fishing is important when deciding where to holiday in Tasmania” - multiple licence fishers had a significantly higher mean value than for pot-only fishers. For the statement “most of my friends are in some way connected with lobster fishing”, the mean agreement value for multiple licence fishers was significantly higher than for dive-only fishers. For the statement “I would rather go lobster fishing than do almost anything else”, multiple licence fishers had a mean value significantly higher than both dive-only fishers and pot-only fishers.

The mean values for all items and all licence groups appear low as they were all less than the middle value of the response range. However, they were comparable with both studies of fishers that have been identified as using similar centrality to lifestyle indices; a study of US freshwater anglers targeting largemouth bass, catfish and crappie (Sutton, 2003) and the general angling population in Queensland (Sutton, 2007).

**Table 4. Mean values for centrality to lifestyle indices for lobster licence groups**

<b>All Fishers</b>	<b>Pot Fishers</b>	<b>Dive Fishers</b>	<b>Multi. Lic. Fishers</b>		
Mean	Mean	Mean	Mean	F	<i>p</i> (two-tailed)
2.1	2.0 <sup>a</sup>	2.0 <sup>a,b</sup>	2.2 <sup>b</sup>	4.724	0.009**

Mean scores are based on levels of agreement to attitudinal statements. Attitudinal statements were coded as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

<sup>a</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

**Figure 11.** Mean and distribution of agreement levels to centrality to lifestyle statements

Disagree ■ Neutral ■ Agree ■



Mean scores for all items were based on responses to the following response categories; 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

### 3.4 Attitudes to Management and Fishery Related Issues

#### *Attitudes to Management*

Overall, the two most popular management options were limiting the number of recreationally caught lobsters that may be taken out of Tasmania and the establishment of different fishing areas for recreational and commercial fishers at certain times of the year (see Figure 12). Four significant differences between licence groups were evident with dive fishers favouring more restrictive management options (see Appendix C22 for details of statistical differences). Divers were significantly more in favour of limiting the number of pots that may be carried on each boat, and significantly less in favour of allowing pot fishers to use one extra pot than both pot-only fishers and multiple licence fishers. These results could be expected because dive fishers may be indirectly negatively impacted from more permissive regulations to the pot fishery or benefit from more restrictive regulations to the pot fishery. However, for the other two significant differences, dive-only fishers favoured more restrictive regulations pertaining to issues affecting *all* lobster fishers. Firstly, dive-only fishers were significantly more in favour of decreasing bag limits to four lobsters (per fisher/day) than multiple licence fishers. Secondly, dive-only fishers were significantly less in favour of increasing the bag limit to six lobsters per day than pot-only fishers who were, in turn significantly less in favour of this option than multiple licence fishers. The tendency for multiple licence fishers to favour a more liberal bag limit is understandable considering they would more likely to be in a position to benefit from being able to keep more lobster due to their ability to deploy more than one capture method. However, the results between pot-only fishers and dive-only fishers cannot be explained by the same logic when one considers the significantly greater daily catch rates observed for dive fishers (Lyle *et al.*, 2005; Lyle, 2008): greater catch rates for dive fishers would increase the likelihood of divers being in a position whereby their activities would be curtailed by a decreased bag limit. Therefore, the counterintuitive results may reflect a comparatively more pronounced conservation ethic of dive-only fishers.

The results suggest that licence group affiliation can influence one perceptions of how the fishery should be managed. To further investigate factors that may influence fisher's attitudes to regulation changes, analysis was undertaken to determine if there was a relationship between fisher agreement levels and three dependent variables; (1) avidity, (2) residential status, and (3) age. Analysis was performed on aggregate data, i.e. data was not segregated into licence groups. A description of significant results for each of the three dependent variables is outlined below. For details of the statistics used, see Appendices C23 and C24.

- I. *Avidity*. Correlation analysis between avidity (days fished per year) and agreement levels indicated significant relationships for four of the nine management proposals (see Appendix C23). There was a negative correlation between avidity and support for both increasing the size limit for lobsters in northern Tasmania and decreasing the size limit for lobsters in southern Tasmania. These results appear contradictory and are difficult to interpret. For the other two significant correlations, less avid fishers were more supportive of management options that are more restrictive than the *status quo* than more avid fishers. Firstly, there was an inverse relationship between avidity and support for limiting the number of pots that fishers may have on their boat. Secondly, there was also a strong inverse

relationship between avidity and support for decreasing bag limits to four lobsters per day. Interestingly, there was no relationship between avidity and support for increasing the bag limit to six lobsters per day.

- II. *Residential Status.* Support for management options were compared between fishers classified as either 'rural' or 'urban' (based on their residential address postcode) using 1-way ANOVA tests for independence (see Appendix C24). Four significant differences were observed. Urban fishers were more supportive of limiting the number of pots that fishers may have on their boat, introducing possession limits for large fishing parties and limiting the number of recreationally caught lobsters that may be taken out of Tasmania. In short, these results suggested that urban fishers were generally more supportive of restrictive management initiatives. Furthermore, urban fishers significantly expressed greater support for the introduction of separate fishing areas for recreational and commercial fishers at certain times of the year than rural fishers.
- III. *Age.* Correlation analysis between age and support for the nine management proposals observed no significant differences.

**Table 12.** Agreement levels to proposed management options.

Disagree ■ Neutral ■ Agree ■

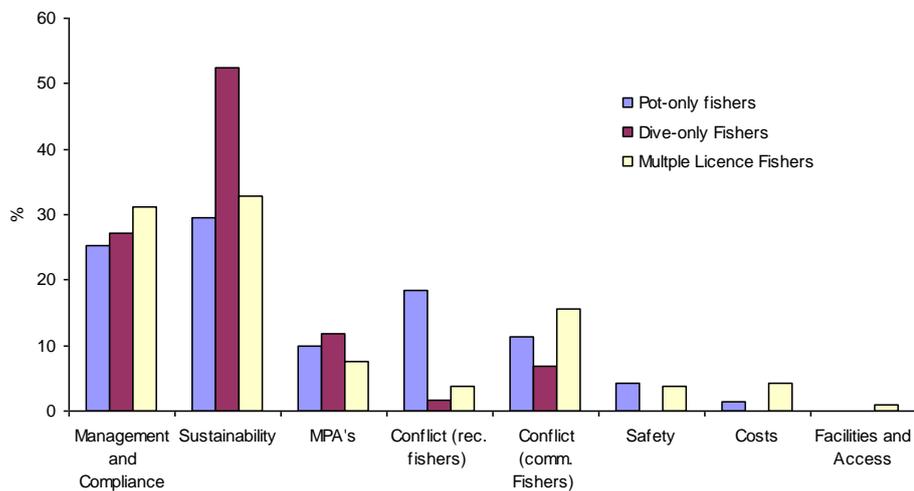
Management Options	Group	Mean	
Limit the number of recreational caught lobsters that may be taken out of Tasmania	All	3.6	
	Pot	3.7	
	Dive	3.9	
	Multi	3.5	
Different fishing areas for recreational and commercial fishers at certain times of the year	All	3.5	
	Pot	3.5	
	Dive	3.2	
	Multi	3.6	
Possession limit for large fishing parties	All	3.2	
	Pot	3.3	
	Dive	3.5	
	Multi	3.1	
A limit on the number of pots per boat	All	3.1	
	Pot	3.0	
	Dive	3.9	
	Multi	3.0	
Increase bag limit to six lobsters per day	All	2.9	
	Pot	2.8	
	Dive	2.2	
	Multi	3.2	
Allow pot fishers to use one extra pot	All	2.8	
	Pot	2.8	
	Dive	1.9	
	Multi	2.9	
Higher size limit of lobsters in northern Tasmania	All	2.5	
	Pot	2.5	
	Dive	2.8	
	Multi	2.5	
Decrease bag limit to four lobsters per day	All	2.4	
	Pot	2.4	
	Dive	2.9	
	Multi	2.2	
Lower size limit of lobsters in southern Tasmania	All	2.3	
	Pot	2.3	
	Dive	2.3	
	Multi	2.3	

Mean scores for all items were based on responses to the following response categories; 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

## Lobster Fishery Issues

Responses to the open ended question relating to the most important issue facing the recreational rock lobster fishery were grouped into eight response categories (see Appendix C25). While it was intended to evoke one main issue per respondent, the compound nature of some responses meant that this was not always practicable. In other words, some responses contained a combination of interrelated issues spanning different categories that were not possible to disentangle. Accordingly, 438 ‘responses’ were obtained from 379 survey respondents.

Issues relating to management and compliance and resource sustainability dominated responses for all three licence groups. However, there were obvious differences in the proportion of responses between licence groups (Figure 13). For example, dive fishers expressed more concern for sustainability related issues while pot-only fishers expressed relatively greater concern about conflict with other recreational lobster fishers. Issues relating to safety and costs associated with lobster fishing were raised by pot-only and multiple licence fishers only.



**Figure 13.** Percentage frequencies of the most important issues relating to lobster fishing, as identified by the three licence groups.

## 3.4 Boat Characteristics and Expenditure

### Boat Characteristics

Overall, 55.5% of lobster fishers reported owning a boat from which they fished for lobster (Table 5). Proportionally fewer dive-only fishers reported owning a boat (38.5%). This probably indicates a portion of the dive fisher population who dive from shore only. It may also be indicative of the nature of diving whereby divers generally dive with ‘dive buddies’. Accordingly, it may be less necessary for divers to own boats if they regularly dive with friends who own boats. Of the boats that were owned by dive-only fishers, their mean purchase price and current market value were considerably higher than reported for the other licence groups.

**Table 5. Boat characteristics**

	<b>All Fishers</b>	<b>Pot-only</b> (n=125)	<b>Dive-only</b> (n=52)	<b>Multi. Lic.</b> (n=197)
% of fishers who own at least 1 boat	55.5	55.5	38.5	59.7
% of fishers who own at least 2 boats	8.6	5.5	0	12.8
Mean age of boat (years)	12.9	11.6	13.2	13.5
Mean purchase price of boat	\$31,961	\$38,370	\$48,135	\$23,387
Mean estimated boat value	\$30,054	\$36,740	\$42,690	\$22,252
Mean days boats used for lobster fishing	19.6	21.5	15.6	19.2
% of days boat used for lobster fishing	33.8	33.1	35.1	32.3
Mean days boats used for other fishing types	24.5	27.1	17.7	24.2
% of days boat used for other fishing types	41.3	42.1	39.9	40.6
Mean days boats used for non-fishing activities	15.4	15.9	11.1	16.1
% of days boat used for non-fishing activities	24.9	24.8	25.0	27.1

For fishers who indicated ownership of more than one boat, figures refer to boat used most often for lobster fishing

The mean number of days that respondents of different licence groups used their boats for lobster fishing was consistent with avidity values reported earlier: pot-only and multiple licence fishers reported considerably more days than dive-only fishers. A very similar trend was also reported for other fishing activities, and for non-fishing activities. Accordingly, while pot-only and multiple licence fishers used their boats for considerably more days per year than dive-only fishers for all activities, the proportion of days that each licence group used their boats for each of the three activity types recorded was remarkably similar.

### *Non-Trip Related Expenditure*

Understanding expenditure patterns and levels of lobster fishers is important as expenditure generates income and employment within Tasmania. It is also a partial expression of the value that lobster fishers ascribe to lobster fishing. While measures of economic impact (i.e. employment, income, multiplier effects) and/or economic valuation were not the focus of this study, understanding annual and trip costs associated with lobster fishing are a necessary precursor for both.

On average, pot, dive and multiple licence holders who reported fishing during the 2006/07 season spent \$1012, \$960 and \$1372 respectively on annual lobster fishing expenses (see Table 6). The higher annual costs for multiple licence fishers was due to purchasing equipment for potentially three modes of lobster fishing (i.e. dive, pot and ring fishing). Multiple licence fishers also incurred considerably higher mean costs associated with boat fittings and modifications than the other licence groups. Boat fittings and modification expenses were incurred by a relatively high proportion (50.5%) of multiple licence fishers compared with other licence groups. Also, individual purchases of this nature were considerably higher for multiple licence fishers.

The higher costs incurred by multiple licence fishers were partially offset by lower boat depreciation costs. These costs, which were calculated at a straight line rate of 7.5% of new boat purchase price (Ernst and Young, 2004), were lower for multiple licence fishers due to a lower mean original boat purchase price. For other expenditure items, results for expense categories shared between licence groups were generally comparable. The total

annual values for each licence group may be regarded as conservative as expense data were not collected for sundry items such as safety gear and special clothing.

To estimate total annual lobster related expenditure by the entire fishery for the 2006/07 season, annual mean expenditures for each licence group were extrapolated proportionally to licence group representation in the 2006/07 licence registration database. Before doing this however, lobster related expenditure by fishers who bought a licence but did not fish for lobster during the season needed to be calculated separately in recognition of considerably lower expenses incurred by these fishers. Mean attributed annual expenditures for these fishers was \$53.48 ( $n=21$ ). This figure consisted primarily of lobster fishing gear purchases.

According to Lyle (2008), 21.6% of licence holders did not fish over the 2006/07 season. Therefore, total annual attributed non-trip expenditure for this sector was estimated to be \$231,141, based on 19,421 licence holders in the 2006/07 season. Assuming that the percentage of fishers who did not fish was evenly distributed across the three licence groups, total statewide non-trip related attributed annual expenditures for pot-only, dive-only and multiple licence fishers (who fished during the 2006/07 season) was estimated to be \$6,840,108, \$2,143,680 and \$9,182,796 respectively. Expenditures for ring only fishers, who were not sufficiently represented to be assessed as a separate licence group in this survey, were incorporated within the expenditure total for pot-only fishers. When combined, annual attributed expenditure for all four groups was estimated to be \$18,166,584.

**Table 6. Annual non-trip related expenditure for pot-only fishers, dive-only fishers and multiple licence fishers. Values exclude licence holders who did no lobster fishing during the 2006/07 season**

<b>Pot-only</b> ( <i>n</i> =112)	number of purchases made	% of fishers who made purchases	Mean item purchase cost	total purchases	mean purchase p/y*	total purchases attributed to lobster fishing	mean purchases p/y attributed to lobster fishing*
Pot Purchases	46	41.1	\$144.46	\$6,645.00	\$59.33	\$6,645.00	\$59.33
Pot Maintenance	20	17.9	\$36.75	\$735.00	\$6.56	\$735.00	\$6.56
Ropes, Floats and Weights	48	42.9	\$65.00	\$3,120.00	\$27.86	\$3,120.00	\$27.86
Boat Insurance (Boat 1)	38	33.9	\$740.74	\$28,148.00	\$251.32	\$10,967.00	\$97.92
Boat Insurance (Boat 2)	2	1.8	\$2,000.00	\$4,000.00	\$35.71	\$2,320.00	\$20.71
Boat Registration (Boat 1)	55	49.1	\$123.98	\$6,819.00	\$60.88	\$2,660.00	\$23.75
Boat Registration (Boat 2)	3	2.7	\$76.67	\$230.00	\$2.05	\$102.00	\$0.91
Boat Modifications and/or fittings (Boat 1)	40	35.7	\$1,997.13	\$79,885.00	\$713.26	\$23,665.00	\$211.29
Boat Modifications and/or fittings (Boat 2)	3	2.7	\$1,346.67	\$4,040.00	\$36.07	\$2,992.00	\$26.71
Boat Depreciation (Boat 1)	62	55.4	\$2,877.80	\$178,423.60	\$1,593.07	\$59,058.21	\$527.31
Boat Depreciation (Boat 2)	6	5.4	\$927.80	\$5,566.80	\$49.70	\$1,113.36	\$9.94
<b>Total</b>				<b>\$312,045.60</b>	<b>\$2,786.12</b>	<b>\$53,206.00</b>	<b>\$1,012.30</b>

<b>Dive-only</b> ( <i>n</i> =52)	number of purchases made	% of fishers who made purchases	Mean item purchase cost	total purchases	mean purchase p/y	total purchases attributed to lobster fishing	mean purchases p/y attributed to lobster fishing*
SCUBA Equipment	25	48.1	\$512.00	\$12,800.00	\$246.15	\$7,790.00	\$149.81
Hookah Equipment	14	26.9	\$472.86	\$6,620.00	\$127.31	\$5,776.00	\$111.08
Snorkelling Equipment	17	32.7	\$185.59	\$3,155.00	\$60.67	\$1,410.00	\$27.12
Boat Insurance (Boat 1)	15	28.8	\$1,224.00	\$18,360.00	\$353.08	\$5,935.00	\$114.13
Boat Registration (Boat 1)	20	38.5	\$176.70	\$3,534.00	\$67.96	\$785.00	\$15.10
Boat Modifications and/or fittings (Boat 1)	12	23.1	\$800.42	\$9,605.00	\$184.71	\$2,865.00	\$55.10
Boat Depreciation (Boat 1)	20	38.5	\$3,610.10	\$72,202.00	\$1,388.50	\$25,342.90	\$487.36
<b>Total</b>				<b>\$54,074.00</b>	<b>\$1,039.88</b>	<b>\$24,561.00</b>	<b>\$959.69</b>

\* p/y = per person per year

<b>Table 6.</b> (continued)								
<b>Multiple Licence Fishers</b> ( <i>n</i> =188)	number of purchases made	% of fishers who made purchases	Mean item purchase cost	total purchases	mean purchase p/p/y	total purchases attributed to lobster fishing	mean purchases p/p/y attributed to lobster fishing	
Pot Purchases	89	47.3	\$157.72	\$14,037.00	\$74.66	\$14,037.00	\$74.66	
Ring Purchases	41	21.8	\$92.71	\$3,801.00	\$20.22	\$3,801.00	\$20.22	
Pot/Ring Maintenance	46	24.5	\$48.72	\$2,241.00	\$11.92	\$2,241.00	\$11.92	
Ropes, Floats and Weights	105	55.9	\$68.71	\$7,215.00	\$38.38	\$7,215.00	\$38.38	
SCUBA Equipment	50	26.6	\$659.24	\$32,962.00	\$175.33	\$19,478.00	\$103.61	
Hookah Equipment	43	22.9	\$719.42	\$30,935.00	\$164.55	\$22,312.00	\$118.68	
Snorkelling Equipment	49	26.1	\$219.69	\$10,765.00	\$57.26	\$6,640.00	\$35.32	
Boat Insurance (Boat 1)	82	43.6	\$946.49	\$77,612.00	\$412.83	\$17,998.00	\$95.73	
Boat Insurance (Boat 2)	10	5.3	\$386.00	\$3,860.00	\$20.53	\$1,004.00	\$5.34	
Boat Registration (Boat 1)	102	54.3	\$271.36	\$27,679.00	\$147.23	\$8,530.00	\$45.37	
Boat Registration (Boat 2)	17	9.0	\$136.53	\$2,321.00	\$12.35	\$792.00	\$4.21	
Boat Modifications and/or fittings (Boat 1)	82	43.6	\$2,658.63	\$218,008.00	\$1,159.62	\$83,694.00	\$445.18	
Boat Modifications and/or fittings (Boat 2)	13	6.9	\$597.31	\$7,765.00	\$41.30	\$868.00	\$4.62	
Boat Depreciation (Boat 1)	112	59.6	\$1,754.00	\$196,448.00	\$1,044.94	\$63,452.70	\$337.51	
Boat Depreciation (Boat 2)	24	12.8	\$1,248.80	\$29,971.20	\$159.42	\$5,844.38	\$31.09	
<b>Total</b>				<b>\$439,201.00</b>	<b>\$2,336.18</b>	<b>\$188,610.00</b>	<b>\$1,371.85</b>	

p/y = per

person per year

### *Trip Related Expenditure*

On average, pot fishers, dive fishers and multiple licence fishers spent \$29, \$50 and \$75 on lobster attributed expenses respectively on 1-day trips. For all three groups, fuel and oil for vehicles and boats were the most prominent expense items. The considerable difference in mean attributed daily expenditure between dive fishers and multiple licence fishers was due to the respective attribution figures applied, not the total amount spent. Fishers from both licence groups spent approximately \$90 per day. However, dive fishers attributed only 55% of these costs to lobster fishing compared to 88% applied by multiple licence fishers. This infers that whilst on lobster fishing trips, the opportunity to target lobster was of greater relative importance for multiple licence fishers. The lower daily expenditure for pot-only fishers reflects the absence of diving related costs and comparatively lower expenses paid for vehicle and boat fuel. From this, it is inferred that, on 1-day trips, pot-only fishers fished closer to home and travelled less whilst on the water compared to dive-only fishers and multiple licence fishers.

For multiple day trips, expenses were assessed both in terms of what fishers spent per day away from home and per day fished. Unattributed daily expenditures were comparable between licence groups for item totals and aggregate totals. For each day on 'lobster trips', pot-only fishers, dive-only fishers and multiple licence fishers spent \$68, \$54 and \$69, respectively. When these values are assessed in terms of expenditure per day *fished*, the respective figures are \$116, \$108 and \$104. The differences in the relative magnitude of unattributed expense values between days away from home and days fished reflects differences in the percentage of days fished (as a proportion of the time spent away from home) between licence groups. For example, multiple licence fishers spent the highest unattributed amount (\$69) per day away from home. However, when their expenditures are viewed in terms of expenditure per day fished, they return the lowest mean relative value (\$104) because they fished on a greater proportion of trip days (66.6%). In contrast, pot fishers and dive fishers targeted lobsters on 58.3% and 49.6% of trip days, respectively.

Greater differences between licence groups were observed when expenditures were subject to lobster fishing attribution. For attributed expenditures per person per day on multiple day trips, the respective totals were \$27, \$15 and \$40 for pot-only, dive-only and multiple licence fishers, respectively. When these values are assessed in terms of expenditure per day fished, the respective figures were \$46, \$31 and \$60. The differences between licence groups for both sets of values can be largely explained by the differences in the attribution figures applied by the respective licence groups. Similar to the pattern observed for one-days trips, the mean proportion of costs attributed to lobster fishing was highest for multiple licence fishers (58.4%), followed by pot fishers (39.4%) and dive fishers (28.8%).

Estimations of total trip-related expenditure for the entire licensed recreational fishery (for 2006/07) were made. For each of the three licence groups, average daily expenditures were calculated using the relative proportions of daily attributed expenditures for both single day trip and multiple day trips. This figure was then multiplied by the estimated total number of days fished for each licence group based on values determined by the 2006/07 phone/diary survey (Lyle, 2008). Accordingly, the average daily expenditure attributed to lobster fishing was \$34.98 for pot fishers, \$45.71 for dive fishers and \$69.61 for multiple licence fishers. When this is expanded to the whole licensed population, total

(attributed) trip-related expenditures are approximately \$6.0M. When this is combined with estimated statewide attributed non-trip related expenses calculated earlier (\$18.2M), total attributed expenditure for rock lobster fishers for the 2006/07 season was estimated to be in the order of \$24M. In interpreting this figure, however, it needs to be pointed out that 6.5% of the licensed population was less than 18 years of age at the commencement of the 2006/07 season. While expenditure estimates were based on data obtained from respondents 18 years or over, it is likely that daily expenses incurred by minors were considerably less than expenses incurred by adult lobster licence holders.

**Table 7. Trip related expenses for single day trips**

**Pot Only Fishers (n=55)**

	Number of purchases made	% of fishers who made purchases	Mean Item Purchase	Total purchase amount	Total purchase attributed to lobster fishing	Mean purchase p/d*	Mean purchase p/d* attributed to lobster fishing
Lobster Bait	10	18.2	\$19.30	\$193.00	\$193.00	\$3.51	\$3.51
Other Lobster Fishing Expenses	2	3.6	\$55.00	\$110.00	\$110.00	\$2.00	\$2.00
Eat in and Take Away Meals	4	7.3	\$42.50	\$170.00	\$25.00	\$3.09	\$0.45
Food and Drink	10	18.2	\$48.00	\$480.00	\$186.00	\$8.73	\$3.38
Boat Fuel and Oil	24	43.6	\$43.13	\$1,035.00	\$712.00	\$18.82	\$12.95
Vehicle Fuel and Oil	19	34.5	\$30.00	\$570.00	\$341.00	\$10.36	\$6.20
Chemist Supplies	1	1.8	\$30.00	\$30.00	\$15.00	\$0.55	\$0.27
Other General Expenses	2	3.6	\$35.00	\$70.00	\$31.00	\$1.27	\$0.56
<b>Total</b>				<b>\$2,658.00</b>	<b>\$1,613.00</b>	<b>\$48.33</b>	<b>\$29.33</b>

**Dive Only Fishers (n=28)**

	Number of purchases made	% of fishers who made purchases	Mean Item Purchase	Total purchase amount	Total purchase attributed to lobster fishing	Mean purchase p/d*	Mean purchase p/d* attributed to lobster fishing
SCUBA air refills	7	25.0	\$10.29	\$72.00	\$34.10	\$2.57	\$1.22
Hookah Fuel	10	35.7	\$11.10	\$111.00	\$98.00	\$3.96	\$3.50
Other Diving Expenses	1	3.6	\$100.00	\$100.00	\$25.00	\$3.57	\$0.89
Eat in and Take Away Meals	7	25.0	\$38.57	\$270.00	\$65.25	\$9.64	\$2.33
Food and Drink	11	39.3	\$35.45	\$390.00	\$172.25	\$13.93	\$6.15
Boat Fuel and Oil	19	67.9	\$42.89	\$815.00	\$558.25	\$29.11	\$19.94
Vehicle Fuel and Oil	20	71.4	\$34.50	\$690.00	\$377.25	\$24.64	\$13.47
Chemist Supplies	1	3.6	\$60.00	\$60.00	\$60.00	\$2.14	\$2.14
Other General Expenses	2	7.1	\$17.50	\$35.00	\$21.50	\$1.25	\$0.77
<b>Total</b>				<b>\$2,543.00</b>	<b>\$1,411.60</b>	<b>\$90.82</b>	<b>\$50.41</b>

**Dive Only Fishers**

	Number of purchases made	% of fishers who made purchases	Mean Item Purchase	Total purchase amount	Total purchase attributed to lobster fishing	Mean purchase p/d*	Mean purchase p/d* attributed to lobster fishing
Lobster Bait	15	21.1	\$15.33	\$230.00	\$230.00	\$3.24	\$3.24
Other Lobster Fishing Expenses	8	11.3	\$47.63	\$381.00	\$381.00	\$5.37	\$5.37
SCUBA air refills	10	14.1	\$24.80	\$248.00	\$166.00	\$3.49	\$2.34
Hookah Fuel	17	23.9	\$9.35	\$159.00	\$133.00	\$2.24	\$1.87
Other Diving Expenses	4	5.6	\$90.00	\$360.00	\$360.00	\$5.07	\$5.07
Eat in and Take Away Meals	16	22.5	\$20.31	\$325.00	\$267.00	\$4.58	\$3.76
Food and Drink	29	40.8	\$18.55	\$538.00	\$399.00	\$7.58	\$5.62
Boat Fuel and Oil	47	66.2	\$58.13	\$2,732.00	\$2,198.00	\$38.48	\$30.96
Vehicle Fuel and Oil	43	60.6	\$27.49	\$1,182.00	\$989.00	\$16.65	\$13.93
Chemist Supplies	3	4.2	\$9.67	\$29.00	\$29.00	\$0.41	\$0.41
Other General Expenses	4	5.6	\$48.75	\$195.00	\$195.00	\$2.75	\$2.75
<b>Total</b>				<b>\$6,379.00</b>	<b>\$5,347.00</b>	<b>\$89.85</b>	<b>\$75.31</b>

\* p/d = per person per day

<b>Table 8.</b> Daily trip related expenses for multiple day trips									
<b>POT FISHERS (n=70)</b>									
Days On Trip = 528	Number of purchases made	% of fishers who made purchases	Mean Item Purchase	Total amount purchased	Total purchase attributed to lobster	<sup>1</sup> Mean purchase p/d	<sup>2</sup> Mean purchase p/d/f	<sup>1</sup> Mean purchase p/d attributed	<sup>2</sup> Mean purchase p/d/f attributed
Days fished for lobster = 308									
Fished 58.3% of days on trip									
Lobster Bait	20	28.6	\$24.70	\$494.00	\$494.00	\$0.94	\$1.60	\$0.94	\$1.60
Other Lobster Fishing Expenses	8	11.4	\$141.25	\$1,130.00	\$1,130.00	\$2.14	\$3.67	\$2.14	\$3.67
Accommodation	16	22.9	\$301.75	\$4,828.00	\$1,557.00	\$9.14	\$15.68	\$2.95	\$5.06
Eat in and Take Away Meals	34	48.6	\$153.74	\$5,227.00	\$1,775.00	\$9.90	\$16.97	\$3.36	\$5.76
Food and Drink	50	71.4	\$171.80	\$8,590.00	\$2,734.00	\$16.27	\$27.89	\$5.18	\$8.88
Boat Fuel and Oil	59	84.3	\$121.36	\$7,160.00	\$3,006.00	\$13.56	\$23.25	\$5.69	\$9.76
Vehicle Fuel and Oil	53	75.7	\$94.72	\$5,020.00	\$2,120.00	\$9.51	\$16.30	\$4.02	\$6.88
Chemist Supplies	12	17.1	\$35.58	\$427.00	\$196.00	\$0.81	\$1.39	\$0.37	\$0.64
Other General Expenses	19	27.1	\$148.68	\$2,825.00	\$1,071.00	\$5.35	\$9.17	\$2.03	\$3.48
<b>Total</b>				<b>\$35,701.00</b>	<b>\$14,083.00</b>	<b>\$67.62</b>	<b>\$115.91</b>	<b>\$26.67</b>	<b>\$45.72</b>
<b>DIVE FISHERS (n=24)</b>									
Days On Trip = 129	Number of purchases made	% of fishers who made purchases	Mean Item Purchase	Total amount purchased	Total purchase attributed to lobster	<sup>1</sup> Mean purchase p/d	<sup>2</sup> Mean purchase p/d/f	<sup>1</sup> Mean purchase p/d attributed	<sup>2</sup> Mean purchase p/d/f attributed
Days fished for lobster = 64									
Fished 49.6% of days on trip									
SCUBA air refills	12	50.0	\$19.00	\$228.00	\$159.00	\$1.77	\$3.56	\$1.23	\$2.48
Hookah Fuel	6	25.0	\$23.00	\$138.00	\$75.50	\$1.07	\$2.16	\$0.59	\$1.18
Other Diving Expenses	1	4.2	\$20.00	\$20.00	\$20.00	\$0.16	\$0.31	\$0.16	\$0.31
Accommodation	6	25.0	\$98.33	\$590.00	\$116.00	\$4.57	\$9.22	\$0.90	\$1.81
Eat in and Take Away Meals	10	41.7	\$65.50	\$655.00	\$109.00	\$5.08	\$10.23	\$0.84	\$1.70
Food and Drink	17	70.8	\$96.47	\$1,640.00	\$477.00	\$12.71	\$25.63	\$3.70	\$7.45
Boat Fuel and Oil	11	45.8	\$55.45	\$610.00	\$126.00	\$4.73	\$9.53	\$0.98	\$1.97
Vehicle Fuel and Oil	18	75.0	\$74.72	\$1,345.00	\$240.00	\$10.43	\$21.02	\$1.86	\$3.75
Chemist Supplies	0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Other General Expenses	10	41.7	\$171.00	\$1,710.00	\$675.00	\$13.26	\$26.72	\$5.23	\$10.55
<b>Total</b>				<b>\$6,936.00</b>	<b>\$1,997.50</b>	<b>\$53.77</b>	<b>\$108.38</b>	<b>\$15.48</b>	<b>\$31.21</b>

<sup>1</sup> p/d refers to per person per day on multiple day trip

<sup>2</sup> p/d/f refers to per person per day in which the participant fished for lobster whilst on a multiple day trip



## 4 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Overview

Overall, the results demonstrate the value of assessing lobster fishers social, economic and demographic characteristics based on the nature of fishing activities undertaken, as inferred from licence type(s) held. While considerable diversity was demonstrated to exist within licence groups, using licence type comparisons to assess the lobster fishery demonstrated significant differences between groups that may be used to better understand the fishery to inform planning and service delivery. Certainly, the approach taken to assess the fishery has identified a degree of diversity that would likely be obscured if an assessment was made by developing an aggregate profile of all constituents. Similarly, Lyle *et al.* (2005) observed significant differences in catch and effort variables between Tasmanian lobster fishers deploying different means to target lobsters.

A sufficient degree of consistency in the results between different variable classes was observed, enabling the development of typological profiles of each of the three licence groups. Whilst developing typologies was not an objective of this project, it may be an effective way to contextualise the results in a summarized fashion.

Pot-only fishers were, on average, older, comprised a higher percentage of females, pensioners and lower income earners. They also demonstrated a greater inclination to fish with family members and rated safety, familiarity and the presence of facilities and amenities more highly than the other licence groups when deciding where to go fishing. Shorter distances travelled on the water plus a high incidence of reported conflict with other recreational lobster fishers suggests that, in comparative terms, pot-only fishers tend to concentrate their effort in easily accessed fishing areas. With the exception of family recreation and relaxation, pot-only fishers were less motivated by non-catch factors such as adventure, excitement, challenge, and experiencing nature than the other two groups. This is also reflected by comparatively shorter distances travelled to go lobster fishing. They were more highly motivated to catch lobster for food and signaled greater orientation to catching numbers of lobster than to catching large lobster.

Dive-only fishers were younger on average, had higher incomes and had attained higher levels of education than pot-only licence holders. Their motivational responses suggested that they had a comparatively greater appreciation for non-catch aspects of the fishing experience and expressed a lesser need to catch lobsters as a measure of success or satisfaction of the fishing experience. This is likely to reflect a tendency of divers to collect other species (i.e. abalone) and to participate in non-extractive pursuits, such as underwater viewing and photography. Dive-only fishers were also more oriented to catching larger lobsters than catching large numbers of lobster; a position afforded by the selective nature of their fishing mode. They also expressed attitudes suggesting greater concern for resource sustainability than the other two groups. Expenditure attributions for both annual and trip costs, and the proportion of days spent lobster fishing on multiple day trips suggest that lobster fishing was of lesser importance than expressed by pot fishers and multiple licence holders. Considerably lower rates of avidity supported this conclusion.

According to a classification framework developed by Bryan (1977) and commonly applied to segment recreational fishers in relation to their frequency of participation, commitment and skills and knowledge, multiple licence fishers could be viewed as more 'specialised' than pot-only or dive-only fishers. Multiple licence holders demonstrated high rates of lobster fishing and other species fishing avidity, particularly in comparison to dive-only fishers. Several indicators suggested that multiple licence fishers had a higher level of commitment to lobster fishing than the two other groups. In addition to the obvious commitment implications of possessing more than one licence type, multiple licence fishers scored highest on the centrality to lifestyle index, incurred higher annual costs, attributed a higher percentage of costs to lobster fishing and spent a greater proportion of days fishing for lobsters on multiple day trips.

Interestingly, some of the results seen for multiple licence fishers appear indicative of a balance between differences observed between pot and dive fishers, whilst other results appear to be a combination of attitudes and orientations observed for pot and dive fishers. This observation is intuitive considering that the overwhelming majority of multiple licence fishers are holders of both pot and dive licences and are therefore subject to issues peculiar to each fishing mode. For example, mean values for demographic variables such as age, income, and half of the employment and education categories used were intermediate between values observed for pot and dive fishers. This trend was also evident for many site preferences and fishing constraints. However, mean values reported for motivations and consumptive orientation suggest that multiple licence fishers valued both catch and non-catch factors highly, and were strongly oriented to catching both numbers of lobster and large lobster.

The highly consumptive focus of multiple licence fishers appears intuitive as the ownership of more than one licence type confers greater flexibility and capacity to catch a larger number of lobsters (and be more size selective), particularly if both modes of fishing are employed on the same day. The fact that multiple licence fishers showed the greatest support for a bag limit increase and the greatest opposition to a bag limit reduction supports this assertion and suggests that this group of fishers is more likely to be in a situation where current bag limits can be obtained.

## **4.2 Methodological Issues and Implications for Future Research**

Whether the results of this study are to be used to better understand the present fishery or as a baseline for further studies, they need to be considered in the context of the rock lobster fishing population. The availability of the licence database to check age and gender, and the phone/diary survey to evaluate avidity, provided a valuable reference for non-response analysis. Accordingly, survey respondents tended to be older and more avid than the broader population of lobster fishers. Response biases to older and more avid fishers are not uncommon in mail surveys (Fisher, 1996). Furthermore, recall biases have been demonstrated to routinely over-estimate avidity values in mail surveys (Connelly and Brown, 1995; Connelly *et al.*, 2000). Fortunately, the biases observed did not appear to affect the relative trends in age and avidity between licence groups, only their absolute values.

It was not possible to determine the effect of observed biases on variables not subject to non-response checks. However, it is likely that data elements requiring the recollection of personal events will be affected by recall bias. Similar to the inflated values for the number of days fished for lobster, it is also likely that recollections of the number of days fished for other species were overestimated. For expenditure estimates, Connelly and Brown (1995) suggest that, unlike recollections of frequency participation, what people have spent is usually recalled accurately over a 12 month period. Therefore, it is plausible that expenditure estimates for individual respondents in this study were less affected by recall bias than days fished. However, as noted, respondents tended to be more avid than the general population and as a consequence this response bias is likely to have influenced expanded expenditure estimates<sup>5</sup>. By contrast, social data is unlikely to be influenced by recall bias effects *per se*, though the over-representation of older fishers may impart some degree of bias.

Overall, response rates to the survey were lower than expected. While the absence of similar surveys of the Tasmanian recreational lobster fishery meant there was no response rate precedent, comparisons with response rates for mail questionnaires similar in scope and size suggests that the response rates observed were rather low. The mailing procedures used were a modified adaptation of those developed by Dillman (1978). Unlike the procedures prescribed by Dillman, cover letters were not personalized and follow-up questionnaires were not sent to non-respondents, only reminder letters. The degree to which these additions to the mailing procedure would have increased response rates is unknown; however Salant and Dillman (1994) suggest that the approach recommended by Dillman (1978) should result in response rates between 50 and 60%. Therefore, mailing procedures incorporating personalized cover letters and follow-up questionnaires should be considered in future mail questionnaires. Nonetheless, other studies have demonstrated that the mailing procedure described by Dillman (1978) does not necessarily guarantee high response rates. For example, response rates of 40% were obtained for mail questionnaires of similar length to the one used in the present study by Anderson and Ditton (2004) and Tseng *et al.* (2006).

An evaluation of trends in response rates and mailing procedures of mail surveys conducted on Western Australian recreational lobster fishers between 1986 and 1999 (Melville-Smith and Anderton, 2000) provides potentially useful information for future survey implementation. Over this period, response rates to annual surveys were successively improved from 36 to 63% with the incremental introduction of reminder postcards, second questionnaire mail-outs and progressively more generous financial inducements. This suggests that response rates may be improved in future surveys by increasing the value of inducements and sending out a second round of questionnaires to fishers who did not respond to the first mail-out. However, the size and complexity of the questionnaire used in the present study implies that the 63% response rate attained by Melville-Smith and Anderton, (2000) may not be attainable; the respective lengths of the questionnaires used in the current study and by Melville-Smith and Anderton were eight and four pages. Response rates are generally sensitive to questionnaire length and complexity. For example, response rates for annual questionnaires sent to Floridian lobster fishers dropped from a consistent inter-annual rate of approximately 60% to 43% when the survey was lengthened to incorporate a socio-economic component (Sharp *et*

---

<sup>5</sup> As more avid fishers tend to have higher annual expenditure levels by virtue of greater participation, a response bias favouring more avid fishers will inflate expanded population expenditure estimates.

*al.*, 2005). It is also likely that fishers are more willing to provide catch and effort type information than answer socioeconomic or demographic questions, which may be perceived as irrelevant or intrusive.

Response rates for future studies would likely be improved with a more economical approach to survey design. Questionnaires designed to collect information to meet more specific objectives such as understanding fisher's attitudes to proposed management changes should require considerably smaller formats. A survey of this nature could be administered by telephone: the high response rates achieved through TAFI's bi-ennial recreational lobster and abalone phone/diary surveys indicate that similarly high response rates may be achieved. Future studies should also consider the selection of larger sample sizes and/or more pronounced stratification techniques to explore diversity between different diving modes, i.e. SCUBA, hookah and snorkeling. The same rationale could also be applied to ring-only fishers if this group is deemed to be sufficiently important to warrant separate analysis.

## **ACKNOWLEDGEMENTS**

We would like to thank all the lobster fishers who contributed their time and energy to participate in the survey. We would also like to acknowledge Rod Pearn for providing valuable input in structuring the report and reviewing drafts and Dr Sarah Jennings for providing advice regarding the analysis and presentation of economic data. Furthermore, we would like to thank Dr Howel Williams and Dr Matt Bradshaw who provided guidance in the development of the survey instrument. Thanks are also extended to Wipawadee Yaikul and Kylie Edwards for their efforts in data entry.

Funding assistance for this study was provided from the Fishwise Resource Management Fund administered by the Department of Primary Industries, Parks, Water and Environment.

## REFERENCES

- Anderson, D.K., and Ditton, R.B. (2004). Demographics, Participation, Attitudes, and Management Preferences of Texas Anglers. Report prepared for the Inland Fisheries and Coastal Fisheries Divisions, Texas Parks and Wildlife Department. Department of Wildlife and Fisheries Sciences, Texas A&M University, Texas. 90pp.
- Bryan, H. (1977). Leisure value systems and recreation specialization: the case of trout fishermen. *Journal of Leisure Research* **9**: 174-187.
- Calvert, B. (2002). The importance of angler motivations on sport fishery management. In Pitcher, T.J. and Hollingworth, C. (eds.), *Recreational Fisheries: ecological, economic and social evaluation*. Blackwell Science, 120-129.
- Commonwealth of Australia (1992). *The National Strategy for Ecologically Sustainable Development*. AGPS, Canberra.
- Connelly, N.A. and Brown, T.L. (1995). Using angler diaries to examine biases associated with 12 month recall on mail questionnaires. *Transactions of the American Fisheries Society* **124**: 413-422.
- Connelly, N.A., Brown, T.L., and Knuth, B.A. (2000). Assessing the relative importance of recall bias and non-response bias and adjusting for those biases in statewide angler surveys. *Human Dimensions of Wildlife* **5**: 19-29.
- Dillman, D. A. (1978), *Mail and Telephone Surveys: The Total Design Method*. Wiley-Interscience, New York.
- Ditton, R.B. and Fedler, A.J. (1984). Towards an understanding of experience preferences of urban anglers. In L.J. Allen, (ed.), *Urban Fisheries Symposium Proceedings* (pp. 55-63). Bethesda, MD: American Fisheries Society.
- Driver, B.L. (1977). Item pool for scales designed to quantify the psychological outcomes desired and expected from recreational participation. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.
- Driver, B.L. and Cooksey, R.W. (1977). Preferred psychological outcomes of recreational fishing. Pages 27-40 in R.A. Barnhart and T.D. Roelofs, eds. *Catch and release fishing as a management tool: A National Sport Fishing Symposium proceedings*. Humboldt State University, Arcata, California.
- Ernst and Young (2004). Economic impact of the NSW striped marlin fishery. Report to NSW Fisheries, Cronulla.
- Fedler, A.J. and Ditton, R.B. (1986). A framework for understanding the consumptive orientation of recreational fishermen. *Environmental Management* **10**: 221-227.
- Fedler, A.J. and Ditton, R.B. (1994). Understanding Angler Motivations in Fisheries Management. *Fisheries* **19**(4): 6-13.

- Fisher, M.R. (1997). Segmentation of the angler population by catch preference, participation and experience: A management oriented application of recreation specialization. *North American Journal of Fisheries Management* **17**: 1-10.
- Fisher, M.R. (1996). Estimating the effect of non-response bias on angler surveys. *Transactions of the American Fisheries Society* **125**: 118-126.
- Graefe, A.R. (1980). The relationship between level of participation and selected aspects of specialization in recreational fishing. Unpublished doctoral dissertation. Texas A&M University, College Station, Texas.
- Kim, S., Scott, D. and Crompton, J.L. (1997). An exploration of the relationships among social psychological involvement, behavioural involvement, commitment, and future intentions in the context of birdwatching. *Journal of Leisure Research* **29**: 320-341.
- Lyle, J.M. (2008). Tasmanian recreational rock lobster and abalone fisheries – 2006/07 fishing season. TAFI Internal Report, TAFI, Hobart. 25pp
- Lyle, J.M., Morton, A.J. and Forward, J. (2005). Characterisation of the recreational fishery for southern rock lobster, *Jasus edwardsii*, in Tasmania, Australia: implications for management. *New Zealand Journal of Marine and Freshwater Research* **39**: 703-714.
- Lyle, J.M., Tracey, S.R, Stark, K.E., and Wotherspoon, S. (2009). 2007-08 survey of recreational fishing in Tasmania. TAFI Report, Hobart, 97pp.
- Melville-Smith, R. and Anderton, S. (2000). Western rock lobster surveys of licenced recreational fishers 1986/87 to 1998/99. Fisheries Research Report No. 122. Fisheries Research Division, W.A. Marine Research Laboratories, Western Australia. 39pp.
- Salant, P. and Dillman, D.A. (1994). How to conduct your own survey. John Wiley and Sons, New York, New York.
- Sharp, W.C., Bertelson, R.D. and Leeworthy (2005). Long-term trends in the recreational lobster fishery of Florida, United States: landings, effort, and implications for management. *New Zealand Journal of Marine and Freshwater Research* **39**: 737-747.
- Sutton, S.G. (2003). Personal and situational determinants of catch and release choice of freshwater anglers. *Human Dimensions of Wildlife* **8**: 109-126.
- Sutton, S.G. (2007). Constraints on recreational fishing participation in Queensland, Australia. *Fisheries* **32**(2): 73-83.
- Tseng, Y., Wolber, N.R. and Ditton, R.B. (2006). Demographics, participation, attitudes and management preferences of Texas anglers. Report prepared for Texas Parks and Wildlife Service. Department of Wildlife and Fisheries Sciences, Texas A&M University, Texas. 72pp.

APPENDIX A. Questionnaire

**SECTION A: 2006/07 FISHING ACTIVITY**

PLEASE NOTE: In this survey, the term *Lobster Fishing* is used to mean the capture of lobsters using any legal means ie potting, ring fishing and diving.

**A1. Over the last 12 months, on how many separate days did you spend doing the following fishing activities in Tasmania?**

	% who participated
Inshore saltwater line fishing (ie bay and estuary).....	<input type="text"/> days
Saltwater Gamefishing (eg tuna, sharks..).....	<input type="text"/> days
Offshore line fishing (excluding gamefishing).....	<input type="text"/> days
Net fishing .....	<input type="text"/> days
Spearfishing.....	<input type="text"/> days
Dive collection (eg abalone, scallops, urchins).....	<input type="text"/> days
Freshwater fishing.....	<input type="text"/> days
Other, _____	<input type="text"/> days

**SECTION B: HISTORY OF PARTICIPATION**

**B1. What age were you when you first started lobster fishing in Tasmania?**  years

**B2. Since then, how many years have you been lobster fishing in Tasmania?**  years

**SECTION C: LOBSTER FISHING ACTIVITY**

**C1. Did you purchase one or more lobster fishing licences for the 2006/07 season?**

No >> *Please Skip to section D (Page 2)*

Yes >> Please tick all that apply  pot  ring  dive

**C2. Did you fish or dive for lobster during the 2006/07 season?**

No >> *Please Skip to section D (Page 2)*

Yes >> *Please Continue Below*

**C3. For each month of the 2006/07 lobster fishing season, please indicate how many ONE-DAY trips you made in which you fished for lobster. A one-day trip is a trip in which you left your main residence (home) and returned on the same day. Please do not in**

	Nov 06	Dec 06	Jan 07	Feb 07	Mar 07	Apr 07	May 07	Jun 07	Jul 07	Aug 07
One-day trips	<input type="text"/>									

For the following question, we ask you to recall any MULTI-DAY trips you may have made in which you fished for lobster during the 2006/07 season. A multi-day trip is any trip in which you fished for lobster that involved one or more nights away from your

**C4. For each month, please indicate the number of days and nights spent on multi-day trips plus the number of days you personally spent fishing for lobster on your trips. For example, if you went on a four night / five day holiday in which you fished for**

	Nov 06	Dec 06	Jan 07	Feb 07	Mar 07	Apr 07	May 07	Jun 07	Jul 07	Aug 07
A) nights away	<input type="text"/>									
B) days away	<input type="text"/>									
C) days fished	<input type="text"/>									

**SECTION D: SOCIAL PARTICIPATION**

**D1. Compared to other types of outdoor activities you participate in, would you say fishing is.....**  
 (PLEASE TICK ONE ONLY)

Your most important outdoor activity  
 Your second most important outdoor activity  
 Your third most important outdoor activity  
 Only one of many outdoor activities that you do

**D2. Compared to other types of fishing you participate in, would you say fishing for lobster fishing is....**  
 (PLEASE TICK ONE ONLY)

The *only* type of fishing that you do  
 Your most important type of fishing  
 Your second most important type of fishing  
 Only one of many types of fishing that you do

**D3. When fishing for lobster, how often do you fish with the following people?**

Always    Often    Sometimes    Never

By yourself.....  
 With friends.....  
 With family.....  
 With family and friends together.....  
 With others, \_\_\_\_\_

**D4. How often are the lobsters that you keep used in each of the following ways?**

Always    Often    Sometimes    Never

Eaten fresh by your household  
 Frozen for later use  
 Given to another household  
 bartered for another product (or service)  
 Used in some other way  
 >> What way? \_\_\_\_\_

**D5. How important are each of the following factors when deciding WHERE you go lobster fishing?**

	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Close/convenient to where you live.....	<input type="checkbox"/>				
The number of other lobster fishers likely to be there.....	<input type="checkbox"/>				
The amount of available lobsters there.....	<input type="checkbox"/>				
The size of available lobsters there.....	<input type="checkbox"/>				
The safety of the location for lobster fishing .....	<input type="checkbox"/>				
The facilities and amenities there.....	<input type="checkbox"/>				
You are familiar with that place.....	<input type="checkbox"/>				
You have access to accommodation there.....	<input type="checkbox"/>				
The location is a good place to take the family.....	<input type="checkbox"/>				
Weather conditions.....	<input type="checkbox"/>				
Water clarity.....	<input type="checkbox"/>				
Other, _____	<input type="checkbox"/>				

**SECTION D: Continued**

**D6. Are there factors that keep you from fishing for lobster as often as you would like?**

- No >> Please skip to D8
  - Yes
- v

**D7. How important are each of the following factors in keeping you from lobster fishing as often as you would like?**

Extremely important  
Very important  
Moderately important  
Slightly important  
Not at all important

- Other time commitments (work, family etc).....
- The cost of lobster fishing equipment .....
- The cost of going lobster fishing.....
- The distance to lobster fishing areas from where I live.....
- Competing leisure activities.....
- Access to a boat.....
- Finding people to go lobster fishing with .....
- Weather/sea conditions.....
- Water clarity .....
- The restrictiveness of rules and regulaitons .....
- The state of fishing facilities (boat ramps, jetties...).....
- Personal health/fitness.....
- Other.....

**D8. Below is a list of general reasons why people go fishing. For each category, please place a tick in the box to rate the importance of your reasons for LOBSTER fishing**

Extremely important  
Very important  
Moderately important  
Slightly important  
Not at all important

- | To be outdoors.....                                     | <input checked="" type="checkbox"/> 88 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|---|--|--------------------------|--------------------------|--------------------------|--------------------------|
| For family recreation.....                              | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| For relaxation.....                                     | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To experience new and different things.....             | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To be close to the water.....                           | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   |  |                          |                          |                          |                          |
| To obtain lobster to eat.....                           | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| For the experience of catching lobster.....             | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To get away from the demands of other people.....       | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To be with friends.....                                 | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To experience unpolluted natural surroundings.....      | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   |  |                          |                          |                          |                          |
| To develop lobster fishing skills.....                  | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To get away from the regular routine.....               | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To catch a 'trophy' lobster.....                        | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To get away from other people.....                      | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| For challenge or sport.....                             | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   |  |                          |                          |                          |                          |
| To experience adventure and excitement.....             | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To learn more about nature.....                         | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| To be with others who enjoy the same things you do..... | <input type="checkbox"/>               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**SECTION D: Continued**

**D9. The following is a list of statements lobster fishing. For each statement, please place a tick in the box that best describes your level of agreement or disagreement.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unsure
The more lobster I catch the happier I am.....	<input type="checkbox"/>					
A fishing trip can be successful even if no lobster are caught.....	<input type="checkbox"/>					
I usually eat the lobster I catch.....	<input type="checkbox"/>					
A successful fishing trip is one in which many lobster are caught.....	<input type="checkbox"/>					
I would rather catch 1 or 2 big lobster than 5 smaller ones.....	<input type="checkbox"/>					
I'm just as happy if I don't catch a lobster.....	<input type="checkbox"/>					
The bigger the lobster I catch, the better the fishing trip.....	<input type="checkbox"/>					
I'm just as happy if I release the lobster I catch.....	<input type="checkbox"/>					
I want to keep all the legal sized lobsters I catch (within the bag limit) .....	<input type="checkbox"/>					
If I thought I would not catch any lobsters I would not go lobster fishing.....	<input type="checkbox"/>					
I like to fish for lobster where I know I may catch a very big one.....	<input type="checkbox"/>					
I'm not satisfied unless I catch at least something.....	<input type="checkbox"/>					
As long as I don't exceed bag or size limits it is reasonable to use the lobsters I catch as a favour or barter.....	<input type="checkbox"/>					
If I stopped lobster fishing, I would probably lose touch with a lot of my friends.....	<input type="checkbox"/>					
If I couldn't go lobster fishing, I'm not sure what I would do.....	<input type="checkbox"/>					
Because of lobster fishing, I don't have time to spend doing other leisure activities.....	<input type="checkbox"/>					
Most of my friends are in some way connected with lobster fishing.....	<input type="checkbox"/>					
I consider myself to be somewhat expert at catching lobster .....	<input type="checkbox"/>					
I find that a lot of my life is organised around lobster fishing.....	<input type="checkbox"/>					
Others would probably say I spend too much time lobster fishing .....	<input type="checkbox"/>					
I would rather go lobster fishing than do almost anything else.....	<input type="checkbox"/>					
Other leisure activities don't interest me as much as lobster fishing.....	<input type="checkbox"/>					
Lobster fishing is important when deciding where to holiday in Tasmania....	<input type="checkbox"/>					

**D10. When fishing for lobster, how often do you also do each of the following fishing activities?**

	Always	Often	Sometimes	Never
Line Fishing.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Net Fishing .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dive collection for other species ie abalone.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spearfishing.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**D11. On trips where you fish for lobsters as well as other species, how would you usually rate the IMPORTANCE of fishing for lobster compared to other species?**

(PLEASE TICK ONE ONLY)

Most Important.....	<input type="checkbox"/>
Equally Important.....	<input type="checkbox"/>
Less Important.....	<input type="checkbox"/>
Unsure.....	<input type="checkbox"/>
Other, _____	<input type="checkbox"/>

**SECTION E: DURABLE ITEM EXPENDITURE**

If you did not purchase a licence for the 2006/07 season, or did not go lobster fishing during the season, please skip to Section G (Page 7)

**E1. Please indicate how much money you have personally spent on the following items over the last 12 months.**

lobster pot purchases \$   
 lobster ring purchases \$   
 pot/ring maintenance \$   
 ropes, floats and weights \$

**E2. If you possess a lobster DIVING licence, please indicate how much you have spent on the following equipment over the last 12 months**

SCUBA equipment \$   
 Hookah equipment \$   
 snorkelling equipment \$

Thinking about your diving habits, approximately what percentage of these costs would you attribute to diving for lobsters?

**E3. Do you own a boat that you go lobster fishing from?**

44.3 No >> Please skip to Section F

55.7 Yes >> How many boats do you own that you fished for lobster from during the 2006/07 season?  boat/s

**E4. Please answer the following questions relating to the boats that you own that you lobster fished from during the 2006/07 season**

	Boat 1	Boat 2	Boat 3
How old is your boat?	<input type="text"/> yrs	<input type="text"/> yrs	<input type="text"/> yrs
How many years have you owned it? (if less than 1 year, write "<1")	<input type="text"/> yrs	<input type="text"/> yrs	<input type="text"/> yrs
How much did you pay for it?	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
Expected current market value if you sold it today?	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
Boat/trailer insurance expenses over the last 12 months	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
Boat/trailer registration fees over the last 12 months	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
Boat fittings and/or modifications over the last 12 months	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
Days spent lobster fishing over the last 12 months	<input type="text"/> days	<input type="text"/> days	<input type="text"/> days
Days spent doing <u>other types of fishing</u> over the last 12 months	<input type="text"/> days	<input type="text"/> days	<input type="text"/> days
Days spent doing <u>non-fishing activities</u> over the last 12 months	<input type="text"/> days	<input type="text"/> days	<input type="text"/> days

\* These figures are based on an average expense incurred by boat owners, not all lobster licence holders

**SECTION F: TRIP RELATED EXPENDITURE**

In this section, we ask you about your MOST RECENT rock lobster fishing trip in Tasmania. For the purposes of this survey, a "rock lobster fishing trip" is defined as any trip you made in which you fished for lobster, whether or not lobster fishing was the

If you cannot recall details of your most recent trip, please provide details of the last lobster fishing trip that you can remember clearly. If you still have problems recalling details, please base your answers on what you would normally do and spend on

**F1. Where did you go lobster fishing on your trip?** \_\_\_\_\_

**F2. In which month did you make the trip?** \_\_\_\_\_

**F3. Did your trip involve any nights spent away from your usual residence?**

No >> Skip to F7  
 Yes >> Continue below

**F4. What type of accommodation did you stay in?**  Hotel  Motel  Camping  Campervan  
 Your own shack  Friends/family shack  Rented shack  Other, \_\_\_\_\_

**F5. How many days and nights did you spend away from home?**

\_\_\_\_\_ day/s  
 \_\_\_\_\_ night/s

**F6. How many days did you personally fish for lobsters on your trip?**

**SECTION F: Continued**

**F7. Besides lobster, did you target any OTHER species on your trip?**

No >> *Continue to F8*

Yes,

↓

Please list them, \_\_\_\_\_

**F8. Besides you, how many OTHER people travelled with you on your trip?**

people

**F9. How many of these people also fished for lobster on the trip?**

people

**F10. Please indicate YOUR share of the following expenses made on your trip. (Some items may have been spent by you OR somebody else, but we only need to know YOUR SHARE of what was purchased)**

<i>Lobster Fishing Expenses</i>	Lobster Bait	\$	<input type="text"/>
	Lobster fishing gear purchases and hire	\$	<input type="text"/>
	Other lobster fishing expenses, _____	\$	<input type="text"/>
<i>Diving Expenses</i>	SCUBA air refills	\$	<input type="text"/>
	Hookah fuel	\$	<input type="text"/>
	Other diving expenses, _____	\$	<input type="text"/>
<i>General Expenses</i>	Accommodation	\$	<input type="text"/>
	Eat-in or take away meals	\$	<input type="text"/>
	Food and drinks from grocery and/or convenience stores	\$	<input type="text"/>
	Boat fuel and oil	\$	<input type="text"/>
	Car/vehicle fuel and oil	\$	<input type="text"/>
	Chemist supplies	\$	<input type="text"/>
	Other general expenses, _____	\$	<input type="text"/>

For the following 3 questions, you will need to think about the reasons WHY you went on on your trip. Lobster fishing may have been the the only or main reason, or it may have been only one of many fishing or non-fishing activities planned for your trip.

**F11. Would you still have made the trip if you had NOT planned to go lobster fishing?**

No >> *Skip to Section G*

Yes >> *Continue Below*

**F12. Of your share of the GENERAL EXPENSES that you listed above, approximately what percentage of these would you say was due to going lobster fishing?**

%

**F13. If you listed any DIVING EXPENSES above, approximately what percentage of these would you say was due to diving for lobster?**

%

**SECTION G: LICENCING QUESTIONS**

**G1. In previous lobster fishing seasons, have you held a lobster licence type that you did not re-new for the 2006/07 season?**

- No >> *Continue to G2*  
 Yes >> What licence type was it?       Pot licence       Ring licence       Dive licence

Why did you not renew that licence type for the 2006/07 season?  
 \_\_\_\_\_

**G2. Do you think that you will purchase one or more lobster fishing licences for next season?**

- No >> Why not? \_\_\_\_\_  
 Yes >> Which one/s?       Pot licence       Ring licence       Dive licence

**SECTION H: DEMOGRAPHIC INFORMATION**

This section is designed to help us learn more about Tasmanian lobster fishers. You will not be identified with your answers and information will not be made available for commercial or marketing interests.

**H1. What is your age?**       years

**H2. What is your gender?**       M       F

**H3. Which one of the following best describes your HIGHEST level of education completed?**

- Junior (<15 years)       Trade Qualification  
 Junior High (>15 years)       Diploma  
 HSC/ Matriculation       Degree

**H4. Which one of the following best describes your current employment status?**

- Full-time employed       Student  
 Part-time employed       Unemployed  
 Casually-employed       Retired  
 Self-employed       Non-retirement pensioner

**H5. What is your approximate annual income in Australian dollars before tax?**

- Under \$20,000       \$30,000 - \$39,999       \$50,000 - \$59,999       \$70,000 - \$79,999       \$90,000 - \$100,000  
 \$20,000 - \$29,999       \$40,000 - \$49,999       \$60,000 - \$69,999       \$80,000 - \$89,999       Over \$100,000

**H6. Are you a member of a fishing club or association?**

- No       Yes      →      Which one/s? \_\_\_\_\_  
 \_\_\_\_\_

**H7. What is the postcode of your current home address?**

APPENDIX B. Questionnaire

Reminders: SECTION: ATTITUDES TO LOBSTER MANAGEMENT

I1. The following are a list of management options for the Tasmanian recreational lobster fishery. None of these options are currently being proposed; however, we would like to understand how you feel about them. Please indicate your level of agreement or

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Unsure
Higher size limit in northern waters.....	<input type="checkbox"/>					
Lower size limit in southern waters.....	<input type="checkbox"/>					
Allow pot fishers to use one extra pot.....	<input type="checkbox"/>					
A limit on the number of pots per boat.....	<input type="checkbox"/>					
Increase bag limit to 6 lobsters per day.....	<input type="checkbox"/>					
Decrease bag limit to 4 lobsters per day.....	<input type="checkbox"/>					
Possession limits for large fishing parties.....	<input type="checkbox"/>					
Limits on the number of recreationally caught lobsters that may be taken out of Tasmania.....	<input type="checkbox"/>					
Different fishing areas for recreational and commercial fishers at certain times of the year.....	<input type="checkbox"/>					

J2. What do you think is the most important issue facing the recreational lobster fishery in Tasmania?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

J3. Is there anything else you would like to share with us about the questionnaire or about the Tasmanian lobster fishery?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Private Bag 78 Hobart  
Tasmania 7001 Australia  
Telephone (03) 6265 7310  
Facsimile (03) 6226 2989  
sfrijlin@utas.edu.au



SCHOOL OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

**Dear Lobster Fisher**

Recently, you were sent a questionnaire on lobster fishing in Tasmania. However, our records suggest that we have not received one from you. While the survey is completely voluntary, we would greatly appreciate your participation. Returning a completed questionnaire will contribute to the information required to better understand lobster fishers, and therefore allow them to be better represented in Tasmania. Even if you did not do any lobster fishing over the 2006/07 season, we would still appreciate your input.

There are five great prizes to be won for those who return questionnaires. The draw date for these prizes has been extended to Monday 19 November, and winners will be notified that day.

If you have already returned your questionnaire, please disregard this letter. If you have lost or misplaced your questionnaire, and would like to be sent another one, please call or email Sven using the details above. Your assistance with this project would be very much appreciated, and we look forward to hearing from you.

Sincerely,

Elaine Stratford  
Chief Investigator  
University of Tasmania

Sven Frijlink  
Investigator  
University of Tasmania

**APPENDIX C**

**Table C1.** Chi-square test for independence to determine gender differences between licence groups

	<b>All fishers</b> ( <i>n</i> = 376)	<b>Pot fishers</b> ( <i>n</i> = 123)	<b>Dive fishers</b> ( <i>n</i> = 52)	<b>Multiple Lic. fishers</b> ( <i>n</i> = 197)
<b>Gender</b>	%	%	%	%
Male	91.1	82.1	98.1	94.9
Female	8.9	17.9	1.9	5.1

A chi-square test detected significant differences between the relative proportions of responses between the three groups:  $\chi^2 (2, n = 376) = 18.980, p = 0.000$

**Table C2.** ANOVA test for differences in mean ages of 2006/07 registered licencees

<b>All Fishers</b> ( <i>n</i> =19043)	<b>Pot Fishers</b> ( <i>n</i> =8005)	<b>Dive Fishers</b> ( <i>n</i> =2751)	<b>Multi. Lic. Fishers</b> ( <i>n</i> =8287)		
M( $\pm$ SD)	M( $\pm$ SD)	M( $\pm$ SD)	M( $\pm$ SD)	F	<i>p</i> (two-tailed)
43.13 (15.5)	46.0 (17.2) <sup>a</sup>	38.6 (13.0) <sup>b</sup>	41.8 (13.8) <sup>c</sup>	292.934	0.000***

<sup>a</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

\*\*\* Asterix denotes significance at *p* < 0.001

**Table C3.** ANOVA test for differences in mean ages of questionnaire respondents

<b>All Fishers</b> ( <i>n</i> =378)	<b>Pot Fishers</b> ( <i>n</i> =123)	<b>Dive Fishers</b> ( <i>n</i> =51)	<b>Multi. Lic. Fishers</b> ( <i>n</i> =194)		
M( $\pm$ SD)	M( $\pm$ SD)	M( $\pm$ SD)	M( $\pm$ SD)	F	<i>p</i> (two-tailed)
46.6 (13.1)	50.5 (13.9) <sup>a</sup>	44.0 (11.3) <sup>b</sup>	44.9 (12.5) <sup>b</sup>	8.591	0.000***

<sup>a</sup> Like superscripts indicate significant differences using Tukey's post-hoc test

\*\*\* Asterix denotes significance at *p* < 0.001

**Table C4.** Mann Whitney U test for differences in median income level between licence groups.

<b>All Fishers</b> ( <i>n</i> =371)	<b>Pot Fishers</b> ( <i>n</i> =123)		<b>Dive Fishers</b> ( <i>n</i> =52)		<b>Multi. Lic. Fishers</b> ( <i>n</i> =196)		<b>X<sup>2</sup></b>	<b>sig.</b>
	Median	Mean Rank	Median	Mean Rank	Median	Mean Rank		
50-60K	40-50K <sup>a</sup>	139.17	55-65K <sup>b</sup>	203.23	50-60K <sup>b</sup>	203.23	19.885	0.000***

<sup>a</sup> Different superscripts indicate significant differences using Mann-Whitney U tests: A significant difference was observed between pot fishers and dive fishers, *U* = 1725.5, *z* = -3.671, *p* = 0.000. A significant difference was also observed between pot fishers and multiple licence fishers, *U* = 7558.5, *z* = -3.791, *p* = 0.000

**Table C5.** Chi square tests for independence to compare employment status between licence group members

Employment Category	All fishers ( <i>n</i> = 373)	Pot fishers ( <i>n</i> = 121)	Dive fishers ( <i>n</i> = 52)	Multiple Lic. fishers ( <i>n</i> = 196)	<i>X</i> <sup>2</sup>	<i>p</i>
	%	%	%	%		
Full-time employed	54.7	39.7	59.6	62.8	16.674	0.000***
Part-time/casually employed	6.2	5.0	7.7	6.6	0.579	0.749
Self employed	16.3	18.2	19.2	14.3	1.226	0.542
Student	2.9	4.1	3.8	2.0	1.288	0.525
Retired/Non-retirement pensioner	17.9	31.4	9.6	11.7	22.528	0.000***
Unemployed <sup>a</sup>	1.8	1.7	0.0	2.6	1.495	0.474

\*\*\* significance observed at *p* < 0.001

<sup>a</sup> 3 cell (50%) had expected counts less than 5. Therefore, the minimum expected cell frequency assumption was violated

**Table C6.** Chi square tests for independence to compare highest education level attained between licence group members

Education Category	All fishers ( <i>n</i> = 373)	Pot fishers ( <i>n</i> = 121)	Dive fishers ( <i>n</i> = 52)	Multiple Lic. fishers ( <i>n</i> = 196)	<i>X</i> <sup>2</sup>	<i>p</i>
	%	%	%	%		
High School (not graduated)	21.1	32.5	9.6	16.9	15.810	0.000***
HCS/Marticalation	14.6	20.3	5.8	13.3	6.739	0.034*
Trade Qualification	37.3	26.0	28.8	46.7	15.601	0.000***
Diploma	11.1	11.4	13.5	10.3	0.445	0.801
Degree	15.9	9.8	42.3	12.8	31.899	0.000***

Asterisks denote significance at \* *p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001

**Table C7.** ANOVA tests for differences between licence groups in annual days spent participating in different fishing types.

	All Fishers ( <i>n</i> =379)	Pot Fishers ( <i>n</i> =126)	Dive Fishers ( <i>n</i> =52)	Multi. Lic. Fishers ( <i>n</i> =197)	F	<i>p</i> (two-tailed)
	M(±SD)	M(±SD)	M(±SD)	M(±SD)		
Inshore saltwater	13.8 (17.1)	15.2 (15.8)	9.1 (13.3)	14.4 (18.8)	2.450	0.088
Offshore saltwater	5.0 (10.3)	5.4 (10.9)	2.5 (6.8)	5.4 (10.7)	1.713	0.182
Saltwater gamefishing <sup>§</sup>	2.6 (6.6)	1.7 (4.7) <sup>b</sup>	0.85 (2.0) <sup>b</sup>	3.4 (7.4) <sup>a</sup>	9.503	0.000***
Net fishing <sup>§</sup>	4.3 (11.1)	3.6 (6.5)	1.62 (5.15)	5.41 (14.2)	5.062	0.007**
Spearfishing <sup>§</sup>	0.8 (3.9)	0.2 (1.3)	1.2 (3.2)	0.96 (3.9)	4.18	0.018*
Dive collection (for species other than lobster) <sup>§</sup>	6.4 (10.7)	1.6 (6.7) <sup>a</sup>	13.0 (10.4) <sup>b</sup>	7.7 (11.7) <sup>c</sup>	35.765	0.000***
Freshwater fishing	2.6 (8.2)	2.2 (6.4)	2.1 (6.0)	3.0 (9.6)	0.479	0.620

<sup>§</sup> Both F and *p* values are based on Welch's Test due to violation of Levene's assumption of homogeneity of variance

<sup>abc</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

\**p* < 0.05, \*\**p* < 0.01, \*\*\* *p* < 0.001

**Table C8.** ANOVA test for differences in annual days fished between licence groups based on data from the 2006/07 phone/diary survey

All Fishers (n=402)	Pot Fishers (n=131)	Dive Fishers (n=64)	Multi. Lic. Fishers (n=207)	F	p (two-tailed)
M(±SD)	M(±SD)	M(±SD)	M(±SD)		
6.50 (9.2)	7.31 (10.9) <sup>a</sup>	4.03 (5.5) <sup>b</sup>	6.76 (8.8)	2.930	0.034*

a Different superscripts indicate significant differences using Tukey's post-hoc test

The assumption of homogeneity of variance was violated. Therefore, test significance was based on the Brown-Forsythe test of equality of means

\* denotes significance at  $p < 0.05$

**Table C9.** ANOVA tests for differences in the frequency by which licence group members target engage in other types of fishing when lobster fishing.

	All Fishers (n=378)	Pot Fishers (n=126)	Dive Fishers (n=52)	Multi. Lic. Fishers (n=197)	F	p
Line Fishing	2.82 (0.97)	3.04 (0.89) <sup>b</sup>	2.15 (0.94) <sup>a</sup>	2.85 (0.95) <sup>b</sup>	16.978	0.000***
Net Fishing	1.80 (0.86)	1.78 (0.88) <sup>b</sup>	1.38 (0.69) <sup>a</sup>	1.92 (0.87) <sup>b</sup>	8.235	0.000***
Dive Collection	2.14 (1.10)	1.29 (0.66) <sup>a</sup>	3.12 (0.81) <sup>b</sup>	2.43 (1.10) <sup>c</sup>	98.926	0.000***
Spearfishing	1.26 (0.62)	1.08 (0.37) <sup>a</sup>	1.48 (0.78) <sup>b</sup>	1.31 (0.66) <sup>b</sup>	9.992	0.000***

Mean scores for all items were based on responses to the following categories; 1 = Never, 2 = Sometimes, 3 = Often, 4 = Always

\*\*\*  $p < 0.001$

Different superscripts indicate significant difference

**Table C10.** Chi square test for independence to compare importance of fishing between licence groups

	All fishers (n = 369)	Pot fishers (n = 125)	Dive fishers (n = 50)	Multiple Lic. fishers (n = 194)
	%	%	%	%
My most important outdoor activity	38.8	36.8	36.0	40.7
My second most important outdoor activity	20.6	20.8	16.0	21.6
My third most important outdoor activity	9.2	7.2	16.0	8.8
Only one of many outdoor activities that I do	31.4	35.2	32.0	28.9

A chi-square test detected a no significant differences between the relative proportions of responses between the three groups:  $X^2 (6, n = 369) = 5.10, p = 0.531$

**Table C11.** Chi square test for independence to compare importance of lobster fishing between licence groups

	<b>All fishers</b> ( <i>n</i> = 362) %	<b>Pot fishers</b> ( <i>n</i> = 124) %	<b>Dive fishers</b> ( <i>n</i> = 49) %	<b>Multiple Lic. fishers</b> ( <i>n</i> = 195) %
My most important type of fishing	18.5	16.4	24.5	18.3
My second most important type of fishing	21	27.0	28.6	15.2
Only one of many types of fishing that I do	60.5	56.5	46.9	66.5

A chi-square test detected a significant difference between the relative proportions of responses between the three groups:  $X^2(4, n = 368) = 10.72, p = 0.030$

The item "The only type of fishing that I do" was removed for analysis due to low cell counts: non-removal would violate chi-square minimum cell frequency. Counts for this item were 2,0 and 4 for pot, dive and multiple licence fishers, respectively.

**Table C12.** Chi square test for independence to compare importance of lobster fishing on 'compound' trips between licence groups

	<b>All fishers</b> ( <i>n</i> = 371) %	<b>Pot fishers</b> ( <i>n</i> = 124) %	<b>Dive fishers</b> ( <i>n</i> = 51) %	<b>Multiple Lic. fishers</b> ( <i>n</i> = 196) %
Most important	23.7	14.5	35.3	26.5
Equally Important	60.6	63.7	47.1	62.2
Less Important	12.7	17.7	9.8	10.2
Unsure	3	4.0	7.8	1.0

A chi-square test detected significant differences between the relative proportions of responses between the three groups:  $X^2(6, n = 371) = 20.647, p = 0.002$

**Table C13.** Chi square tests for independence to compare frequency of lobster fishing participation with different social among licence group members

**C13 (a) By yourself**

	<b>All fishers (<i>n</i> = 370) %</b>	<b>Pot fishers (<i>n</i> = 122) %</b>	<b>Dive fishers (<i>n</i> = 49) %</b>	<b>Multiple Lic. fishers (<i>n</i> = 195) %</b>
Always	2.5	2.5	6.1	1.5
Often	9.6	9.0	8.2	10.3
Sometimes	17.5	12.3	22.4	19.5
Never	70.5	76.2	63.3	68.7

A chi-square test detected no significant differences between the relative proportions of responses between the three groups:  $X^2(6, n = 369) = 7.619, p = 0.267$

**C13 (b) With Friends**

	<b>All fishers (<i>n</i> = 370) %</b>	<b>Pot fishers (<i>n</i> = 122) %</b>	<b>Dive fishers (<i>n</i> = 49) %</b>	<b>Multiple Lic. fishers (<i>n</i> = 195) %</b>
Always	30.6	27	26.5	33.8
Often	24.9	13.9	36.7	28.7
Sometimes	23.0	23.8	18.4	23.6
Never	21.6	35.2	18.4	13.8

A chi-square test detected significant differences between the relative proportions of responses between the three groups:  $X^2(6, n = 369) = 27.955, p = 0.000$

**C13 (c) With Family**

	<b>All fishers (<i>n</i> = 370) %</b>	<b>Pot fishers (<i>n</i> = 122) %</b>	<b>Dive fishers (<i>n</i> = 49) %</b>	<b>Multiple Lic. fishers (<i>n</i> = 195) %</b>
Always	24	33.6	16.3	20
Often	23.5	17.2	28.6	26.2
Sometimes	19.4	13.1	24.5	22.1
Never	33.1	36.1	30.6	31.8

A chi-square test detected significant differences between the relative proportions of responses between the three groups:  $X^2(6, n = 369) = 14.715, p = 0.023$

**C13 (d) With Family and Friends Together**

	<b>All fishers (<i>n</i> = 370) %</b>	<b>Pot fishers (<i>n</i> = 122) %</b>	<b>Dive fishers (<i>n</i> = 49) %</b>	<b>Multiple Lic. fishers (<i>n</i> = 195) %</b>
Always	14.2	17.2	8.2	13.8
Often	21.3	15.6	28.6	23.1
Sometimes	24.9	21.3	26.5	26.7
Never	39.6	45.9	36.7	36.4

A chi-square test detected no significant differences between the relative proportions of responses between the three groups:  $X^2(6, n = 369) = 8.189, p = 0.225$

**Table C14.** ANOVA tests for differences in importance ascribed to site selection factors between licence groups

	All Fishers (n=373)	Pot Fishers (n=125)	rank	Dive Fishers (n=50)	rank	Multi. Lic. Fishers (n=195)	rank	F	<i>p</i> (two-tailed)
	M (±SD)	M (±SD)		M (±SD)		M (±SD)			
Prevailing weather conditions at that location	4.3 (1.1)	4.4 (1.1)	1	4.2 (1.0)	1	4.2 (1.1)	1	1.244	0.290
The safety of the location for lobster fishing	3.9 (1.2)	4.2 (1.2)	2	3.7 (1.1)	2	3.9 (1.1)	2	3.351	0.036*
You are familiar with that place	3.5 (1.2)	3.7 (1.2) <sup>a</sup>	3	3.2 (1.1) <sup>b</sup>	5	3.4 (1.2) <sup>b</sup>	3	5.411	0.005**
The amount of available lobsters there	3.3 (1.2)	3.1 (1.3)	4	3.5 (1.1)	4	3.4 (1.1)	3	3.103	0.046*
Prevailing water clarity at that location <sup>§</sup>	3.1 (1.4)	3.0 (1.5) <sup>b</sup>	5	3.6 (1.0) <sup>a</sup>	3	3.0 (1.4) <sup>b</sup>	4	4.431	0.013*
Close/convenient to where you live <sup>§</sup>	3.0 (1.4)	3.0 (1.6)	5	2.9 (1.2)	7	3.0 (1.3)	4	0.049	0.952
The size of available lobsters there	2.9 (1.3)	2.8 (1.3)	6	3.1 (1.2)	6	3.0 (1.3)	4	1.023	0.361
The location is a good place to take the family <sup>§</sup>	2.8 (1.5)	3.1 (1.6) <sup>a</sup>	4	2.3 (1.3) <sup>b</sup>	9	2.7 (1.4) <sup>b</sup>	5	5.994	0.003**
The number of other lobster fishers likely to be there	2.6 (1.3)	2.4 (1.3)	8	2.7 (1.2)	8	2.7 (1.3)	5	2.424	0.090
You have access to accommodation there <sup>§</sup>	2.3 (1.5)	2.7 (1.6) <sup>a</sup>	7	1.9 (1.4) <sup>b</sup>	11	2.2 (1.5) <sup>b</sup>	6	6.061	0.003**
The facilities and amenities there <sup>§</sup>	2.2 (1.3)	2.4 (1.5) <sup>a</sup>	8	2.1 (1.2)	10	2.0 (1.1) <sup>b</sup>	7	3.341	0.038*

Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

Asterisks denote significance at \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

<sup>a</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

<sup>§</sup> Both F and  $p$  values are based on Welch's Test due to violation of Levene's assumption of homogeneity of variance

**Table C15.** ANOVA tests for differences in importance ascribed to factors constraining participation in lobster fishing between licence groups

Constraints	All Fishers (n=307)	Pot Fishers (n=98)	rank	Dive Fishers (n=43)	rank	Multi. Lic. Fishers (n=163)	rank	F	p (two-tailed)
	M (±SD)	M (±SD)	M (±SD)	M (±SD)	M (±SD)				
Weather/sea conditions	4.3 (1.1)	4.3 (1.2)	1	4.2 (0.9)	1	4.2 (1.1)	1	0.105	0.900
Other time commitments (work, family etc) <sup>§</sup>	4.1 (1.2)	3.9 (1.3)	2	4.2 (1.1)	1	4.0 (1.1)	2	0.725	0.487
Water clarity <sup>§</sup>	2.9 (1.3)	2.8 (1.4) <sup>b</sup>	3	3.4 (0.9) <sup>a</sup>	2	2.7 (1.3) <sup>b</sup>	3	9.937	0.000***
Personal health and/or fitness	2.8 (1.6)	2.8 (1.6)	3	2.6 (1.6)	4	2.5 (1.5)	5	1.180	0.309
The distance of lobster fishing areas from where I live <sup>§</sup>	2.7 (1.3)	2.7 (1.5)	4	2.4 (1.2)	5	2.7 (1.3)	3	0.887	0.415
Competing leisure activities	2.6 (1.2)	2.2 (1.2) <sup>b</sup>	7	3.0 (1.4) <sup>a</sup>	3	2.5 (1.2) <sup>b</sup>	5	6.369	0.002**
The state of fishing facilities (boat ramps, jetties etc.) <sup>§</sup>	2.6 (1.4)	2.7 (1.6)	4	2.2 (1.3)	6	2.4 (1.4)	6	2.176	0.115
The cost of going lobster fishing <sup>§</sup>	2.5 (1.2)	2.3 (1.4)	6	2.0 (1.0) <sup>b</sup>	8	2.5 (1.2) <sup>a</sup>	5	4.418	0.014*
The restrictiveness of rules and regulations <sup>§</sup>	2.5 (1.5)	2.5 (1.9) <sup>b</sup>	5	1.9 (1.3) <sup>a</sup>	9	2.6 (1.5) <sup>b</sup>	4	4.774	0.010*
Finding people to go lobster fishing with	2.3 (1.3)	2.1 (1.4)	8	2.2 (1.3)	6	2.3 (1.3)	7	0.279	0.757
The cost of lobster fishing equipment	2.1 (1.1)	1.9 (1.1)	9	1.8 (0.9)	10	2.2 (1.2)	8	3.976	0.020*
Access to a boat <sup>§</sup>	2.0 (1.4)	2.2 (1.6)	7	2.1 (1.5)	7	1.9 (1.4)	9	1.319	0.272

Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

Asterisks denote significance at \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

<sup>a</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

<sup>§</sup> Both F and p values are based on Welch's Test due to violation of Levene's assumption of homogeneity of variance

**Table C16.** Reliability analysis of motivational items within categories for pooled data from all licence groups

<b>Domains and Items</b>	<b>Mean</b>	<b>SD</b>	<b>Item-total correlation</b>	<b><math>\alpha</math> if item deleted</b>
<i>Experiencing Nature</i> ( $\alpha = 0.783$ )				
To be outdoors	3.74	1.09	0.536	0.756
To be close to the water	3.46	1.30	0.632	0.706
To experience unpolluted natural surroundings	3.67	1.31	0.632	0.706
To learn more about nature	2.83	1.35	0.562	0.745
<i>Social</i> ( $\alpha = 0.695$ )				
For family recreation	3.13	1.30	0.325	0.833*
To be with friends	3.61	1.18	0.650	0.833
To be with others who enjoy the same things you do	3.71	1.24	0.592	0.496
<i>Excitement and Adventure</i> ( $\alpha = 0.658$ )				
To experience new and different things	2.76	1.35	0.490	N/A
To experience adventure and excitement	3.19	1.35	0.490	N/A
<i>Escape and Relaxation</i> ( $\alpha = 0.767$ )				
For relaxation	3.82	1.08	0.420	0.780*
To get away from the demands of other people	3.06	1.44	0.680	0.645
To get away from the regular routine	3.53	1.28	0.643	0.670
To get away from other people	2.35	1.34	0.542	0.725
<i>Fishery Resource</i> ( $\alpha = 0.714$ )				
To obtain fish to eat	3.68	1.16	0.284	0.732*
For the experience of catching fish	3.36	1.25	0.549	0.634
To develop my fishing skills	2.73	1.33	0.585	0.616
To catch a trophy fish	1.91	1.26	0.507	0.651
For challenge or sport	2.78	1.39	0.442	0.680

Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

\*exclusion of item increases index reliability

**C17. ANOVA tests for differences in importance ascribed to lobster fishing motivations between licence groups**

Motivational Items	All Fishers (n=373)	Pot Fishers (n=125)	rank	Dive Fishers (n=50)	rank	Multi. Lic. Fishers (n=195)	rank	F	p (two-tailed)
	M (±SD)	M (±SD)		M (±SD)		M (±SD)			
Relaxation <sup>§</sup>	3.8 (1.1)	3.7 (1.2)	2	3.9 (0.9)	1	3.9 (1.0)	1	1.806	0.168
Social recreation (friends) <sup>§</sup>	3.7 (1.1)	3.5 (1.2) <sup>a</sup>	3	3.5 (1.2)	3	3.8 (1.0) <sup>a</sup>	2	3.374	0.037*
Catching lobster to eat	3.7 (1.2)	3.9 (1.2) <sup>a</sup>	1	3.2 (1.3) <sup>ab</sup>	5	3.7 (1.1) <sup>b</sup>	3	6.350	0.002**
Experiencing nature	3.4 (1.0)	3.2 (1.1) <sup>ab</sup>	5	3.7 (0.8) <sup>a</sup>	2	3.5 (0.9) <sup>b</sup>	4	6.163	0.003**
The experience of catching lobster	3.4 (1.3)	3.4 (1.3)	4	3.3 (1.4)	4	3.4 (1.2)	5	0.044	0.957
Adventure and excitement	3.2 (1.3)	2.9 (1.4) <sup>a</sup>	6	3.3 (1.3)	4	3.4 (1.3) <sup>a</sup>	5	6.619	0.001**
Social recreation (family)	3.1 (1.3)	3.2 (1.4)	5	2.9 (1.2)	7	3.2 (1.3)	6	1.210	0.299
Escapism	3.0 (1.1)	2.8 (1.2)	7	2.8 (1.1)	8	3.1 (1.1)	7	2.961	0.053
Experiencing new and different things	2.8 (1.3)	2.6 (1.4)	8	3.0 (1.3)	6	2.9 (1.4)	8	2.632	0.073
For the challenge or sport of lobster fishing	2.8 (1.4)	2.5 (1.4) <sup>ab</sup>	9	3.2 (1.4) <sup>a</sup>	5	2.9 (1.4) <sup>b</sup>	8	6.232	0.002**
Developing lobster fishing skills	2.7 (1.3)	2.8 (1.4)	7	2.5 (1.2)	9	2.8 (1.3)	9	0.774	0.462
Catching a large/trophy lobster	1.9 (1.3)	1.7 (1.2)	10	2.0 (1.3)	10	2.0 (1.3)	10	2.016	0.135

Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

Asterisks denote significance at \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

<sup>a</sup> Like superscripts indicate significant differences using Tukey's post-hoc test

<sup>§</sup> Both F and p values are based on Welch's Test due to violation of Levene's assumption of homogeneity of variance

**Table C18.** Reliability analysis of consumptive orientation items within categories for pooled data from all licence groups.

<b>Categories and Items</b>	Mean	SD	Item-total correlation	$\alpha$ if item deleted
<i>Attitudes to Catching Lobster</i> ( $\alpha = 0.783$ )				
A fishing trip can be successful even if no lobster are caught <sup>a</sup>	2.12	0.96	0.553	0.751
Im just as happy if I don't catch a lobster <sup>a</sup>	2.85	1.12	0.627	0.711
If I thought I would not catch any lobsters I would not go fishing	2.81	1.29	0.536	0.770
Im not satisfied unless I catch at least something	2.85	1.06	0.673	0.690
<i>Attitudes to Catching Numbers of Lobster</i> ( $\alpha = 0.758$ )				
The more lobster I catch the happier I am	3.01	1.07	0.611	N/A
A successful fishing trip is one in which many lobster are caught	2.85	1.12	0.611	N/A
<i>Attitudes to Catching Large lobster</i> ( $\alpha = 0.754$ )				
I would rather catch 1 or 2 big lobster than 5 smaller ones	2.97	1.12	0.520	0.746
The bigger the lobster I catch, the better the fishing trip	2.69	1.05	0.654	0.599
I like to fish for lobster where I know I may catch a very big one	2.87	1.04	0.588	0.666

Mean scores are based on levels of agreement to attitudinal statements. Attitudinal statements were coded as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

<sup>a</sup> Items are reverse coded for consistency with other items within the same domain

**Table C19.** ANOVA tests for difference in consumptive orientation between licence groups

<b>Consumptive Orientation Domains</b>	<b>All Fishers</b>	<b>Pot Fishers</b>	<b>Dive Fishers</b>	<b>Multi. Lic. Fishers</b>	F	<i>p</i> (two-tailed)
	( <i>n</i> =374)	( <i>n</i> =123)	( <i>n</i> =52)	( <i>n</i> =196)		
	M ( $\pm$ SD)	M ( $\pm$ SD)	M ( $\pm$ SD)	M ( $\pm$ SD)		
<i>Attitudes to Catching Lobster</i>	2.7 (0.9)	2.6 (0.9)	2.4 (0.8)	2.7 (0.9)	2.341	0.098
<i>Attitudes to Catching Numbers of Lobster</i>	2.9 (1.0)	2.9 (1.0)	2.6 (0.8) <sup>a</sup>	3.0 (1.0) <sup>b</sup>	3.567	0.029*
<i>Attitudes to Catching Large lobster</i>	2.8 (0.9)	2.6 (0.8) <sup>a</sup>	3.1 (0.9) <sup>b</sup>	2.9 (0.9) <sup>b</sup>	6.356	0.002**

Mean scores for all items were based on responses to the following response categories; 1 = Not at all Important, 2 = Slightly important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important

Asterisks denote significance at \*  $p < 0.05$ , \*\*  $p < 0.01$

<sup>a</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

<sup>§</sup> Index was not deemed reliable. Therefore, index item have been analysed separately

**Table C20.** Reliability analysis for centrality to lifestyle statements for pooled data between licence groups

	Mean	SD	Item-total correlation	$\alpha$ if item deleted
If I stopped lobster fishing, I would probably lose touch with a lot of my friends	2.2	1.1	0.615	0.879
If I couldn't go lobster fishing, Im not sure what I would do	2.1	1.1	0.725	0.870
Because of lobster fishing, I don't have time to spend doing other leisure activities	1.8	0.8	0.508	0.886
Most of my friends are in some way connected with lobster fishing	2.4	1.1	0.588	0.881
I consider myself to be somewhat expert at catching lobster	2.6	1.1	0.464	0.890
I find that a lot of my life is organised around lobster fishing	1.9	1.0	0.745	0.870
Others would probably say I spend too much time lobster fishing	1.8	0.9	0.669	0.786
I would rather go lobster fishing than do almost anything else	2.1	1.0	0.738	0.870
Other leisure activities don't interest me as much as lobster fishing	2.1	1.0	0.716	0.871
Lobster fishing is important when deciding where to holiday in Tasmania	2.3	1.1	0.538	0.885

The Cronbachs alpha coefficient was 0.889

Mean scores are based on levels of agreement to attitudinal statements. Attitudinal statements were coded as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

**Table C21.** ANOVA tests for differences in agreement with centrality to lifestyle statements between lobster licence groups

	<b>All Fishers</b> ( <i>n</i> =372)	<b>Pot Fishers</b> ( <i>n</i> =125)	<b>Dive Fishers</b> ( <i>n</i> =52)	<b>Multi. Lic.</b> <b>Fishers</b> ( <i>n</i> =195)	F	<i>p</i> (two-tailed)
<b>Statements</b>	M (±SD)	M (±SD)	M (±SD)	M (±SD)		
Because of lobster fishing, I don't have time to spend doing other leisure activities	1.79 (0.8)	1.79 (0.8)	1.81 (1.0)	1.79 (0.8)	0.014	0.986
Others would probably say I spend too much time lobster fishing	1.80 (0.9)	1.67 (0.8) <sup>a</sup>	1.65 (0.9)	1.92 (0.9) <sup>b</sup>	3.999	0.019*
I find that a lot of my life is organised around lobster fishing	1.92 (1.0)	1.80 (0.9)	1.79 (0.8)	2.03 (1.0)	2.782	0.063
I would rather go lobster fishing than do almost anything else	2.06 (1.0)	1.87 (1.0) <sup>a</sup>	1.85 (0.9) <sup>a</sup>	2.24 (1.0) <sup>b</sup>	6.263	0.002**
Other leisure activities don't interest me as much as lobster fishing	2.11 (1.0)	1.93 (1.0) <sup>a</sup>	1.96 (0.9)	2.26 (1.1) <sup>b</sup>	4.291	0.013*
If I couldn't go lobster fishing, Im not sure what I would do	2.12 (1.1)	2.05 (1.0)	2.00 (1.0)	2.20 (1.2)	1.089	0.338
If I stopped lobster fishing, I would probably lose touch with a lot of my friends	2.16 (1.1)	2.09 (1.1)	2.04 (1.0)	2.24 (1.2)	1.019	0.362
Lobster fishing is important when deciding where to holiday in Tasmania	2.25 (1.1)	2.09 (1.1) <sup>a</sup>	2.12 (0.9)	2.39 (1.2) <sup>b</sup>	3.067	0.048*
Most of my friends are in some way connected with lobster fishing	2.37 (1.1)	2.30 (1.1)	2.02 (1.0) <sup>a</sup>	2.51 (1.1) <sup>b</sup>	4.42	0.013*
I consider myself to be somewhat expert at catching lobster	2.59 (1.1)	2.41 (1.2)	2.78 (1.0)	2.65 (1.1)	2.701	0.058

Mean scores are based on levels of agreement to attitudinal statements. Attitudinal statements were coded as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Asterisks denote significance at \*  $p < 0.05$ , \*\*  $p < 0.01$

<sup>a</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

**Table C22. ANOVA tests for differences in agreement to proposed management options between licence groups**

	All Fishers (n=376)			Pot Fishers (n=124)			Dive Fishers (n=52)			Multi. Lic. Fishers (n=196)			F	p (two-tailed)				
	M (±SD)	A	N	D	M (±SD)	A	N	D	M (±SD)	A	N	D						
Limit the number of rec. caught lobsters that may be taken out of Tasmania	3.6 (1.2)	58.9	23.5	17.6	3.7 (1.2)	58.1	25.0	16.9	3.9 (1.2)	65.4	23.1	11.5	3.5 (1.3)	57.7	22.7	19.6	1.668	0.190
Different fishing areas for rec. and comm. fishers at certain times of the year	3.5 (1.3)	52.7	25.5	21.7	3.5 (1.3)	55.7	19.7	24.6	3.2 (1.2)	42.3	32.7	25.0	3.6 (1.2)	53.6	27.3	19.1	1.465	0.232
Possession limit for large fishing parties	3.2 (1.3)	46.0	23.1	30.9	3.3 (1.2)	48.3	27.5	24.2	3.5 (1.4)	51.0	25.5	23.5	3.1 (1.3)	43.1	19.7	37.2	2.629	0.074
A limit on the number of pots per boat	3.1 (1.3)	44.5	18.0	37.6	3.0 (1.2) <sup>b</sup>	36.9	23.0	40.2	3.9 (1.2) <sup>a</sup>	74.5	9.8	15.7	3.0 (1.3) <sup>b</sup>	41.3	16.9	41.8	12.959	0.000***
Increase bag limit to six lobsters per day	2.9 (1.3)	37.6	15.9	46.4	2.8 (1.2) <sup>a</sup>	35.5	13.2	51.2	2.2 (1.2) <sup>b</sup>	15.4	13.5	71.2	3.2 (1.4) <sup>c</sup>	45.0	18.3	36.6	13.836	0.000***
Allow pot fishers to use one extra pot	2.8 (1.4)	34.3	13.4	52.3	2.8 (1.3) <sup>b</sup>	35.5	16.5	47.9	1.9 (0.9) <sup>a</sup>	9.6	7.7	82.7	2.9 (1.4) <sup>b</sup>	40.2	12.9	46.9	20.695	0.000***
Higher size limit of lobsters in northern Tas.	2.5 (0.9)	9.4	46.5	44.0	2.5 (0.9)	8.3	47.5	44.2	2.8 (0.8)	11.8	56.9	31.4	2.5 (1.0)	9.5	43.2	47.4	1.573	0.209
Decrease bag limit to four lobsters per day	2.4 (1.3)	18.4	15.7	65.9	2.4 (1.2)	16.8	16.8	66.4	2.9 (1.4) <sup>a</sup>	34.6	17.3	48.1	2.2 (1.2) <sup>b</sup>	15.0	14.5	70.5	4.419	0.005**
Lower size limit of lobsters in southern Tas.	2.3 (1.0)	9.1	30.6	60.3	2.3 (0.8)	5.0	34.7	60.3	2.3 (1.0)	9.8	27.5	62.7	2.3 (1.0)	11.5	28.8	59.7	0.019	0.981

Mean scores for all items were based on responses to the following response categories; 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Asterisks denote significance at \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

<sup>a</sup> Different superscripts indicate significant differences using Tukey's post-hoc test

**Table C23.** Results of correlation analysis between agreement levels to proposed management changes and avidity for pooled data

Management Scenarios	<i>r</i>	<i>p</i>
Higher size limit of lobsters in northern Tasmania	-0.143	0.006**
Lower size limit of lobsters in southern Tasmania	-0.146	0.005**
Allow pot fishers to use one extra pot	-0.100	0.055
A limit on the number of pots per boat	-0.142	0.007**
Increase bag limit to six lobsters per day	0.008	0.871
Decrease bag limit to four lobsters per day	-0.192	0.000***
Possession limit for large fishing parties	-0.055	0.295
Limit the number of rec. caught lobsters that may be taken out of Tasmania	-0.090	0.083
Different fishing areas for rec. and comm. fishers at certain times of the year	0.031	0.550

**Table C24.** Results of T-tests for differences in agreement levels to proposed management scenarios between metropolitan and rural fishers

	<b>Metro</b> ( <i>n</i> =169)	<b>Rural</b> ( <i>n</i> =207)		
	M	M	t	<i>p</i> (two-tailed)
Higher size limit of lobsters in northern Tasmania	2.61	2.46	1.544	0.123
Lower size limit of lobsters in southern Tasmania	2.29	2.3	-0.129	0.898
Allow pot fishers to use one extra pot	2.65	2.83	-1.309	0.191
A limit on the number of pots per boat	3.25	2.97	2.03	0.043*
Increase bag limit to six lobsters per day	2.89	2.87	0.163	0.871
Decrease bag limit to four lobsters per day	2.38	2.32	0.457	0.648
Possession limit for large fishing parties	3.41	3.05	2.641	0.009**
Limit the number of rec. caught lobsters that may be taken out of Tasmania	3.88	3.44	3.411	0.001**
Different fishing areas for rec. and comm. fishers at certain times of the year	3.67	3.34	2.473	0.014*

Mean scores for all items were based on responses to the following response categories; 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Asterisks denote significance at \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table C25.** Issues of greatest importance facing the lobster fishery

	Pot fishers	Dive Fishers	Multi. Lic. Fishers	All Fishers
<b>Management and Compliance</b>				
General concerns about non-compliance by other fishers	14	7	17	38
Concerns about fishers keeping undersized lobsters	3	1	9	13
Concerns about fishers exceeding bag limits	1	1	2	4
Illegal selling of recreationally caught lobsters	3	1	4	8
Concerns about a lack of compliance resources	7	4	10	21
Concerns about excessive policing of recreational fishers	0	1	0	1
Concerns about fishery research	0	0	3	3
Concerns about a lack of participaiton in the decision making process	0	1	3	4
Concerns about fishery education	0	0	3	3
Rules are too complicated, restrictive or numerous	0	0	10	10
Rules are insufficiently restrictive	1	0	0	1
Concerns over resource allocation between sectors	2	0	0	2
Expressions of satisfaction with current regulaitons	5	0	13	18
<b>Sustainability</b>				
General concerns about sustainability of the lobster resource	10	10	28	48
General concerns about overfishing of lobster	6	7	5	18
General concerns about overfishing by recreational fishers	1	0	0	1
General concerns about overfishing by commercial fishers	5	4	14	23
Localised concerns about overfishing of lobster	3	0	5	8
Localised concerns about overfishing by recreational fishers	3	0	5	8
Localised concerns about overfishing by commercial fishers	5	0	12	17
General concerns about the health of the marine environment	3	1	0	4
Impacts of sea urchins	0	2	1	3
Destruction of lobster habitat	1	2	0	3
Climate change	1	1	2	4
Pollution	2	4	5	11
Damage to lobsters from improper handling	2	0	0	2
Expressions of satisfaction with current stock levels	0	0	1	1
<b>Marine Protected Areas</b>				
Expressions of support	3	1	1	5
Expressions of opposition	9	2	12	23
Unspecified	2	4	5	11
<b>Costs Associated with Lobster Fishing</b>				
General	2	0	6	8
Fuel	0	0	2	2
Licences	0	0	1	1
Boat registration and insurance	0	0	1	1
<b>Facilities and Access</b>				
Lack of boat launching facilities	0	0	1	1
Lack of access to fishing areas	0	0	1	1
<b>Conflict with recreational fishers</b>				
Divers take too many lobsters	19	0	0	19
Diving near pots	3	0	2	5
Pot pulling/raiding or stealing	4	1	6	11
General expression of concern over conflict	0	0	1	1
<b>Conflict with commercial fishers</b>				
Competition over space/access	15	4	35	54
Pot pulling/raiding or stealing	1	0	2	3
<b>Safety</b>				
Concerns about safety	6	0	9	15
<b>Total</b>	<b>142</b>	<b>59</b>	<b>237</b>	<b>438</b>