UNIVERSITY
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Improving our understanding of the motivations and attitudes of recreational fishers in NSW.

Final Report to the NSW DPI Recreational Fishing Trust,

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by ANCORS, 29th September 2016

AUSTRALIAN NATIONAL CENTRE FOR
OCEAN RESOURCES & SECURITY

The **Australian National Centre for Ocean Resources and Security (ANCORS**), University of Wollongong, is Australia's only multidisciplinary university-based centre dedicated to research, education and training on ocean law, maritime security and natural marine resource management providing policy development advice and other support services to government agencies in Australia and the wider Asia-Pacific region, as well as to regional and international organizations and ocean-related industry.

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Executive summary

This is the first detailed study of motivational profiles of recreational fishers in NSW. Those involved in recreational fishing are diverse, but are often perceived as a general group or a single entity. This reflects insufficient understanding of the psycho-social drivers of those pursuing recreational fishing. In this report we examine the attitudes, motives and beliefs of those pursuing recreational fishing in NSW.

The study employed a combination of quantitative telephone and internet surveys, and also took a qualitative approach via the use of focus groups. This approach adds to the breadth of results found in standard recreational fishing surveys of fishing activity, by asking questions about motivations and then analysing them using a unique modelling approach which groups respondents according to different clusters and intersections of motivations. The results were "ground truthed" by using post survey focus groups as a means of validating and testing the survey results. This approach provides the fullest picture to date of the motivational and attitudinal characteristics of those fishing in NSW.

We find that the use of phone surveys using randomly identified fishers resulted in accessing fishers with a significantly lower level of fishing activity compared with those fishers self-nominating to complete the internet survey. The voluntary internet survey attracted more avid fishers, who were also more likely to be younger males, Australian born, hold a fishing licence, have higher levels of education and have either high income or very low income, compared with those in the random phone survey. The phone survey results were accepted as the most representative of fishers statewide, while the internet survey represented anglers who were more avid.

A Latent Class Analysis (LCA) was used to differentiate psycho-social sub-groups among the recreational fishing population. Across both surveys the following motivational factors were determined to be important influences on overall motivational profiles:

1. Activity general (or non-catch) motivations - three primary factors were identified:
    a. Mastery: Relates to a desire to develop skills, experience a challenge, achieve personal milestones, and intellectual factors
    b. Escapism: Relates to a desire to be outside and get away from life demands, to relax
    c. Socialisation: Relates to a desire to spend time with family and friends for recreation and fun.
2. Activity specific (catch related) motivations, otherwise known as consumptive orientation – four primary factors were identified:
    a. Importance of catching something
    b. Importance of catching numbers of fish

c. Importance of catching large fish and
d. Importance of keeping fish

The relationships between these different motivational factors differed within the sample surveyed and these relationships were used to determine a number of recreational fishing 'sub-groups'. The phone survey identified four groups, while the internet respondents differed with respect to the size of each motivational sub-group, and included an additional group – outdoor enthusiasts. The focus group discussions confirmed these groupings and provided additional information about the areas of difference between the sub-groups. Details on each subgroup were as follows:

1. Social fishers (30% phone, 13% internet): prioritise the social and escapism aspects of the fishing experience. While consumptive orientation is relatively low they may be motivated to catch and retain fish based on a desire to share seafood products with friends and family. Mastery aspects of fishing are of low importance to this group.
2. Generalists (37% phone, 44% internet): have no clear motivational preferences, with elements of all three activity general (non-catch related) categories of motivation common within the sub-group. While mastery aspects of the fishing experience are moderately important to this group there is some suggestion that this may focus primarily on experimentation with equipment or fishing gear.
3. Hunter gatherers (24% phone, 6% internet): high levels of consumptive orientation compared with the other profiles. This suggested a group of fishers who are motivated primarily by catching, retaining, and eating fish. They are much more inclined to try and catch whatever they can, rather than targeting specific species, and often believe their catches come down to luck rather than skill.
4. Trophy fishers (10% phone, 15% internet): comparatively high levels of interest in 'catching large/trophy fish' and 'mastery'. This suggested a group of fishers who were motivated by the challenge and skill involved in catching large trophy fish.
5. Outdoor enthusiasts (not detected in phone, 22% internet): low levels of consumptive orientation and high levels of all three categories of activity general motivations, especially motives related to being outdoors and with nature. The key difference between this profile and trophy hunters relates to their consumptive orientation, which is closely related to their specific motivations in relation to mastery. While trophy fishers are aiming primarily to catch the biggest fish they can, outdoor enthusiasts are more interested in challenging themselves against nature or against the fish through experimentation with gear (eg using light line), location or technique.

These profiles differed significantly in relation to centrality of fishing to lifestyle (an indication of the extent to which an individual's life revolves around the activity) and fishing frequency. Trophy fishers, outdoor enthusiasts, and hunter gathers had the highest levels of centrality, with the trophy fishers and outdoor enthusiasts also fishing on a more frequent basis.

Perceived barriers and satisfaction levels around fishing varied significantly between the sub-groups. Satisfaction with recreational fishing management was relatively high across all sub-groups in the phone survey but low in the internet survey, suggesting that highly avid fishers have lower levels of satisfaction than the broader recreational fishing community. Main areas of concern related to levels of enforcement. Dissatisfaction with the cost of the fishing licence was strongest amongst generalists, social fishers and hunter gatherers. Hunter gatherers were more likely to be concerned about fishing regulations being too confusing or restrictive and the condition of fishing facilities, while trophy fishers were more likely to be concerned about fishing areas being too crowded.

Conflict between commercial and recreational fishing, and displeasure about access restrictions through MPAs were frequently mentioned in the open ended questions in both surveys. These concerns were explored in greater detail in the focus group discussions. While no clear trends were detected within fisher sub-groups, these discussions highlighted the influential nature of the 'mastery' motivational category in attitudes towards fisheries and marine conservation management. In particular those fishers who prioritised mastery aspects of the fishing experience (primarily outdoor enthusiasts, trophy hunters and, to a lesser extent, hunter gatherers) were more likely to be concerned by the forgone opportunities associated with competing uses –such as commercial fishing activities or area closures through MPAs. Fishers who did not prioritise mastery aspects of fishing (primarily social and generalist fishers) were often generally supportive of MPAs as a concept but were more likely to feel confused or unsure about their regulations or purpose and were highly mistrustful of the process around MPA declaration. Similarly these fishers tended to think of commercial fishing as a generically destructive practice, often calling on examples of international overfishing or industrial scale fishing (such as the 'supertrawler') to demonstrate the damage associated with commercial fishing.

These results have implication for current and future management and educational approaches and provide insight into the different ways in which different sub groups of fishers may respond. Further research is required to investigate the link between attitudes and motivations in greater depth, however, the results of this project suggest the following;

- Fishers with higher consumptive orientation (eg hunter gatherers) are more likely to be concerned with restriction on catch and effort, including access and use restrictions through

availability of infrastructure. The motivational profile of this group suggests they are most likely to be 'tempted' by non-compliance given high consumptive orientation. Efforts to build voluntary compliance with fishing regulations should focus on this group.

- Fishers with higher mastery motivations (including hunter gatherers, outdoor-enthusiasts and trophy fishers) are most sensitive to over-crowding concerns and perceived forgone opportunities associated with loss of access (eg through MPAs) or competition with other users (eg commercial fishers). While these are the smallest sub-groups they are also the most avid, most likely responsible for the highest catch rates and have the greatest level of involvement in and knowledge of fishing related management issues.
- Fishers with lower avidity and lower levels of mastery motivations (ie social and generalist fishers) are more likely to have lower levels of knowledge about fisheries management and associated regulations, and are more likely to be concerned by the costs associated with fishing licences. Declines in fishing participation are likely generated primarily from this group of fishers and may be, in part, a response to the increasing level of regulation and costs associated with fishing. These groups require active and targeted education campaigns around all aspects of fisheries management, building on key escapism and socialisation themes.
- Efforts to recruit and retain recreational fishers need to address impediments to female participation, drawing on insights from other traditionally male dominated sports which have campaigned to attract women. Additional strategies which appeal directly to the individual sub-groups would also assist in attracting a range of new entrants to the sport.

1. Introduction and project background

Recreational fishing is a popular leisure activity. An estimated 5 million adults participate in recreational fishing in Australia each year, which generates considerable economic value through licence fees, retail activity, and hospitality (McIlgorm & Pepperell, 2013). Recreational fishing can benefit individual well-being via relaxation, stress reduction, contemplation, and increases in physical activity since it can be accompanied by other outdoor activities such as bushwalking (RFAC, 2011). Recreational fishing is also increasingly relevant from an environmental perspective, since some fishing practices can have substantial adverse ecological effects (Cooke & Cowx, 2004; Lewin, Arlinghaus & Mehner, 2006). Policy makers and regulators are thus increasingly focused on promoting safe, satisfying, and environmentally sustainable fishing behaviours (Anderson et al., 2007). This requires a comprehensive understanding of the motivations underlying recreational fishing, which are complex and may vary substantially between individuals. Despite this, recreational fishers are often envisaged and managed as one generic stakeholder group.

The project proposed to address the following research questions:

1. Who are recreational fishers in NSW and what characteristics (including motivations, values and beliefs) make up the various fishing 'sub-groups' or segments that exist within the NSW RF community?
2. What techniques and methods do each of these sub-groups use to access information and learning about RF and why?
3. What are the attitudes of each segment to selected regulatory restrictions and codes of practice and why do they have these attitudes? (Source: Project application)

This report provides new insights into the nature of recreational fishing motivations and the relationship between these motivations and attitudes towards fishing. Using a person-centred approach, we aimed to identify distinct profiles of recreational fishers on the basis of multiple motivation domains. We then investigated whether the motivational profiles differed in relation to fishing behaviours and centrality-to-lifestyle. Finally we used focus group discussions to ground truth the survey results and investigate if and how attitudes towards management of recreational fishing differed according to motivational profiles.

Much is assumed about recreational fishers, but this project seeks to determine "*Who are recreational fishers and what makes them tick?"* Answering these questions is essential to developing a better understanding of some of the key background issues currently facing the recreational fishing community, including management of the sector. These issues include:

- A decline in fishing participation: understanding what motivates fishers to take up fishing (or to stop fishing) is crucial to arresting this decline;
- Conflict with other user groups and amongst recreational fishers: understanding the values, beliefs and attitudes that lie behind areas of conflict and division within the recreational fishing community on particular issues can assist in seeking solutions and areas of compromise and common ground. It will also assist recreational fishing representatives to better represent the diversity of opinions on a wide range of issues in the fishing community;
- Regulatory impacts: Improved understanding of differences within the recreational fishing community may also assist in better identifying the social and economic impacts of management changes and inform questions such as: What sub-groups of the recreational fishing population would be most affected by changes to or the introduction of particular fishing or marine park regulations and how can these impacts be most effectively mitigated?; and
- Social licence: In recent debates on (for example) marine parks, recreational fishers have often been portrayed in a negative light in terms of their level of environmental and ethical consciousness. Understanding the attitudes of different sub groups of recreational fishing will not only shine light on those fishers who adhere to good fishing practices (thereby winning social licence to fish within the general community) but will also enable targeted education and enforcement efforts to assist in bringing about behavioural change where it is necessary in order to address negative community perceptions.

In order to analyse these issues we need to examine the psycho-social profiles of the fishing community as seen in loose sub-groups – not based solely on their fishing preferences, age or socio-economics – but also by identifiable 'clusters' of motivations. It is these drivers that will reveal why fishers are reacting and behaving in certain ways.

The report initially examines the literature and past research that is relevant to the NSW situation. The research uses several survey methods to gain information on recreational fisher motivations. These results are then analysed into motivational groupings within the recreational fishing population. The groups identified are then cross checked by utilising focus groups to gain opinions from fishers. Finally the report discusses the implications of the research for recreational fishing and its management in NSW.

2. Literature review

Human dimensions researchers and fisheries managers have long recognised the value of understanding the heterogeneity that exists amongst recreational fishers (Hunt et al., 2013). Unlike many other recreational pursuits, which often see participation linked to clear segmentation of the community according to socio-demographic factors such as age, gender, race and socioeconomic status, recreational fishing has widespread appeal across the broad spectrum of society (Floyd et al., 2006). This makes management challenging in that it is difficult to conceive of, or cater for, a 'typical fisher' (Kyle et al., 2007). As noted, recognising the differences within the recreational fishing community can assist in addressing management problems, developing communication strategies and attracting new entrants (Hunt et al., 2013). Attempts to categorize fishers into sub groups began in the 1970s when human dimensions researchers first proposed a specialisation index for recreational fishers (Salz et al., 2001). This index proposed that fishers developed along a spectrum from novice to highly specialised as they became more experienced at fishing. A large body of research has since refined, expanded or replaced this approach. The main concepts that have been used in further developing approaches to understanding heterogeneity within the recreational fish population include:

- Motivation to fish
- Consumptive orientation (a subset of motivation)
- Commitment/avidity
- Centrality to lifestyle

2.1 Motivation to fish

Individuals engage in recreational fishing for many reasons, including catching and eating fish, catching large (or trophy) fish, challenge and competition, learning new skills, relaxation, and being with nature (Anderson et al., 2007; Arlinghaus, 2006; Finn & Loomis, 2001). These diverse motivations are generally grouped into two broad categories: (1) Activity specific (or catch related) motivation, and (2) Activity general (or non-catch related) motivation (Arlinghaus et al., 2006).

2.1.1 Activity general motivations

Individuals can also be motivated to engage in recreational fishing for general (or non-catch) reasons including relaxation, escaping work and life demands, being with nature, learning new skills, and socialisation (Anderson et al., 2007; Arlinghaus et al., 2006; Hills et al., 2000; Hunt & Ditton, 2001; Kuehn et al., 2013). There is some evidence that many recreational fishers place a greater value on these activity general motivational factors compared with catch-related aspects (e.g., Schramm &

Gerard, 2004; Aas & Kaltenborn, 1995). Recreational experience preference (REP) scales are often used to assess activity general motivation across many leisure activities, including recreational fishing. Such research has identified broad domains of activity general motivation. Beard and Ragheb (1983), for instance, identified four activity general motivation domains across a mix of leisure activities: (1) Intellectual factors, whereby an individual is motivated by the mental stimulation and discovery of the activity; (2) Social factors, whereby an individual is motivated by social interactions arising from the activity; (3) Competence/mastery – an individual is motivated by the challenge of the activity and the opportunity for skill development; and, (4) Stimulus avoidance, where an individual pursues an activity to escape work and/or family demands. Similar activity general domains have been identified in subsequent studies (Chen et al., 2013; Dillard & Bates, 2011; Hills et al., 2000; While et al., 2008). For example, White et al. (2008) found four main motivation domains in outdoor recreational activities (achievement, enjoyment of nature, escapism, and socialisation), with Dillard and Bates (2011) reporting four motivational domains (escape, personal mastery, enhancing relationships, and winning). Some studies have identified similar domains in samples of recreational fishers. Hunt and Ditton (2001) identified four distinct activity general motivation domains: escaping individual stress; being in a natural environment; interacting with fish; and, achievement. Beardmore et al (2011) categorised survey respondents into five sub groups based on their motivational preferences: experience nature, catch trophy fish, spend time with friends and family, meal sharing and challenge. Similarly, Kuehn et al. (2013) examined a sample of recreational fishers and found multiple domains of activity general motivations encompassing nature appreciation, affiliation, achievement, and escape.

While non-catch motivations for fishing have generally been found to be the primary motivations of most fishers in a range of surveys, this finding has not translated into support for management approaches which allow fishing but remove the option of fulfilling catch-related motivations (eg through catch and release only areas) (Beardmore et al., 2011, Arlinghaus, 2006b, Connelly et al., 2013). In a study of trip specific motivations, Beardmore et al (2011) concluded that while fishers may place higher value on non-catch motivations in general, they often have more catch-related motives on individual fishing trips or specific fishing experiences. Therefore consideration of both catch and non-catch related motivations are important to consider. Catch-related motivations are often referred to in the literature as ‘consumptive orientation’.

2.1.2 Activity specific motivations (consumptive orientation)

Activity specific motivation reflects the value individuals place on pursuing, catching, and retaining fish, and is often referred to as consumptive orientation (Anderson et al., 2007). Previous research has typically examined consumptive orientation in relation to four domains, which reflect the

importance of: (1) catching 'something'; (2) catching large numbers of fish; (3) catching large sized fish; and (4) releasing caught fish. Levels of consumptive orientation have been found to vary considerably between recreational fishers (e.g., Kyle et al., 2007), and are linked with outcomes such as satisfaction with fishing experiences (Arlinghaus, 2006) and levels of fishing avidity or commitment (Kyle et al., 2007; Sutton & Ditton, 2001).

Understanding consumptive orientation is important because different sub-groups of the angling community are likely to have different levels of consumptive orientation and are therefore likely to have varying levels of impact on the resource (Fenichel et al., 2013). This aspect of the fishing experience has often been neglected in the literature in favour of more general non-catch related motivations which are often primary motivators. Consumptive orientation is difficult to measure because catch-related motivations are likely to differ significantly from trip to trip according to species targeted, locations fished and the other people involved in the fishing trip (Beardmore et al., 2011, Anderson et al., 2007).

As noted, non-catch related motives have often been found in surveys to rank higher in importance to recreational fishers, however, a number of studies have indicated that catch related aspects of fishing may still be crucial components of the fishing experience and are often one of the primary determinants of levels of satisfaction with a fishing trip (Arlinghaus, 2006a). For example, work by Arlinghaus (2006) determined that having the possibility or opportunity to catch a fish is likely to be a necessary component of almost every angling trip. In addition Beardmore et al (2011) found that angler motivations were influenced by the biological characteristics of the target species, with inter-relationships between catch and non-catch motivations. For example, different species were targeted primarily by different groups, with abundant easy-to-catch species targeted and retained by social and nature-oriented anglers, while larger, harder to catch species were targeted by trophy and challenge-oriented fishers. Therefore specific species can fulfil very specific expectations and recreational opportunities for anglers (Beardmore et al., 2011).

2.2 Commitment/avidity

The level of commitment to fishing has been measured in a range of ways in previous studies, including frequency of fishing (avidity), levels of finances and time invested in fishing and 'willingness to substitute' – or the interchangeability of recreational experiences with other similar activities (Ditton and Sutton, 2004). Commitment was one of the key tools used by researchers to develop and refine a 'specialisation index' with initial studies suggesting that commitment could serve as a surrogate for specialisation levels (ie more committed or avid fishers are more likely to be highly specialised) (Hawkins et al., 2009). This has been supported by research which explored the role of

commitment in specialisation indices. These studies found that highly specialised fishers were more likely to have considerable money and time investments in fishing, for example they may own a boat and/or significant amounts of fishing equipment (Salz et al., 2001, Schroeder et al., 2006). In addition these studies determined that fishing plays a large role in the life of a highly specialised fisher – who may belong to a fishing club, go fishing very frequently, have friendships or relationships with other fishers or be active in internet fishing forums or chat rooms (Schroeder et al., 2006, Salz et al., 2001). The specialisation index did not rely entirely on measures of commitment however, with consideration also given to orientation (extent to which the person identifies themselves as a fisher), experience (level of experience and expertise in fishing) and relationships (extent to which relationships and friendships are built around fishing) (Hawkins et al., 2009). Many of these measures of commitment are also considered through the 'centrality to lifestyle' scale.

2.3 Centrality to lifestyle

The centrality to lifestyle scale is a nine question scale that measures the extent to which fishing is central to a person's lifestyle. It was adapted by Sutton (2003) from a scale developed for bird watching by Kim et al (1997). It includes questions that build on the four factors considered in the specialisation index, including the amount of time spent fishing, the extent to which social connections and relationships centre on fishing, levels of expertise in fishing and extent of identification with fishing as a primary focus in one's life.

The centrality to lifestyle scale has been used in a number of studies to understand the differential ways in which the recreational fishing community responds to management actions. For example, Li et al (2010) found that high centrality fishers in Central Queensland were more likely to be receptive to science communication and more interested in engaging in management processes. In addition, Beardmore et al (2011) found a link between the angler groups their study identified and centrality to lifestyle scores - for example nature oriented and meal sharing sub-groups generally had lower commitment to fishing and lower centrality to lifestyle scores.

2.4 A new 'person centred' approach to understanding fishers

Existing research has demonstrated that an array of factors underlie recreational fishing behaviour, including diverse activity specific and activity general motivations. Most studies, however, have used variable-based approaches to examine motivational domains; this is an important limitation because such approaches overlook potential inter-individual differences in the nature of fishing motivations. That is, recreational fishers are not a homogeneous group, but rather vary considerably in relation to the types and levels of their fishing motivations. These individual differences could lead to distinct motivational profiles reflecting unique combinations of different activity specific and activity general

motivation domains. Person-centred approaches that identify distinct profiles based on multiple motivation domains have the potential to provide new insights into the nature of recreational fishing motivation and may inform tailored approaches to engage to promote safe, enjoyable, and sustainable fishing practices (Anderson et al., 2007). This is the approach that was adopted for this study and is the first known example of employing this method in relation to recreational fishers.

3. Methods

The research utilised a combination of methods incorporating both qualitative and quantitative techniques. These included:

1. telephone and internet surveys of recreational fishers;
2. modelling the identified motivational groups; and
3. focus group interviews with sub groups of recreational fishers.

3.1 Telephone and internet surveys of NSW recreational fishers

The majority of recreational fishers in NSW require a recreational fishing licence to fish in NSW. Exemptions exist for children under the age of 18, Aboriginal people, concession holders and pensioners and adults assisting their children to fish. Licences are issued for three days though to three years. The motivation survey aimed to obtain a sample of the entire NSW fishing population, and in order to do so adopted two main approaches:

A **telephone** survey method was used to contact:

1) Non- licenced anglers: A sample of 600 recreational fishers not requiring a licence (eg. concession holders, pensioners) had been previously identified in a UoW State-wide expenditure project (McIlgorm and Pepperell, 2013). This was used to obtain responses from 300 non-licenced anglers.
2) Holders of a recreational fishing licence: A sub-sample of licence holders in the Recreational Fishing Licence database was surveyed to obtain responses from 300 licenced anglers. These were stratified in proportion to the actual number of 3 day, monthly, 1 year and 3 year licence holders in the licensed population.

An **internet** survey method was used to supplement the telephone survey primarily amongst licensed anglers in an attempt to maximise response rates, particularly from younger anglers who may be more difficult to reach through a phone survey. The respondents were obtained through placing a short article on the project in the DPI recreational fishing News Cast newsletter which is distributed to those on the recreational fishing licence data base. This meant those reading the article had the opportunity to log on to the link given and to complete the internet- based survey. We hoped for a similar number of respondents to the phone survey, (600) and actually exceeded this.

Both of the telephone surveys, and the internet survey, used the same survey questions, although the phone survey was modified slightly to minimise the time burden on participants. The results from the two different survey sampling methods were compared to investigate how internet based

approaches compared with traditional phone survey approaches. This was designed to provide insights into the most effective way of obtaining a sample of the recreational fishing community appropriate to the research objectives. The two methods also tested whether one method was more effective than the other in reaching a broad representative cross section of the fishing community.

Both phone and internet surveys provide a number of advantages and disadvantages. Phone surveys provide good geographical coverage, personal interaction and high quality data. Potential disadvantages, however include interviewer bias and possible social desirability bias. Social desirability bias occurs when individuals provide different responses in the presence of an interviewer than those they would normally give, so as to appear in a favourable light (Ethier et al., 2000).

Although internet surveys provide a number of strengths such as lower costs, increased willingness to participate and increased speed, in terms of distribution and data collection, there are also a number of potential drawbacks, mainly in relation to the representativeness of the sample. It is questionable whether internet surveys do in fact represent the entire population. Relying on such methods as those which require initiative from respondents, will likely lead to selective samples, raising concerns about non-responsive bias (Mohadjer et al. 1994). Therefore, internet samples may possibly be regarded as representative of population subgroups only. An additional problem presents itself in the form of Internet access, which may be distorted by age, education and gender. This effect is unknown.

In certain cases, however internet surveys may have lower social desirability bias than telephone surveys. That is not to say that certain other biases may not remain an issue. One such particular bias is avidity bias. Those with a greater interest in the survey topic are more likely to respond. Thus, people interested in the topic are more likely to participate than people without interest (Ethier et al., 2000). This kind of bias is especially likely to appear in internet surveys.

As well as exploring the different responses to survey methods, the questionnaires aimed to explore the different social factors at play within the recreational fishing community through different question areas. These are outlined in further detail below. A copy of the questionnaire is available in Appendix 1.

3.1.1 Demographics

The survey collected information on a range of demographic characteristics that could influence profile membership. These covariates included age, sex, marital status, education level, and country of birth.

3.1.2 Fishing practices

Individuals were asked to indicate the number of days they had engaged in recreational fishing over the past year in (1) saltwater locations; and (2) freshwater locations. Responses to these questions were combined to provide an overall indication of annual fishing frequency. In addition respondents were asked about their barriers to fishing (what stops them fishing) and levels of satisfaction with fishing.

3.1.3 Fisher motivations

Guided by the literature the survey questionnaires explored both activity general and activity specific (consumptive orientation) motivational categories. For **activity general motivations** we utilised 13 items from a measure developed by Fedler and Ditton (1994). This scale has been widely used to assess fishing motivation in previous research (e.g., Schramm & Gerard, 2004; Wilde et al., 1998). The items in this scale ask participants to rate the importance of different non-catch aspects of recreational fishing (e.g., "for relaxation", "to develop my skills"," and "to experience new and different things"). For **catch-related motivation** we used a 16-item consumptive orientation scale initially developed by Graefe (1980), and refined in subsequent research (e.g., Anderson et al., 2007; Fisher et al., 1997). Previous research (e.g., Anderson et al.. 2007) has indicated that the 16-items load onto four distinct factors: (1) Attitudes towards catching something (e.g., "A fishing trip can be successful even if no fish are caught"); (2) Attitudes towards catching numbers of fish (e.g., "A successful fishing trip is one in which many fish are caught"); (3) Attitudes towards catching large fish (e.g., " The bigger the fish I catch, the better the fishing trip"); and (4) Attitudes towards retaining fish (e.g., "I usually eat the fish I catch"). All items were scored on a 5-point likert scale from strongly disagree to strongly agree.

3.1.4 Centrality-to-lifestyle.

The nine-item centrality scale originally developed by Kim et al. (1997) and adapted specifically to recreational fishers by Sutton (2003) was used in this study. This scale assesses the extent to which fishing is a core feature of an individual's lifestyle (e.g., "If I stopped fishing, I would probably lose touch with a lot of my friends" and "I find that a lot of my life is organized around fishing"). Each item was assessed on a 5-point likert scale from strongly disagree to strongly agree. Consistent with existing research (e.g., Sutton , 2003; Li et al., 2010), scores on these items were summed and averaged to provide an indication of level of centrality (Cronbach α = .87).

3.2 Modelling the motivational profiles of NSW fishers

Latent profile analysis (LPA) was performed with software package M*plus* to identify distinct sub groups of recreational fishers on the basis of their scores on the activity general related and activity specific motivation domains. This approach involved testing a model with one latent profile, and specifying one additional profile thereafter until the optimal number of latent profiles was identified. According to existing recommendations, statistical and theoretical considerations guided the selection of the final model (Bauer & Curran, 2003; Jung & Wickrama, 2008). Indicators of statistical fit - Akaike's Information Criteria (AIC), Bayesian Information Criteria (BIC), and sample-size adjusted BIC (lower values indicate an improved fit) (Nylund et al., 2007) – were used to compare sequential models. Lower relative values for these indices indicate a better fitting model. Bootstrap likelihood ratio tests (BLRT) were also used to provide a statistical comparison of model fit between a model with k profiles and a model with k – 1 profiles.

Classification accuracy (i.e., entropy levels) was also inspected to determine the extent of separation between profiles. Entropy levels lower than .8 need to be interpreted with caution as they may reflect a lack of separation between two or more profiles (Celeux & Soromenho, 1996). The characteristics of the profiles were also inspected to ensure they provided a meaningful and parsimonious solution. This is important because reliance on statistical criteria alone can overestimate the number of profiles, with some identified profiles merely reflecting subtle variations on a theme rather than having distinct characteristics (Bauer & Curran, 2003).

3.3 Focus group interviews.

Recruitment of participants for focus groups was linked to the internet and telephone survey. The final question in this survey asked if respondents would be interested in participating further in the research through involvement in a focus group discussion. The resulting list was classified according to their motivation profile and used to recruit participants in the subsequent focus groups. These groups aimed to include participants from across all the identified motivational sub-groups.

Prior to commencement of each focus group the Project objectives were explained and a detailed consent form provided to each participant to complete. All participants were provided the opportunity to ask questions about the Project. Focus group discussions centred firstly on exploring the survey results in order to groundtruth the results and provide depth to these findings. The discussion then went on to explore participants' attitudes towards a number of fisheries management approaches. All focus groups were between 1.5 and 2hrs long and were audio and video recorded. Audio recordings were subsequently transcribed verbatim and the results analysed

using Nvivio 10 qualitative research software. This involved coding focus group discussions into key themes.

4. Results

4.1 Telephone and internet surveys of NSW recreational fishers

The telephone survey was used to contact both non-licenced anglers (e.g. concession holders, pensioners, though those under 18 years of age were excluded) as well as licence holders. The sample of 600 non-licenced angler households was previously identified in the UoW State wide expenditure project, precluding the need for a screening of the total NSW population in order to identify such anglers. Of this group, 300 individuals were contacted which resulted in 155 responses, a response rate of 51.7%. A subsample of licence holders in the Recreational Fishing Licence database was also surveyed by telephone. This yielded 468 responses of 615 fish contacted, a response rate of 76%.

An internet survey was used to supplement the telephone survey amongst both licensed and unlicensed fishers. Both the phone and internet surveys used the same survey questions. However the internet survey yielded a higher number of responses, with 741 responses from licence holders and 72 responses from unlicensed fishers (Total 831).

As expected based on the sample selection methods, the proportion of phone respondents who are unlicensed was larger than that of the internet sample. This is due to the internet sample being gathered by sending out an article requesting volunteers in the DPI's News Cast. This is emailed to recreational fishing licence holders explaining the low returns from non licence holders (8.7%).

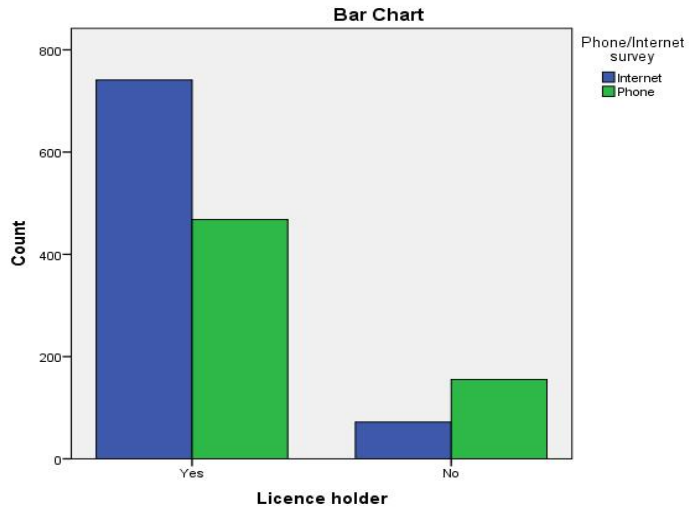

Figure 1: *Proportion of licence and non-licence holders, by survey method (Source: Phone and Internet surveys)*

The responses can subsequently be categorised into four separate groups; internet licence holders, internet non-licence holders, phone licence holders and phone non-licence holders. The number of

responses per group as well as the overall percentage of responses each category represents is detailed in Figure 1 and Table 1.

Table 1: *Proportion of group responses from phone and internet surveys by licence and non-licence holders (Source: Phone and Internet surveys)*

Subgroup

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Internet, licence holder	741	51.6	51.6	51.6
	Internet, non-licence holder	72	5.0	5.0	56.6
	Phone, licence holder	468	32.6	32.6	89.2
	Phone, non-licence holder	155	10.8	10.8	100.0
	Total	1436	100.0	100.0	

Due to the differing nature of the two survey methods and the issues that present themselves with each, it was necessary to test whether survey respondents differed significantly based on the survey method used. To do so, an analysis of variance (ANOVA) in measures such as fishing effort and demographics (e.g. age, gender, education, income) was performed. The outcome of any analysis on variance between the survey modes should allow for improved interpretation of the results of further analysis of the data contained therein.

4.1.1 Response rate

The internet survey provided a higher number of responses than the phone survey, 813 versus 623 respondents, providing a total sample size of 1,436. Table 2 shows the response numbers per survey method.

Table 2: *Response numbers by survey method (Source: Phone and Internet surveys)*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Internet	813	56.6	56.6	56.6
	Phone	623	43.4	43.4	100.0
	Total	1436	100.0	100.0	

4.1.2 Fishing effort

The results of the two survey methods were used to produce an estimate of total activity of licence holders as well as of non-licence holders. One of the main measures of recreational fishing activity and motivation/dedication is the number of days per annum spent fishing. Such a measure, alongside those such as sociodemographic characteristics provides a basis upon which to group fishers, allowing for a better understanding of varying behaviours. Both internet and phone survey respondents were asked to detail the number of days they had spent fishing in both saltwater and freshwater over the course of the previous 12 months.

The results indicate that in general those who completed the internet survey tended to belong to those groups of fishers who spent a greater number of days fishing in the time period, in short the internet sample contained a high proportion of avid fishers and as such is likely to contain avidity bias. The percentage frequencies of total days fished by survey respondents in both saltwater and freshwater are shown in Figure 2 and Figure 3.

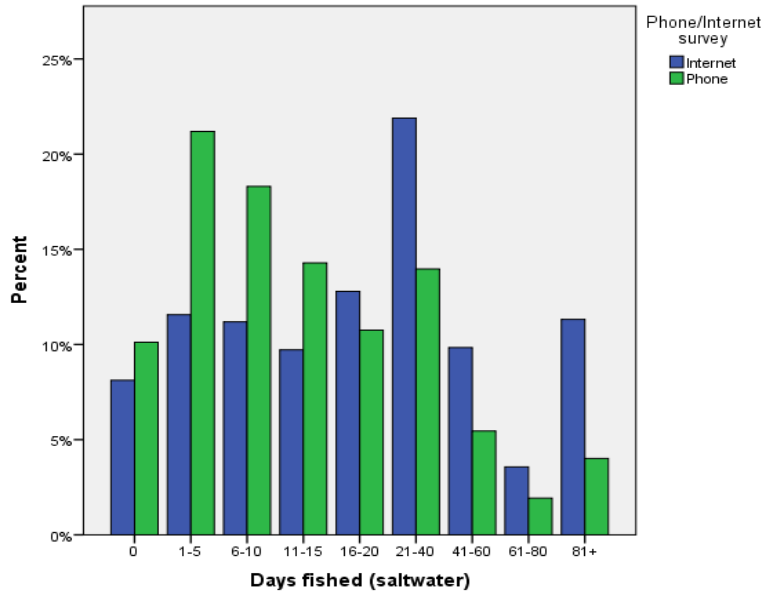

Figure 2: *The percentage frequency of total days fished in saltwater in NSW by survey respondents in the past 12 months (Source: Phone and Internet surveys)*

The majority of respondents from the internet survey (21.9%) spent between 21 and 40 days fishing in saltwater in the previous 12 months. A large number of internet respondents (11.3%) fished more than 81 days in the same period. In relation to those respondents surveyed over the phone, the majority (21.2%) spent between 1 and 5 days saltwater fishing in the previous 12 months.

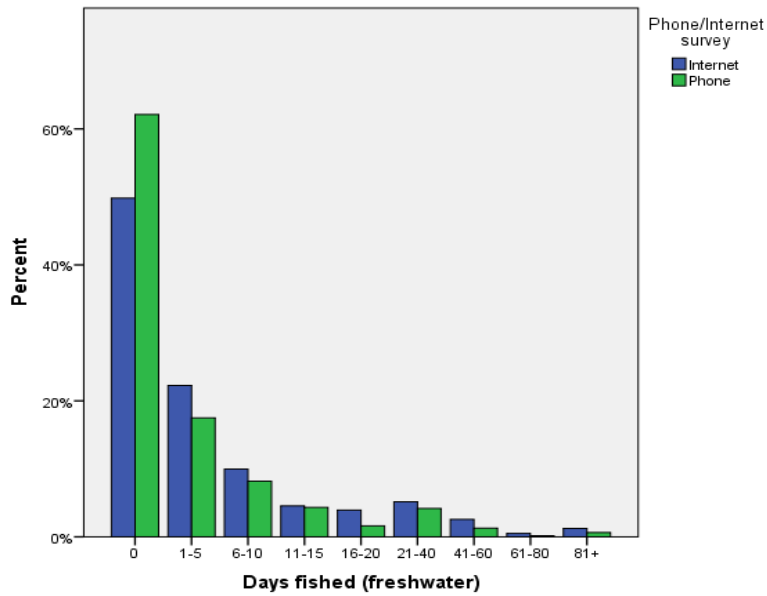

Figure 3: *The percentage frequency of total days fished in freshwater in NSW by survey respondents in the past 12 months (Source: Phone and Internet surveys)*

Half of the respondents from the internet survey (49.8%) did not spend any time fishing in freshwater in the previous 12 months. This trend was also reflected in the survey responses obtained over the phone, where 62.1% did not spend any time freshwater fishing in the same period. These results suggest that there is indeed an issue of representativeness for the internet sample, with respondents displaying more interest in freshwater fishing than those belonging to the phone sample.

A one-way analysis of variance (ANOVA) was used to determine whether there were any significant differences between the means of the two groups, that is to say whether the average number of days spent fishing differed between phone and internet respondents, indicating differences between the fishing habits and characteristics of the samples that may lie outside the scope of general sample diversity, thus indicating an issue in terms of representativeness.

Table 3 provides some useful descriptive statistics, including the mean, standard deviation and 95% confidence intervals for the dependent variable (Number of days fished in saltwater) for each separate group (Phone and Internet), as well as when both groups are combined (Total).

Table 3: *Average number of days spent fishing in saltwater over previous 12 months, by survey method (Source: Phone and Internet surveys)*

Descriptives

In NSW over the past 12 months, approximately how many days have you fished in saltwater?

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Internet	813	36.33	49.360	1.731	32.93	39.73	0	365
Phone	623	20.01	29.483	1.181	17.69	22.33	0	300
Total	1436	29.25	42.672	1.126	27.04	31.46	0	365

Table 4 shows the output of the first ANOVA analysis. There was a statistically significant difference between the two groups in terms of the number of days spent fishing in saltwater as determined by one-way ANOVA (F(1,1434) = 53.463, p = .000).

Table 4: *ANOVA results for comparison of average number of days spent saltwater fishing by each survey group (Source: Phone and Internet surveys)*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	93916.037	1	93916.037	53.463	.000
Within Groups	2519051.202	1434	1756.661		
Total	2612967.239	1435			

Table 5 provides the mean, standard deviation and 95% confidence intervals for the dependent variable (Number of days fished in freshwater) for each separate group (Phone and Internet), as well as when both groups are combined (Total).

Table 5: *Average number of days spent fishing in freshwater over previous 12 months, by survey method (Source: Phone and Internet surveys)*

Descriptives

In NSW over the past 12 months, approximately how many days have you fished in freshwater?

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Internet	813	8.18	23.848	.836	6.54	9.83	0	365
Phone	622	4.87	15.812	.634	3.63	6.12	0	300
Total	1435	6.75	20.809	.549	5.67	7.83	0	365

Table 6 shows the output of the second ANOVA analysis. There was a statistically significant difference between groups in terms of the number of days spent fishing in saltwater as determined by one-way ANOVA (F(1,1433) = 83.976, p = .003).

Table 6: *ANOVA results for comparison of average number of days spent freshwater fishing by each survey group (Source: Phone and Internet surveys)*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3865.277	1	3865.277	8.976	.003
Within Groups	617071.403	1433	430.615		
Total	620936.680	1434			

4.1.3 Demographics

Survey respondents were asked for information regarding age, gender, income, education levels etc. Alongside fishing effort, an analysis of such is required to test for differences between the two groups of respondents.

Table 7 shows the output of a one-way ANOVA analysis, testing whether there is a significant difference between the two groups in terms of the average age of the respondents. The results indicate that there was a statistically significant difference between the two means (F(1,1426) = 36.532, p = .000).

Table 7: *ANOVA results for comparison of average age of each survey group (Source: Phone and Internet surveys)*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8603.865	1	8603.865	36.532	.000
Within Groups	335849.415	1426	235.519		
Total	344453.279	1427			

The average age of fishers in each group is shown in Table 8. The internet respondents were, with a mean age of 46 years old, on average younger than those surveyed by phone, who displayed an average age of 51 years. This difference may somewhat be accounted for by more limited access to the Internet among older generations.

Table 8: *Average age of fishers by survey method (Source: Phone and Internet surveys)*

Phone/Internet survey	Mean	N	Std. Deviation
Internet	45.7732	807	14.21474
Phone	50.7246	621	16.70377
Total	47.9265	1428	15.53650

The other socio-demographic variables were analysed using cross tabulations of each of the variables and whether respondents belonged to the phone or internet survey group. For each pair of columns, the column proportions were also compared using a z test. If a pair of values was significantly different, the values were assigned different subscript letters. All values were tested at the 5% significance level.

Table 9 shows the results of the aforementioned column proportion test for the gender variable, the results indicate that the proportion of males and females responding to each of the surveys is statistically different at the 5% significance level. The proportion of male respondents for the internet survey was higher than that of those for the phone survey while the proportion of female respondents was higher in the phone survey than that conducted internet.

Table 9: *Percentage frequency of gender by survey response method (Source: Phone and Internet surveys)*

		Phone/Internet survey		Total
		Internet	Phone	
Gender	Male	91.5%$_a$	85.6%$_b$	88.9%
	Female	7.6%$_a$	14.4%$_b$	10.6%
	Did not say	0.9%$_a$		0.5%
Total		100.0%	100.0%	100.0%

**Each subscript letter denotes a subset of Phone/Internet survey categories whose column proportions do not differ significantly from each other at the .05 level.*

With regards to education levels, the results of the z-test indicate a significant difference between the two groups only for certain educational groupings. These results can be seen in Table 10. The proportion of those who have completed Year 10 or Year 12 is significantly different and higher in the phone survey sample. On the other hand the proportion of those who have completed a Diploma/Advanced Diploma, Bachelor Degree or Graduate Diploma/Post Graduate Degree is significantly different and higher in the internet survey sample, suggesting that those who completed the internet survey have as a whole a higher level of educational qualifications.

Table 10: *Percentage frequency of educational levels by survey response method (Source: Phone and Internet surveys)*

Level of Education	**Internet**	**Phone**	**Total**
Primary school	0.6%$_a$	0.6%$_a$	0.6%
Junior secondary school (Year 10)	12.7%$_a$	21.7%$_b$	16.6%
Junior secondary school (Year 12)	11.3%$_a$	17.7%$_b$	14.1%
Certificate I or II	2.5%$_a$	4.2%$_a$	3.2%
Certificate III or IV	20.8%$_a$	18.8%$_a$	19.9%
Diploma or Advanced Diploma	17.6%$_a$	11.6%$_b$	15.0%
Bachelor Degree	19.7%$_a$	12.8%$_b$	16.7%
Graduate Diploma/Post Graduate Degree	14.0%$_a$	12.4%$_a$	13.3%
Did not say	0.9%$_a$	0.3%$_a$	0.6%
Total	100.0%	100.0%	100.0%

**Each subscript letter denotes a subset of Phone/Internet survey categories whose column proportions do not differ significantly from each other at the .05 level.*

The marital status of phone and internet respondents does not exhibit any significant differences in the proportions of respondents for each category apart from those who are widowed. Respondents who identified as widowed comprised a significant and higher proportion in the phone survey sample. In terms of ethnic background, no significant differences were found between the two samples apart from those who identified as being Australian. In this instance the proportion of Australian respondents was higher in the phone survey sample. However internet survey respondents were given the option to give a non-response to this question if they so wished, which 0.9% chose to do. It may be that this has skewed the results somewhat. The results of this column proportion test can be seen in Table 11.

Table 11: *Percentage frequency of various ethnic backgrounds by survey response method (Source: Phone and Internet surveys)*

		Phone/Internet survey		Total
		Internet	Phone	
Ethnicity	Australian	70.7%$_a$	76.4%$_b$	73.2%
	Aboriginal and/or Torres Strait Islander	0.9%$_a$	0.5%$_a$	0.7%
	English	6.0%$_a$	5.1%$_a$	5.6%
	Irish	0.9%$_a$	1.1%$_a$	1.0%
	Chinese	2.0%$_a$	1.9%$_a$	1.9%
	Italian	1.5%$_a$	1.8%$_a$	1.6%
	Greek	1.5%$_a$	0.8%$_a$	1.2%
	Scottish	1.2%$_a$	0.6%$_a$	1.0%
	Lebanese	1.2%$_a$	0.8%$_a$	1.0%
	Dutch	0.6%$_a$	0.3%$_a$	0.5%
	Maltese	0.7%$_a$	0.6%$_a$	0.7%
	Polish	0.4%$_a$	0.3%$_a$	0.3%
	Filipino	1.0%$_a$	0.2%$_a$	0.6%

	Indian	0.2%$_a$	0.2%$_a$	0.2%
	Croatian	0.9%$_a$	0.8%$_a$	0.8%
	Vietnamese	0.5%$_a$	0.3%$_a$	0.4%
	Other	9.0%$_a$	8.2%$_a$	8.6%
	Did not say	0.9%$_a$		0.5%
Total		100.0%	100.0%	100.0%

**Each subscript letter denotes a subset of Phone/Internet survey categories whose column proportions do not differ significantly from each other at the .05 level.*

The z-test method found that there were statistically significant differences between the two sample groups when it came to income levels. The proportion of the lowest income earners i.e. those earning up to $18,200 per annum was much higher in the internet sample. However the proportion of those in the next category up, earning between $18,201 and $37,000 was almost double in the phone sample. There was no statistically significant difference between the mid-level earners ($37,001 - $80,000) and highest earners ($180,001 and over) from both groups, but there was a large difference between those earning $80,001 to $180,000, with the proportion of those earning at this level being much higher in the internet sample. The results can be seen in Table 12.

Table 12: *Percentage frequency of income levels by survey response method (Source: Phone and Internet surveys)*

		Phone/Internet survey		Total
		Internet	Phone	
Income	$0 - $18,200	8.0%$_a$	4.8%$_b$	6.6%
	$18,201 - $37,000	6.5%$_a$	12.5%$_b$	9.1%
	$37,001 - $80,000	26.9%$_a$	28.7%$_a$	27.7%
	$80,001 - $180,000	42.6%$_a$	26.2%$_b$	35.4%
	$180,001 and over	15.1%$_a$	15.7%$_a$	15.4%
	Did not say	0.9%$_a$	12.0%$_b$	5.7%
Total		100.0%	100.0%	100.0%

**Each subscript letter denotes a subset of Phone/Internet survey categories whose column proportions do not differ significantly from each other at the .05 level.*

4.1.4 Effect of licence status on variation analysis

In order to understand in depth the differences that have presented themselves between the two survey samples it was necessary to test whether there may be a correlation between the differences and the number of licensed versus unlicensed fishers in each group. It may be that due to the larger proportion of unlicensed fishers in the phone sample, the results are somewhat distorted as generally speaking such unlicensed fishers will be concession holders due to their age or income level. As such, a truer picture of the samples variations or similarities as the case may be, would be represented by an analysis the two samples in terms of those who do hold a NSW recreational fishing licence.

Once again the main measure used here to analyse the variation between the two groups was the level of fishing effort i.e. the number of days spent fishing in saltwater and freshwater by licence holders in NSW in the past 12 months. Removing the non-licence holders from the analysis resulted in a sample of 468 phone respondents and 741 internet respondents. The percentage frequencies of total days fished by licenced survey respondents in both saltwater and freshwater are shown in Figure 4 and Figure 5.

A high proportion of licence holders from the internet survey (21.7%) spent between 21 and 40 days fishing in saltwater in the previous 12 months. A large number of licence holders from the internet sample (10.9%) fished more than 81 days in the same period. In relation to those respondents surveyed over the phone, the majority of licenced fishers (24.8%) spent between 1 and 5 days saltwater fishing in the previous 12 months. The results of saltwater anglers shows a far higher proportion of internet anglers fished more days than anglers who replied to the phone survey.

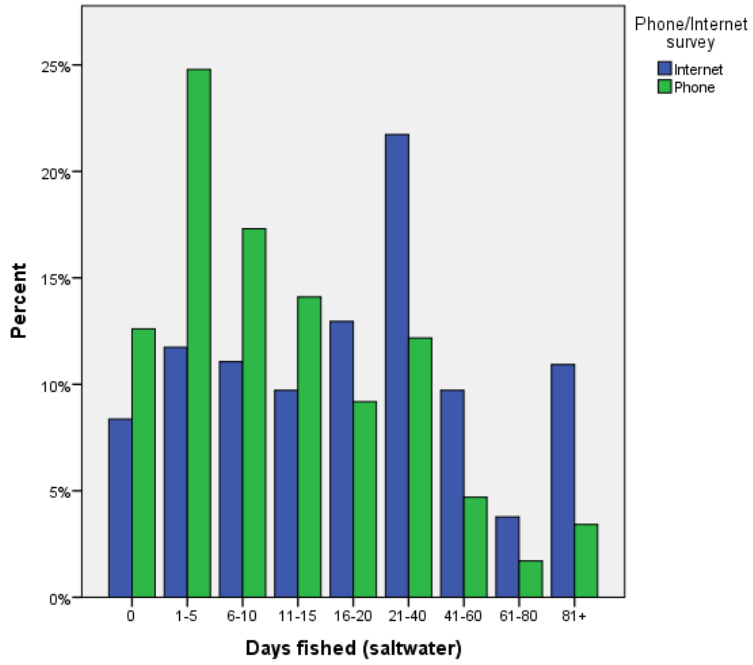

Figure 4: *The percentage frequency of total days fished in saltwater in NSW by survey respondents who hold recreational fishing licences in the past 12 months (Source: Phone and Internet surveys)*

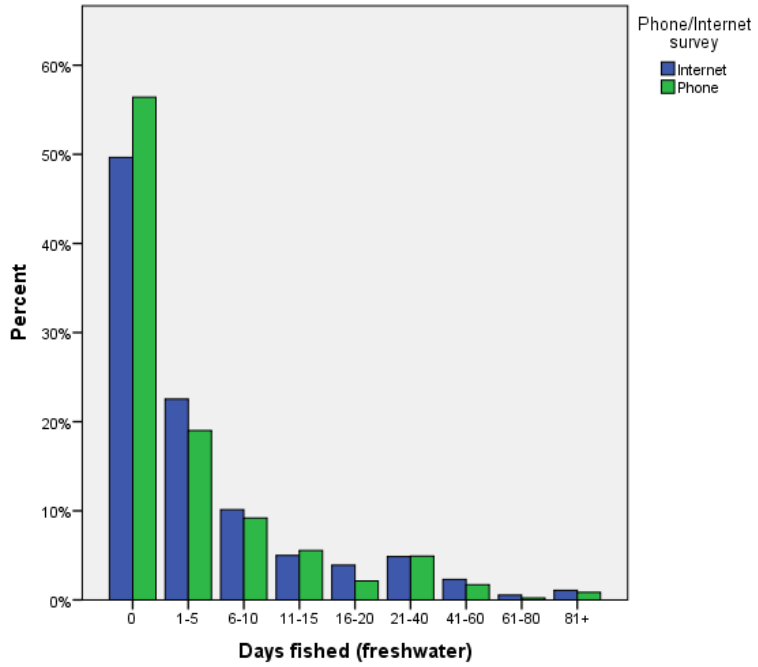

Figure 5: *The percentage frequency of total days fished in freshwater in NSW by survey respondents who hold recreational fishing licences in the past 12 months (Source: Phone and Internet surveys)*

A one-way analysis of variance (ANOVA) was used to determine whether there were any significant differences between the means of the two groups, that is to say whether the average number of days spent fishing differed between phone and internet licence holders. Table 13 provides some useful descriptive statistics, including the mean, standard deviation and 95% confidence intervals for the dependent variable (Number of days fished in saltwater) for each separate group (Phone and Internet Licence holders), as well as when both groups are combined (Total).

Table 13: *Average number of days spent fishing in saltwater by licensed fishers over previous 12 months, by survey method (Source: Phone and Internet surveys)*

Descriptives

In NSW over the past 12 months, approximately how many days have you fished in saltwater?

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Internet	741	34.82	44.538	1.636	31.61	38.03	0	350
Phone	468	17.92	29.149	1.347	15.28	20.57	0	300
Total	1209	28.28	40.143	1.154	26.02	30.55	0	350

Table 14 shows the output of the first ANOVA analysis. There was a statistically significant difference between the two groups in terms of the number of days spent fishing in saltwater as determined by one-way ANOVA ($F(1,1207) = 53.021$, $p = .000$).

Table 14: *ANOVA results for comparison of average number of days spent saltwater fishing by licence holders in each survey group (Source: Phone and Internet surveys)*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	81912.229	1	81912.229	53.021	.000
Within Groups	1864703.717	1207	1544.908		
Total	1946615.945	1208			

Table 15 provides the mean, standard deviation and 95% confidence intervals for the dependent variable (Number of days fished in freshwater) for each separate group (Phone and Internet Licence holders), as well as when both groups are combined (Total).

Table 15: *Average number of days spent fishing in freshwater by licensed fishers over previous 12 months, by survey method (Source: Phone and Internet surveys)*

Descriptives

In NSW over the past 12 months, approximately how many days have you fished in freshwater?

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Internet	741	7.24	16.130	.593	6.08	8.40	0	170
Phone	467	5.95	17.849	.826	4.33	7.58	0	300
Total	1208	6.74	16.820	.484	5.79	7.69	0	300

Table 16 shows the output of the second ANOVA analysis. There was no significant difference between groups in terms of the number of days spent fishing in freshwater as determined by one-way ANOVA (F(1,1206) = 1.675, p = .196).

Table 16: *ANOVA results for comparison of average number of days spent freshwater fishing by licence holders in each survey group (Source: Phone and Internet surveys)*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	473.733	1	473.733	1.675	.196
Within Groups	341001.684	1206	282.754		
Total	341475.417	1207			

4.1.5 Summary

The total tally of the two surveys was 1,436 responses, 623 from the phone survey and 813 from the internet survey. The average days fished in both salt and fresh water are higher in the internet

survey results. This difference between survey methods was statistically significant, meaning the internet survey fishers are more avid than the phone survey respondents.

The surveys also requested a range of information on demographics such as age, gender, income and education levels. The mean age of respondents to the internet survey was 45.7 years and the phone survey 50.7 years. The difference was statistically significant and may be related to the more limited use of the internet in those phone surveyed. Male fishers constituted 91.5% of the internet survey respondents compared with 85.6% of phone surveys being significantly different at the 5% level.

With regard to education levels, results of the z-test indicate a significant difference between the two groups only for certain educational groupings. The proportion of those who have completed Year 10 or Year 12 was significantly higher in the phone survey sample. On the other hand, the proportion of those who have completed a Diploma/Advanced Diploma, Bachelor Degree or Graduate Diploma/Post Graduate Degree was significantly higher in the internet survey sample. Marriage status results did not vary between survey methods, except for Widowers who were higher in the phone survey. Ethnicity of respondents for the two survey methods were similar, though the phone survey showed significantly more "Australians" than the internet survey. Regarding income levels, results showed the internet sample to have significantly more low earners (<$18,200pa) and also high earners (>$80,000) than the phone survey. Conversely, the phone survey showed significantly more respondents in the $18,200-$37,000 income category.

Non licence holders were represented in both samples, with 66 of 807 (8.17%) internet respondents being unlicensed and 153/621 (24.6%) of phone survey respondents. Comparative tests of the average days fished between licence holders in the two samples indicated internet respondents were again more avid.

The results indicate that the demographics and avidity of respondents from the phone survey were more representative of the wider NSW recreational fishing population than the internet respondents, as the phone survey results in these parameters concur well with those of McIlgorm and Pepperell (2013). We can therefore conclude that the internet survey attracted more avid fishers, who are more likely to hold a fishing licence, be younger, fish significantly more days a year, be male, have higher levels of education and are either high income or very low income. They are also more likely to be Australian born, than those in the phone survey.

4.2 Modelling the motivational profiles of NSW fishers

The data from both telephone and internet surveys have been treated as separate samples and analysed independently. The phone survey identified four sub groups of fishers with different profiles in terms of motivations and catch related preferences while the internet survey identified five sub-groups.

4.2.1 Exploring the relationships between different aspects of motivation

Prior to conducting the Latent Class Analysis the relationships between different aspects of the motivational scales were explored. For **activity general motivation** the factor structure of the Fedler and Ditton (1994) motivation scale used in each survey was explored by splitting the sample into random halves and performing exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on the respective sub-samples. The EFA performed in SPSS using principal axis factoring and direct oblimin rotation revealed three distinct factors (see Table 17). This factor structure was supported in the CFA conducted in M*plus;* although the chi-square test was significant (χ^2 (81, N = 392) = 265.12, $p < .001$) the levels of the comparative fit index (CFI, .92), tucker lewis index (TLI, .89), root mean square error of approximation (RMSEA, .08), and standardized root mean square residual (SRMR, .07) indicated an adequate model fit (e.g., Hu and Bentler, 1999)

The first factor included 4 items (e.g., “to develop my skills” and “to experience new and different things”), and was comparable with mastery/competency, personal achievement, and intellectual factors identified in previous leisure motivation research (e.g., Beard, 1983; Dillard & Bates, 2011; Kuehn et al., 2013; White et al., 2008). We therefore labelled this factor *Mastery* (α = .83). The second factor included six items examining aspects of being outside and getting away from life demands (e.g., “to get away from the demands of other people”, “to be outdoors”). Consistent with previous research (Beard, 1983; Dillard & Bates, 2011; Kuehn et al., 2013; White et al., 2008), we labelled this factor *Escapism* (α = .77). The third factor included two items (“for family and recreation” and “to be with friends”). These items are consistent with the socialisation aspects of leisure motivation examined in previous studies (Beard, 1983; Chen et al., 2013; Dillard & Bates, 2011; Kuehn et al., 2013; White et al., 2008). This *Socialisation* subscale had adequate levels of internal consistency (α = .66).

***Table 17**. Exploratory Factor Analysis results for Fedler and Dutton's (1994) fishing motivation scale.*[a]

	Mastery	Escapism	Socialisation
Develop my skills	.86		
Test my equipment	.75		
Experience new and different things	.70		
The challenge of the sport	.67		
Be close to the water	.31	.27	
Be outdoors		.69	
For relaxation		.64	
get away from regular routine		.64	
Experience unpolluted natural surroundings		.54	
Get away from the demands of other people		.49	
For family and recreation			.79
Be with friends			.55

[a] *three items were removed from this scale as they assessed catch-specific motivations that are captured by the consumptive orientation scale.*

For **catch-related motivations** the factor structure of the 16-item consumptive orientation scale was investigated and compared with previously identified structures within the literature, namely the four distinct factors, viz: (1) Attitudes towards catching something (2) Attitudes towards catching numbers of fish (3) Attitudes towards catching large fish and (4) Attitudes towards retaining fish (Anderson et al., 2007). We performed EFA and CFA on random halves of the sample. The EFA results (Table 18) identified four clear factors which are consistent with previous research. The CFA further supported this factor structure, with the relevant indices indicating an appropriate model fit: 2 (49, N = 392) =171.03, p < .001; CFI = .91, TLI = .88; RMSEA = .08; SRMR = .10. The levels of internal consistency for the four subscales ranged from .77 to .81.

***Table 18.** Exploratory Factor Analysis results for the Consumptive Orientation scale.*

	Numbers of fish	Retaining fish	Catching somethin g	Catching large fish
A full bag is the best indicator of a good fishing trip	.75			
A successful fishing trip is one in which many fish are caught	.69			
I'm happiest with a fishing trip if I catch at least the bag limit	.66			
The more fish I catch, the happier I am	.55			
I'm just as happy if I release the fish I catch		.77		
I'm just as happy if I don't keep the fish I catch		.73		
I usually eat the fish I catch*		.58		
I want to keep all the fish I catch*		.56		
When I go fishing, I'm just as happy if I don't catch fish			.77	
A fishing trip can be successful even if no fish are caught			.76	
When I go fishing, I'm not satisfied unless I catch something*			.70	
If I thought I wouldn't catch any fish, I wouldn't go fishing*			.51	
The bigger the fish I catch, the better the fishing trip				.75
I'm happiest with the fishing trip if I catch a challenging				.74

game fish				
I would rather catch 1 or 2 big fish than 10 smaller fish				.68
I like to fish where I know I have a chance to catch a trophy fish				.65

* item is reversed scored.

The three identified non-catch related motivational factors and the four non catch related motivational factors were then used as the basis of the Latent Profile Analysis (LPA) for both the phone and internet surveys.

4.2.2 Internet survey results

The LPA analysis indicated that the five profile model provided the most parsimonious solution (Table 19). There was evidence of further statistical improvements in model fit with the 6 profile model, but the additional profile identified was small and was not clearly distinct from the other profiles. Given that the aim of LPA is to identify a parsimonious solution, we selected the five profile solution.

Table 19. *Model fit indices for the different latent profile models.*

Profiles*	**AIC**	**BIC**	**aBIC**	**BLRT**	**entropy**
1	14024.16	14089.44	14044.99		
2	13659.57	13762.16	13692.30	< .001	.63
3	13525.30	13665.20	13569.93	< .001	.63
4	13427.38	13604.57	13483.91	< .001	.65
5[a]	13354.47	13568.97	13422.90	< .001	.68
6	13284.97	13536.78	13365.30	< .001	.72
7	13227.34	13516.46	13319.58	< .001	.72

[a] *the model with 5 latent profiles was selected as the optimal model. Although specifying further latent profiles led to improvements in model fit, the identified profiles were small (e.g., < 5%) and not distinct from those identified in the five profile solution.*

**AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; aBIC, sample size adjusted Bayesian Information Criterion; BLRT, bootstrap likelihood ratio test.*

The first profile (Figure 6) had comparatively low levels of consumptive orientation and moderate levels of escapism and socialisation. This suggested a group a fishers who were primarily motivated by the socialisation aspects, and to a lesser extent escapism, of recreational fishing. We therefore labelled this profile *social fishers* with 13.4 % of fishers sampled belonging to this category.

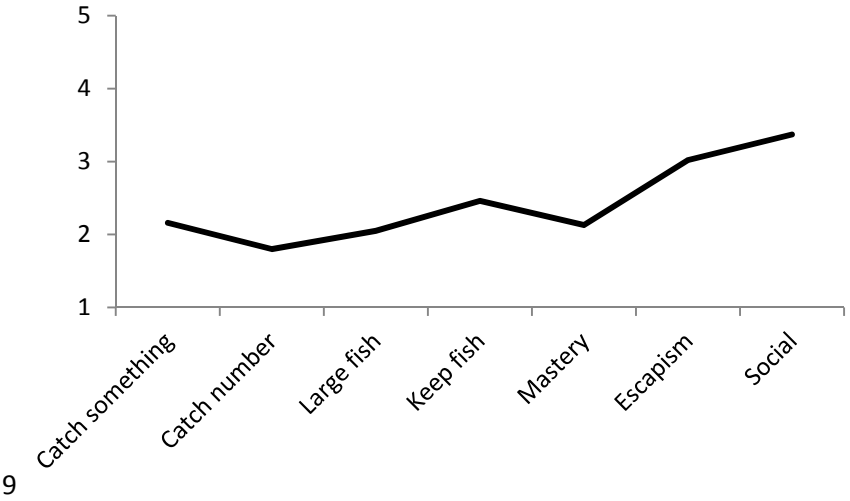

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Figure 6: *Motivational profile of 'social fisher' sub-group*

The second profile (Figure 7) also indicated low levels of consumptive orientation, but higher levels of mastery, affiliation, and escapism. We labelled this profile *outdoor enthusiasts* given their high levels of activity general motivations with 21.6 % of fishers sampled belonging to this category.

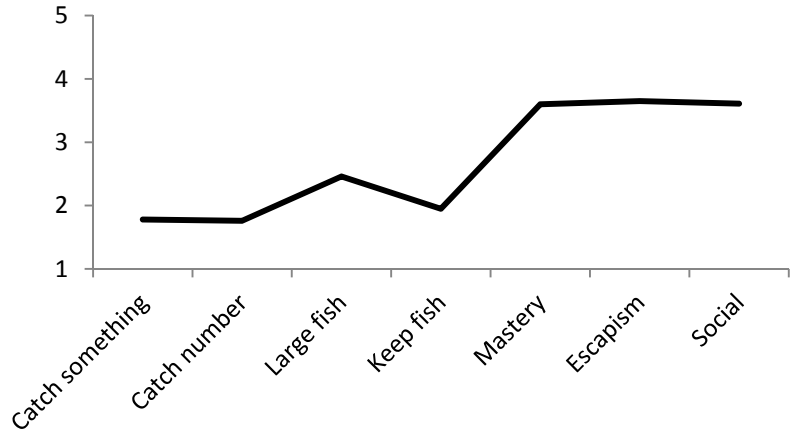

Figure 7: *Motivational profile of 'outdoor enthusiast' sub-group*

The third profile (Figure 8) accounted for nearly 44% of the sample, and had moderate levels of activity general and activity specific motivations. Given that this was easily the largest profile with no clear extreme on any motivational domain, we labelled it *generalist fishers.*

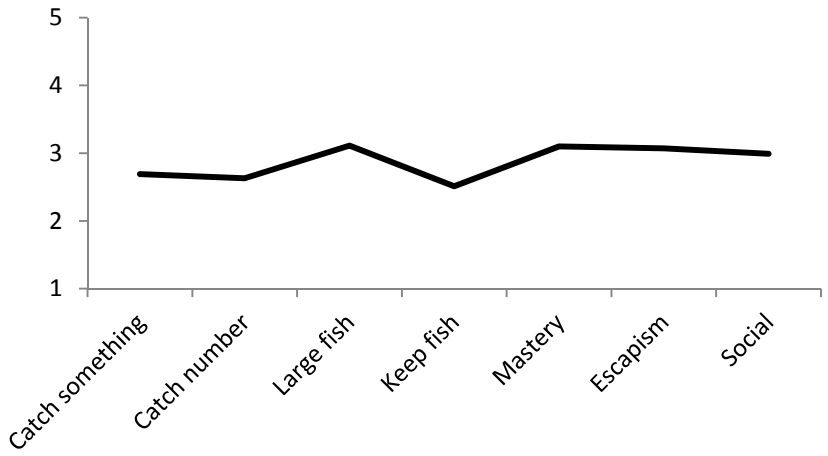

Figure 8: *Motivational profile of 'generalist' sub-group*

The defining characteristics of the fourth profile (Figure 9) were comparatively high levels of 'catching large/trophy fish' and 'mastery'. This suggested a group of fishers who were motivated by the challenge and skill involved in catching trophy fish. We therefore labelled this profile *trophy fishers* with 15.5 % of fishers sampled belonging to this category.

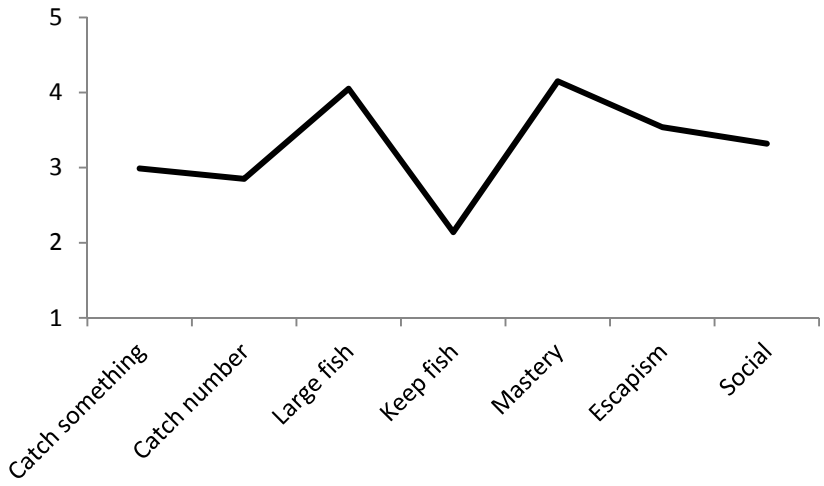

Figure 9: *Motivational profile of 'trophy fisher' sub-group*

The fifth profile (Figure 10) was much smaller than the other profiles accounting for only 5.7% of the sample (N = 45). Individuals in this profile had comparably high levels of consumptive orientation compared with the other profiles but lower activity general motivations. This suggested a group of fishers who were motivated primarily by consumptive orientation; that is, catching, retaining, and eating fish. Based on these characteristics, we labelled this profile *hunter gatherers.*

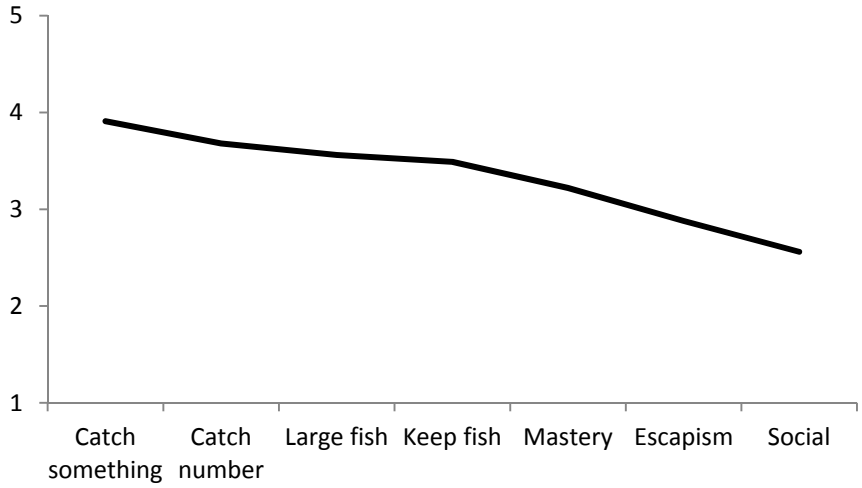

Figure 10: *Motivational profile of 'hunter-gatherer' sub-group*

Table 20 summarises the five motivation profiles identified through the LPA.

Table 20. *Motivational characteristics of the five motivational profiles from the internet survey sample.*

Name of sub-group	Motivational characteristics	% of sample
Social fishers	Low consumptive orientation Moderate levels of escapism and socialisation	13.4%
Outdoor enthusiasts	Low consumptive orientation. High levels of mastery, affiliation, and escapism	21.6%
Generalists	Moderate levels of activity general and activity specific motivations	43.8%
Trophy fishers	Comparatively high levels of 'catching large/trophy fish' and 'mastery'	15.5%
Hunter gatherers	Comparatively high levels of consumptive orientation	5.7%

An analysis of the demographic characteristics of the five motivational profiles, or sub-groups, indicates some significant differences between the groups, particularly in relation to income and age, and to a lesser extent ethnicity (Table 21). In particular hunter gathers and trophy fishers were significantly more likely to be a very high income earner (>$180 000) whereas social fishers has a stronger representation in the low income bracket of $18,201 - $37,000. This may relate closely to the breakdown of age across the sub-groups, with social fishers on average falling into the older age category (mean age of 56), possibly reflecting larger number of retirees in this category, compared with the younger trophy fishers (mean age of 35).

Of note in the analysis of responses according to ethnicity is the higher incidence of trophy fishers and Hunter Gatherers amongst East Asian fishers. 'Australian' ethnic background was strongest in the 'outdoor enthusiast' subgroup.

Table 21. *Demographic characteristics of the five motivational profiles from the internet survey sample.*

	Social Fishers	**Outdoor Enthusiasts**	**Hunter Gatherers**	**Trophy Fishers**	**Generalists**	**P**
Education (%)						.603
< Year 12	7.6	14.2	6.7	10.0	11.7	
Year 12	10.5	12.4	6.7	11.7	11.7	
Trade/certificate/diploma	42.9	45.0	40.0	45.0	40.5	
University	39.0	28.4	46.7	33.3	36.2	
Income (%)						.009
≤ 18,200	4.8	4.7	6.7	7.5	7.0	
$18,201 – $37,000	15.2	4.1	2.2	6.7	5.8	
$37,001 - $80,000	31.4	30.8	2.4	23.3	26.5	
$80,001 - $180,000	34.3	50.3	40.3	41.7	45.5	
> $180,000	14.3	10.1	26.7	20.8	15.2	
Ethnic background (%)						.041
Australian	74.3	77.5	66.7	63.6	72.0	
British	9.5	10.1	6.7	8.3	9.3	
Western Europe	11.4	5.3	11.1	11.6	8.7	
Eastern Asia	1.0	0.6	6.7	9.9	5.0	
Other	3.8	6.5	8.9	6.6	5.0	
Age, mean (SD)	56.0 (11.3)	44.5 (11.8)	47.9 (12.8)	35.4(11.1)	48.8 (12.6)	< .001
Marital Status (%)						.071
Single	16.2	21.3	15.6	28.3	17.2	
Partnered	83.8	78.7	84.4	71.7	82.8	

4.2.3 Phone survey results

In this sample, the latent class analysis indicated that there were four distinct sub-groups of fishers. The relative sizes and characteristics of these sub-groups are summarized in Table 22.

Table 22*. Characteristics of the four motivational profiles from the phone survey sample.*

Name of sub-group	**Motivational characteristics**	**% of sample**
Trophy Fishers	High consumptive orientation for catching large, trophy fish. Low consumptive orientation for numbers of fish and keeping fish. Moderate-to-high mastery, escapism, and socialism	9.6%
Hunter Gatherers	High consumptive orientation for catching and eating fish. High levels of escapism and socialism.	23.8%
Social fishers	High levels of escapism and socialization	29.9%
Generalists	Moderate levels of retaining caught fish. Lower levels for other motivation domains.	36.8%

4.2.4 Comparison between the telephone and internet sample sub-groups

As noted previously, the telephone survey is a more representative sample of the broad population of NSW recreational fishers, while the self-selected internet survey most likely represents a sub-population of more avid recreational fishers. Thus, it is not surprising that there are some differences in the nature and size of the respective motivational sub-groups between the two samples. There are, however, some important similarities in the characteristics of the motivational sub-groups in each sample. In particular, both samples revealed four very similar sub-groups:

- Trophy fishers – characterized by high orientation to catch large trophy fish;
- Hunter gatherers – characterized by high orientation to catch and consume fish;
- Social fishers – motivated by activity general factors, particularly viewing fishing as an opportunity to spend time with friends and family;
- Generalists – the largest proportion of fishers in both surveys who were not strongly motivated by any single factor, but rather likely fished for a combination of different factors.

The two samples differed with respect to the size of each motivational sub-group, however. In the telephone sample, there were greater proportions of hunter gatherers (24% versus 6%) and social fishers (30% versus 13%). On the other hand, the internet sample revealed a greater proportion of trophy fishers (15% versus 9%) and generalists (44% versus 37%) compared with the telephone survey. Furthermore, the internet sample revealed an additional sub-group – outdoor enthusiasts - not observed in the telephone sample. The outdoor enthusiast sample accounted for nearly one quarter of the internet sample and was characterized by high motives to be outdoors and with nature. These aspects of motivation were also present within the phone survey respondents, but were nested within other higher level motivations. A visual comparison of the size of the respective motivational sub-groups between the two samples is shown in Figure 11 below.

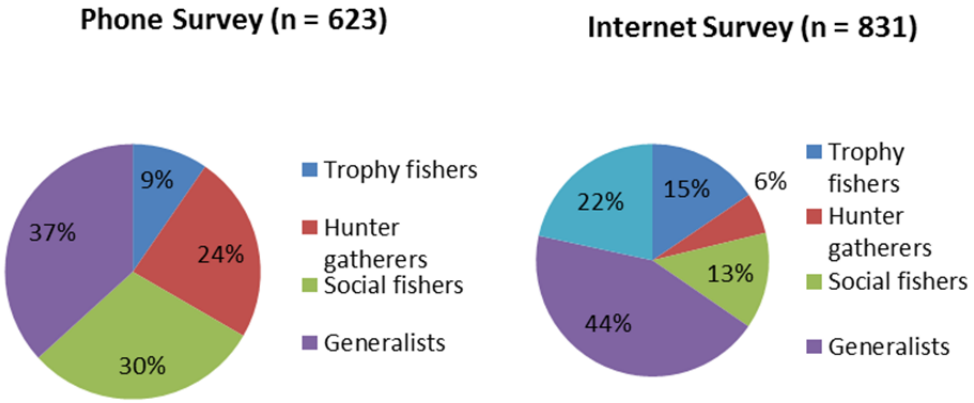

Figure 11: The different proportions of motivational sub-groups in the telephone and internets surveys.

4.2.5 Centrality to lifestyle and fishing frequency

Levels of fishing frequency and centrality-to-lifestyle were higher in the internet sample compared with the telephone sample as shown in Table 23. There was also a clear relationship between motivational sub-groups and these two measures of fishing avidity. Across both samples, trophy fishers had the highest levels of fishing frequency and centrality to lifestyle. In the telephone sample, avidity was lowest in generalists while in the internet sample avidity was lowest in social fishers. Across both samples, hunter gatherers had generally high levels of avidity.

Table 23: *A comparison between the fishing frequency and centrality between the telephone and internet surveys (nb. Values are means, with standard deviation in parenthesis).*

	Telephone sample		**Internet sample**	
	Fishing frequency	**Centrality-to-lifestyle**	**Fishing frequency**	**Centrality-to-lifestyle**
Trophy fishers	34.8 (40.4)	2.71 (0.71)	60.74 (53.32)	3.32 (0.76)
Hunter gatherers	24.4 (25.1)	2.79 (0.75)	43.11 (53.46)	3.06 (0.81)
Social fishers	28.6 (40.1)	2.41 (0.75)	27.94 (74.3)	2.02 (0.75)
Generalists	19.6 (29.1)	2.22 (0.64)	36.60 (54.55)	2.71 (0.74)
Outdoor enthusiasts	-	-	49.96 (52.78)	2.88 (0.75)

4.2.6 Fishing Satisfaction

We examined the extent to which recreational fishers were satisfied with various aspects of the fishing experience. Fishing satisfaction varied substantially between the two samples as shown in Table 24. Whereas the majority of the telephone sample was generally satisfied with all aspects of fishing, the opposite was true for the internet sample. In particular, relatively few fishers in the internet sample were satisfied with fisheries management (18.8%) or the overall quality of fishing (23.6%).

Table 24. *The percentage of fishers who indicated they were satisfied or very satisfied with various aspects of the fishing experience.*

	Telephone sample	**Internet sample**	**Total**
Fishing opportunities in general	78.7%	26.9%	49.9%
The number of fish caught	56.5%	33.1%	43.4%
The size of fish caught	59.4%	30.3%	43.1%
Fisheries management	56.2%	18.8%	35.3%
Level of enforcement of fishing practices	56.2%	32.4%	42.8%
Cost of fishing licences	57.0%	26.3%	39.8%
Overall quality of fishing	72.1%	23.6%	44.9%

Levels of fishing satisfaction also varied by motivational sub-groups as reported in Tables 25 and 26. In the telephone sample, generalists had the lowest levels of satisfaction with fishing opportunities in general, fisheries management, levels of fisheries enforcement, and cost of fishing licences. Hunter gatherers, in contrast, tended to have the highest level of satisfaction with fisheries management and enforcement of fishing practices, along with fishing opportunities in general. All groups indicated quite high satisfaction with the overall quality of fishing (69% to 75.8%).

Table 25. *Differences in fishing satisfaction between the motivational sub-groups (telephone sample)*

	Trophy fishers	**Hunter gatherers**	**Social Fisheries**	**Generalists**
Fishing opportunities in general	78.3%	88.5%	82.3%	69.4%
The number of fish caught	50.0%	59.5%	61.8%	52.0%
The size of fish caught	53.3%	64.2%	62.9%	55.0%
Fisheries management	63.3%	63.5%	55.4%	50.2%
Level of enforcement of fishing practices	46.7%	56.1%	47.3%	42.8%
Cost of fishing licences	76.7%	54.1%	65.6%	46.7%
Overall quality of fishing	75.0%	70.9%	75.8%	69.0%

Some similar trends were observed for the internet sample (Table 26). For example, generalists tended to be least satisfied with overall fishing opportunities and fisheries management. A major contrast is seen in satisfaction of the internet sample with the overall quality of fishing, which was much lower than that of the telephone sample.

Table 26. *Differences in fishing satisfaction between the motivational sub-groups (internet sample)*

	Social Fishers	**Outdoor enthusiasts**	**Hunter gatherers**	**Trophy fishers**	**Generalists**
Fishing opportunities in general	23.8%	33.7%	28.9%	28.9%	23.6%
The number of fish caught	29.6%	29.6%	26.6%	34.7%	36.2%
The size of fish caught	19.0%	30.1%	22.2%	41.3%	30.9%
Fisheries management	17.2%	26.1%	13.3%	19.8%	16.1%
Level of enforcement of fishing practices	27.6%	38.4%	26.6%	29.8%	32.6%
Cost of fishing licences	21.9%	33.2%	26.7%	28.9%	23.3%
Overall quality of fishing	26.7%	26.0%	22.2%	27.3%	20.4%

4.2.7 Barriers to Fishing

Perceived barriers to fishing, shown in Table 27, did not differ markedly between the telephone and internet samples. In both samples, issues surrounding lack of time and poor weather were identified as the main barriers to recreational fishing. Not being able to catch enough fish rated as the lowest barrier to fishing for both the telephone and internet samples.

Table 27. *The percentage of fishers who agreed that the following factors were barriers to their own fishing experiences.*

	Telephone sample	Internet sample	Total
Not enough time	59.9%	61.6%	60.8%
Fishing areas are too crowded	22.0%	30.5%	26.7%
I don't have access to fishing opportunities close to home	15.4%	24.0%	20.2%
I can't afford to fish more often	13.5%	13.8%	13.7%
Fishing facilities (boat ramps, jetties etc) are poorly developed and/or maintained	19.7%	27.8%	24.3%
I can't catch enough fish to suit me	11.1%	10.5%	10.7%
Fishing regulations are too confusing and/or restrictive	21.2%	12.6%	16.4%
Poor weather	43.7%	41.0%	42.2%

We observed the following trends in relation to perceived barriers, which were similar in both samples (Table 28 and 29). Hunter gatherers were more likely to indicate that the following as barriers to fishing:

- Fishing regulations being too confusing/restrictive;
- Poor weather;
- Cannot catch enough fish;
- Condition of fishing facilities.
- Not being able to afford to fish more often

Trophy fishers were more likely to indicate that the following as barriers to fishing:

- Fishing areas being too crowded;
- Not having enough time;
- Not being able to afford to fish more often (phone sample only).

No clear patterns were observed for the social fishers, generalists, or outdoor enthusiasts (internet sample only).

Table 28. *Comparison of fishing barriers between motivational sub-groups (telephone survey)*

	Trophy fishers	Hunter gatherers	Social Fishers	Generalists
Not enough time	70.0%	54.1%	66.1%	55.9%
Fishing areas are too crowded	35.0%	25.7%	21.0%	17.0%
I don't have access to fishing opportunities close to home	13.3%	13.5%	14.5%	17.9%
I can't afford to fish more often	23.3%	16.9%	9.1%	12.2%
Fishing facilities (boat ramps, jetties etc) are poorly developed and/or maintained	6.7%	30.4%	16.1%	19.0%
I can't catch enough fish to suit me	11.7%	15.5%	7.0%	11.4%

Fishing regulations are too confusing and/or restrictive	16.7%	31.1%	18.3%	18.3%
Poor weather	46.7%	61.5%	37.1%	36.7%

Table 29. *Comparison of fishing barriers between motivational sub-groups (internet survey)*

	Social Fishers	**Outdoor enthusiasts**	**Hunter gatherers**	**Trophy fishers**	**Generalists**
Not enough time	33.3%	28.4%	17.8%	34.7%	28.9%
Fishing areas are too crowded	29.5%	26.0%	33.3%	38.8%	29.7%
I don't have access to fishing opportunities close to home	26.7%	20.1%	31.1%	20.7%	25.4%
I can't afford to fish more often	13.3%	16.0%	31.1%	13.2%	10.8%
Fishing facilities (boat ramps, jetties etc) are poorly developed and/or maintained	20.0%	27.2%	33.3%	33.1%	28.0%
I can't catch enough fish to suit me	2.9%	5.3%	33.3%	14.9%	10.8%
Fishing regulations are too confusing and/or restrictive	19.0%	11.2%	40.0%	17.4%	19.8%
Poor weather	7.6%	10.7%	33.3%	13.2%	12.2%

4.3 Focus group interviews.

Of the 813 respondents to the internet survey, 463 (57%) indicated they would be interested in further involvement and nominated a location in which they would be able to attend. From this list, the 182 people who nominated the Sydney region and the 52 who nominated the Wollongong region were invited to take part in focus groups. While respondents from other locations did indicate a willingness to be involved in the focus group these two locations were selected because they had the highest numbers of potential candidates, thereby ensuring adequate participation levels. In addition no significant differences between motivation profiles were detected between different regional areas of NSW, therefore focus group discussions which were aimed at exploring these profiles were unlikely to be significantly influenced by location. It is likely, however, that satisfaction with fishing, or the ability of different sub-groups to fulfil their motivations, is likely to differ according to geographical and environmental conditions and this is an area that requires further research attention.

Six focus groups, consisting of 36 participants (with an average of six participants per session) were subsequently conducted between November 2015 and February 2016, two in the Wollongong region and four in the Sydney region. While attempts were made to conduct additional focus groups with the respondents to the phone survey there was insufficient interest to proceed (only one

respondent agreed to participate from 75 invited). This is not surprising given our findings that the respondents to the internet survey are more engaged, highly avid fishers and are therefore more likely to be interested in participating in research of this nature.

The six focus groups included a mix of participants from across the sub-groups identified in the internet survey (Table 30). The representation of the focus groups was roughly consistent with the representation of the groups found in the internet survey, however trophy fishers were under represented in the focus group when compared with the survey results (6% in focus groups, compared with 15% of internet respondents). Consistent with the survey results the majority of participants were male (89%) and ages ranged between 24 and 78.

***Table 30**. Focus group participation per sub-group*

Sub group (% of internet survey)	**FG1 (Woll)**	**FG2 (Woll)**	**FG3 (Syd)**	**FG4 (Syd)**	**FG5 (Syd)**	**FG6 (Syd)**	**Total**	**%**
Generalist (44%)	4	1	2	2	6	1	16	44
Social (13%)	1	1	1	2	1	1	7	19
Outdoor enthusiast (22%)	2	1			1	2	6	17
Hunter gatherers (6%)			2			1	3	8
Trophy fisher (15%)	1			1			2	6
Unassigned	1		1				2	6
Total	**9**	**3**	**6**	**5**	**8**	**5**	**36**	**100**

Analysis of the focus group responses focused on two primary objectives:

1. To 'groundtruth' the survey findings and test validity,
2. To explore the influence of motivation on attitudes and beliefs in relation to fisheries management, regulation, communication and practices, with a particular emphasis on exploring attitudes towards two frequently discussed concepts in the comments section of the internet survey – commercial fishing and Marine Protected Areas (MPAs)

4.3.1 Ground-truthing the survey results

The extent to which the participants identified with each of the motivation categories identified through the quantitative surveys was analysed through a count of the references they made to that concept. To standardise the responses these coding references were examined as a proportion of the total number of coding references within each sub-group. The results of this analysis are contained in Figure 12.

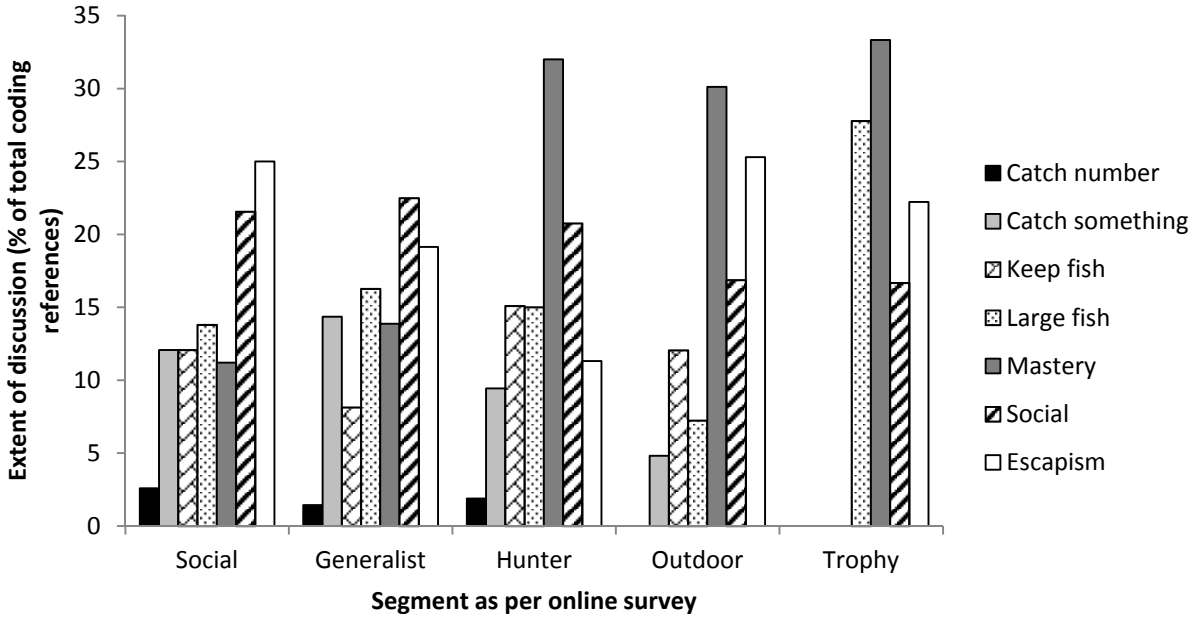

***Figure 12**. Extent of agreement or identification within Focus Groups with each of the different aspects of motivation across pre-identified sub-groups.*

The results of the focus group discussions largely supported the findings of the internet surveys and gave further insight into its results. A summary of the main findings from the focus groups, and how they compare with the internet survey can be found below.

Social fishers

Internet survey description: Characterised by low levels of consumptive orientation and moderate levels of escapism and socialisation. Primarily motivated by the socialisation aspects, and to a lesser extent escapism, of recreational fishing. Low centrality, lower numbers of days fished.

Discussion amongst social fishers in the focus groups focused primarily on the social and escapism aspects of fishing - especially opportunities to connect with nature, relax and to learn and teach fishing skills. While consumptive orientation ('keeping' and 'large fish') was relatively important this often focused on the idea of catching enough to share the catch with family and friends and preferences around size of fish was highly species specific, often relating to the desirability of the species for eating. Therefore although consumptive orientation was higher than one would expect from the internet survey, it was consistent with the importance given to the socialization aspect of fishing.

> *We'll keep them live in a big tank but if we don't catch many then I'll say let's put them back because there's no point. If we're not going to feed the whole family then forget it. There's no real point.* ***Social Fisher – FG5***

Generalist fishers

Internet survey description: Characterised by moderate levels of activity general and activity specific motivations. Easily the largest profile (45%) with no clear extreme on any motivational domain.

The 'generalist fishers' in our focus groups were largely consistent with the internet survey. They had no clear primary motivation but rather discussed all relatively equally. Discussion around the escapism value of fishing related mostly to relaxation and stress relief. Discussions around keeping fish largely focused on 'keeping what I need' and releasing the rest, and like social fishers the size of the fish pursued was largely species and context specific. Some discussed having personal milestones of fish sizes they wished to better and others competed against themselves or others in a light-hearted, often informal manner. This group was one of the most likely to focus on testing and experimenting with fishing equipment in their discussions of the mastery aspects of fishing. The social connections associated with fishing were also an important motivator.

> *The relaxing part of it is a big motivator especially with the stresses of work...Getting up really early on a Saturday morning and nipping out to the beach; watch the sun rise. If the tide is right the anticipation of nailing a couple of big fish is pretty cool. That can be with friends or on my own. I really do enjoy it a lot of times on my own. Sometimes I'll go up the beach and won't take any bait or won't have any lures...give myself a challenge and see how big a fish I can come home with at the end of the day.* ***Typical Fisher – FG1***

Hunter-Gatherers

Internet survey description: Characterised by comparably high levels of consumptive orientation compared with the other profiles but lower activity general motivations. This suggested a group of fishers who were motivated primarily by consumptive orientation; that is, catching, retaining, and eating fish.

'Hunter gatherers' were the group which most discussed the importance of keeping fish. This group had only a small number of participants in the focus groups but these participants were consistent with the internet survey in that they were driven by catching sufficient fish for a meal, preferring to keep what they caught, taking only what they needed and were less inclined to fish for the purposes of catch and release. While the focus group participants showed higher levels of interest in the mastery aspects of fishing than was suggested by the internet survey this was in a slightly different context than the other two groups who prioritised mastery aspects of fishing. Some within this group discussed enjoying the 'gamble' of fishing, rather than having specific targets or techniques to catch particular fish– a sentiment not shared by the two other groups, but in common with 'social'

and 'typical' fishers who had less interest in mastery. Others indicated that they believed that their catches were more about luck than skill. One fisher said:

> *I think my preferred style of fishing outside is actually easier than the art that's required for estuary based fishing. I'm part of a fishing club and there are a lot of guys in that that I think are artists, whereas I'd probably use dynamite if I was allowed….I'm certainly more of a skull dragger than a finesse fisherperson* ***Hunter Gatherer – FG3***

Outdoor enthusiasts

Internet survey description: Characterised by low levels of consumptive orientation, but higher levels of mastery, affiliation, and escapism. High levels of activity general motivations.

'Outdoor enthusiasts' in the focus groups placed far less emphasis on catching something and were much more motivated by a desire to connect with nature, relax and 'de-stress'. This frequently involved fishing on their own or in remote locations away from large numbers of people. They often shared their catch with family and friends with some indicating they only kept their fish for others, not themselves. This group had clear goals and milestones they wished to achieve in their fishing expeditions – seeking to better personal bests in terms of size for particular species. This involved building skills and knowledge to trick or outsmart the fish and often involved experimentation with equipment or the use of challenging equipment such as light line and lures.

> *I always fish primarily by myself, it's the challenge of looking at the conditions, working out what's my best chance, where I should go, what lure I should use, all that sort of thing and just the satisfaction of actually getting the fish. Being so concentrated everything else just ceases to exist and so you do relax because there's nothing else on your mind. All your cares and woes are gone because you just focus so much on what you're trying to achieve.*
> ***Outdoor enthusiast – FG1***

Trophy fishers

Internet survey description: Characterised by comparatively high levels of 'catching large/trophy fish' and 'mastery'. This suggested a group of fishers who were motivated by the challenge and skill involved in catching trophy fish.

'Trophy fishers' were under-represented in the focus group sample but showed clearly distinct preferences in relation to the other groups. Their discussions around motivation concentrated almost exclusively on solitary or remote, catch and release fishing and chasing personal milestones or personal bests.

It's purely..for catching the fish, the fight of the fish and yeah obviously at the top our mind, is the personal best I guess…it's the size of the fish that's most important. ***Trophy Fishers – FG3***

4.3.2 Exploring the link between motivation and attitudes

The internet survey recorded 464 responses to an open ended question asking respondents to add any additional comments or statements relating to recreational fishing in NSW. The most commonly mentioned concerns in these comments related to commercial fishing and general enforcement or compliance (11% each), followed by statements both supporting and criticising Marine Protected Areas (6.5%). These three areas of concern were explored in greater detail through the focus group discussions to assess whether there were any links between the motivation profiles of the identified sub-groups and attitudes towards fisheries management.

Attitudes were coded and compared against sub-groups. The focus groups discussions and the analysis of motivations according to sub-group indicated clear points of differentiation amongst fishers around the importance of mastery aspects of fishing. Therefore additional analysis of attitudes was also undertaken according to the presence or absence of mastery/competence motivations within individuals.

A count was done of all participants for whom mastery aspects of the fishing experience were important (Table 31). Mastery was important to varying extents to 65% of the group, and was found to varying degrees within all sub-groups as would be expected from the results of the internet survey.

Table 31*. Presence or absence of 'mastery' motivation in focus group participants*

	Mastery	
Sub-group	**Yes**	**No**
Social	3	4
Generalist	10	5
Outdoor	5	1
Hunter	2	0
Trophy	2	0
Unassigned	0	2
Total	**22**	**12**

Marine Protected Areas

Discussions around Marine Protected Areas (MPAs) within the focus groups were largely focused on negative perceptions, with individuals often indicating support for the concept but concerns about local Marine Parks in practice. Across all sub-groups negative comments focused on a range of concerns relating to a lack of understanding of the purpose or effectiveness of the parks and their

links to key threats. There was also considerable universal concern about the influence of 'vested interests' especially the conservation movement. For both 'Social fishers' and 'Typical fishers' there were worries about interpreting zoning maps correctly when on the water. In general there were low levels of trust in Government or scientists to implement fair, science based parks.

More clear distinctions emerged when analysing attitudes according to the presence or absence of mastery motivations (Table 32). This analysis indicated some significant points of difference in the trends towards particular attitudes or ideas. In general those fishers who did not prioritise mastery aspects of fishing were more likely to be supportive of the idea of MPAs but qualified that support by indicating that the scientific basis for the parks should be clearly articulated and understood, expressing a concern that vested interests are too influential in planning processes. They were also far more likely to express concern or confusion about zoning boundaries and a fear that they would inadvertently break the rules of the MPA.

> *The first word that pops into my mind is confusion. I respect science, good science. But I become confused when the areas and the number and the size, as in area of marine parks, have changed when there's a change of government. Also, the other confusion is the detail and the complexity. I was down at Jervis Bay recently and I was thinking of going out fishing. Then I looked ..at that map. Where am I allowed to go and where am I not allowed to go? You know, you've got to make it easy to understand - I'm not a dimwit, I don't think. But I find it hard enough* ***Generalist fisher FG4***

Table 32. *Intersection of 'mastery' motivation with attitudes in relation to MPAs amongst focus group participants with areas of divergence shaded.*

	Mastery motivated		**Not mastery motivated**	
MPAs	**No. of fishers**	**% of fishers**	**No. of fishers**	**% of fishers**
Critical comments in relation to MPAs				
Impacts v effectiveness	8	36	3	25
Lack of trust in process, concern over vested interests	8	36	5	42
Stress and or confusion (eg about zoning boundaries)	5	23	5	42
Unsure of benefits or rationale	6	27	3	25
Supportive comments in relation to MPAs				
Concerned by threats	5	23	3	25
Not concerned by MPAs, no impact on activities	5	23	1	8
Support science based management	4	18	5	42
Seen evidence of improvements from MPAs	5	23	2	17
Support theory of MPAs	5	23	5	42

By way of contrast those fishers who prioritised mastery aspects of fishing were far more concerned about the impact of the MPA on fishing activities and often discussed this in context with whether

they believed that MPAs were effective in achieving improvements in fishing or in general environmental health.

> *I've fished a lot in those areas, and I've seen no improvement in the catch rate. Because I think fish are not just going to stay in that area. Fish move with the seasons, water temperature, food, et cetera… things like your flathead, your bream, your snapper and whiting, they move with the seasons up river, down river, out to sea, deep water, shallow water. You are not going to lock them up.* ***Outdoor enthusiast FG6***

This was the main point of difference for supportive comments as well, with mastery motivated fishers more likely to indicate they supported the idea of MPAs because they felt they hadn't, or wouldn't, impact their fishing.

> *But I know there's parts where I go where I can't fish in reserves, just accept it, sceptically but I just accept it and I follow the rules but nothing's really stopped me getting my little catch.* ***Typical fisher FG5***

Commercial fishing

Similar to the discussion of MPAs, comments relating to commercial fishing were overwhelmingly negative within the focus groups and were consistently negative across all five sub-groups. 'Social fishers' indicated that there was little reliable information on which they could base their opinions yet were concerned about the sustainability of the industry based on stories they had heard about past practices or things they had witnessed themselves which they had found confronting. Amongst the generalist fishers interviewed there was a more nuanced view – commercial fishing was acknowledged as being important for bait and seafood production, however there was strong support for existing and additional recreational fishing only areas, and concerns over illegal practices. Support for the industry focused primarily on small scale operators in preference to larger industrial scale fishing operations. The 'outdoor enthusiasts' were the most likely of the sub-groups to discuss concerns about commercial fishing 'taking all the fish' and leaving nothing for recreational anglers. The small number of 'Hunter Gatherers' and 'Trophy Fishers' interviewed focused largely on the idea that commercial fishing had more impact on the environment then recreational fishing.

When examining the influence of the 'mastery' motivations, distinctions between attitudes became clearer (Table 33). Mastery motivated fishers focused heavily on contrasts between the environmental impacts of commercial fishing (perceived to be greater) and the economic benefits (perceived to be lower) in comparison with recreational fishing and expressed concern over management practices. As with MPAs these arguments related largely to the impacts of commercial fishing on fish stocks and by extension on their own fishing activities. Related to this were

complaints about management approaches that were deemed by 'unfair' or favouring commercial fishing over recreational fishing, especially differences in size limits.

> *You can ask anyone that goes out fishing, they'll tell you that once they've been through there's nothing left for quite a few weeks, so even that can't be continuously sustainable either. The other thing that annoys me with commercial fishing, in general, is that we have size limits imposed on us and then you can walk past the fish shop…you'll see small fish that a recreational fisher is not allowed to keep but, yeah, commercial fisherman keep them and they're on sale.* ***Outdoor enthusiast FG2***

Table 33. *Intersection of 'mastery' motivation with attitudes in relation to commercial fishing amongst focus group participants with areas of divergence shaded.*

	Mastery motivated		Not mastery motivated	
Commercial fishing	**No. of fishers**	**% of fishers**	**No. of fishers**	**% of fishers**
Critical comments in relation to commercial fishing				
Concerns over management and enforcement (eg bycatch mgt)	9	41	2	17
Recreational v commercial - impacts and benefits	7	32	2	17
Reductions in abundance - blame	7	32	4	33
Support recreational fishingHs or reduction in commercial fishing	10	45	3	25
Undersize fish - inequality recs v commercial	4	18	0	0
Unsustainable or illegal practices	11	50	7	58
Global or supertrawler	6	27	6	50
Supportive comments in relation to commercial fishing				
Economically important	1	5	0	0
Management improving	3	14	0	0
Necessary for food and bait	3	14	0	0
Not concerned	3	14	2	17
Support small scale commercial fishing	3	14	3	25

By way of contrast those fishers not motivated by mastery aspects of fishing were still concerned about the environmental impacts of commercial fishing but were less likely to relate it to their local situation or their own fishing experiences. Instead they were more likely to refer to international examples of over fishing or concerns over industrial scale fishing such as the so-called 'super trawler' operating in NSW waters at the time of the interviews.

> *Well I mean, you've only got to watch the so-called reality shows they show on TV…they're throwing away everything they pull out of the water because they've dredged so deep for the crabs they want, the stuff they bring to the surface, dies. They can't survive at the low pressures so it just dies.* ***Social fisher FG4***

Recreational fishing regulations

Discussion around existing fisheries management regulations, such as bag and size limits, primarily focused on the need for greater enforcement of or education about existing regulations, implying an implicit acceptance of these regulations. This was consistent across all the sub-groups. Again more distinct differences were found between mastery and non-mastery motivated fishers (Table 34). Primarily this related to an open-ness to tightening bag and size limit regulations and beliefs that current regulations and management was effective. There were consistently high levels of concern over the representation of recreational fishers in decision making and the level of enforcement of regulations across both groups.

Table 34. *Intersection of 'mastery' motivation with attitudes in relation to recreational fishing regulations amongst focus group participants with areas of divergence shaded.*

	Mastery motivated		Not mastery motivated	
Recreational fishing regulations	**No. of fishers**	**% of fishers**	**No. of fishers**	**% of fishers**
Concerns over representation of fishers in decisions	11	50	5	42
Management good	7	32	1	8
Support tightening bag and/or size limits	6	27	1	8
More education needed	10	45	6	50
More enforcement needed	13	59	8	67
Concern over cultural practices	7	32	6	50

Within the recreational fishing sector there was wide spread concern about the actions of particular ethnic communities and a belief that some cultures did not adequately abide by or adhere to recreational fishing regulations. This was particularly prevalent amongst 'non-mastery' oriented fishers. A number of fishers from Asian backgrounds attended the focus groups and some acknowledged the cultural factors that influenced these behaviours – an area which requires significant additional research attention. This may relate closely to their higher representation in the hunter-gatherer and trophy fisher profiles.

> *If you go to Asia from Vietnam, Taiwan, Hong Kong, you travel around those places, you go to market, have a look, they tend to sell small ones and everyone says the small one it's good for soup and they are fresh, they are tasty. So it's the cultural thing, people already accustomed to keeping small ones. It's not good. It's not protective of the environment, but that's the way it's been done over the years.* ***Unassigned fisher (FG3)***

5. Discussion

5.1 Effectiveness of different methodological survey approaches

The comparison of the phone and internet survey results shows a statistically significant difference with the internet survey respondents being a much more avid sample. This is an important insight which can help inform future research which seeks to survey recreational fishers. In particular it finds an internet based survey targeted at licensed fishers through the licence database to be highly effective at reaching the more avid and engaged fishers. This may be an important target group if, for example, information is sought about fisher knowledge about fish movements or fish biology. This is not a reliable method, however, if wishing to reach a representative sample of the recreational fishing community. In these instances a phone survey remains the most reliable method.

The significant contribution of the project is in the area of discovering the psycho-social groups among fishers in NSW. The results have been reported as the percentage of numbers of fishers responding to each survey. The average days fished for each motivational group are reported for both survey methods in Table 35 below. The final column then shows motivational groups by the percentage of total days fished by that group.

Table 35: *A table of the relationship between motivational groups, fishing activity, centrality and the total percentage of days fished by each motivational groups for both surveys.*

	Telephone survey				Internet sample			
Motivational group	**% by number**	**Average Days fished**	**Centrality**	**% of total days fished**	**% by number**	**Average Days fished**	**Centrality**	**% of total days fished**
Trophy fishers	**9.6%**	**34.8 (40.4)**	**2.71 (0.71)**	**13.4%**	**15.5%**	**60.74 (53.32)**	**3.32 (0.76)**	**22.2%**
Hunter gatherers	**23.8%**	24.4 (25.1)	2.79 (0.75)	**23.3%**	**5.7%**	43.11 (53.46)	3.06 (0.81)	**5.8%**
Social fishers	**29.9%**	28.6 (40.1)	2.41 (0.75)	**34.3%**	**13.4%**	27.94 (74.3)	2.02 (0.75)	**8.8%**
Generalists	**36.8%**	19.6 (29.1)	2.22 (0.64)	**29.0%**	**43.8%**	36.60 (54.55)	2.71 (0.74)	**37.8%**
Outdoor enthusiasts	-	-	-		**21.6%**	49.96 (52.78)	2.88 (0.75)	**25.4%**

In Table 35 we see that for the telephone survey results the percentage of total days fished correlates to the percentage of fishers in each motivational class. Trophy fishers and social fishers fish more days than their percentage by number. In the internet sample the additional outdoor specialist category reduces the percentage of hunter gatherers and social fishers by number,

suggesting this additional group is primarily drawn from these two motivation profiles. The trophy fishers and enthusiasts fish proportionally more days than for their numbers, whereas social and generalist fishers fish proportionally less total days than their numbers.

The implications of these two samples are important in interpreting the results. Firstly we would see the phone survey results as being more representative of fishers on a state wide basis including both licence holders and non licence holders (24.6%) in similar proportions to previous surveys (McIlgorm and Pepperell 2013). The inclusion of more non licence holders also explains the higher average age of the phone sample.

The internet responses are predominantly licence holders (92%) and our two different survey modes have produced a sample of fishers which the modelling has categorised into more detailed motivational characteristics.

5.2 Motivational profiles of NSW recreational fishers

The two surveys identified a number of motivational profiles and the results of the focus group discussion were consistent with, and largely supported these findings (bearing in mind that focus groups were not conducted with telephone survey respondents). A modified description of each of the five sub-groups, based on the combined findings of both the internet survey and the focus groups are shown in Table 36.

Table 36. *Modified description of fisher sub-groups building on quantitative and qualitative results.*

Sub-group	Description
1. Social fishers (13%)	Social fishers prioritise the social and escapism aspects of the fishing experience. While consumptive orientation is relatively low they may be motivated to catch and retain fish based on a desire to share seafood products with friends and family. Mastery aspects of fishing of low importance to this group.
2. Generalists (44%)	Generalist fishers have no clear motivational preferences, with elements of all three activity general (non-catch related) categories of motivation common within the sub-group. While mastery aspects of the fishing experience are moderately important to this group there is some suggestion that this may focus primarily on experimentation with equipment or fishing gear.
3. Hunter gatherers (6%)	Individuals in this profile had comparably high levels of consumptive orientation compared with the other profiles. This suggested a group of fishers who were motivated primarily by consumptive orientation; that is, catching, retaining, and eating fish. They are much more inclined to try and catch whatever they can, rather than targeting specific species, and often believe their catches come down to luck rather than skill.
4. Outdoor enthusiasts (22%)	Outdoor enthusiasts have low levels of consumptive orientation, but high levels of all three categories of activity general motivations. The key difference between this profile and trophy hunters relates to their consumptive orientation, which is closely related to their specific motivations in relation to mastery. While trophy fishers are aiming primarily to catch the biggest fish they can, outdoor enthusiasts are more interested in challenging themselves through experimentation with gear (eg using light line), location or technique.
5. Trophy fishers (15%)	This group has comparatively high levels of interest in 'catching large/trophy fish' and 'mastery'. This suggested a group of fishers who are motivated by the challenge and skill involved in catching large trophy fish.

5.3 Links between motivations profiles and attitudes towards fisheries management

Both the general phone survey results and the more avid internet results, coupled with the focus group findings, can contribute to our understanding of recreational fisher motivations and how they relate to attitudes and beliefs about fisheries management.

The two surveys indicated significantly different responses in relation to fishers satisfaction. In the telephone survey fishers were generally satisfied with most aspects of fishing scoring between 50% and 79% across a range of questions. However the internet sample varied in satisfaction ratings between 18% (fisheries management) and 33% (number of fish caught) representing significantly lower satisfactions compared with the telephone survey results. This may partly be explained by the survey mode with respondents being less likely to score low when responding to a telephone operator and conversely being able to "protest" on the internet form.

Among the motivational groups, generalists seemed to have less satisfaction than other groups and hunter gatherers were the most satisfied. Given hunter gatherers were the only group which placed a high value of consumptive orientation their high level of satisfaction may indicate that their primary motivations of 'catching a fish' are being satisfied. Other groups, who prioritised other aspects of the fishing experience, are experiencing lower levels of satisfaction and these require further exploration. Across both the internet and phone surveys an average of 35% of respondents were satisfied with fisheries management. Key areas of concern appeared to relate to levels of enforcement (43% satisfied) and cost of licence fees (40% satisfaction).

Both the phone and internet surveys found that lack of time and poor weather were seen as the main barriers to recreational fishing across all motivational groups. This suggests that some of the main causes of dissatisfaction with fishing lie outside the realm of fisheries managers to address. Concerns more relevant to fisheries managers included fishing areas being too crowded (27%), poor fishing facilities (24%) and fishing regulations (16%). Hunter gatherers seemed the group least concerned by time restrictions and most concerned by poor fishing facilities and regulations. Trophy fishers were the most concerned by time restrictions and fishing areas being too crowded.

These results were supported by the focus group analysis, which indicated that concerns around fisheries management tended to focus on a feeling that more enforcement and education is needed. Within the groups there was concern about the actions of particular ethnic communities and a belief that some cultures did not adequately abide by or adhere to recreational fishing regulations. This is an area in which there appears to be significant conflict and division within the recreational fishing

community and additional research attention should be directed towards understanding the cultural factors that influence the way in which people respond to fishing regulations. This could be conducted as part of wider examination of areas of conflict between different motivational profiles, especially given the significantly higher representation of East Asian fishers in the hunter gatherer and trophy fisher profiles.

This focus on enforcement and education indicates an implicit acceptance of current bag and size regulations, with the mastery oriented fishers seemingly open to greater restrictions on these limits. In management and regulation the approach of government to fisheries management has been to avoid limiting the days fished by anglers as this would disproportionately impact different motivational groups with different fishing frequencies and centralities. Instead management addresses the outputs from the fishing activity by setting a limit on the number of fish taken by a fisher per day, referred to as a bag limit. This person based limit is more independent of activity and enables fishers to pursue their fishing objectives. For example our results indicate that restricting fishing effort would impact trophy fishers in particular, whereas a general restriction of the number of fish taken per angler enables high centrality and high frequency fishers to exercise their preferred individual fishing patterns through, for example, catch and release practices. However, fishers with highly consumptive intentions will object to this approach if they consider the daily bag limit to be insufficient. This is one likely explanation for fishing regulations being identified as a significantly greater barrier to 'Hunter-Gatherers' than any other sub-group, given they have the highest consumptive orientation of the five sub-groups. This is also the group that were the focus groups revealed was more likely to relate their fishing success to luck than skill and, therefore these individuals may have a greater reluctance to return fish to the water on the occasions they are lucky enough to land them. Despite this, Hunter Gatherers displayed some of the highest levels of overall satisfaction with their fishing experiences across all the sub-groups and across both surveys, indicating that despite their concerns over regulation this did not significant impede their enjoyment of fishing.

Across all sub-groups interviewed in the focus group there was general dissatisfaction with the opportunities for their voices to be heard in fisheries management decision making. Few of the participants knew how to get involved in decision making processes or how to access representative groups, and a number indicated they did not believe the current representation adequately reflected their views or opinions. The sub-groups identified through this study provide a basis through which further exploration can be conducted of how to facilitate two-way communication between peak bodies and the different sections of the fishing community.

The findings of this study indicate that conflict amongst user groups - particularly between recreational and commercial fishing - are likely to relate to two key areas. The first area of concern focused on the impact of these user groups on the individuals fishing experience, through declines in abundance or through witnessing activities or practices found confronting or upsetting. This was particularly prevalent amongst 'mastery' motivated fishers who were concerned by issues relating to bycatch, a perception that commercial fishing 'takes all the fish' or beliefs about fisheries management being inequitable (e.g. different size limits for commercial and recreational catch). The second area of concern related to wider global or national issues which were often extrapolated to a more local context. These were more frequently observed amongst the 'non-mastery' oriented fishers and related largely to misconceptions or misunderstandings about the nature of commercial fishing in NSW. Discussions focused largely on international examples of over fishing or on industrial scale fishing operations, such as the 'supertrawler'. Responses to each of these issues would be quite different. Targeted non-bias education of social and generalist fishers about NSW commercial fishing would ensure that this group had a greater degree of awareness and comfort about commercial fishing management in NSW, given the relative environmental health of NSW fisheries in comparison with the international examples often cited in the focus groups. While concerns over environmental practices are likely to remain negotiations over resource allocation would be improved if fishers are better informed about the relevant local settings. Concerns from mastery oriented fishers about forgone opportunities as a result of two sectors competing over a limited common resource are more complex and will require consideration as part of wider resource management planning.

Similar trends were observed between mastery and non-mastery oriented fishers in relation to MPAs with mastery oriented fishers again indicating concerns over the loss of potential or future opportunities associated with area closures. These concerns related closely to a sense that the benefits associated with MPAs did not outweigh the potential costs. These groups also indicated a greater desire to fish alone or in remote locations. This was supported by the internet and phone surveys which highlight trophy hunters in particular as being the most likely to see overcrowding as a barrier to their enjoyment of fishing. This may means these fishers are more susceptible to perceived or actual concentration of fishing effort sometimes associated with MPAs (De Freitas et al., 2013).

Similar to commercial fishing debates, those not motivated by mastery aspects of fishing had lower levels of understanding of the purpose of MPAs and higher levels of confusion over zoning arrangements, but in general supported the concept of MPAs.

Another area of existing and potential conflict between user groups exists between recreational fishers and the conservation movement. There was widespread deep suspicion about the motivations of conservation groups who lobby for additional MPAs with some believing these groups have an 'anti-fishing' agenda. These results would be beneficial starting point to begin to build understanding within the conservation movement and the wider community as to the reasons behind fisher responses to management approaches such as MPAs , which can then be used to deliberate on potential responses which achieve environmental objectives while minimising the opportunities forgone by fishers.

5.4 Attracting new participants to fishing

One of the key concerns expressed by the Recreational Fishing Trust during the commissioning of this research related to the declining popularity of recreational fishing in NSW (as a proportion of the population) (West et al., 2015). The identification of different motivational profiles in the current recreational fishing population of NSW may provide some insight into potential strategies to arrest this decline or attract new entrants. These are detailed further as suggestions only in Table 37. Additional to these specific recommendations attempts to grow the sector would benefit from targeted campaigns aimed at attracting more female participants given the current dominance of males in the sport. The majority of female participants fell into the Social and Generalist sub groups so efforts to recruit women should draw on these social and escapism themes. A potential barrier to increased female recruitment and retention in the sport may be related to some of the imagery and culture commonly associated with fishing which tends to objectify and sexualise women's participation. This imagery tends to cement fishing as a predominantly male recreation and may dissuade females from trying it out. Active campaigns to address these perceptions in other sports traditionally seen as male dominated, including surfing and all the football codes, may provide some insights into how they could be addressed in fishing.

Any campaign to increase overall participation in fishing should be cognisant of the fact that mastery motivated fishers are more susceptible to concerns about lost opportunities from competing uses and overcrowding. There may, therefore, be some resistance to further grow the sector, particularly in the categories of fishing favoured by those groups (eg 'trophy' fishing for game fish, remote adventure based fishing etc). This should also be considered in context with the potential environmental implications of any increases in fishing effort.

Table 37. *Suggested responses to addressing fisher recruitment based on insights from the motivational profiles of NSW fishers*

Sub-group	Description
6. Social fishers (13%)	Promotion based on socialisation with family and friends eg family fishing days, assistance with outreach and recruitment for established fishing clubs or social groups. Social media campaigns to build networks and connection between fishers.
7. Generalists (44%)	This sub-group is likely to benefits from the suggested strategies across all other sub-groups. May also respond well to 'free' fishing days or weekends where costs associated with licence fees are waived.
8. Hunter gatherers (6%)	Establishment and promotion of fishing infrastructure ie linking messages about access (eg location of boat ramps) with suggestions on what species can be caught close by and how. Promotion of activities which maximise opportunities for taking home a catch for the table eg fish stocking, impoundment fishing. Emphasis on cooking (recipes) and eating as part of fishing promotions. Link with food ethics and 'primal' instincts to provide food for family and friends. Given the high consumptive orientation of this group rules and regulations will have to be very clearly articulated in any promotional campaign. Improved links between the professional and recreational fishing sectors may be facilitated through cross promotion of fishing 'events' with local co-ops (e.g. fishers who don't manage to catch a fish get to take some fillets home from the local co-op, local professional fishers recruited to provide tips and advice).
9. Outdoor enthusiasts (22%)	Promotion of fishing tourism and strategies which target people interested in other 'adrenaline' sports especially those that involve remote or nature based activities eg hiking, kayaking, abseiling etc. Potential to combine fishing with other adventure sports to provide an introduction to fishing to a new demographic (eg hike/abseil to a remote location and fish)
10. Trophy fishers (15%)	As above except with a focus on achievement sports such as triathlons, mountain climbing, marathons etc i.e. sports that involve competition or skill development and personal achievement.

6. Conclusions

Strategies to reach and manage different sub-groups of the fishing population are likely to have different levels of success according to the suite of motivations and values that influence individual fishers. This study identified 5 key sub-groups that exist amongst NSW recreational fishers. The characteristics of these groups are summarised in Table 38. The majority of NSW fishers fall into two main categories – social fishers (30%) and generalist fishers (37%). Those fishers have lower levels of avidity and centrality to lifestyle and are less motivated by the mastery aspects of fishing – with social fishers preferring the escapism and social aspects of fishing. Consumptive orientation is generally low in this group. Given the lower emphasis on mastery aspects of fishing it is likely that these two groups are the most receptive to MPAs as management tools. It is also likely however that

they would be more easily persuaded by the arguments of fishers they see as being more knowledgeable and highly skilled in fishing than those of governments or conservation groups given the consistently high level of cynicism in relation to these groups. These groups also had high levels of confusion or misconceptions about both MPAs and commercial fishing practices in NSW they would benefit from targeted education campaigns, preferably through trusted recreational fishing channels. These would gain greater traction by tapping into the key motivational categories preferenced by this group – socialising and escapism.

Hunter Gatherers are a unique sub-group in that they have high levels of consumptive orientation, coupled with a moderate to high level of interest in the mastery aspects of fishing – although the focus group discussion suggest that this may relate less to the development of skill preferred by Trophy Fishers and Outdoor enthusiasts, and more with the gamble of fishing. Whilst the surveys indicated that this group is one of the most satisfied with their fishing experience they were also the group most sensitive to the impacts of regulation (eg bag and size limits) and access (through physical infrastructure or through closures such as MPAs). This is likely to relate directly to their ability to catch and keep fish. Whilst there is no suggestion that all fishers in this sub-group would be non-compliant with regulations, their profile suggests that this would be the group most tempted to exceed bag limits or take under-sized fish and therefore compliance strategies may benefit from a closer examination of their motivations and attitudes.

Finally, the two most avid groups of fishers – trophy fishers (9.6%) and outdoor enthusiasts (not detected in the phone survey) - are also the smallest groups. They are highly motivated by the mastery aspects of fishing in different ways – trophy fishers are chasing the biggest fish they can while outdoor enthusiasts enjoy challenging themselves against nature and against the fish, not necessarily chasing big fish but chasing new and challenging experiences. Given these fishers are seeking to maximise their opportunities to challenge themselves, seek different experiences and achieve personal bests they are more significantly impacted by activities which they perceive to limit these opportunities – especially MPAs and commercial fishing – but are highly supportive of regulations that limit their take (ie what they can keep) but not their catch (ie whether they can catch but release), such as bag and size limits. While traditional motivation scales would therefore class these fishers as having low consumptive orientation, given they are less interested in keeping fish, their opposition to activities which limit their opportunities to target or land fish, such as area closures or competing uses, suggests that the loss of the potential fishing *experience* is of significant concern to this group. This is reinforced by analysis of the individuals motivated by mastery who supported MPAs or commercial fishing. They couched their support in terms of impact (ie that an

MPA had not affected them) or 'traded off' any impacts against the benefits they saw as MPAs and/or commercial fishing providing (eg bigger fish or bait products).

These findings are of significance for management responses in that they highlight the different approaches that may be necessary to engage different groups and to build support for management changes such as MPAs. In particular management needs to consider the 'foregone opportunity' impacts for mastery motivated recreational fishers from both MPAs and competing commercial fishing activities. This does not means recreational fishing opportunities should be prioritised over conservation or commercial fishing activities, rather that consideration should be given to maximising benefits to offset these impacts through, for example, compensatory strategies or fisheries enhancement exercises. Finally, education and promotional campaigns across all sub-groups would benefit from tapping into the different motivational profiles and needs of the different groups. For example, those fishers with high interest in mastery are likely to already be an engaged audience with significant pre-existing knowledge. Capturing their attention may require developing more sophisticated messaging focusing on challenge and skill development. Similarly social fishers and generalists may be more receptive to simple, informative messages which build on themes around escape, relaxation and social networks.

***Table 38**: Study summary - Recreational fishing sub-groups and their characteristics from the results of the phone and internet surveys and focus group discussions.*

Sub-group	**Average days fished**		**Centrality (score from 5)**		**Attitudes and recommended management responses**
	Ph	**Net**	**Ph**	**Net**	
Social fishers (30% phone, 13% internet): prioritise the social and escapism aspects of the fishing experience. While consumptive orientation is relatively low they may be motivated to catch and retain fish based on a desire to share seafood products with friends and family. Mastery aspects of fishing of low importance to this group.	28.6	27.94	2.41	2.02	Requires active and targeted education campaigns around all aspects of fisheries management, building on key escapism and socialisation themes. Highest levels of confusion around regulation and lowest levels of understanding of current fisheries management approaches and practices.
Generalists (37% phone, 44% internet): have no clear motivational preferences, with elements of all three activity general (non-catch related) categories of motivation common within the sub-group. While mastery aspects of the fishing experience are moderately important to this group there is some suggestion that this may focus primarily on experimentation with equipment or fishing gear.	19.6	36.6	2.22	2.71	
Hunter gatherers (24% phone, 6% internet): high levels of consumptive orientation compared with the other profiles. This suggested a group of fishers who are motivated primarily by consumptive orientation; that is, catching, retaining, and eating fish. They are much more inclined to try and catch whatever they can, rather than targeting specific species, and often believe their catches come down to luck rather than skill.	24.4	43.11	2.79	3.06	Most impacted by regulations on 'keep' and most likely to be 'tempted' by non-compliance given high consumptive orientation. Efforts to build voluntary compliance with fishing regulations should focus on this group.
Trophy fishers (10% phone, 15% internet): comparatively high levels of interest in 'catching large/trophy fish' and 'mastery'. This suggested a group of fishers who were motivated by the challenge and skill involved in catching large trophy fish.	34.8	60.74	2.71	3.32	Most sensitive to over-crowding concerns and perceived forgone opportunities associated with loss of access (through MPAs) or competition with other users (eg commercial fishers). The smallest sub-groups but also the most avid, and have high level of involvement in fishing related issues (eg committees).
Outdoor enthusiasts (not detected in phone, 22% internet): low levels of consumptive orientation, but high levels of all three categories of activity general motivations. The key difference between this profile and trophy hunters relates to their consumptive orientation, which is closely related to their specific motivations in relation to mastery. While trophy fishers are aiming primarily to catch the biggest fish they can, outdoor enthusiasts are more interested in challenging themselves against nature of against the fish through experimentation with gear (eg using light line), location or technique.	n/a	49.96	n/a	2.88	

7. Priorities for further research

- This study uses the approaches of recreational fishing researchers to these motivational issues. Recent non fishing literature has more arm's length and detailed analysis approaches from "outside" the recreational fishing literature that should be investigated in future research.
- This study has identified a gap in the communication between the motivational groups and the management system. Across all sub-groups and motivation categories fishers expressed concern that they did not feel there were sufficient opportunities for them to have input into fisheries management, and many indicated that they did not feel that fishing peak bodies adequately represented their views. Further research is required to build more suitable co-management arrangements for stakeholders with different motivations to communicate with representatives and management
- Further research is necessary to test the validity of the identified sub-groups across cultures and where key ethnic or cultural differences might lie. This is a high priority need, particularly in metropolitan areas, given there is evidence that it is a source of conflict and disharmony within the recreational fishing community. Understanding the motivational profiles of different sections of the community will help to build broader cultural awareness and tolerance amongst fishers, whilst developing programs and strategies which build support for environmental objectives.
- Linked to the above is the need for a broader examination of potential areas of conflict that may lie between the different motivational profiles of fishers and how they might be resolved.
- Educational strategies that link with the key motivational sub groups identified in this study is an area of potential application of this research. For example, to target fishers with low levels of understanding of marine parks and commercial fishing, educational strategies could focus on key escapism and socialisation motivations.

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Appendix 1: The internet survey instrument

UNIVERSITY OF WOLLONGONG

Default Question Block

STUDY TITLE: Examining the Motivations and Satisfaction of Recreational Fishers in New South Wales

Principal Investigator: Professor Alistair McIlgorm (University of Wollongong)
Co-Investigators: Dr Michelle Voyer (University of Wollongong), Dr Christopher Magee (University of Wollongong), Dr Julian Pepperell (consultant).

PURPOSE OF THE RESEARCH

The purpose of this research is to examine the motivations of recreational fishers in New South Wales. This research is funded by the government Recreational Fishing Licence Trust and is being conducted by researchers at the University of Wollongong.

Participation in this study will involve completing a 20 minute online survey. This survey is primary focused on your fishing experiences, including what you enjoy about fishing (e.g., "When I go fishing, I am not satisfied unless I catch something"), why you go fishing (e.g., "To be outdoors with nature"), and what things limit your enjoyment about fishing (e.g., "the level of enforcement of fishing practices"). The survey will also collect information about demographic characteristics (e.g., age, gender, ethnic background) to better understand the characteristics of recreational fishers in NSW.

PARTICIPATION IS VOLUNTARY

Participation in this study is voluntary. You are free to decide to not participate or withdraw your consent during the survey without having an effect on your relationship with the investigators or the University of Wollongong. However, because the data are anonymous, it will not be possible for you to withdraw your results after you have completed the survey.

ANTICIPATED USES/BENEFITS OF THIS RESEARCH

It is anticipated that this research will provide an improved insight into the behaviours and motivations of recreational fishers in NSW. This information will be used to inform fisheries management practices in NSW. All collected data are anonymous and will be accessible only to the named researchers. The findings of the research will be presented in reports and journal articles, but only at a summary level (i.e., individual data will not be reported).

ETHICS REVIEW AND COMPLAINTS

This study has been reviewed by the Human Research Ethics Committee (Social Science, Humanities and Behavioural Science) of the University of Wollongong. If you have any concerns or complaints regarding the way this research has been conducted, you can contact the UoW Ethics Officer on (02) 4221 3386 or email rso-ethics@uow.edu.au.

If you have any further questions about this study please contact:

Professor Alistair McIlgorm at amcilgor@uow.edu.au or 02 4221 8117.

Do you consent to participate in this study?

- Yes, I would like to participate
- No, I would not like to participate

SECTION A.

This section of the survey asks you about your fishing experiences.

Please answer each question by selecting the most appropriate response. If you are unsure about how to answer a question, please give the best answer you can.

At what age did you first start fishing?

Have you gone fishing in NSW at least once in the past 12 months?

- Yes
- No

In NSW over the 12 months, approximately how many days have you fished in saltwater?

In NSW over the 12 months, approximately how many days have you fished in freshwater?

Please indicate how frequently you have fished at the following locations in NSW over the past 12 months

	Never	Rarely	Sometimes	Often
Ocean bottom fishing	○	○	○	○
Ocean game fishing	○	○	○	○
Estuary and habour fishing from a boat	○	○	○	○
Fishing from the rocks	○	○	○	○
Beach fishing	○	○	○	○
Fishing charter vessel	○	○	○	○
Dams, lakes, or impoundments	○	○	○	○
Fishing from wharves/jetties	○	○	○	○
Rivers/streams	○	○	○	○
Spearfishing	○	○	○	○

On your last fishing trip, please list the species of fish you were hoping to catch

Was anyone with you the last time you went fishing?

- ○ Yes
- ○ No

Who did you go fishing with (tick all that apply)?

- ☐ Fishing friends
- ☐ Partner/spouse
- ☐ Children/other family members

- [ ] Other
- [ ] Cannot say

How likely is it that you will renew your NSW fishing licence?

- ○ Unlikely
- ○ Undecided
- ○ Likely

What type of NSW recreational fishing licence would you like to hold next?

- ○ 3 days
- ○ 1 month
- ○ 1 year
- ○ 3 year
- ○ I don't need a licence

SECTION B.

This section of the survey asks you about your views and attitudes relating to recreational fishing.

Please answer every question by selecting the most appropriate response. If you are unsure about how to answer a question, please give the best answer you can.

Please rate the importance of each of the following in relation to recreational fishing?

	Not important	Slightly important	Moderately important	Very important	Extremely important
For relaxation	○	○	○	○	○

To be outdoors	○	○	○	○	○
To get away from regular routine	○	○	○	○	○
For the experience of the catch	○	○	○	○	○
To get away from the demands of other people	○	○	○	○	○
To experience unpolluted natural surroundings	○	○	○	○	○
For the challenge of the sport	○	○	○	○	○
To be close to the water	○	○	○	○	○
For family recreation	○	○	○	○	○
To be with friends	○	○	○	○	○
To develop my skills	○	○	○	○	○
To experience new and different things	○	○	○	○	○
To test my equipment	○	○	○	○	○
To obtain a 'trophy' fish	○	○	○	○	○
To win a trophy or a prize	○	○	○	○	○

Please indicate your level of agreement with each of the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
If I stopped fishing, I would probably lose touch with a lot of my friends	○	○	○	○	○
If I couldn't go fishing, I am not sure what I would do	○	○	○	○	○
Because of fishing, I don't have time to spend participating in other leisure activities	○	○	○	○	○
Most of my friends are in some way connected with fishing	○	○	○	○	○
I consider myself to be somewhat expert at fishing	○	○	○	○	○
I find that a lot of my life is organised around fishing	○	○	○	○	○
Others would probably say I spend too much time fishing	○	○	○	○	○
I would rather go fishing than do almost anything else	○	○	○	○	○
Other leisure activities don't interest me as much as fishing	○	○	○	○	○

Please indicate the extent to which you agree or disagree with each of the following statements

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
A fishing trip can be successful even if no fish are caught	○	○	○	○	○
When I go fishing, I'm just as happy if I don't catch fish	○	○	○	○	○
If I thought I wouldn't catch any fish, I wouldn't go fishing	○	○	○	○	○
When I go fishing, I'm not satisfied unless I catch something	○	○	○	○	○
The more fish I catch, the happier I am	○	○	○	○	○
A successful fishing trip is one in which many fish are caught	○	○	○	○	○
A full bag is the best indicator of a good fishing trip	○	○	○	○	○
I'm happiest with a fishing trip if I catch at least the bag limit	○	○	○	○	○
I would rather catch 1 or 2 big fish than 10 smaller fish	○	○	○	○	○
The bigger the fish I catch, the better the fishing trip	○	○	○	○	○
I'm happiest with the fishing trip if I catch a challenging game fish	○	○	○	○	○
I like to fish where I know I have a chance to catch a trophy fish	○	○	○	○	○
I usually eat the fish I catch	○	○	○	○	○
I'm just as happy if I don't keep the fish I catch	○	○	○	○	○
I want to keep all the fish I catch	○	○	○	○	○
I'm just as happy if I release the fish I catch	○	○	○	○	○

Please indicate whether any of the following are factors that prevent you from fishing as often as you would like.

	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I have too many work/family commitments	○	○	○	○	○
Other leisure activities take up my time	○	○	○	○	○
Fishing areas are too crowded	○	○	○	○	○
I don't have access to fishing opportunities close					

to home	○	○	○	○	○
I can't afford to fish more often	○	○	○	○	○
Fishing equipment and supplies is too expensive	○	○	○	○	○
Fishing facilities (boat ramps, jetties etc) are poorly developed and/or maintained	○	○	○	○	○
I can't catch enough fish to suit me	○	○	○	○	○
Fishing regulations are too confusing	○	○	○	○	○
It is difficult to find others to fish with	○	○	○	○	○
Fishing regulations are too restrictive	○	○	○	○	○
I don't have the necessary fishing skills	○	○	○	○	○
Poor weather	○	○	○	○	○

Reflecting on the previous 12 months, please indicate the extent to which you have been satisfied with:

	Very dissatisfed	Dissatisfied	Unsure	Satisfied	Very satisfied
Fishing opportunities in general	○	○	○	○	○
The number of fish caught	○	○	○	○	○
The size of fish caught	○	○	○	○	○
Fisheries management	○	○	○	○	○
The level of enforcement of fishing practices	○	○	○	○	○
The cost of fishing licences	○	○	○	○	○
The overall quality of fishing	○	○	○	○	○

SECTION C.

This section of the survey asks you some questions about yourself. As noted above, all of this information will be anonymous and is important in understanding the types of people who engage in recreational fishing.

What is your age in years?

Are you:

- Male
- Female

What is your country of birth?

- Australia
- Another Country (please specify)

What is the highest level of education you have completed?

Which of the following best describes your current situation?

What is the total of all household wages/salaries, government benefits, pensions, allowances, and other income? ($ per year/before tax)

Which of the following best describes your ethnic background?

- Australian
- Aboriginal and/or Torres Strait Islander
- English
- Irish
- Chinese
- Italian
- Greek
- Scottish
- German
- Lebanese
- Dutch
- Maltese
- Polish
- Filipino
- Indian
- Croatian
- Vietnamese
- Other (please specify)

How did you find out about this survey?

- Fishing newsletter
- Friend or family member
- Found out about it online
- Other. Please specify

Do you have any other comments about your motivation to fish or your satisfaction with fishing that is not covered in this survey?

Thank you very much for your time - you have now completed the survey.

We will be conducting further research to better understand the experiences of recreational fishers in NSW.

This research will consist of focus group discussions.

If you would like to be involved in this research, or receive further information, please provide your details below. These details will be kept strictly confidential.

- I would like to be contacted about future research in this area
- I would not like to be contacted about future research in this area

Your first name:

Email address:

We are planning to conduct the focus groups in Newcastle, Sydney, and Wollongong. Please indicate which of these locations would be most convenient for you.

- Sydney
- Wollongong
- Newcastle
- None of these locations