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FISHERIES RESEARCH & DEVELOPMENT CORPORATION

Quantifying inter-sectoral values within and among the Indigenous, commercial and recreational sectors

Schultz, T., Thomy, B., Hardaker, T., Perry,

M., Faranda, A., Gustavsson, M., Chudleigh, P., and Binney, J.

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Researcher Contact Details

Name:	Buyani Thomy
Address:	10-12 Agnes St, Fortitude Valley, Qld 4006
Phone:	0401 625 281
Email:	buyani.thomy@gmail.com
Web:	www.nceconomics.com

FRDC Contact Details

Address:	25 Geils Court
	Deakin ACT 2600
Phone:	02 6122 2100
Email:	frdc@frdc.com.au
Web:	www.frdc.com.au

In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

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The study was undertaken in a confidential manner, and the survey included a confidentiality statement to assure participants that no personal information beyond their email address was required. Any data relating to the study were stored in a password-protected database.

Participants' email addresses were temporarily linked to the data collected for the sole purpose of providing compensation to participants through a draw to acknowledge their contributions. All email addresses were deleted except for participants who opted to receive a copy of the final report.

The survey and overall research were designed and undertaken in line with the principles of responsible research conduct as outline in the Australian Code for the Responsible Conduct of Research (2018).

Furthermore, the study was undertaken in line with the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) Code of Ethics for Aboriginal and Torres Strait Islander Research. The research was designed in consideration of the four principles of the AIATSIS research framework: indigenous self-determination, Indigenous leadership, impact and value, and sustainability and accountability. Additionally, our face-to-face data collection was collected by Indigenous team members.

A list of organisations that were contacted and/or those that helped to distribute the survey is provided in **Appendix 1** and **2**.

Abbreviations and acronyms

AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
FRDC	Fisheries Research and Development Corporation
Comm.	Commercial
Qld	Queensland
RD&E	Research, Development and Extension
Rec.	Recreation
Tas	Tasmania
WA	Western Australia

Executive Summary

What the project is about

Natural Capital Economics, Alluvium Consulting and Agtrans were engaged by Fisheries Research and Development Corporation (FRDC) to quantify inter-sectoral values within and between the Indigenous, commercial and recreational sectors. A Q-methodology approach was used to tease out values held by these three sectors.[1] The research process included a literature review and extensive industry consultation to ensure that the findings reflected the values of the relevant fishing sectors. Key industry organisations were consulted and a survey of fishers across the three sectors in Western Australia, Tasmania, and the Great Barrier Reef region in Queensland. Survey data was collected between May 2021 and August 2021.

A key motivation for this project was a desire to achieve fair and secure access to aquatic resources and the first step in the achievement of this outcome was having a baseline understanding of the key shared and contrasting values held by key fishing sectors (Indigenous, commercial, and recreational).

This study was undertaken to collate values and identify complementary and contrasting values within and between the three sectors.

Background

FRDC is an organisation that is co-funded by the Australian Government and the fishing and aquaculture sectors with the aim to plan and invest in fisheries research, development and extension (RD&E) activities in Australia. This includes providing leadership and coordination of the monitoring, evaluating and reporting of RD&E activities, facilitating dissemination, extension and commercialisation. In developing the organisation's 2020-25 Strategic Plan, FRDC identified five outcomes and associated enabling strategies, including Outcome 4: Fair and secure access to aquatic resources. In developing Outcome 4, FRDC realized that a shared appreciation of the different beliefs and values that underpin perceptions of fairness and security was required. Furthermore, it was acknowledged that such values are believed to differ within and between different sectors of the fishing and aquaculture sector and can be a source of tension, conflict and mistrust. For these sectors to collaborate effectively, solutions need to be found to the challenges associated with co-management and resources access. However, in the past, trust among the sectors has not always been straightforward. A baseline understating of shared and contrasting values will help inform future decisions and engagement activities between fishers and policymakers.

Aims/objectives

To support FRDC's vision of fair and secure access to aquatic resources, it is important to begin with a baseline understanding of contrasting and complementary fishing values held by the key sectors (Indigenous, commercial, and recreational). In the context of this report, a fishing value refers to when an aspect of fishing is perceived to be important (i.e., it is of value) to a person who identifies as someone from one of the three fishing sectors. Values were considered across environmental, cultural, economic and/or social aspects of fishing. A complementary value, therefore, refers to when something is equally important across different groups. A contrasting value is when that value is not shared equally across different groups.

[1] Q-methodology is a semi-quantitative technique used to explore human perspectives (Zabala *et al*., 2018). It is a robust, systematic and repeatable method (Sneegas *et al*., 2021; Dziopa & Ahern, 2011). Further details about Q-methodology is provided in the Methods section.

Through this understanding, FRDC can better make decisions regarding fair and equitable access to resources that align with the values that have been identified as complementary across the three sectors. Moreover, the discovery, promotion and discussion of values that are shared across the three sectors can help build trust between groups of people that perhaps previously did not identify as having shared or common values. That is, by highlighting the shared values you can create and establish a common ground for future discussions and/or collaborations between the groups. Similarly, by understanding areas of contrasting values, FRDC can identify factors that might be driving mistrust between groups and develop strategies to overcome these barriers.

Therefore, the objectives of the project were:

1. To collect, analyse and report on the values held by the Indigenous, commercial, and recreational sectors using a robust and systematic methodology that is repeatable.
2. To identify complementary and contrasting values among Indigenous, commercial, and recreational sectors through an extensive survey.
3. To report findings and provide recommendations for efficient and practical data collection mechanisms to FRDC.

Methodology

The core research question addressed by this study was to understand the extent to which values are shared (or not shared) by fishers across three key sectors (i.e., Indigenous, commercial and recreational).

The research process began with an extensive desktop review to identify what is important to fishers from across the social, environmental, economic and cultural domains. The final list of 44 value statements were refined and finalised in consultation with representatives from across the three sectors as well as the FRDC Human Dimensions Research Committee.

The study was run online using Q-Method Software (https://qmethodsoftware.com), a semi-quantitative technique used to explore human perspectives in a systematic and repeatable manner. Fishers across the three sectors were required to sort and rank the pre-listed value statements. Participants were recruited through emailed invitations, social media posts and newsletters from key fishing sector representative bodies as well as snow-ball sampling. In response to a very low response rate from the Indigenous sector, additional participants (n = 6) were recruited by a member of the project team at a conference held in Far North Queensland. A total of 116 fishers completed the Q study.

The collected data was analysed using inverted factor analysis to allow for the identification of distinct sub-groups of people whose responses are highly correlated. Through examining the Q-methodology outputs, five distinct sub-groups emerged: Sub-group A – “social-value fishers” (n = 39); Sub-group B – “economic-value fishers” (n = 19); Sub-group C – “environmental-value fishers” (n = 24); Sub-group D – “traditional-value” fishers (n = 10); and Sub-group E – “fish-focused” fishers (n = 15). Each subgroup comprises fishers who ranked the value statements similarly in terms of those statements they felt were very important to them and those that were less important to them. As such, the analysis provided information about complementary and contrasting values among different groups of fishers.

Results/key findings

This study indicated that values (i) do not “neatly” align to the different industry sectors; and (ii) do not differ based on the different industry sectors. However, the Q-methodology analysis indicated that there were five distinct groups based on how values were ranked.

Across the five distinct groups the top four complementary values were: (1) *fishing is environmentally sustainable*, (2) *accountability for industry participants who break the rules*, (3) *having access to fish and*

fishing, and (4) *access to the ocean/sea*. Environmental sustainability was the highest ranked value even among the sub-group that was dominated by economic type values (sub-group B), suggesting that even for productivity-based research and development (R&D), the focus should be on R&D that drives productivity and/or profitability improvements *without* reducing/ compromising environmental sustainability. Environmental sustainability is also key driver of production and there seem to be general appreciation of its importance across the fishing sectors.

The three lowest ranked values across the five distinct groups were cultural values: (1) fishing's support of cultural practices and requirements, (2) fishing provides a connection to ancestors/previous generations, and (3) opportunity to barter and trade goods. Some of the social values not considered to be important by any of the sub-groups included catching lots of fish or large fish, and spending time fishing alone.

In terms of contrasting values across the five sub-groups, economic type values were generally not highly ranked except by one group which was dominated by commercial fishers (sub-group B). Statements like fishing's economic returns and employment/income from fishing, industry innovation and advancement, fishing's contribution to the local economy were not considered to be important by the remaining groups.

The use of Q-methodology to identify values for the different sectors revealed that online survey may not also be practical and effective. For example, there was very limited responses to the online survey by Indigenous sector participants and further effort was required to capture their values in a face-to-face approach. It is recommended that future research should seek to include face-to-face data collection methods to improve efficiency in capturing views of diverse groups.

Implications for relevant stakeholders

Values play a key role in decision-making and in creating public policy. One of the primary implications of the current study is that it would likely be ineffective and inefficient to make decisions or set policies based on sectoral classifications in the fishing industry such as Indigenous, commercial and/or recreational. The project findings strongly demonstrate that the values held by fishers cannot be neatly delineated into standard industry sector classifications. However, the project findings also show that there are a number of values shared by all fishers across sectors that may provide 'common ground' and 'common language' that in turn would provide a basis for better engagement and communication both between the sectors and between researchers, fisheries managers, Government and Australian fishers.

Recommendations

Recommendations based on project findings are:

i. FRDC and other decision-making stakeholders take into account the diversity of values held by each sector. This will ensure that future research and policy are driven by a broad suite of diverse values for each sector and not driven by a limited set of dominant groups within the sector.
ii. The project findings be used to inform and prioritise further investigation into specific issues associated with the range of complementary and contrasting fisher values identified.
iii. Where possible, future survey studies adopt an in-person, and targeted recruitment approach. Face-to-face data collection methods will improve efficiency in capturing views of diverse groups.
iv. A more qualitative data collection approach is utilised to enable a deeper understanding of the values identified and the implications for policy and planning.
v. Insights about the complementary and contrasting values of fishers across the Indigenous, commercial and recreational sectors be shared with the industry stakeholders through publication of this report and the extension and adoption outputs outlined later in this report.

Dissemination of the findings that all sectors have several complementary values will help improve engagement and communication between the sectors and enhance effective and efficient implementation of future fisheries policies. Notably, the dissemination of the findings of this study is a step towards building a shared understanding of complementary values among different sectors and contrasting values within individual sectors. The shared knowledge will help improve trust among the sectors and between regulators and resource users. The improvements in trust among the various stakeholders will further enhance effective decision-making processes, particularly co-management and resource access.

Keywords: Indigenous, commercial, recreational, fishing, values, value statement, Q-methodology

Introduction

Background

Fisheries Research and Development Corporation (FRDC) is an organisation that is co-funded by the Australian Government and the fishing and aquaculture sectors to plan and invest in fisheries research, development and extension (RD&E) activities in Australia. FRDC's role includes providing leadership and coordination of the monitoring, evaluating and reporting of RD&E activities, facilitating dissemination, extension and commercialisation.

The Australian fisheries industry is made up of several sectors, including Indigenous, commercial and recreational. The FRDC identified building community trust as a key priority for Australian fishing and aquaculture in an effort to improve recognition of the contributions these sectors make, but also to address issues that may impact their 'social license to operate'. However, trust among sectors (e.g. recreational and commercial fishers) or between regulators and resource users is equally important, as trust will underpin effective decision-making processes, e.g. associated with co-management and resource access. A critical element to the development of trust is establishing a two-way understanding of the social, economic and ecological values, objectives and aspirations both within and between the Indigenous, commercial and recreational sectors.

The current project titled "*Quantifying inter-sectoral values within and the Indigenous, commercial and recreational sectors*" has delivered research findings on the contrasting and complementary values between Indigenous, commercial, and recreational fishing sectors. The purpose of this project was to develop a baseline understanding of values of the Indigenous, commercial and recreational sectors, identifying contrasting and complementary values among these groups. The research process included a literature review and extensive industry consultation to ensure that the values identified were reflective of the values of the different fishing sectors. The consultation was undertaken through discussions with representatives of the fishing sectors and a Q-methodology study of fisheries resource users across the three sectors in Western Australia, Tasmania, and the Great Barrier Reef region in Queensland.

The research findings will help contribute to an improved understanding of values held by fishers among the three sectors and potentially assist in developing shared understanding and trust among the sectors and between regulators and resource users. Improvements in trust among the various stakeholders will enhance effective decision-making processes, particularly co-management and resource access. Findings from the project will be used to inform future RD&E, fisheries resource management, and support fair and secure access to aquatic resources. The findings also will be valuable to regulators through an enhanced understanding of values across the different sectors leading to more efficient and effective consultation processes.

Rationale for the current project

In developing the organisation's 2020-25 Strategic Plan, FRDC identified five outcomes and associated enabling strategies, including Outcome 4: Fair and secure access to aquatic resources. In developing Outcome 4, FRDC realized that it did not have an appreciation of the different beliefs and values that underpin perceptions of fairness and security among people from each of the fishing sectors. Furthermore, it was acknowledged that such values differ within and between the sectors and this can be a source of tension, conflict and mistrust.

Objectives

Typically, policy and programs focus on strategies to approach and overcome challenges (such as the achievement of fair and equitable access to resources). However, before determining what strategies to take, it is important to understand how varying values among the community of interest might influence and drive the challenges. That is, understanding values can help formulate alternative strategies to address challenges through new ways that align and appeal to what is important to the whole community.

Therefore, to support FRDC's vision of fair and secure access to aquatic resources, it is important to begin with a baseline understanding of contrasting and complementary fishing values held by the key sectors (Indigenous, commercial, and recreational). In order to create a baseline understanding, and given the nascent research to explore this topic, a very broad definition of values was used for this study. That is, in the context of this report, a fishing value refers to when an aspect of fishing is perceived to be important (i.e., is of value) to a person who identifies as someone from one of the three fishing sectors (Ignatius, Delaney and Haapasaari, 2019; Ignatius and Haapasaari, 2018; Tadaki *et al*., 2017). Values were also considered across environmental, cultural, economic and/or social aspects of fishing. A complementary value, therefore, refers to when something is important across different groups. A contrasting value is when that value is not shared equally across different groups.

Rather than general community values, or how the community values the fishing sector, the study focuses on fishers and their own values. That is, what is important to them about fishing. This understanding is critical because those values guide their beliefs, attitudes and, ultimately, behaviour. Through this understanding, FRDC can better make decisions regarding fair and equitable access to resources that align with the values that have been identified as complementary across the three sectors. Moreover, the discovery, promotion and discussion of shared values across the three sectors can help build trust between groups of people that perhaps previously did not identify as having shared values. Similarly, by understanding areas of contrasting values, FRDC can identify factors that might be driving mistrust between groups and develop strategies to overcome these barriers to collaboration.

Therefore, the objectives of the project were:

1. To collect, analyse and report on the values held by the Indigenous, commercial, and recreational sectors using a robust and systematic methodology that is repeatable (i.e., using Q-methodology)
2. To identify complementary and contrasting values among Indigenous, commercial, and recreational sectors through an extensive survey.
3. To report findings and provide recommendations for efficient and practical data collection mechanisms to FRDC.

For the purposes of this study the following simple definitions for the three sectors were used:

- Indigenous sector – involved people of Aboriginal or Torres Strait Islander descent who identifies as Aboriginal or Torres Strait Islander and is accepted as such by the community in which they live[2]
- Recreational fishers – are people who engage in catching or attempting to catch fish for non-commercial and leisure purposes
- Commercial fishers – are people who engage in fishing for commercial purposes.

[2] https://aiatsis.gov.au/explore/indigenous-australians-aboriginal-and-torres-strait-islander-people

Method

What is Q-methodology?

For this project we aimed to explore the degree to which the values for three different fishing sectors converged and/or diverged. We specifically focused on the values that are important to fishers, rather than what the wider community values about fishing. That is, we sought to examine whether some values are shared across all three fishing sectors or whether some values are specific to a particular sector or sub-group of fishing sectors. Knowing what is important to fishers, and how values vary, across the sectors is of practical importance to policymakers and key stakeholders from the different sectors in order to build trust and to improve the way in which they communicate with fishing communities and each other.

To answer the project objectives, we used a technique referred to as Q-methodology. Q-methodology is a semi-quantitative technique used to explore human perspectives (Zabala *et al*., 2018). It is a robust, systematic and repeatable method (Sneegas *et al*., 2021; Dziopa & Ahern, 2011). It is used to investigate the perspectives of participants who represent different viewpoints with regards to an issue or topic, by having participants rank and sort a series of statements (or images) that represent all things people potentially think or feel about the issue or topic being investigated; in this case fishing values. The underlying validity of this method relies on the ability to identify, select, define, and articulate what is being assessed in a way that is relevant and understandable to the target community (i.e., fishers). Q-methodology achieves this through the systematic study of participant viewpoints.

It is important to note that Q-methodology is a non-representative method of identifying and quantifying perspectives (in this context, perspectives related to fishing values). It is often referred to as a mixed methodology. That is, while the method uses qualitative judgements to define and develop the statements, it uses quantitative analysis to reveal the participants perspectives.

The goal of Q-methodology is to understand different patterns of thought among groups of people within a target community. It is an exploration of *how* people think and feel. It does not consider *how many* people think a certain way (Valenta and Wigger, 1997). Therefore, rather than seeking a representative sample, participants for Q-methodology studies are selected for comprehensiveness and diversity. For this reason, Q-methodology does not generate a representative understanding of a particular viewpoint among the target community. Importantly, however, this also means that the results of these Q-methodology studies are less influenced by low response rates compared with the results of more typical survey studies (Brown, 1980; McKeown, 1998). A thorough discussion of the process of Q-methodology can be found by reading Webler *et al*. (2009). Further, an assessment of Q-methodology as an approach to qualitative research to support the selection and definition of attributes for non-market valuation was conducted by Armatas *et al*., (2014).

Why Q-methodology?

Q-methodology elicits peoples' subjective viewpoint about an issue or topic (or in the context of this study, fishing values) through a process whereby participants sort and rank items in response to a guiding question or statement, thus producing quantitative data. The ability to quantifiably identify distinct patterns of responses (i.e. viewpoints) among subsets of participants is not easily achieved using focus groups or surveys but can be accomplished using Q-methodology (Donner, 2001). Specifically, the trade-offs made necessary by Q-methodology are not possible in Likert-type surveys, where a participant is allowed to assign a high level of importance to all attributes (in this case, values) and which can be subject to acquiescence bias. Moreover, surveys and focus groups can be

problematic when trying to pare down or prioritise from a large list of statements to a manageable number of prioritised and common statements that can be used to inform future policy, communications, inventions, monitoring and evaluation. Thus, the Q-methodology is deemed more suitable to address this project's objectives. A selection of fishing related studies where Q-methodology was applied is provided in **Box 1** below.

BOX 1: Q-methodology applications relevant to this study

Case Study 1: Stakeholders' perceptions of marine fish farming in Catalonia (Spain): A Q-methodology approach (Bacher, Gordoa and Mikkelsen, 2014)

This Q-methodology study was conducted with the marine aquaculture production industry in Spain. It explored the perceptions of five aquaculture-related key stakeholder groups (Non-Government Organisations, local fishermen, fish farming industry, scientists and regional administration) towards marine fish aquaculture in Catalonia (north-eastern Spain). There were 30 participants who were asked to sort 39 statements about environmental, social and economic aspects of marine fish farming. The emergence of four distinct perceptions indicated that marine fish farming is seen from diverse perspectives. Interestingly, all four perceptions were represented by various groups of stakeholders and not all respondents of a sector shared the same perception. Although the identified perceptions were well distinguished, several areas of agreement were identified, which the study authors identified as being useful as a common ground for future discussion. Finally, the findings revealed the main economic, social and environmental challenges faced by the fish farming industry in Catalonia. The authors concluded that "understanding perceptions of different stakeholder groups can help clear misunderstandings, as well as identify which issues are crucial to be resolved to unleash the full potential of the aquaculture sector" (Bacher, Gordoa and Mikkelsen, 2014, p. 84).

Case Study 2: Application of Q-methodology to determine the importance of water-based ecosystem services derived from the Shoshone National Forest, USA (Armatas, Venn and Wastson, 2014)

Forest Service managers were interested in using information about the value of water-based ecosystem services to local people to support management of a national forest in the United States. A Q-methodology study was conducted to obtain a greater understanding of stakeholder values and interests regarding the diverse range of ecosystem services provided by the forest. Using a purposeful, snowball sampling method a total of 96 stakeholders sorted 34 statements. Post survey analysis indicated that there were four perspectives, referred to as environmental, agricultural, Native American, and recreational. By identifying what is relevant to the respondents, the perspectives yielded could inform efforts to report implications of current policy and proposed policy changes in a way that is meaningful to respondents.

Case Study 3: Water in 2025 Beliefs and Values as a Means for Cooperation (Kathlene and Julian, 2006)

Issues of water supply, water needs, and water quality continually bring stakeholders together in cooperation or in conflict. This study explored how beliefs and values are connected to water challenges with a range of stakeholders in Colorado, USA using Q-methodology. The findings revealed both overlapping and diverging beliefs and values within the water community. Three overwhelming areas of agreement emerged:

1. Water is fundamental to the economy.

2. An appropriated right does not mean water will be available for use.

3. Agricultural water is the prime target for water transfers to urban and recreational uses

While the study also revealed contrasting values within the water community, the authors recommended that the study findings be used to guide future conversations within the water community by beginning with, and periodically coming back, to the common or shared values. They strongly advocate that future collaboration between different stakeholders should begin with an articulation of beliefs and values to "enhance the effectiveness of cooperative problem solving" (Kathlene and Julian, 2006, p. 19).

Importantly, Q-methodology allows for the study of complex issues or topics from the subject's point of view and is therefore well suited to examine peoples' values. The key strength of Q-methodology is that it clusters peoples' reactions to different types of stimuli (van de Velde *et al*., 2010), which is well aligned with the current project's goal of identifying whether fishers, across different sectors, feel and think the same way or differently in relation to a cross section of their values.

There are five basic steps in setting up this methodology:

1. Definition of the concourse[3]
2. Development of the set of statements (referred to as the Q-set)
3. Selection of the participants
4. Sorting and ranking of statements by participants (referred to as the Q-sort)
5. Conducting and analysing the results

These steps are discussed in detail in the next sub-sections.

Definition of the concourse (Step 1)

Research on broader human dimensions and fishing

To date, much of the research on the human dimensions of fishing has focused on topics such as motivations (Mcllgorm *et al.*, 2016; Magee *et al.*, 2018; French *et al.*, 2019; McNeill, Clifton and Harvey, 2019), satisfaction (Griffiths *et al.*, 2017; French *et al.*, 2019; Birdsong, Hunt and Arlinghaus, 2021), and attitudes (Essense, 2015; Mcllgorm *et al.*, 2016; Jasper, Stewart and Knight, 2017; Magee *et al.*, 2018; McNeill, Clifton and Harvey, 2019). There is an increasing recognition of the health and wellbeing of fishing (McManus, Storey and White, 2011; Hunt, Sutton and Arlinghaus, 2013; Griffiths *et al.*, 2017; King *et al.*, 2019). Recent FRDC funded studies by Thomy *et al.* (2020) and Coglan *et al*. (2020) have reviewed the literature to identify available information on how to quantify non-market values and highlight gaps in the literature. However, there has been very little research on the topic of values held by fishers across regions and fishing industry sectors in Australia.

What is a value and why are they important?

We defined a value as something that is important to someone. Therefore, for the purposes of this study, a fishing value exists when an aspect of fishing is important (i.e., of value) to a fisher from any one of the three sectors, and this could include environmental, cultural, economic and/or social aspects. It is important to flag that this definition carries anthropocentric assumptions - i.e. that values are represented by people. Acknowledging this framing, we assumed that examining what is important to people that identify as someone from either a recreational, commercial or Indigenous sector would provide a comprehensive understanding of fishing values in general. This definition of

[3] The concourse refers to a set or "population" of statements on the issue or a particular topic being investigated from which the final Q-set is drawn. It is attempting to represent "the sum of all things" people might say, think or feel about the issue or topic.

fishing values, as an evaluation of what is important to fishers, has been used in past fishing research (Ignatius, Delaney and Haapasaari, 2019; Ignatius and Haapasaari, 2018; Tadaki *et al*., 2017).

From the broader literature, there are several ways to conceptualise values that are useful for consideration. When conceptualising values theoretically, there are three different dimensions to the idea of value, 'held' values, 'assigned' values and 'relational' values. 'Held' values as those that have their basis in a person's worldview and consequently these can be very difficult to alter. 'Assigned' values are those that people have attached to specific places or landscapes and are therefore easily mapped and organised. 'Relational' values are those that are derived from the interactions between people and places or elements of the natural world; these values are more likely to change and shift over time (Jones *et al*., 2016; Witt *et al*., 2019). For the purposes of this project, we are interested in both assigned and relational values.

Stephen Kellert[4] argued that humans have innate and beneficial connections with nature that have evolved over millennia of living, surviving, and learning in natural environments. Kellert went on to conceptualise relational values as deriving from people's dependence on nature and developed a typology of values that systematically addresses nature-human relational values. Kellert's set of relational values covers ten nature-related values (Jones *et al*., 2016; Ross, Witt and Jones, 2018), including (in alphabetical order):

- Aesthetic/attraction (physical appeal and beauty of nature),
- Dominionistic (mastery, physical control, dominance over nature),
- Humanistic/affection (strong emotional attachment and love for aspects of nature),
- Moralistic (ethical concern for nature),
- Naturalistic (direct experience and exploration of nature),
- Negativistic/aversion (fear, aversion, alienation from nature – also includes apathy),
- Scientific-ecologistic/reason (systematic study of structure, function and relationships of nature),
- Spiritual (spiritual reverence for nature),
- Symbolic (use of nature in language and thought) values, and
- Utilitarian/exploitation (practical and material exploitation of nature).

Kellert's ten value types, described above, reflect a range of emotional, intellectual and physical connections between humans and other species, landscapes and environments (Ross, Witt and Jones, 2018).

However, at an individual level, a person's system of values is determined by ethnic, ideological, and religious priorities and preferences prevailing in a certain ethnic group; this system then is transmitted from generation to generation via family upbringing and schooling/education, literature, art, and mass media (Kostina *et al.*, 2015). This system of values determines an individual's relations in the family, at work, in social and political spheres, as well as in interactions among groups and nations. Values may differ substantially between individuals and groups. Further, though the nature of values and their structure may be universal, individuals and groups differ in the relative importance they attribute to the values. That is, individuals and groups have different value priorities or hierarchies (Schwartz, 2012). This is not to say that one group's values are more important than another group's values, more that understanding how values differ is important for understanding various social-psychological phenomena and numerous empirical studies have linked values to human behaviour (Bardi and Schwartz, 2003). It also means that values may be used to define and/or

[4] Stephen Kellert (1944-2016), Tweedy Ordway Professor Emeritus of Social Ecology and Senior Research Scholar at the School of Forestry and Environmental Studies, Yale University, New Haven CT, United States of America.

categorise groups, societies, and individuals, to trace change over time, and to explain the motivational bases of human attitudes and behaviour (Schwartz, 2012).

Moreover, identifying and understanding what is important to fishers across the social, environmental, cultural and economic domains is also critical. For the purposes of this project, the *social dimension* refers to what is important to people in relation to their well-being (both mental and physical), relationships, social interactions, education, participation, and quality of life. The *environmental dimension* refers to what is important to people in relation to the natural environment. The *economic dimension* refers to what is important to people in relation to profit, technology and employment/income. The *cultural dimension* refers to what is important to people in relation to their culture, heritage, and society. It is important to note that each of these dimensions are not independent; values can overlap dimensions, and many are inter-related.

Furthermore, as an exploration of the broad range of assigned and relational values relevant to fishers, it was important to have a representative set of values, some of which were potentially only going to be valued by one sector and some of which might be potentially shared values. The purpose of this project is understanding how those different values are prioritised by different individuals and groups, as this is important knowledge for policymakers, business managers and other decision makers. Most importantly, understanding complementary and contrasting values between individuals or groups (such as recreational fishers, commercial fishers and Indigenous fishers) that have shared or competing interests provides insights to support fair, sustainable, and secure availability of access, and/or use of key resources. In addition, with respect to fishing and fisheries in Australia, understanding the values of fishers in collective groups supports the efficient and effective management and regulation of aquatic resources. This is because improved understanding and appreciation of complementary and contrasting values across fishing sectors helps to promote enhanced communication and trust between decision/policymakers and fishers, and between the different fisher groups (Jones *et al.*, 2016; Fleming *et al.*, 2020).

Development of the set of statements (Q-set; Step 2)

Research on values and fishing

The value statements selected for use were identified through a desktop literature review of journal articles, websites, and grey literature that contained information relevant to the values of fishers across the three sectors. Given the limited nature of the fishing values literature, the desktop review was supported by a series of online interviews with stakeholders from each of the three fishing sectors. The stakeholders were selected based on their familiarity and experience as representatives of the fishing sectors in consultation with FRDC and members of the project team who are familiar with the fishing industry. The interviews were used to elicit additional information and evidence about potential values for fishers. The interviews identified that the values relevant to the aquaculture industry were substantially different to the values held by the wider commercial fishing sector and it was decided that it was preferable to exclude the aquaculture industry from the study at this point. In particular, given that the focus of the study was to identify shared values across the three sectors, it was preferrable to narrow of the scope of the study to fishers that have a similar level of access to marine and/or fresh waters from the three chosen case study locations. This was also driven by practical considerations in terms of recruitment and completion of the study. For example, there was recognition that to further broaden the range of values included in the study would be more time consuming and, therefore, cognitively draining which may impact on the quality of the data collected.

The literature search and review were limited to reports or studies published within the last 10 years up to 2021. This period was selected to ensure that the most up-to-date content was being considered. The Q-set (i.e., the final set of statements included in the study) was designed to be a representative set of the identified social, cultural, environmental and economic values relevant to Indigenous, commercial, and recreational fishing sectors. It is important that the Q-set is representative of the range of possible values, as this will determine the ultimate validity of the final results. The process of achieving the final representative set of 44 statements is described below.

The desktop review and stakeholder interviews yielded 291 'value' statements. Consistent with past Q-methodology research (Sleenhoff *et al*., 2015), the concourse was filtered and reduced into a set of consolidated and unique value statements. The purpose of reducing the statements is to get a Q-set that is representative, but not exhaustive and to have a sample of the diversity of possible values within the target community (Dziopa and Ahern, 2011). The process was conducted in collaboration with the project team and the FRDC Human Dimensions Research Group to reduce the list to 57 statements across the recreation, commercial and Indigenous fishing sectors. The values identified were further categorised by theme (environmental, social, cultural and economic values) to ensure that a diversity of value types was present. **Table 1** and

Table 2 present a summary of the number of value statements identified by fishing sector and by theme. The following sections then outline the source for each of the identified value statements.

Table 1: Value Statements by Fishing Sector

Fishing Sector	**No. of Value Statements**
Recreation	15
Commercial	15
Indigenous	7
Recreation/ Indigenous	9
Commercial/ Recreation	6
Indigenous/ Commercial	1
Commercial/ Recreation/ Indigenous	4
Total No. of Value Statements	**57**

Table 2: Value Statements by Theme

Fishing Sector	**No. of Value Statements**
Economic	12
Environmental	10
Social	19
Cultural	7
Economic/ Social	6
Social/ Cultural	1
Social/ Environmental	1
Environmental/ Social/ Cultural	1
Total No. of Value Statements	**57**

Values for recreation sector

Fifteen unique value statements were identified specifically for recreational fishers. The values identified for recreational fishers were predominantly social and/or environmental values. **Table 3** summarises the value statements identified for the recreational fishing sector.

Table 3: Value Statements Identified for Australian Recreational Fishers*

Value Statement	Theme	Supporting Sources
That introduced species are decreased	Environmental	Marsden Jacob Associates (no date); Deloitte Access Economics (2012)
That there is a reduction in commercial fishing pressure	Environmental	Stakeholder interviews
Catching large fish	Social	Stakeholder interviews
Catching lots of fish	Social	Ward *et al*., (2012); Mcllgorm *et al*., (2016); French *et al*., (2019); Stakeholder interviews
Catching a variety of fish	Social	Deloitte Access Economics (2012)
Catching fish for sport	Social	McInnes, Taylor and Webley (2013); Ward *et al*., (2012); Griffiths *et al*., (2017); Stakeholder interviews
Catching fish to eat for myself and/ or my family	Social/ Economic	Ward et al., (2012); Yamazaki et al., (2013)
Fishing provides a connection to nature	Social/ Environmental	Arlinghaus *et al*., (2007); Ward *et al*., (2012); Griffiths *et al*., (2017); Stakeholder interviews
Access to the outdoors	Social	McManus, Storey and White (2011); Yamazaki *et al*., (2013); Griffiths *et al*., (2017); Teixeira, Janes and Webley (2019); Stakeholder interviews
The challenge of fishing	Social	Ward *et al*., (2012); Magee *et al*., (2018); French *et al*., (2019); Stakeholder interviews
Spending time fishing with family and friends	Social	McInnes, Taylor and Webley (2013); Ward *et al*., (2012); Yamazaki *et al*., (2013); Stakeholder interviews
The competition of fishing	Social	Deloitte Access Economics (2012); Ward *et al*., (2012); Griffiths *et al*., (2017); Stakeholder interviews
The lifestyle of fishing	Social	Stakeholder interviews
Spending time fishing alone	Social	McInnes, Taylor and Webley (2013); Stakeholder interviews
Adhering to the rules and regulations	Economic/ Social	Stakeholder interviews

**Compiled from the literature review and Stakeholder interviews*

Values for commercial sector

Fifteen unique value statements were identified specifically for commercial fishers. Values identified for commercial fishers spanned all key themes including environmental, social, economic and cultural values. **Table 4** summarises the value statements identified for the commercial fishing sector.

Table 4: Value Statements Identified for Australian Commercial Fishers

Value Statement	Theme	Supporting Sources
That native fish populations are increased	Environment	Deloitte Access Economics (2012)
That fish are caught in a natural/pristine environment	Environment	Australian Fisheries Management Authority (2020); French and French (2020)
Involvement in fishing policy design and implementation	Social	French and French (2020)
Participating in scientific research	Social	French and French (2020)
Access to the ocean/sea	Social	French and French (2020); Western Rock Lobster, 2020); Stakeholder interviews

Value Statement	Theme	Supporting Sources
Fishing provides employment/income	Economic	Department of Primary Industries NSW (2008); Voyer *et al*., (2016); French and French (2020)
The profitability of fishing	Economic	Voyer *et al*., (2016); French and French (2020)
Industry innovation/technical advancement	Economic	French and French (2020)
Providing locally produced seafood	Economic	Voyer *et al*., (2016); French and French (2020)
That the fishing industry is treated fairly	Economic	Stakeholder interviews
Food security for the future	Economic	French and French (2020); Stakeholder interviews
Serving consumer needs	Economic	French and French (2020)
Fishing is "a way of life"	Cultural	Tobin *et al*., (2017); Stakeholder interviews
Having a social license to fish	Economic/ Social	Stakeholder interviews
Unethical practices are tarnishing the reputation of the sector	Economic/ Social	Stakeholder interviews

**Compiled from the literature review and stakeholder interviews*

Values for Indigenous sector

Seven unique value statements were identified specifically for Indigenous fishers. Values identified for Indigenous fishers included cultural, economic and environmental values. **Table 5** summarises the value statements identified for the Indigenous fishing sector.

Table 5: Value Statements Identified for Indigenous Australian Fishers

Value Statement (what is important)	Theme	Supporting Sources
That everyone is making an effort to improve the sustainability of fishing practices	Environment	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*
Water quality and environmental flows are maintained/improved for fish	Environment	Stakeholder interviews
Fishing provides the opportunity to barter and trade	Economic	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*; Smyth, Egan and Kennett (2018); Alkassab, (2020)
Saving money from sourcing my own food	Economic	Jackson *et al*., (2011); Schnierer (2011)
Passing on/being part of fishing traditions and knowledge	Cultural	Queensland Government Department of Agriculture and Fisheries: *https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing*; Franklyn (2003); Smyth, Egan and Kennett (2018)
That fishing binds community together	Cultural	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*; Schnierer (2011); Smyth, Egan and Kennett (2018)
Fishing supports cultural practices and requirements	Cultural	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*; Franklyn (2003); Zander and Straton (2010); Jackson *et al*. (2011); Schnierer (2011); Deloitte Access

Value Statement (what is important)	Theme	Supporting Sources
		Economics (2012); Smyth, Egan and Kennett (2018); Alkassab (2020); Thomy *et al*., (2020); Stakeholder interviews

**Compiled from the literature review and stakeholder interviews*

Cross-sector values

In addition to the unique value statements identified for the specific recreation, commercial and Indigenous fishing sectors, a number of values were identified that came from multiple sectors. These additional, potentially cross-sectoral, value statements are summarised in **Table 6**.

Table 6: Cross-sector Value Statements identified for Australian Fishers*

Value Statement	Fishing Sectors	Theme	Supporting Sources
That fish habitats are restored, improved and/or protected	Recreation/ Indigenous	Environment	Australian Government (no date); Deloitte Access Economics (2012); Stakeholder interviews
Catching only what I need		Environment	Stakeholder interviews
Access to fishing knowledge and education		Social/ Cultural	Franklyn (2003); Schnierer (2011); Smyth, Egan and Kennett (2018)
Fish are an important part of my diet		Social	Franklyn (2003); Jackson *et al*., (2011); Smyth, Egan and Kennett (2018)
Fishing is part of my identity		Social	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*; Franklyn (2003); Schnierer (2011)
Fishing provides a connection to my ancestors/previous generations		Cultural	Franklyn (2003); Schnierer (2011); Smyth, Egan and Kennett (2018); Stakeholder interviews
Maintaining and protecting fishing traditions		Cultural	Franklyn (2003); Smyth, Egan and Kennett (2018); Stakeholder interviews
The health benefits of eating fish		Social	Franklyn (2003); McManus, Storey and White (2011); Deloitte Access Economics (2012); Griffiths *et al*., (2017); Smyth, Egan and Kennett (2018); Stakeholder interviews
Fishing provides mental health benefits		Social	McManus, Storey and White (2011); Deloitte Access Economics (2012)
Self-regulation and independence	Commercial/ Recreation	Economic/ Social	Stakeholder interviews
Fishing's contribution to the local economy		Economic	BDO (2021); Stakeholder interviews
Fishing's contribution to the Australian economy		Economic	Raguragavan, Hailu and Burton (2013); Alkassab (2020)
Fishing's contribution/support of other related industries (e.g., boating, tourism)		Economic	Raguragavan, Hailu and Burton (2013); MacPherson (2017)
The quality of the fish		Economic/ Social	Zander and Straton, 2010; French *et al*., (2019)
Fishing provides physical health benefits		Social	Deloitte Access Economics (2012); Ward *et al*., (2012); Smyth, Egan and Kennett (2018)

Value Statement	Fishing Sectors	Theme	Supporting Sources
The affordability of fish	Indigenous/ Commercial	Economic/ Social	Smyth, Egan and Kennett (2018)
Having access to fish and fishing	Commercial/ Recreation/ Indigenous	Environment/ Social/ Cultural	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*; Franklyn (2003); Smyth, Egan and Kennett (2018); Stakeholder interviews
Animal welfare and animal rights		Environment	Stakeholder interviews
That my fishing is environmentally responsible and/or sustainable		Environment	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*; French and French (2020); Stakeholder interviews
Fishing is part of my culture and heritage		Cultural	Australian Institute of Aboriginal and Torres Strait Islander Studies: *https://aiatsis.gov.au/explore/fishing*; Franklyn (2003); Schnierer (2011); Smyth, Egan and Kennett (2018); Stakeholder interviews

**Compiled from the literature review and Stakeholder interviews*

Final value statements

A further process of consolidation (with additional feedback from the FRDC Human Dimensions Research Committee) involved the removal of duplicates, outliers or 'non-values' to reduce the value statements to 44 (see **Table 7** below). This process also involved updating the wording of some statements to be consistent across the entire Q-set. A pilot study was conducted with eight representatives from across the three sectors. The pilot study resulted in additional minor updates to statement wording to provide further clarity and minimise misinterpretations. The size of the final pool of statements aligns with Watts and Stenner's (2005) recommendation that 40 to 80 items are needed to maximize the stability and reliability of a Q-sort factor analysis.

Table 7: Final Q-Set statements

Having access to fish and fishing	Fishing as part of personal identity
Fishing practices that protect animal welfare	Fish are caught in a natural/pristine environment
Everyone is working to improve the sustainability of fishing practices	Fishing provides a connection to ancestors/previous generations
Native fish population sizes are healthy	Catching fish to eat for myself and/or my family
Fishing as part of culture and heritage	Fishing's role in binding community together
Catching only what is needed for a feed	Fishing as "a way of life"
Fish habitats are restored, improved and/or protected	Fishing's support of cultural practices and requirements
That introduced fish species are decreased	Catching large fish
Fishing is environmentally sustainable	Catching lots of fish
Catching only what is needed to make a living	Catching a variety of fish
Biosecurity is maintained	Catching fish for sport
Water quality and environmental flows are maintained/improved for fish	Being part of strong traditions of sharing fishing knowledge
Co-management of fisheries	Fishing provides a connection to nature
Participation in scientific research	Mental health benefits from fishing
Access to the ocean/sea	Physical health benefits from fishing
Opportunity to barter and trade goods	Access to the outdoors
Employment/income from fishing	Spending time fishing with family and friends
Fishing's contribution to the local economy	Spending time fishing alone
Fishing's economic returns	Community acceptance of my fishing activities
Providing locally caught/produced seafood to Australians	Accountability for industry participants who break the rules
Industry innovation/technical advancement	Contribution to food security
Catching good quality fish	Fish as an important part of a healthy diet

Selection of the participants (Step 3)

Three case study locations were selected for the study. The case study approach was adopted to explore the role of potential geographic differences in relation to the identified values. The three locations were selected in consultation with representatives from each of the three sectors as well as the FRDC project management team. The locations represented three geographically diverse areas of interest:

- Saltwater fishing within the Great Barrier Reef catchments
- The fresh and salt waters of Tasmania
- The fresh and salt waters of Western Australia

Participants for the study were recruited through emailed invitations either directly or through key representative bodies (for example, the Western Australia Fishing Industry Council), government agencies that regularly interact with fishers across the sectors (for example, the Queensland Department of Agriculture and Fisheries) as well as fishing researchers (for example, universities and other publicly funded institutions). Approximately 160 representatives were contacted via email and/or telephone. A full list of contacted organisations has been provided in **Appendix 1** and **2**.

The project team worked with representatives from each of the contacted organisations to assist with the recruitment of a diverse sample of participants from each case study region. Invitations, with a link to the online Q-Method Software (https://qmethodsoftware.com), were provided to the sample of participants. The invitation included an incentive (i.e., 'a chance to win a $50 BCF voucher') to encourage participation in the study. An example invitation can be seen in **Appendix 3**.

It is important to note that the sample was obtained by strategic sampling, not random sampling of a large number of participants (Webler, Thomas and Danielson, 2009; Lee, 2017). That is, the aim is to ensure comprehensiveness and diversity, rather than quantity. For the purposes of this project, the participants recruited needed to include a cross-section of representatives from each of the major stakeholder groups.

Sorting and ranking of the values by participants (Q-sort; Step 4)

The study was open on the 20th of May 2021 and closed on the 10th of August 2021. In total, 256 participants commenced the study, with 116 completed Q-Sorts. In response to a very low response rate from the Indigenous sector, additional participants (n = 6) were recruited by a member of the project team at a conference held in Far North Queensland on the 26 July 2021. The final sample size across the key sectors (i.e., industry and location), plus other key demographics, are provided in **Table 8** below. The average time to complete the study was 11 mins, 29 seconds.

Table 8: Characteristics of the respondents by Industry Sector (percentages represent proportion of respondents)

		Comm. (n = 19)	Indigenous (n = 8)	Rec. (n = 81)	National (n = 116)
Location	Queensland	35%	75%	63%	58%
	Western Australia	40%	25%	16%	20%
	Tasmania	20%	-	17%	16%
	Not disclosed	-	-	4%	6%
Age	Under 25 years	-	-	6%	4%
	26 to 65 years	95%	88%	82%	83%
	Over 65 years	-	-	12%	9%
	Not disclosed	5%	12%	-	4%
Gender	Male	76%	72%	88%	85%
	Female	14%	29%	12%	14%

		Comm. (n = 19)	Indigenous (n = 8)	Rec. (n = 81)	National (n = 116)
	Not disclosed	10%	-	-	2%
Aboriginal or Torres Strait Islander (TSI)	Aboriginal	10%	71%	-	6%
	TSI	-	14%	4%	6%
	Not disclosed	10%	14%	2%	4%
How long have you been involved in the fishing sector?	< 1 year	-	-	1%	1%
	1-5 years	10%	0%	1%	3%
	6-10 years	10%	14%	2%	4%
	> 10 years	80%	86%	95%	92%
Fishing identity[1]		4.26	3.71	3.78	3.86
How long has your family been involved in fishing?	First generation fisher	37%	0%	13%	17%
	Second generation fisher	42%	14%	24%	27%
	Third or more generation fisher	21%	86%	63%	57%
Where to do mostly catch fish?	Bays, estuaries and/or inlets	11%	20%	12%	12%
	Beach (e.g. cockles, pipis)	0%	20%	2%	3%
	Freshwater	0%	0%	12%	9%
	Inshore or coast	37%	60%	30%	32%
	Offshore	47%	0%	44%	43%
	Other	5%	0%	0%	1%
What type of fish do you MOSTLY catch?	Crustaceans	42%	0%	0%	7%
	Finfish	53%	100%	95%	88%
	Molluscs	5%	0%	0%	1%
	Other	0%	0%	5%	4%
Ownership model	Contractor	3%	-	-	-
	Employee	6%	-	-	-
	Operator	10%	-	-	-
	Owner/Licensee	6%	-	-	-
	Owner/Operator	29%	-	-	-
	Other	45%	-	-	-
Type of operation	Harvest	54%	-	-	-
	Post-harvest	4%	-	-	-
	Other (eg., commercial rec fishing)	43%	-	-	-
Size of operation	Zero to less than $50k	33%	-	-	-
	$50k to less than $200k	21%	-	-	-
	$200k to less than $2m	21%	-	-	-
	$2m to less than $5m	13%	-	-	-
	$5m to less than $10m	4%	-	-	-
	$10m or more	8%	-	-	-

[1] Measured on a scale from 1 = not at all to 5 = Very. Presented data represents average score.
NOTE: Not all participants completed the survey, so the sum of the sector totals does not equal the total number of participants.

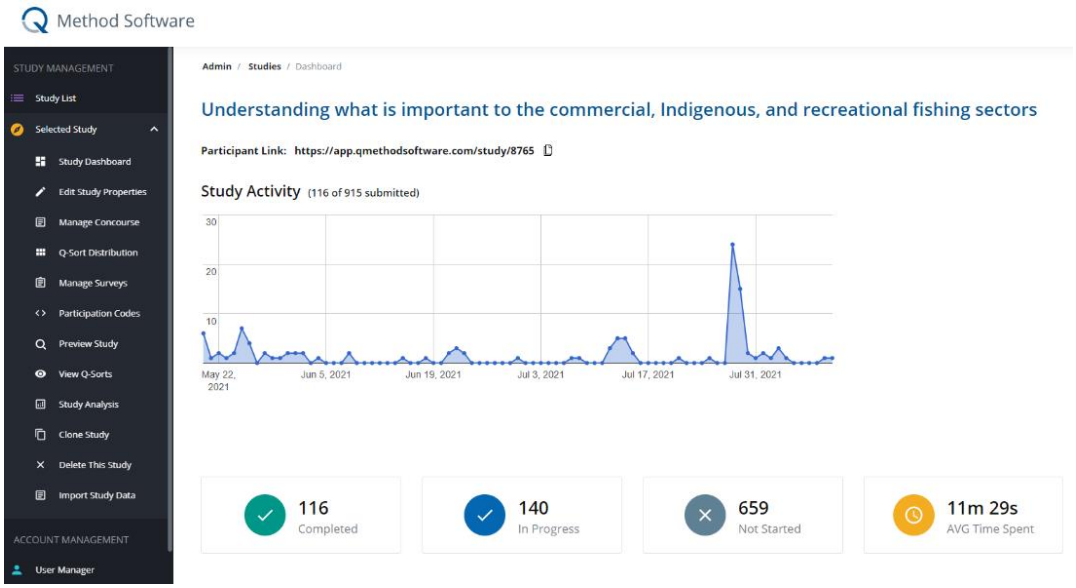
Rather than seeking a representative sample, participants for Q-methodology studies are selected for comprehensiveness and diversity. While responses to the survey indicated there was sufficient diversity across the different categories and demographics there are some notable exceptions:

- The sample is over-represented by Queensland recreational fishers (representing close to 50% of the entire participants)
- No participants from Tasmania identified as Indigenous
- No young fishers or older fishers responded from either the commercial or Indigenous fishing sectors

- The sample was overrepresented by men (more than 85%; however this likely reflects the demographics of the industry)
- Very few participants indicated that they fish 'molluscs'
- A large majority of participants had been involved in fishing for a long time (over 10 years)
- Within the commercial fishing sector, very few participants indicated their operation was post-harvest.

The participants were invited to complete the study online using the software platform *https://qmethodsoftware.com/*. Q-Method Software is an online platform that can be used to set up, conduct, and analyse Q-methodology studies. It is 100% web-based, thus participants can complete the study independently and do not have to download anything to use the platform. Participants can complete their Q-Sorts on any internet browser and computer operating system by clicking on an emailed link. The platform is not enabled for mobile phones (see study limitations). The software includes inbuilt study management (refer to **Figure 1** below) as well as data analysis functionality.

Figure 1. Q-methodology Software functionality interface



Participants were directed to an information page, which included details such as the purpose of the study, eligibility, procedures, potential risks, compensation and confidentiality (see **Appendix 4**). Participants were given the opportunity to provide their consent to participate in the study by selecting either "I agree" or "I do not agree" at the bottom of the screen. Participants that selected "I do not agree" were thanked for their interest. For participants that agreed to participate, the following page provided a set of instructions on how to undertake the sorting and ranking exercises (refer **Appendix 4**). Essentially, participants were instructed to complete two sorting tasks. The first task involved sorting 44 value statements into three piles (most, least and neutral) according to how important each statement was to them "as a representative of either the commercial, Indigenous or recreational fishing sector".

In the second sorting task participants were asked to rank the three piles of previously sorted statements onto a triangle shaped grid according to the below guiding statement:

Sort and rank all the statements according to which is most important (5) and least important (-5) to you as a representative of the commercial, Indigenous or recreational fishing sector.

This Q-sorting exercise required the participants to decide, from their perspective, that which is important and, conversely, that which is not. By instructing the participants to rank the items from 'most important' (+5) to 'less important' (-5) the poles of the board will capture the strong values (refer **Figure 2** grid below) and the middle of the Q-board captures those values that are more neutral. The logic behind this idea is that understanding those values that do not align with the participant viewpoint are just as important to understand as those that do.

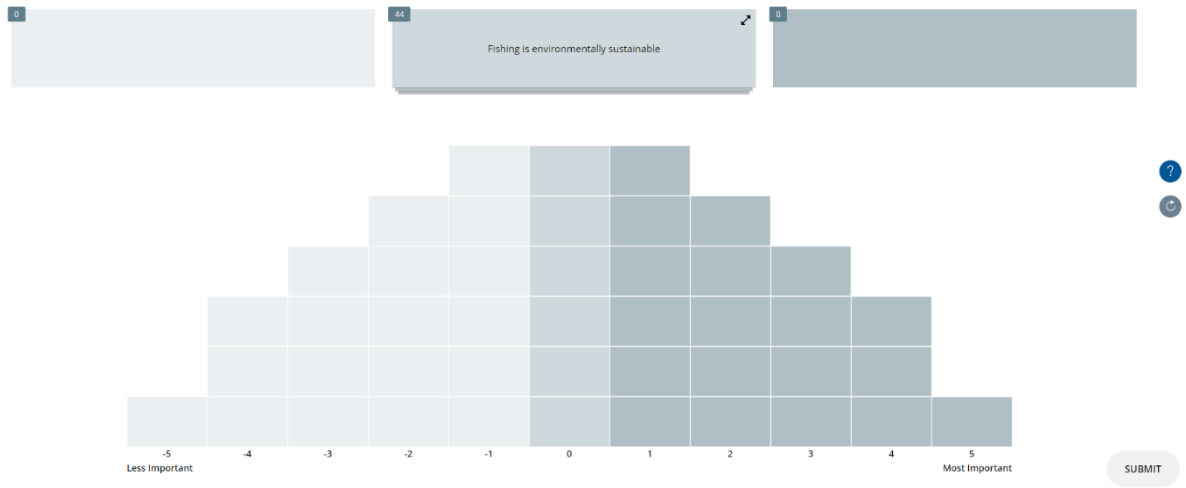


Figure 2. Sorting the initial Q-set and the grid used for sorting statements into most to least important value

Once all statements are sorted, participants were then asked to complete a brief survey to identify which sector and region they were from, plus a number of demographic type questions. This is also where participants could provide their email address to be entered into a draw to win a $50 gift voucher from BCF. The full participant information sheet, instructions and completion survey is provided in **Appendix 4**.

Results

Data collected from this Q study was analysed using inverted factor analysis as per Donner (2001). Inverted factor analysis is the statistical basis of Q-methodology (Excel and Graaf, 2005) and the data collected via Q-methodology is not suitable for normal factor analysis (ten Klooster *et al*., 2008; Watts and Stenner, 2005). The analysis is considered "inverted" because it looks for patterns among participants rather than variables, thus allowing for the identification of distinct subgroups of people (referred to as 'factors') whose responses are highly correlated (Sleenhoff *et al*., 2015; Watts and Stenner, 2005). As such, the analysis provides information about similarities and differences in the participants' subjective reactions to the value statements. Each identified sub-group or factor, therefore, consisted of participants who reacted similarly to the value statements. As such, the analysis provides information about contrasting and complementary values (in Q-methodology these are commonly referred to as distinguishing and consensus statements).

The Q-Sorts were analysed at the case study level (i.e., separately for Qld, WA and Tas) and then compared to combined or national sample. There was a high degree of overlap between the case study level and national scale results. The distribution of case study locations was relatively even for the identified sub-groups. This indicates that geographic location is not a significant factor in the identification of values, so it was decided to retain and report the results at the national scale. However, the outputs of the analysis for each of the three case study locations is provided in Attachment One. Additionally, the results of an analysis that looked at the distribution of values for the recreational sector only has been provided in the attachment.

As is common with Q studies, principal component analysis was used for factor extraction and the factors were rotated using varimax rotation (McKeown and Thomas, 2013). In total, the Q-Sorts accounted for 58% of the explained variance. It is worth noting that in social science and humanities research the explained variance for factor analysis is commonly between 50% and 60% (Pett, Lackey, and Sullivan, 2003). Thus, the performance of the Q-Sorts in this case is satisfactory.

Deciding which 'factors' to retain is based on having: a maximal explained variance; a maximum number of Q-Sorts loading significantly on one factor (the aim is to have at least five persons defining each anticipated viewpoint); all factors with eigenvalue greater than 1.00; all factors containing statements distinguishing them from other factors; none of the sorts being confounded (i.e. significantly loading on more than one factor); and the researcher's judgement (Clover *et al*., 2019; Flurey *et al*., 2014).

Guided by the above criteria and examining the Q-methodology outputs, five distinct factors emerged in relation to the value statements: Sub-group A (n = 39); Sub-group B (n = 19); Sub-group C (n = 24); Sub-group D (n = 10); and Sub-group E (n = 15). Each subgroup comprises fishers who ranked the value statements similarly in terms of those statements they felt were very important to them and those that were less important to them. The Q-Sorts from nine participants (including two of the respondents from the Indigenous sector) were removed from the analysis as they failed to significantly load onto a single subgroup.[5] The individual factor loadings for each of the participants can be found in **Appendix 5**.

Table 8 below provides a summary of each of the Sub-groups in terms of values most important and least important, as well as the proportion of sectorial representation in each group. For Sub-group A

[5] A **significant factor loading** at the 0.01 level was calculated using the following equation: 1.96 (1÷ √No. of items in q-set)

"social-value" fishers there were 39 respondents who aligned with this group. Recreational fishers were 95% (or 37 respondents) and 3% (1 respondent) were from the Indigenous sector and the rest did not disclose their sector. The sections following the table describe each of the sub-groups in more detail, including their characteristics and which values are most important to them. The Q-Sorts presented represent a composite Q-sort for each factor that has been rotated. That is, the Q-Sorts below represent the "ideal" Q-sort for each sub-group. A table summarising demographic characteristics of each sub-group is provided in **Appendix 6**.

Table 9: Summary of Sub-groups, highest/lowest ranked values and sectorial representation (percentages represent proportion of respondents from each sector)

	Sub-Group A "Social-value" fishers N=39	Sub-group B "Economic-value" fishers n=19	Sub-group C "Environmental- value" fishers n=24	Sub-group D "Traditional-value" fishers n=10	Sub-group E "Fish-focused" fishers n=15
Respondents	**no**				
Recreational Sector	94.8%	15.8%	75.0%	80.0%	93.3%
Commercial Sector	-	78.9%	4.2%	10.0%	6.7%
Indigenous Sector	2.6%	-	16.7%	10.0%	-
Not disclosed	2.6%	5.3%	4.2%	-	-
Highest Values	• Having access to fish and fishing • Access to the ocean/sea • Spending time fishing with family and friends • Catching fish for sport	• Fishing is environmentally sustainable • Employment/income from fishing • Fishing's economic returns • Everyone is working to improve the sustainability of fishing practices	• Fish habitats are restored, improved and/or protected • Fishing is environmentally sustainable • Fish are caught in a natural/pristine environment • Water quality and environmental flows are maintained/improved for fish	• Catching fish to eat for myself and/or my family • Access to the ocean/sea • Fishing as "a way of life" • Fishing provides a connection to nature	• Catching a variety of fish • Catching good quality fish • Accountability for industry participants who break the rules • Catching fish to eat for myself and/or my family
Lowest Values	• Opportunity to barter and trade goods • Employment/income from fishing • Fishing's support of cultural practices and requirements • Fishing provides a connection to ancestors/previous generations	• Opportunity to barter and trade goods • Catching fish for sport • Spending time fishing alone • Catching a variety of fish	• Catching lots of fish • Catching large fish • Fishing as part of personal identity • Fishing's economic returns	• Catching lots of fish • Catching large fish • Opportunity to barter and trade goods • Catching fish for sport	• Fishing provides a connection to ancestors/previous generations • Fishing as part of personal identity • Community acceptance of my fishing activities • Fishing's support of cultural practices and requirements

Sub-group A – “social-value” fishers

What is most important to this group?

The most important values to this sub-group were largely social values. The highest ranked value was having access to fish and fishing. Access to the ocean, spending time with family and friends, access to the outdoors, catching good quality fish and catching fish for sport were also ranked highly. Importantly, the social values of this group are largely related to personal benefits. Secondary to social values, several environmental values were important. Values such as water quality and the sustainability of fishing practices. The highest ranked environmental value for this group was that fishing is environmentally sustainable. Cultural values were least important to this group.

Who is in this group?

The large majority of respondents in this group were from the recreation sector (95%), with just one respondent who identified as from the indigenous fishing sector. Over 95% of the fishers in this group indicated that they had been fishing for more than 10 years and catch finfish. Fishing is an important part of their personal identity, with a mean score of 4.15 out of a possible five. This group had a high degree of diversity in terms of where they fish, although most fish offshore.

Complementary and contrasting values

This group mostly aligns to the Sub-groups D and E, which also included largely recreation fishers and also tended to rank social values more highly. This was the only group to rank ‘catching fish for sport’ as important. Similarly, spending time fishing with family and friends was more important to this group compared to the other groups. As with all the other groups, it is important to this group that everyone is working together to improve the sustainability of fishing practices and that there is accountability for industry participants that break the rules. Also similar to the other groups, having access to the ocean and access to fish and fishing is important to this group however both of these values were ranked much higher in this group compared to the other groups.

				Co-management of fisheries	Community acceptance of my fishing activities	Fishing as "a way of life"				
			Catching lots of fish	Spending time fishing alone	Fish as an important part of a healthy diet	Fish habitats are restored, improved and/or protected	Catching fish to eat for myself and/or my family			
		Fishing as part of culture and heritage	Industry innovation/technical advancement	Fishing's role in binding community together	Fishing as part of personal identity	Fishing provides a connection to nature	Mental health benefits from fishing	Access to the outdoors		
	Employment/income from fishing	Catching only what is needed to make a living	Providing locally caught/produced seafood to Australians	Fishing practices that protect animal welfare	Catching large fish	Native fish population sizes are healthy	Water quality and environmental flows are maintained/improved for fish	Catching good quality fish	Fishing is environmentally sustainable	
	Fishing provides a connection to ancestors/previous generations	Contribution to food security	Fishing's contribution to the local economy	That introduced fish species are decreased	Biosecurity is maintained	Catching a variety of fish	Everyone is working to improve the sustainability of fishing practices	Catching fish for sport	Access to the ocean/sea	
Opportunity to barter and trade goods	Fishing's support of cultural practices and requirements	Fishing's economic returns	Being part of strong traditions of sharing fishing knowledge	Participation in scientific research	Physical health benefits from fishing	Catching only what is needed for a feed	Fish are caught in a natural/pristine environment	Accountability for industry participants who break the rules	Spending time fishing with family and friends	Having access to fish and fishing
-5	-4	-3	-2	-1	0	1	2	3	4	5

Sub-group B – “economic-value” fishers

What is most important to this group?

While the most important value to this group was that fishing is environmentally sustainable, the most important values *overall* to this group were largely economic, including employment/income from fishing, fishing’s economic returns, fishing’s contribution to the local economy. No values ranked in the top-half of the below Q-sort would be considered purely social values. The values least important to this group were the social and cultural type values – spending time fishing alone, catching fish for sport or a variety of fish, fishing support of cultural practices/fishing as a part of culture.

Who is in this group?

This group largely comprised of commercial fishers (four out of five commercial fishers align with this group), but also included three recreation fishers. Unlike the other groups, this group catches a variety of fish types and had a more equal distribution of generational fishers (equal split between first, second and third or more fishers). All of the larger sized commercial fishers were in this group, with only smaller operators split between the other groups.

How does this group relate to the other groups?

In terms of what is most important, this group has the lowest degree of value overlap with the other groups. It was the only group to highly rank many of the economic type values. This was the only group that considered issues such as biosecurity, technical advancement, co-management of fisheries or fishing contribution to food security as important. The values that were shared by this group and the other groups were largely the environmental values (i.e., that fishing is environmentally sustainable and that everyone is working together on sustainability). As with all the other groups, it is important to this group that there is accountability for industry participants that break the rules. Also similar to the other groups, having access to the ocean and access to fish and fishing is important to this group (though generally not ranked as highly as the other groups dominated by recreational fishers).

					Spending time fishing with family and friends	Fishing's role in binding community together	Fishing practices that protect animal welfare			
				Access to the outdoors	Fishing provides a connection to ancestors/previous generations	That introduced fish species are decreased	Native fish population sizes are healthy	Access to the ocean/sea		
			Fishing's support of cultural practices and requirements	Mental health benefits from fishing	Fishing provides a connection to nature	Catching only what is needed to make a living	Fish are caught in a natural/pristine environment	Participation in scientific research	Biosecurity is maintained	
		Catching fish for sport	Fishing as part of culture and heritage	Catching lots of fish	Fishing as part of personal identity	Fishing as "a way of life"	Catching good quality fish	Having access to fish and fishing	Contribution to food security	Fishing's economic returns
		Spending time fishing alone	Catching large fish	Catching fish to eat for myself and/or my family	Fish as an important part of a healthy diet	Fish habitats are restored, improved and/or protected	Water quality and environmental flows are maintained/improved for fish	Industry innovation/technical advancement	Fishing's contribution to the local economy	Everyone is working to improve the sustainability of fishing practices
Opportunity to barter and trade goods	Catching a variety of fish	Catching only what is needed for a feed	Physical health benefits from fishing	Being part of strong traditions of sharing fishing knowledge	Community acceptance of my fishing activities	Co-management of fisheries	Accountability for industry participants who break the rules	Providing locally caught/produced seafood to Australians	Employment/income from fishing	Fishing is environmentally sustainable
-5	-4	-3	-2	-1	0	1	2	3	4	5

Sub-group C – “environmental-value” fishers

What is most important to this group?

Of most importance to this group were environmental values – having fishing habitats being restored, improved and/or protected was most important to this group. The top 10 values for this group all had an environmental component. The least important values to this group were economic and values that were ranked higher by the recreation groups (things like catching lots of fish, large fish, fish for sport etc).

Who is in this group?

This group is largely comprised of recreational fishers (75%) and Indigenous fishers. Four of the five Indigenous fishers whose Q-sorts were retained in the analysis fell in this group. One commercial fisher (a small scale, crustacea harvest operator) also fell in this group. This group also had the highest proportion of women respondents as well as all but one of the younger respondents (i.e., under the age 25). This group had the lowest score in terms of importance of fishing to their personal identity (3.35 out of 5). This group had a higher proportion of inshore fishers (where most of the groups had a majority offshore fishers).

How does this group relate to the other groups?

Compared to all the other groups, this group was the most highly aligned with the environmental values included in the Q-Set. While all the groups ranked at least some environmental values highly, this was the only group to indicate that fish welfare and decreasing introduced fish species are important issues. Like all the other groups however, it is important to this group that everyone is working together to improve the sustainability of fishing practices and that there is accountability for industry participants that break the rules. Also similar to the other groups, having access to the ocean and access to fish and fishing is important to this group (though it was not ranked as highly). While still not ranked highly, cultural values were ranked higher by the group in comparison to other groups.

					Catching good quality fish	Fishing's support of cultural practices and requirements	Mental health benefits from fishing			
				Industry innovation/technical advancement	Being part of strong traditions of sharing fishing knowledge	Physical health benefits from fishing	Catching fish to eat for myself and/or my family	Participation in scientific research		
			Opportunity to barter and trade goods	Contribution to food security	Fishing's role in binding community together	Fish as an important part of a healthy diet	That introduced fish species are decreased	Biosecurity is maintained	Catching only what is needed for a feed	
		Catching large fish	Catching fish for sport	Spending time fishing alone	Catching only what is needed to make a living	Providing locally caught/produced seafood to Australians	Having access to fish and fishing	Access to the outdoors	Native fish population sizes are healthy	Water quality and environmental flows are maintained/improved for fish
		Fishing as part of personal identity	Employment/income from fishing	Community acceptance of my fishing activities	Fishing's contribution to the local economy	Co-management of fisheries	Spending time fishing with family and friends	Fishing practices that protect animal welfare	Everyone is working to improve the sustainability of fishing practices	Fish are caught in a natural/pristine environment
Catching lots of fish	Fishing's economic returns	Fishing as "a way of life"	Catching a variety of fish	Fishing provides a connection to ancestors/previous generations	Fishing as part of culture and heritage	Fishing provides a connection to nature	Access to the ocean/sea	Accountability for industry participants who break the rules	Fishing is environmentally sustainable	Fish habitats are restored, improved and/or protected
-5	-4	-3	-2	-1	0	1	2	3	4	5

Sub-group D – “traditional-value” fishers

What is most important to this group?

For this group, social/cultural values were most important. Fishing as a “way of life” is very important to this group. Of most importance to this group was ‘catching fish to eat for myself and/or my family’. While some environmental type values were important (i.e., that fish habitats are restored) most environmental values were ranked around the middle of the pyramid. Interestingly, while it is important to this group to be able to catch fish, neither the type of fish nor catching lots of fish was important to this group.

Who is in this group?

This group was dominated by recreation fishers (80%), with just one commercial (a small scale, finfish operator) and one fisher from the Indigenous fishing sector. All participants in this sub-group have been fishing for greater than 10 years. The group had the highest proportion of fishers aged 65 years and over, as well as the highest score for the importance of fishing to personal identity (90% of fishers in this group selected on or above the mid-point of the scale). This group had a higher proportion of inshore fishers (where most of the groups had a majority offshore fishers).

How does this group relate to the other groups?

This was the only group to rank ‘fishing as a way of life’ as very important. Compared to all the groups, environmental values were consistently ranked lower for this group. Excluding Sub-group B (which was dominated by commercial fishers and highly ranked economic values), economic values were also not ranked highly by this group. Although, fishing’s economic returns and fishing’s contribution to the local economy were ranked higher in this group in comparison to the other recreation dominated groups. Similarly, some of the social values ranked by the other recreation dominated groups, were ranked much lower in this group. For example, unlike Sub-group A (“social-value” fishers), catching fish for sport is not important to this group at all. As with other groups, access to the sea/ocean and access to fish and fishing was important to this group. Similarly, it was important to this group that fishing is environmentally sustainable and that there is accountability for industry participants that break the rules, but both were ranked lowest in this group.

			Contribution to food security	Fishing's contribution to the local economy	Accountability for industry participants who break the rules					
			Fishing's support of cultural practices and requirements	Native fish population sizes are healthy	Physical health benefits from fishing	Fishing is environmentally sustainable	Catching only what is needed to make a living			
		Fishing practices that protect animal welfare	Fishing as part of personal identity	Industry innovation/technical advancement	Everyone is working to improve the sustainability of fishing practices	Spending time fishing with family and friends	Biosecurity is maintained	Providing locally caught/produced seafood to Australians		
	Catching fish for sport	Fishing provides a connection to ancestors/previous generations	Fish are caught in a natural/pristine environment	That introduced fish species are decreased	Fishing's role in binding community together	Catching a variety of fish	Catching only what is needed for a feed	Having access to fish and fishing	Catching good quality fish	
	Catching large fish	Employment/income from fishing	Participation in scientific research	Water quality and environmental flows are maintained/improved for fish	Community acceptance of my fishing activities	Mental health benefits from fishing	Being part of strong traditions of sharing fishing knowledge	Fish as an important part of a healthy diet	Fishing as "a way of life"	
Catching lots of fish	Opportunity to barter and trade goods	Spending time fishing alone	Co-management of fisheries	Fishing's economic returns	Access to the outdoors	Fishing as part of culture and heritage	Fish habitats are restored, improved and/or protected	Fishing provides a connection to nature	Access to the ocean/sea	Catching fish to eat for myself and/or my family
-5	-4	-3	-2	-1	0	1	2	3	4	5

Sub-group E – “fish-focused” fishers

What is most important to this group?

For this group, catching good quality fish and a variety of fish is very important. This is linked to fish for food – for themselves and their family, but also providing locally caught seafood to Australians. Second to catching fish for food, this group considered environmental values as important – that fish habitats are restored, improved and/or protected and that fishing is environmentally sustainable. The more traditional cultural values (fishing providing a connection to ancestors, fishing support of cultural practices nor fishing’s role in binding community together) were not important to this group, nor was fishing’s economic returns.

Who is in this group?

This group was dominated by recreation fishers (94%), with just one small scale finfish owner/licence. This was the only group to not include any women fishers. 100% of respondents were finfish fishers, but it had a relatively even split between inshore and off-coast fishers. Similar to Sub-group C (“environmental-value” fishers), this group had a relatively low score for fishing being important to their sense of identify (3.6 out of 5.0).

How does this group relate to the other groups?

Like Sub-group D (“traditional-value” fishers), this was the only group to rank catching good quality fish and catching fish to eat very highly. This group ranked catching a variety of fish much higher than any other group. This was the only group to rank catching large fish as important. Fishing as a ‘way of life’ was ranked lowest by this group. Sub-group D (“traditional-value” fishers) and Sub-group E (“fish-focused” fishers) were only groups to share the value ‘providing locally caught fish/seafood to Australians’ with Sub-Group B (“economic-value” fishers). As with other groups, access to the sea/ocean and access to fish and fishing was important to this group. Similarly, it was important to this group that fishing is environmentally sustainable and that there is accountability for industry participants that break the rules. Also similar to the other groups, cultural values were not important to this group.

				Employment/income from fishing	Access to the outdoors	Catching lots of fish				
			Industry innovation/technical advancement	Catching only what is needed to make a living	Everyone is working to improve the sustainability of fishing practices	Access to the ocean/sea	Catching large fish			
		Community acceptance of my fishing activities	Spending time fishing alone	Physical health benefits from fishing	Co-management of fisheries	Catching fish for sport	Fish as an important part of a healthy diet	Providing locally caught/produced seafood to Australians		
	Fishing as part of personal identity	Fishing's economic returns	Being part of strong traditions of sharing fishing knowledge	Fishing provides a connection to nature	Biosecurity is maintained	Fish are caught in a natural/pristine environment	Spending time fishing with family and friends	Fish habitats are restored, improved and/or protected	Catching a variety of fish	
	Fishing's support of cultural practices and requirements	Fishing as part of culture and heritage	Fishing as "a way of life"	Fishing's contribution to the local economy	That introduced fish species are decreased	Participation in scientific research	Native fish population sizes are healthy	Catching only what is needed for a feed	Catching fish to eat for myself and/or my family	
Fishing provides a connection to ancestors/previous generations	Opportunity to barter and trade goods	Fishing's role in binding community together	Fishing practices that protect animal welfare	Mental health benefits from fishing	Contribution to food security	Water quality and environmental flows are maintained/improved for fish	Having access to fish and fishing	Fishing is environmentally sustainable	Accountability for industry participants who break the rules	Catching good quality fish
-5	-4	-3	-2	-1	0	1	2	3	4	5

Discussion

Complementary values

There were some complementary values that were common across respondents. That is, some of the included values were highly ranked across the three sectors. The 10 highest ranked values, based on an average rank score (refer **Appendix 8**), presented in order from highest average rank to lowest average rank, are as follows:

1. Fishing is environmentally sustainable
2. Accountability for industry participants who break the rules
3. Having access to fish and fishing
4. Access to the ocean/sea
5. Catching good quality fish
6. Fish habitats are restored, improved and/or protected
7. Catching fish to eat for myself and/or my family
8. Everyone is working to improve the sustainability of fishing practices
9. Providing locally caught/produced seafood to Australians
10. Spending time fishing with family and friends

Most importantly, the top four statements were ranked positively by *all* five sub-groups (i.e., the composite Q-sort for that group ranked those statements as +1 or higher). These four values represent perspectives that are important to fishers across the three sectors. These values could be considered largely environmental and/or social values. Indeed, across the top 10 values listed above, these values could be considered predominately environmental and/or social values.

When considering all 44 statements, the three consistently lowest ranked values were cultural values – fishing's support of cultural practices and requirements, fishing provides a connection to ancestors/previous generations, and opportunity to barter and trade goods. Some of the social values not considered to be important by any of the sub-groups included catching lots of fish or large fish, and spending time fishing alone.

The identified complementary values align with the FRDC's R&D outcomes of:

- growth for enduring prosperity e.g. Fishing is environmentally sustainable, Catching good quality fish, Fish habitats are restored and improved and/or protected, and Everyone is working to improve the sustainability of fishing practices
- best practices and production systems e.g. Accountability for industry participants who break the rules
- culture that is inclusive and forward thinking e.g. Spending time fishing with family and friends
- fair and secure access to aquatic resources e.g. Having access to fish and fishing, Access to the ocean/sea, and Catching fish to eat for myself and/or my family
- community trust, respect and value e.g. Accountability for industry participants who break the rules

Contrasting values

In terms of contrasting values across the five sub-groups, economic type values were generally not highly ranked except by Sub-group B ("economic-value" fishers). Statements like fishing's economic

returns and employment/income from fishing, industry innovation and advancement, fishing's contribution to the local economy were not considered to be important by the remaining groups. With regards to contrasting or differing values between the different groups, the key findings are described below:

- The largest variation was between Sub-group B ("economic-value" fishers) and all four other sub-groups with regards to ranking of economic values. Sub-group B is largely made up by large commercial fishers, so it is somewhat not surprising that they ranked the economic-type values as of high importance. It is important to note however that while this group ranked economic values highly, the highest rank value was that "fishing is environmentally sustainable", thus these commercial fishers also place a high value on environmental outcomes.
- While there was a lot of similarities across the four remaining groups, for example the importance of social values for Sub-group A, D and E in particular, other, more specific, differences between the largely recreational sub-groups included:
    - Sub-group A ("social-value" fishers) was the only group to rank fishing as a sport as an important value. They also ranked fishing with friends and family higher than any other group.
    - Sub-group C ("environmental-value" fishers) was the group that ranked environmental values in general most highly compared to all other sub-groups. Fish welfare and reducing non-native fish species were also important *only* to this group. This group also had noted demographic differences (i.e., younger, women, lower fishing identity, higher proportion of Indigenous fishers).
    - Sub-group D ("traditional-value" fishers) was the only group to rank 'fishing as a way of life' as important. Overall, this group tended to rank environmental type values lower (noting though that environmental sustainability still ranked in the top half of the scale). This group had highest proportion of older fishers.
    - For Sub-group E ("fish-focused" fishers), catching good quality fish and a variety of fish was important. They were the only group to rank catching large fish as important and was the only group to rank providing locally caught fish to Australians as important.

Additional values

In addition to asking participants to sort the value statements according to importance, respondents were asked *"Were any values (things that you feel are important in relation to fishing) missing?"*. Twenty-three respondents, representing 20% of all respondents, provided a response. Detailed participant responses are provided in **Appendix 7**.

Aligned to overall findings of the study, environmental values, particularly issues related to sustainability, were strongly represented in responses. For example, *"I am embarrassed by the wasteful practices at filleting tables and on trawlers", "The concern is that the advent of GPS and larger recreational vessels has seen a rapid rise in the recreational fish take. THIS IS NOT SUSTAINABLE"* and *"Preventing pillaging of our fish stocks by overseas countries and excess harvesting by commercial interests."*

A further theme identified among the responses was related to the enforcement of rules, for example *"Reducing bag limits and increasing size limits on popular species",* and *"A shared resource and better enforcement"* and *"Bag limit fish sizes per fisherman*". This again aligned with one of the values that was shared most widely among the three sectors in terms of "accountability".

Lastly, a final theme identified was related to equity of access. For example *"equity of access between commercial and recreational sectors"*, *"Consistency for all sectors. No sector is favoured over another".* Again, rather than being a separate value, this aligned with the shared values of "access".

A number of other values were listed in the responses, for example *"Family values"* and *"Opportunities for a diverse range of people to participate in fishing*". Overall, the additional values suggested by participants were largely a different way or a stronger way of expressing values that were already captured in the value statements.

Conclusion

The objectives of this project were to better understand the values held across three fishing sectors and to identify how those values align. This project used Q-methodology to identify what is important to fishers from across three fishing sectors located in three different locations. Q-methodology has been demonstrated to be a robust and systematic methodology for understanding subjective phenomena such as values. Importantly, Q-methodology allows for the identification of groups of respondents whose values are complementary as well as groups of respondents whose values contrast.

An extensive desktop review, supplemented by stakeholder interviews, identified 44 statements across the environmental, social, economic and cultural domains that were important to fishers from either the Indigenous, commercial or recreational fishing sectors. By working with representative groups from each of the three sectors, a total of 116 fishers completed an online Q-sort to rank which statements were more or less important to them. While the study was able to recruit participants from across the three sectors and across the three case study locations, the respondents were dominated by recreational fishers from Queensland. However, it is important to note that the purpose of Q-methodology is not to understand how representative the identified viewpoints are and that having a representative sample is not a necessary pre-requisite for conducting a Q-methodology study. The principal purpose is to understand diversity in how people think and feel about different issues or topics.

While no major variations in values were found between case study locations, there were variations both across and within sectors. Five distinct sub-groups emerged from the analysis. Interestingly, no one industry sector was represented in a single group. Respondents from the Indigenous sector were spread across three sub-groups; however, a large majority fell in the 'environmental group' (sub-group C). While a large majority of the commercial fishers clustered together in the 'economic group', commercial fishers were present in three of the other sub-groups, albeit them being smaller operators. The recreational sector dominated four of the sub-groups. In addition to industry sector, other characteristics were more common to some groups over others. For example, most younger respondents and most women fishers were in Sub-group C ("environmental-value" fishers) and most of the older fishers were in Sub-group D ("traditional-value" fishers). The four, largely recreational groups also varied in terms of how important fishing was to their sense of identity. While scores of the 'fishing' identity scale were very high for Sub-group D ("traditional-value" fishers, scores were much lower for Sub-group C ("environmental-value" fishers).

Of the five identified groups, Sub-group B ("economic-value" fishers) held the most 'contrasting values' compared to the other four groups. It is important to note however that while this group ranked economic values highly, the highest rank value was that "fishing is environmentally sustainable", thus commercial fishers also place a high value on environmental outcomes.

Across all the respondents in all three sectors the 10 highest ranked values, based on an average rank score, presented in order from highest average rank to lowest average rank. These 10 values align with and reinforces current FRDC R&D outcomes, they are as follows:

1. Fishing is environmentally sustainable
2. Accountability for industry participants who break the rules
3. Having access to fish and fishing
4. Access to the ocean/sea
5. Catching good quality fish
6. Fish habitats are restored, improved and/or protected
7. Catching fish to eat for myself and/or my family

8. Everyone is working to improve the sustainability of fishing practices
9. Providing locally caught/produced seafood to Australians
10. Spending time fishing with family and friends

The three lowest ranked values by all three sectors were cultural values e.g. fishing's support of cultural practices and requirements, fishing provides a connection to ancestors/previous generations, and opportunity to barter and trade goods. Some of the social values that were not considered to be important by any of the sub-groups included catching lots of fish or large fish, and spending time fishing alone.

A key finding of this study was that values do not "neatly" align to specific industry sectors. There are commercial fishers whose values are more aligned to recreational fishers when compared to other commercial fishers and vice versa. The implication of this finding is that holistic policy that accounts for this diversity in values across sectors is more appropriate rather than development of policy that is focused on individual fishing groups. In particular, the values of the recreational fishing sector were very diverse and split across four of the five sub-groups A to E.[6] This finding is similar to past Q-methodology research in the marine aquaculture in Spain (refer **Box 1**, page 3). The marine aquaculture study also explored perspectives across social, environmental, and economic dimensions and found that the identified perspectives did not align to specific sectors (the sectors explored were NGOs, fisherman, scientists and government). Instead, Bacher, Gordoa and Mikkelsen (2014) found that the identified perspectives were made up of various representatives of the different groups of stakeholders. There was no one sector that had its own unique set of values.

This was also evident in relation to the values of the respondents that represented the Indigenous sector as they were spread across three sub-groups. The results show that to treat any one industry sector as a homogenous group with similar values is mis-guided and is not an accurate representation of the sectors. Instead, the results indicate that a better approach would be to treat each sector as a group that has both complementary and contrasting values across the social, economic and environmental themes. The results provide valuable insights to support this approach.

Limitations

There were a number of limitations that must be noted. While the intent of a Q-methodology study is not to seek a representative sample of respondents, it is important to ensure *diversity* among respondents. With the very low number of responses from the Indigenous sector, it is unlikely that we have achieved sufficient diversity in the sample to be confident that the range of voices within this sector have been represented in the results. This may also be true for the commercial sector, which was dominated by responses for the finfish sector over other sectors such as the molluscs or crustaceans.

Limitations related to the diversity of the respondents could be at least partially attributed to some of the difficulties faced in the recruitment of participants. The study recruitment relied heavily on the snow-ball method of recruitment (i.e., relying on online referrals from member organisations). This meant that the project had little control over who exactly was responding to the survey. A related issue is that the study was conducted online via a computer and the survey was not compatible with mobile phones. The requirement of access to the internet and a computer to participate in the survey potentially restricted some fishers to complete the study. This will have biased the survey results towards those fishers that had access to computers, though it is not clear how such a bias in response would have affected the results.

[6] Sub-group B is dominated by commercial fishers.

A further difficulty faced during recruitment was that some of the participants were not familiar with NCEconomics nor Alluvium Consulting, the lead delivery organisations. This meant that responses to emailed requests were often unreturned and when attempting to contact representatives via the phone, project staff needed to reassure key contacts that they were not 'marketers' and that the study was sponsored by the Fisheries Research Development Corporation to confirm the legitimacy of the study.

Survey fatigue was an issue being increasingly faced by social researchers, and feedback from representatives of the industry groups being asked to assist with recruitment reflected this. Some of the industry groups contacted indicated that they had only recently sent out requests to their members to participate in other surveys/projects and they were unwilling to further burden their members. Other feedback received from the industry representatives indicated that some of the sectors, the commercial sector in particular, were currently experiencing a period of 'unrest' or 'uncertainty' and were hesitant to distribute a survey during this time as they felt that their members needed to focus on the perceived pressing issues.

The current COVID-19 pandemic has also created challenges for research by restricting data collection methods. For example, our initial attempts to recruit further Indigenous participants in person at a national conference was hampered by unanticipated border closures which meant that only Queensland delegates were able to attend. Anecdotal evidence also suggests that the COVID-19 pandemic has led to people generally feeling overwhelmed and/or experiencing 'burnout' which may have contributed to a general unwillingness to participate in social research.

In addition to general survey fatigue, it is also possible that the high cognitive load of completing the study online without adequate compensation (i.e., not offering a direct incentive/participation payment for each respondent) may have meant only those fishers with strong agendas were willing to complete the study. It is recommended for future studies to consider offering direct payments to participants that complete the study to ensure:

- diversity in participants willing to complete the study,
- minimise the potential for a respondent bias, and
- provide adequate compensation for the respondents' time.

With regard to the interpretation of the results, while participants were asked to sort the statements according to what is important to themselves, given the broad and general nature of the values included (i.e., the values in the final Q set included both individual/private values as well as altruistic/cross sectorial values) there is a possibility that some fishers rated some values highly because they perceived those values as important either to their own sector as a whole or a different sector, rather than directly in relation to themselves. Therefore, to overcome this response ambiguity, we recommend that further research is conducted to explore what is important to fishers personally versus what they perceive as important to their sector or society as a whole.

A final limitation of the study was that the online platform that was used to administer the Q study was not suited to some of the target audience. Feedback received indicated that the online platform was not suited to representatives from the Indigenous sector in particular, and that in person is the most suitable and appropriate method to recruit participants from this sector. Additionally, the online platform was not compatible with mobile phones. The project team received feedback from several potential participants that indicated that they were not able to complete the study due to limited access to a computer.

Lastly, while the project targeted only fishers from three geographic locations and the results suggest that no significant variations in the findings could be attributed to geographic location, it would be necessary to replicate and expand any future study to other locations to ensure that the results equally apply across Australia.

Implications

A key motivation for this project was a desire to achieve fair and secure access to aquatic resources and the first step in the achievement of this outcome was having a baseline understanding of the key shared values held by key sectors (Indigenous, commercial, and recreational). As part of the first step to directly explore the values of fishers across the three sectors, the study took a very broad view of values. This approach was driven by the literature review and the project team's consultation with representatives from across the three sectors to identify and understand the breadth of values that are important to fishers and the extent to which those values are either shared or not shared both within and across sectors. Through the establishment of a baseline understanding of general values, further studies can be conducted to explore what are the factors or drivers underpinning those values, as well as identifying the values that unpin specific attitudes, motivations and fishing behaviours.

The study has identified that four values are shared by *all* fishers across the three sectors. These four values align with current FRDC R&D outcomes of growth for enduring prosperity, best practices and production systems, and fair and secure access to aquatic resources:

1. Fishing is environmentally sustainable
2. Accountability for industry participants who break the rules
3. Having access to fish and fishing
4. Access to the ocean/sea

Values play a key role in decision-making and in creating public policy. One of the primary implications of the current study is that it would likely be ineffective and inefficient to make decisions or set policies based on sectoral classifications in the fishing industry such as Indigenous, recreational, and/or commercial. The project findings strongly demonstrate that the values held by fishers cannot be neatly delineated into standard industry sector classifications. However, the project findings also show that there are a number of values shared by all fishers across sectors that may provide 'common ground' and 'common language' that in turn would provide a basis for better engagement and communication both between the sectors and between researchers, fisheries managers, Government and Australian fishers.

<u>The FRDC and Other Funders of Fisheries Research:</u>

The FRDC is responsible for the selection, funding, and management of a wide range of RD&E investments across fisheries sectors. Fishers are both end-users of FRDC RD&E outputs as well as key funders of the RD&E through the various statutory levies and voluntary industry contributions that contribute to the FRDC's RD&E investment. However, commercial fishers, as opposed to recreational and Indigenous fishers, likely represent the largest proportion of fishers contributing to, and utilising the outputs from, FRDC RD&E.

Understanding the general values that are shared, and not shared, across the fishing sectors may:

- Confirm or improve FRDC's understanding of what is important to the organisation's stakeholders, enabling the organisation to prioritise and fund relevant RD&E that aligns with industry values,
- Identify areas of potential conflict between fishers that may contribute to perceptions of unfairness and/or unsecure access to aquatic resources that may be addressed by targeted RD&E,

- Ensure that RD&E funded to further commercial goals, such as profitability and/or productivity, continues to be underpinned by a strong focus on environmental sustainability, and
- Create a platform for increased collaboration and cooperation between different sectors to address cross sectoral issues, particularly between commercial fishers and other fisheries sectors (i.e. the Indigenous and recreational sectors).

Fisheries Managers and Policymakers:

Governments, non-government organisations, private companies, and community members must all be involved in programs to create shared value, yet they often work in opposition than in alignment. No company operates in isolation; each exists in an ecosystem where societal conditions may curtail its markets and restrict the productivity of its suppliers and distributors. Government policies present their own limitations, and cultural norms also influence demand (Kramer & Pfitzer, 2016).

By identifying the complementary and contrasting values of Australian fishers, the data provided by the current study may:

- Help fisheries managers and policymakers better report and communicate the implications of current policies/decisions and proposed future changes in a way that is meaningful to Australian fishers across different sectors,
- Guide future conversations between managers and policymakers and the fishing community using identified common values as a platform,
- Improve managers and policymaker's understanding of what is important to different groups which may help clear up misunderstandings, both between managers/policymakers and fishers and between different groups of fishers, and therefore more clearly identify key issues to be resolved,
- Ensure that new policy decisions take into account the values of all relevant stakeholders which, in turn, may contribute to a fairer and more secure access to aquatic resources, and
- Enable fisheries managers and policymakers to better prioritise and target key issues based on the spectrum of industry values .

Broader Industry and Community:

The target audience for the findings of the current study are the Indigenous, recreational and commercial fishing sectors, FRDC management and industry policymakers. However, the findings may have some implications for the broader fisheries industry and Australian community.

By extending the findings of the study, particularly the shared and non-shared values of Australian fishers across sectors, the project may contribute to the broader industry and community better understanding where their values overlap. This, in turn, may contribute to improved communication between industry stakeholders and between industry and the wider community. Further, improved community understanding of industry values may contribute to maintained or enhanced social licence to operate for Australian fishers.

Recommendations

The following recommendations have been developed based on project findings. It is recommended that:

i. FRDC and other decision-making stakeholders take into account the diversity of values held by each sector. This will ensure that future research and policy are driven by a broad suite of diverse values for each sector and not driven by a limited set of dominant groups within the sector.

A key finding of this study was that values do not "neatly" align to specific industry sectors. There are commercial fishers whose values are more aligned to recreational fishers when compared to other commercial fishers and vice versa. In particular, the values of the recreational fishing sector were very diverse, and split across four of the five sub-groups. There was no one sector that had its own unique set of values. This was also evident in relation to the values of the respondents that represented the Indigenous sector as their values were spread across three sub-groups.

The results show that to treat any one industry sector as a homogenous group with similar values is mis-guided and is not an accurate representation of the sectors. Instead, the results indicate that a better approach would be to treat each sector as a group that has both complementary and contrasting values across the social, economic and environmental themes.

Based on this key finding, it is recommended that FRDC and other decision-making stakeholders take into account the diversity of values held by each sector. This will ensure that future research and policy are driven by a broad suite of diverse values for each sector and not driven by a limited set of dominant groups within the sector.

ii. The project findings be used to inform and prioritise further investigation into specific issues associated with the range of complementary and contrasting fisher values identified.

Through the establishment of a baseline understanding of general values, further studies may be conducted to explore what are the factors or drivers underpinning those values, as well as identifying the values that underpin specific attitudes, motivations and associated fishing behaviours. Due to the generalised and baseline nature of the study's findings, it would not be appropriate to make specific recommendations about changes to research and policy associated with the three fisheries sectors included in the study. However, the project findings should be used to inform and prioritise further investigation into specific issues associated with the range of complementary and contrasting fisher values identified.

iii. Where possible, future survey studies adopt an in-person and targeted recruitment approach. Face-to-face data collection methods will improve efficiency in capturing views of diverse groups.

Given some of the methodological challenges experienced during the implementation of the study online using Q-methodology, specifically related to difficulties recruiting participants from the Indigenous and commercial sectors, it is recommended that future approaches use an in-person, target recruitment approach.

iv. A more qualitative data collection approach is utilised to enable a deeper understanding of the values identified and the implications for policy and planning.

This study focussed on collection and analysis of identified values from the three sectors. A further investigation to understand these values will be valuable for developing policies that better address industry needs.

v. Insights about the complementary and contrasting values of fishers across the Indigenous, commercial and recreational sectors be shared with the industry stakeholders through publication of this report and the extension and adoption outputs outlined later in this report.

The FRDC should engage in a process to create forums for discussion about the range of complementary and contrasting values with the fishing industry, policymakers and researchers. Such discussion will contribute to FRDC's R&D Plan outcomes 3 and 4.[7] The report findings should be shared through publication of this report and the extension and adoption outputs outlined later in this report. Dissemination of the findings that all sectors have several complementary values will help improve engagement and communication between the sectors and enhance effective and efficient implementation of future fisheries policies.

Further development

The study of intersectoral values across the Australian Indigenous, commercial and recreational fishing sectors using Q-methodology has identified a range of complementary and contrasting values held by Australian fishers and demonstrated that fisher values do not neatly align with defined industry sectors. These baseline fisher value findings and the Q-methodology approach used has exposed a number of areas for further RD&E that would contribute to a deeper understanding of fisher values and potentially inform future policy and fisheries management decisions.

i. Improved data collection for the Indigenous fishing sector

There was a relatively low response rate to the survey by the Indigenous community. Only about 7% of the respondents identified as from the Indigenous fishing sector and none were from Tasmania. Similarly, there were low numbers from some specific areas (for example, freshwater fishers, crustacean and molluscs fishers, and post-harvest for the commercial sector). It is therefore recommended that future projects should consider allocating resources for targeted in-person data collection, particularly for the Indigenous community. The ability to do this will be reliant on improvements in the current COVID19 pandemic travel restrictions so the project team can travel. Face-to-face interactions will provide a better platform to communicate the project rationale. Expanding the results to other locations and the aquaculture industry would also be recommended to further verify the validity of the results with a broader audience. Such an undertaking will further develop an understanding of values for the fishing sector overall and also help build trust with other stakeholders and FRDC.

ii. Further enhancement of the Q-methodology approach for intersectoral values in the Australian fisheries industry

Q-methodology data collection is a sophisticated and time-consuming process. In the future, if a larger and/or more diverse sample is required, then respondent compensation should be considered as an incentive to increase response rates and the extent to which a wider diversity of fishers are

[7] FRDC R&D Plan outcomes 3 and 4 are: *A culture that is inclusive and forward thinking* and *Fair and secure access to aquatic resource.*

willing to participate. Future research could include the following additions, all of which would require more resources than were available in this project:

- establish the concourse using an alternative framework for values (e.g. using values that are consistent with the total economic value framework)
- further refine the existing concourse and its phrasing using more widely consultative processes, and
- undertake the Q sort in collective workshop settings to get group feedback and shared value discussions or, run the Q sort using smart phone-capable software.

Further there was some evidence of demographic differences between the sub-groups that warrants further exploration. For example, Sub-group C had a higher proportion of women and younger respondents. While the purpose of the study was not to understand the role of demographic factors, there was no purposeful sampling to recruit a representative sample of fishers in relation to factors such as age or gender. However, the results suggest that this might be an area worth future study. Specifically, further research should seek to understand if demographic profiles are underlying some of the study's findings in relation to the different values underpinning the identified sub-groups, rather than their identification with a particular fishing sector.

iii. Refining the understanding of fisher values that underpin fair and secure access to aquatic resources (and other specific fisheries issues)

Utilising the complementary and contrasting values of fishers across the industry sectors as a baseline and platform, additional study should be undertaken to investigate what is important to fishers across different groups and geographic regions for specific fisheries issues that may require policy and/or management changes. For example, a more specific and detailed study on the intersectoral values of Australian fishers with respect to the specific issue of fair access to aquatic resources (a key shared value identified through the current study) may reveal where fishers perceive unfairness/ inequality of access that could be addressed by policy and/or where misunderstandings between sectors have occurred with respect to perceptions of fair access. This should assess different policy/intervention approaches to, ultimately, establish a portfolio of reinforcing and complementary approaches.

Similarly, environmentally sustainable fishing practices is a value shared by all Australian fisheries sectors. Further study could be used to better understand what aspects of 'sustainability' are important across or between sectors to better inform and prioritise environmental management decisions and policy.

Extension and adoption

At the onset of this project, we undertook consultation with the FRDC, the Human Dimensions Research Coordination Program and key stakeholders via email, phone calls, social media and through FRDC's Message in a Bottle newsletter. The consultation process involved discussions to introduce this work and to ensure that the project was collecting data that was fit for purpose.

A total of 98 organisations representing Indigenous, commercial and recreational sectors were contacted via email and phone calls (where possible) for recruitment to undertake the online survey. To ensure the establishment of an effective feedback loop to industry, survey respondents were asked to indicate their willingness to receive future publications about the project findings.

The project team, in collaboration with FRDC, shared a project summary with survey participants who indicated a desire to receive study findings as well as the organisations that helped to facilitate the recruitment of fishers to complete the study.

A post-project on-line workshop was held early in 2022 to publicise the study and its findings across the three sectors, and decision makers within government and industry groups. An estimated 20 people from the industry, FRDC, government and the Human Dimensions Research Coordination Program attended.

The project team was subsequently invited to conduct a presentation on the study by the Fisheries Branch of the Department of Agriculture, Water and Environment. An estimated 20 people from the department attended this meeting which was well received. Attendees were provided with copies of the presentation slides. The findings of this study will help inform engagement with the different sectors.

The final report will be published via the FRDC website, and it will be accessible to the public including managers, other researchers, industry and where applicable, the broader community. Making the report publicly available will help to extend its usage across relevant sectors and researchers and assist with broader dissemination of the findings.

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Appendices

Appendix 1: List of organisations contacted to take part in the survey and/or help distribute the survey link

No.	Organisation	Sector	Region
1	Infofish Australia	Recreational	National
2	CapReef - Adori Charters	Recreational	Qld
3	Game Fishing Association of Australia	Recreational	National
4	Cairns Bluewater Game Fishing Club Inc	Recreational	Qld
5	Hervey Bay Game Fishing Club	Recreational	Qld
6	Ingham Rod and Reel Club	Recreational	Qld
7	Innisfail Game Fishing Club	Recreational	Qld
8	Mackay Game Fishing Club	Recreational	Qld
9	Mission Beach Game Fishing Club	Recreational	Qld
10	Port Douglas Fishing Club	Recreational	Qld
11	Ribbons Ladies Game Fishing Club	Recreational	Qld
12	Townsville Game Fishing Club	Recreational	Qld
13	Yorkeys Knob Boating Club	Recreational	Qld
14	Game Fishing Club of Northern Tasmania	Recreational	Tas
15	Southern Tasmania Game Fishing Club	Recreational	Tas
16	St Helens Game Fishing Club	Recreational	Qld
17	Queensland Amateur Fishing Clubs Association	Recreational	Qld
18	Broome Fishing Club	Recreational	W
19	Broome North Fishing Club	Recreational	WA
20	Exmouth Game Fishing Club	Recreational	WA
21	Fremantle Sailing Club - Game Fishing Section	Recreational	WA
22	Geraldton and Districts Offshore Fishing Club	Recreational	WA
23	King Bay Game Fishing Club	Recreational	WA
24	Marmion Angling and Aquatic Club	Recreational	WA
25	Marmion Angling and Aquatic Club	Recreational	WA
26	Naturaliste Game and Sports Fishing Club	Recreational	WA
27	Nor-West Game Fishing Club	Recreational	WA
28	Perth Game Fishing Club	Recreational	WA
29	Australian Anglers Association	Recreational	WA
30	Whitsunday Game Fishing Club	Recreational	Qld
31	WA Trout and Freshwater Angling Association	Recreational	WA
32	Recfish Australia (Australian National Sportfishing Association)	Recreational	National
33	Australian Recreational Fishing Foundation (ARFF)	Recreational	National
34	Australian Fishing Trade Association (AFTA)	Recreational	National
35	Australian National Sportfishing Association (ANSA)	Recreational	National
36	Native Fish Australia	Recreational	National
37	Recfishwest	Recreational	WA
38	Surf Casting and Angling Club of WA (Inc.)	Recreational	WA
39	FRDC Indigenous Reference Group on Fisheries	Indigenous	National - Research Focus
40	Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS)	Indigenous	National - Research Focus
41	Girringun Aboriginal Corporation	Indigenous	Qld
42	Seafood Industry Australia	Commercial	National
43	Abalone Council of Australia Ltd (ACA)	Commercial	National

No.	Organisation	Sector	Region
44	Arabon Seafoods	Commercial	Qld
45	Rosslyn Bay Fishermens Market	Commercial	Qld
46	Australian Council of Prawn Fisheries (ACPF)	Commercial	National
47	Australian Southern Bluefin Tuna Industry Association (ASBTIA)	Commercial	National
48	Southern Ocean (SO) Tasmania	Commercial	TAS
49	Western Rock Lobster Council (WRLC)	Commercial	National
50	Commonwealth Fisheries Association (CFA)	Commercial	National
51	Master Fish Merchants Association of Australia (MFMA)	Commercial	National
52	Women in Seafood Australasia	Commercial	National
53	Queensland Seafood Marketers Assoc	Commercial	National
54	Queensland Seafood Industry Assoc	Commercial	Qld
55	OceanWatch Australia	All	National
56	Tasmanian Regional Aboriginal Communities Alliance (TRACA)	Indigenous	TAS
57	Tasmanian Seafood Industry Council	Commercial	Tas
58	Tasmanian Rock Lobster Fishermens Association	Commercial	Tas
59	Tasmanian Abalone Council	Commercial	Tas
60	Tasmanian Scallop Fishermen's Association	Commercial	Tas
61	Western Australia Rock Lobster Council	Commercial	WA
62	Sea and Land Rangers	Indigenous	National
63	TARFish	Recreational	Tas
64	Anglers Alliance	Recreational	Tas
65	Fishing Tackle Industry	Recreational	Tas
66	Tasmanian Fly Fishing Clubs	Recreational	Tas
67	Trout Guide and Member of the Inland Fisheries Advisory Council	Recreational	Tas
68	Southern Tasmanian Licensed Anglers Association	Recreational	Tas
69	Northern Angling Clubs Tasmania	Recreational	Tas
70	North West Fishing Association	Recreational	Tas
71	Break O'Day Sports Anglers	Recreational	Tas
72	Independent – North, Tasmania	Recreational	Tas
73	Independent - North West, Tasmania	Recreational	Tas
74	Independent – South, Tasmania	Recreational	Tas
75	TasFish		Tas
76	Western Australia Fishing Industry Council	Commercial	WA
77	Tasmanian Aboriginal Centre	Indigenous	TAS
78	North Australia Indigenous Land and Sea Management Alliance	Indigenous	Qld
79	South West Aboriginal Land and Sea Council		WA
80	Nathan Johnson	Recreational	Qld
81	Bank Angler Angling Club - WA	Recreational	WA
82	NQ Traweller Fresh	Commercial	Qld
83	Ingham Road Seafood	Commercial	Qld
84	Mures Seafood	Commercial	Tas
85	Petuna Seafood	Commercial	Tas
86	The Seafood Gateway	Commercial	WA
87	Correia Fishing Company	Commercial	WA
88	Magic Abalone	Commercial	WA
89	SunFish Queensland Inc.	Recreational	Qld

No.	Organisation	Sector	Region
90	Martuwarra Fitzroy River Council	Indigenous	WA
91	Bush Heritage Australia	Indigenous	WA
92	Oysters Australia	Commercial	National
93	MG Kailis Group	Commercial	Qld
94	Broome Fishing Club	Recreational	WA
95	Martuwarra Fitzroy River Council	Indigenous	WA
96	North Australian Indigenous Land and Sea Management Alliance (NAILSMA)	Indigenous	National
97	Trout Guide and Lodges	Recreational	TAS

Appendix 2: List of government, research and industry organisations contacted help distribute the survey link

No.	Organisation
1	Department of Fisheries, WA
2	Department of Primary Industries and Regional Development, WA
3	AgriGrowth Tasmania, Department of Primary Industries, Water and Environment
4	Australian Fisheries Management Authority (AFMA)
5	Australian Institute of Marine Sciences
6	Bass Strait Central Zone Scallop Fishery (Commonwealth) - AFMA
7	Commonwealth Research Advisory Committee (COMRAC)
8	Coral Sea Fishery - AMFA
9	Commonwealth Scientific and Industrial Research Organisation (CSIRO)
10	Department of Agriculture and Fisheries, QLD
11	Department Primary Industries & Regional Development - Fisheries Division
12	Department Primary Industries & Regional Development - Regional Services – Licensing
13	Department Primary Industries & Regional Development - Surveys, Assessments and Data Analysis
14	Eastern Tuna and Billfish Fishery- AMFA
15	Geoscience Australia
16	Heard Island and McDonald Island Fishery- AMFA
17	Institute for Marine and Antarctic Studies (IMAS), UTAS
18	Macquarie Island Fishery- AMFA
19	Marine Solutions
20	Murdoch University
21	North Australian Indigenous Land and Sea Management Alliance Ltd (NAILSMA)
22	North West Slope Trawl Fishery- AMFA
23	Northern Prawn Fishery- AMFA
24	Queensland Department of Agriculture and Fisheries
25	Queensland Research Advisory Committee (QLDRAC)
26	Small Pelagic Fishery- AMFA
27	Southern and Eastern Scalefish and Shark Fishery- AMFA
28	Southern Bluefin Tuna Fishery- AMFA
29	Southern Squid Jig Fishery- AMFA
30	Tasmania Research Advisory Committee (TASRAC)
31	Torres Strait Fisheries- AMFA
32	University of Tasmania
33	University of Western Australia
34	University of Wollongong
35	Western Australia Research Advisory Committee (WARAC)
36	Western Deepwater Trawl Fishery- AMFA
37	Western Tuna and Billfish Fishery- AMFA

Appendix 3: Example invitations

Hi [redacted],

I found your contact details on the website [redacted]. The reason for reaching out is that we are currently undertaking a study to understand what is important to fishers from the commercial, Indigenous and recreational fishing sectors to better understand which values are shared (and not shared) among and within the fishing industry. Everyone that completes the study will have the chance to win a $50 gift voucher from BCF.

It would be great if you would be willing to complete the study – accessed *here*. This study uses a methodology called *Qmethod* and is not optimised for smartphone use. Please use a computer or tablet to complete the study.

The study is being conducted by *NCEconomics*, in collaboration with Alluvium Consulting and Agtrans Research and Consulting, with funding from the *Fisheries Research and Development Cooperation* (FRDC). The results of the study will be used by the FRDC and other policy stakeholders to build a better understanding of shared and contrasting values among the fishing industry and will contribute to the achievement of the FRDC's vision for 2030 of fair and secure access to aquatic resources. The FRDC are not involved in the study design or analysis, and funding is not dependent on the research outcomes.

If you have any questions about the study, please feel free to give me a call and please feel free to share the study with your peers or colleagues.

Kind Regards,

Yaama [redacted]

Firstly, I hope you both are safe and well along with your families.

I am reaching out to you seeking your assistance in connecting us to Indigenous people who are actively involved in freshwater and salt water fishing across Tasmania, Western Australia and the Great Barrier Reef Catchments. We are seeking to have at least ***five (5) people*** to complete the attached survey. If you would be able to connect me / us with people in Tasmania and have them complete the survey, it would be greatly appreciated.

This study is being conducted by NCEconomics, in collaboration with Alluvium Consulting and Agtrans Research and Consulting, with funding from the Fisheries Research and Development Cooperation (FRDC). The FRDC are not involved in the study design or analysis, and funding is not dependent on the research outcomes.

Is fishing important to you? Do you fish in one of the below locations?

- Saltwater fishing within the Great Barrier Reef catchments
- The fresh and salt waters of Tasmania
- The fresh and salt waters of Western Australia

We want to understand what is important to fishers from the commercial, Indigenous and recreational fishing sectors to better understand which values are shared (and not shared) among and within the fishing industry.

Everyone that completes the below study will have the chance to win a $50 gift voucher from BCF.

Click here to launch the study.

We would also be very appreciative if you could forward the study to any of your fellow fishers from the three above locations.

The results of the study will be used by the FRDC and other policy stakeholders to build a better understanding of shared and contrasting values among the fishing industry and will contribute to the achievement of the FRDC's vision for 2030 of fair and secure access to aquatic resources.

This study uses a methodology called Qmethod and is not optimised for smartphone use. Please use a computer or tablet to complete the study.

Alternatively, it may be more appropriate if we were able to give you some further background over the phone at a convenient time in the next couple of days. Please feel free to contact Tracy Schultz at tracy.schultz@alluvium.com.au or 040 7575 464 with any questions that you might have or to suggest a convenient time to discuss this study further.

Seafood Industry Australia
The Voice of Australian Seafood

Share Tweet Forward

Feedback sought: FRDC Project to understand what is important to commercial, recreational and indigenous fishers

Dear [redacted],

The Fisheries Research and Development Corporation, along with its research partners, are conducting a study to better understand the shared and contrasting values among the fishing industry and their vision for fair and secure access to aquatic resources.

If you are a commercial fisher and regularly fish in either Western Australia, Tasmania or the Great Barrier Reef catchments in Queensland, *please provide your thoughts via this survey*. Everyone responding will have the chance to win a $50 gift voucher from BCF. The study is closing at the end of the month.

The survey form uses a methodology called Qmethod and is not optimised for smartphone use, so please use a computer or tablet to complete the study. The study, "Project 2020-088: Quantifying inter-sectoral values within and among the Indigenous, commercial and recreational sectors", is being conducted by NCEconomics with funding from the Fishing Research and Development Corporation (FRDC) on behalf of the Australian Government.

If you have any questions about the study, you can contact Tracy Schultz at *tracy.schultz@alluvium.com.au*.

Fishers who regularly fish the Great Barrier Reef can participate in a survey and go into the draw to win a $50 BCF gift voucher for their effort.

The research is conducted by Fisheries Research and Development Corporation and its research partners and aims to understand commercial, recreational and Indigenous fishers' values and thoughts on access to aquatic resources.

Tip: the survey is easier to complete on a desktop rather than a mobile device.

Check out the survey link below before it closes on 31 July

https://app.qmethodsoftware.com/study/8765

Appendix 4: Participant information sheet, instructions and survey

PURPOSE OF THE STUDY

Is fishing important to you? Do you fish in one of the below locations?

- Saltwater fishing within the Great Barrier Reef catchments
- The fresh and salt waters of Tasmania
- The fresh and salt waters of Western Australia

We want to understand what is important to fishers and seafood harvesters from the commercial, Indigenous and recreational fishing sectors to better understand which values are shared (and not shared) among and within these three fishing sectors.

The study is being conducted by NCEconomics with funding from the Fisheries Research and Development Cooperation (FRDC). The results of the study will be used by the FRDC and other policy stakeholders to build trust across the fishing industry through an improved understanding of values and will contribute to the achievement of the FRDC's vision for 2030 of fair and secure access to aquatic resources. The FRDC are not involved in the study design or analysis, and funding is not dependent on the research outcomes.

PROCEDURES

If you choose to continue, you will be asked to:

- Sort a list of 44 value statements, over two stages, based on how important they are to you as a representative from either the commercial, Indigenous or recreational fishing sector.
- Answer a short survey about some background and demographic information like your gender, what state you live in and your relationship to the fishing sector.

This questionnaire/survey requires a time commitment of less than 30 minutes and can be completed online from any location. Please note the study cannot be completed on a smartphone. Participants will not be contacted for any follow up requests or further studies; however, you will be given an opportunity to receive a copy of the final report should you wish.

POTENTIAL RISKS AND DISCOMFORTS

This study does not entail any significant risks beyond those presented by everyday living. If you have any concerns or negative experiences as a result of your participation in this study however, please contact Tracy Schultz, tracy.schultz@alluvium.com.au.

COMPENSATION

As compensation for your time, participants will be entered into a draw to receive a $50 gift card from BCF. Simply enter your email address at the completion of the study to be eligible.

CONFIDENTIALITY

Beyond an email address, you will not be asked to provide any personal information that could be used identify you. Any data relating to the study will be stored in a password protected file. Participant's email addresses will be temporarily linked to the data collected for the sole purpose of providing compensation to participants. Once the study closes, the email addresses and data will be separated. Once the draw is complete, all email addresses will be deleted except for those that have opted to receive a copy of the final report. Information obtained from this sample study will NOT be used in further research. Any data used for publication will be kept on file for five years after the last date of publication and will then be destroyed.

PARTICIPATION AND WITHDRAWAL

You can choose whether to participate in this sample study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You can request your data to be removed from the study by the end of August by emailing tracy.schultz@alluvium.com.au. After August, the identifying information (your email address) and data will be separated, and you can no longer choose to remove your data from the study because there will be no way to link your identification with the corresponding data.

CONTACT INFORMATION

If you have any questions or concerns about this study, or would like a receive a summary of the results, please feel free to contact Tracy Schultz, tracy.schultz@alluvium.com.au.

PLEASE READ THE BELOW INSTRUCTIONS CAREFULLY BEFORE STARTING THE STUDY

You will be asked to complete two sorting tasks. The first sorting task will involve you sorting 44 value statements into three piles according to how important they are to you as a representative of either the commercial, Indigenous or recreational fishing sector. Once all statements are sorted you will be taken to the second sorting task.

In the second sorting task you will be asked to sort the three piles of previously sorted statements onto a triangle shaped grid according to what is most important (+5) and least important to you (-5). We recommend that you complete the sorts quickly; don't over think it.

Once all statements are sorted and no changes are required, a SUBMIT button will appear that will allow you to submit your final response. You will then be asked to complete a brief survey that will ask questions that are similar to those that may be found in a traditional demographic survey. This is where you can enter your email address to be entered into the draw to win a $50 gift voucher from BCF.

The purpose of the study is to understand YOUR values as a representative of either the recreational, commercial or Indigenous fishing sectors. Some values may not apply to you or your sector. We are not suggesting that one value is more important than others across the sectors. What we aim to understand is where values are shared across sectors.

You can view the instructions at any time by clicking on the question mark icon in the pre-sort and post-sort areas.

SURVEY

Please complete this brief survey so we can better understand who has completed the survey and to assist us with the interpretation of the results. You will be given an opportunity to enter your email address at the completion of the survey to be entered into a draw to with a $50 gift voucher from BCF.

*Where are you located? **

- Queensland
- Tasmania
- Western Australia
- Other

*Please nominate the fishing sector that you MOST identify with**

- Indigenous
- Commercial
- Recreational

Were any values (things that you feel are important in relation to fishing) missing? If yes, please list those values below.

What is your age?

- 25 years or younger
- 26 to 65 years
- Older than 65 years

What is your gender?

- Man
- Woman

- Non-binary
- Prefer not to say

Are you of Aboriginal or Torres Strait Islander (TSI) origin?

- Yes, Aboriginal
- Yes, TSI
- No
- Prefer not to say

How long have you been involved in the fishing sector that you nominated above?

- Less than one year
- 1-5 years
- 6-10 years
- Greater than 10 years

How important is fishing to your sense of identity?

- Not at all
- Slightly
- Somewhat
- Moderately
- Very

How long has your family been involved in fishing?

- First generation fisher
- Second generation fisher
- Third or more generation fisher

Where do you MOSTLY catch fish?

- Inshore or coast (within 3 nautical miles offshore)

- Offshore (beyond 3 nautical miles offshore)
- Bays, estuaries and/or inlets
- Beach (e.g. cockles, pipis)
- Freshwater (rivers, creeks and dams)
- Other

What type of fish do you MOSTLY catch?

- Finfish
- Crustaceans
- Molluscs
- Other

If you identified as primarily as a commercial fisher, are you a/an…..

- Owner/Licensee
- Owner/Operator
- Operator
- Contractor
- Employee
- Other

If you identified as primarily as a commercial fisher, would you describe your operation as…..

- Harvest
- Post-Harvest
- Other (e.g., Commercial recreational fishing provider)

If you identified as primarily a commercial fisher, how would you describe the size of your operation?

- Zero to less than $50k

- $50k to less than $200k
- $200k to less than $2m
- $2m to less than $5m
- $5m to less than $10m
- $10m or more

If you would like to be entered into the draw to receive a $50 gift voucher from BCF, please enter your email address here:

Appendix 5: Factor loadings by Sub-group

Part. No	Sub-Group A		Sub-Group B		Sub-Group C		Sub-Group D		Sub-Group E	
1	0.19585		0.31272		0.45022	flagged	0.29525		0.10514	
2	0.22158		0.36224		0.64647	flagged	0.19064		0.30231	
3	-0.17709		0.61428	flagged	0.35824		-0.05424		-0.13546	
4	-0.25497		0.38084		0.55222	flagged	0.2774		0.24966	
5	0.34926		0.05759		0.24079		0.08014		0.45491	flagged
6	0.51789	flagged	0.19155		0.40649		0.14883		0.42215	
7	0.25513		0.62064	flagged	0.09238		0.08326		-0.31859	
8	0.25505		-0.38386		0.10676		0.5986	flagged	-0.20936	
9	0.26416		-0.07616		0.33768	flagged	-0.23678		0.26067	
10	0.7906	flagged	-0.10454		0.19668		-0.0767		0.13242	
11	0.49437		0.08047		0.54957	flagged	-0.0342		0.17579	
12	0.46224	flagged	-0.00232		0.26239		0.11864		0.06618	
13	0.56265	flagged	0.07294		0.27038		0.02497		0.16942	
14	0.62043	flagged	-0.12001		0.14398		0.49246		0.0098	
15	0.32891		0.10589		-0.00055		-0.03564		0.36234	flagged
16	0.35837		0.18872		0.42538	flagged	0.05583		0.3179	
17	0.41299	flagged	0.01643		0.2471		0.23224		0.32326	
18	-0.14202		0.66131	flagged	0.27304		0.16823		0.31498	
19	0.43802		0.22969		0.03521		0.2932		0.49968	flagged
20	0.36025	flagged	-0.03367		-0.0675		0.00676		-0.18119	
21	0.02187		0.31751		0.08508		0.07615		0.56326	flagged
22	-0.01623		0.05185		-0.1068		0.13838		0.53087	flagged
23	-0.04863		0.65875	flagged	-0.04801		0.13342		-0.18939	
24	0.34285		-0.09827		-0.12002		0.42777	flagged	0.20026	
25	0.06368		0.40744		0.27158		0.48471	flagged	0.28334	
26	0.23813		0.17208		0.65267	flagged	0.22462		0.20323	
27	-0.07825		0.66331	flagged	0.00639		0.06756		0.10006	
28	0.41479	flagged	0.25768		0.22757		0.33886		0.19443	
29	0.21107		0.05666		0.23139		0.42866	flagged	0.03809	
30	0.46044	flagged	-0.23911		0.11925		0.30561		0.23922	
31	0.06457		0.60126	flagged	0.01815		0.38489		0.23455	
32	0.10937		0.22268		0.36638		0.03086		0.43388	flagged
33	0.39336	flagged	0.12069		0.04795		-0.10463		0.20991	
34	0.51452	flagged	-0.08784		0.2241		0.15204		0.11352	
35	0.18665		-0.28956		-0.08237		0.18469		0.64407	flagged
36	0.37163		0.14293		0.28895		-0.00422		0.65588	flagged
37	0.64497	flagged	-0.31975		0.03089		0.34322		0.22977	
38	0.10889		0.27007		0.42088	flagged	-0.19562		-0.25055	
39	-0.12591		0.68865	flagged	0.14156		-0.03488		-0.04003	
40	0.74749	flagged	0.06234		0.24428		0.03591		0.33685	
41	-0.00778		-0.14137		0.49352	flagged	0.25186		-0.14838	
42	0.28439		-0.20707		0.21293		-0.20458		-0.05765	
43	-0.01066		0.27497		0.17475		0.39796	flagged	-0.04521	
44	0.64704	flagged	-0.19643		0.1592		0.04121		0.15931	
45	-0.02433		0.80428	flagged	0.08141		0.25573		-0.00472	

Part. No	Sub-Group A		Sub-Group B		Sub-Group C		Sub-Group D		Sub-Group E	
46	0.33947		-0.14824		0.1352		0.48415	flagged	0.16464	
47	0.12737		-0.0368		0.1745		0.25896		0.27363	
48	0.1146		0.10112		0.13397		0.06937		0.60041	flagged
49	0.28109		0.02476		-0.13875		-0.0658		0.08473	
50	0.34453		0.08093		0.55057	flagged	-0.0536		0.04114	
51	0.34458		-0.0243		0.66381	flagged	0.16214		0.22448	
52	0.408		0.07205		-0.20689		-0.03418		0.47897	flagged
53	0.45475	flagged	-0.09602		0.34565		0.25109		0.29845	
54	0.44406	flagged	0.13803		0.33663		0.35697		0.38597	
55	0.54958	flagged	0.20132		0.46417		0.09537		0.18706	
56	0.0367		0.54426	flagged	0.41429		0.24828		-0.15409	
57	0.57311	flagged	-0.07117		-0.40248		0.18307		0.22603	
58	0.14267		0.34696		0.60213	flagged	0.25332		0.27004	
59	0.06223		0.48378	flagged	-0.01315		0.41453		0.33455	
60	0.62263	flagged	-0.16296		0.17352		0.41698		0.01545	
61	0.20173		-0.09942		0.14086		0.30001		0.45953	flagged
62	0.70609	flagged	0.21379		0.14888		-0.03334		-0.06802	
63	0.06714		-0.04559		-0.1357		0.08849		-0.00678	
64	0.42465		-0.00978		0.4723	flagged	0.38818		0.21777	
65	-0.11482		-0.35702		0.11625		0.16356		-0.01137	
66	-0.13631		0.62385	flagged	0.02251		-0.05577		0.40571	
67	-0.05023		0.04513		0.66918	flagged	0.09386		-0.32358	
68	0.54307	flagged	-0.01316		0.21325		-0.30395		-0.05624	
69	0.33789	flagged	0.08977		-0.34024		-0.04131		0.063	
70	0.65278	flagged	-0.09825		0.40612		0.16902		0.24171	
71	0.45343	flagged	0.08441		0.47332		0.23697		0.03117	
72	0.37501		-0.09739		0.14735		0.24779		0.70184	flagged
73	-0.25001		-0.06547		0.25231		0.54951	flagged	0.0976	
74	0.46385	flagged	0.40986		0.25615		0.08954		0.25403	
75	-0.04362		0.77988	flagged	-0.1168		-0.05226		0.1374	
76	0.02085		0.13972		0.54233	flagged	0.27882		-0.16488	
77	0.45621		0.0891		0.09631		-0.27334		0.57182	flagged
78	0.61032	flagged	0.02138		0.27758		0.22456		0.45596	
79	0.47422		-0.10423		0.55131	flagged	0.12418		0.13409	
80	0.73848	flagged	0.17044		-0.08764		0.06919		0.07451	
81	0.72953	flagged	-0.0461		0.09408		-0.10964		0.14549	
82	0.1713		0.39994	flagged	0.22525		0.34512		0.04379	
83	-0.05815		0.69327	flagged	-0.04409		-0.06861		0.12632	
84	0.72454	flagged	0.05601		-0.08984		0.28123		0.02276	
85	0.35379		0.10239		0.41068		0.03664		0.45513	flagged
86	-0.04779		0.52237	flagged	0.24665		-0.07287		-0.04035	
87	0.58356	flagged	0.08207		-0.08381		0.37259		0.12169	
88	0.64428	flagged	-0.20945		-0.03671		0.16406		0.03137	
89	-0.11754		0.22855		-0.02649		0.57636	flagged	0.04018	
90	0.26209		0.07322		0.21221		0.28682		-0.37705	
91	-0.40981	flagged	-0.03289		0.0362		0.12063		0.18668	
92	0.22588		0.17939		0.64523	flagged	0.12583		0.32655	

Part. No	Sub-Group A		Sub-Group B		Sub-Group C		Sub-Group D		Sub-Group E	
93	0.4057		0.07553		0.43709	flagged	-0.15252		0.40575	
94	0.17814		0.21973		0.25779		0.29672	flagged	0.23947	
95	0.71712	flagged	0.10152		0.16311		0.06059		0.21294	
96	0.11095		0.14448		0.16671		0.17285		-0.17191	
97	0.05347		0.47617	flagged	0.31119		0.00118		0.23947	
98	0.49668	flagged	0.05015		0.38763		-0.11565		0.39959	
99	0.56055	flagged	0.01726		0.49065		0.22314		0.12518	
100	0.11396		0.43251	flagged	0.20858		-0.14047		0.39373	
101	0.40061	flagged	0.11104		0.1566		-0.29065		0.26458	
102	0.25908		0.20941		0.2578		0.28714		0.30077	flagged
103	0.02876		0.22229		0.04068		0.52006	flagged	0.06461	
104	0.53114	flagged	0.33417		0.27035		0.15367		0.25775	
105	0.70859	flagged	0.06324		0.3073		0.25368		0.21077	
106	0.0482		0.1381		0.81281	flagged	0.02138		-0.00892	
107	-0.07747		0.01284		0.69362	flagged	-0.10928		0.06036	
108	0.16306		0.15086		0.59758	flagged	-0.01854		0.44873	
109	0.00532		-0.13891		0.59499	flagged	0.43826		0.07627	
110	0.27291		0.1989		0.23386		0.10865		0.09913	
111	0.17795		0.64285	flagged	0.26262		-0.00832		0.00617	
112	0.1773		-0.16389		0.25857		0.06158		0.20514	
113	0.24814		0.13167		0.7191	flagged	0.06289		0.20382	
114	0.20669		0.73011	flagged	-0.09867		-0.05109		0.03348	
115	0.29062		0.05637		0.46427	flagged	0.24541		0.13221	
116	0.48891	flagged	-0.27754		0.05822		0.47476		0.16682	

Appendix 6: Respondent Characteristics by Sub-Group

		Sub-Group A (n = 39)	Sub-Group B (n = 19)	Sub-Group C (n = 24)	Sub-Group D (n = 10)	Sub-Group E (n = 15)	National (n = 107)
Location	Queensland	64%	32%	58%	40%	73%	58%
	Western Australia	21%	32%	8%	40%	13%	20%
	Tasmania	10%	26%	25%	20%	7%	16%
	Not disclosed	5%	11%	8%	0%	7%	6%
Industry	Indigenous	3%	-	17%	10%	-	7%
	Commercial	-	79%	4%	10%	7%	18%
	Recreation	95%	16%	75%	80%	93%	72%
	Not disclosed	3%	5%	4%	-	-	3%
Age	Under 25 years	-	-	13%	-	7%	4%
	26 to 65 years	90%	89%	79%	10%	87%	83%
	Over 65 years	8%	-	4%	30%	7%	9%
	Not disclosed	3%	11%	4%	-	-	4%
Gender	Male	92%	72%	74%	80%	100%	85%
	Female	8%	17%	26%	20%	-	14%
	Not disclosed	-	11%	-	-	-	2%
ATSI	Aboriginal	-	6%	13%	10%	-	6%
	TSI	5%	-	-	10%	7%	6%
	Not disclosed	5%	11%	-	-	-	4%
How long have you been involved in the fishing sector?	< 1 year	3%	-	-	-	-	1%
	1-5 years	-	6%	-	-	-	3%
	6-10 years	-	6%	9%	-	13%	4%
	> 10 years	97%	89%	91%	100%	87%	92%
Fishing identity[1]		4.16	4.12	3.35	4.2	3.67	3.86
How long has your family been involved in fishing?	First generation fisher	8%	31%	26%	10%	7%	17%
	Second generation fisher	26%	38%	22%	30%	29%	27%
	Third or more generation fisher	66%	31%	53%	60%	64%	57%
Where to do mostly catch fish?	Bays, estuaries and/or inlets	11%	13%	10%	10%	7%	12%
	Beach (e.g. cockles, pipis)	3%	-	-	10%	7%	3%
	Freshwater	8%	-	24%	10%	-	9%
	Inshore or coast	24%	31%	43%	50%	40%	32%
	Offshore	55%	50%	24%	20%	47%	43%
	Other	-	6%	-	-	-	1%

		Sub-Group A (n = 39)	Sub-Group B (n = 19)	Sub-Group C (n = 24)	Sub-Group D (n = 10)	Sub-Group E (n = 15)	National (n = 107)
What type of fish do you MOSTLY catch?	Crustaceans	-	44%	5%	-	-	7%
	Finfish	95%	50%	90%	90%	100%	88%
	Molluscs	-	6%	-	-	-	1%
	Other	5%	-	5%	10%	-	4%

[1] Score represents mean score on a 5-point scale where 1 = not at all to 5 = very

Appendix 7: Additional values not captured by the Q-sort statements as reported by respondents

1) Cost/Benefit studies to determine the best use of the resource in overall "Dollars/Kg generated" If proven that Recreational Harvest generates more value than Commercial harvest then Quota to the Recreational sector would logically be increased. 2) Ability of Public sector to purchase Quota from the Commercial sector, on raising sufficient funds to make it a non-reversible increase the recreational take is required so Recreational fishers can invest in their future.
a lot of my values that i believe in ended up on the negative side unfortunately as there wasn't enough questions of less importance or for other sector groups that might be of less importance to me. also there was a lot of double ups on the questions around cultural experiences which are represented /supported with different views/answers on the positive side, we all have and want similar experiences for ourselves regardless of ethnic backgrounds.
A shared resource and better enforcement
Ability to maintain fisheries industries for coming generations - family businesses, not empires and super boats.
Commercial fisher should pay a return to the community. Caution is needed in giving away fishing rights. Non extractive activities, such as dive values should be considered. Eg view diversity, large fish etc.
Consistency for all sectors. No sector is favoured over another.
equity of access between commercial and recreational sectors and the political and economic interplay between these sectors.
Exclusions of spear fishing in recreational areas sometimes unfair as an extremely selective and sustainable style of fishing
Family values. Support networks within fishing communities Acceptance for commercial fisheries by recreational fishers
Fish habitat like coral reefs. No fish zones or areas Commercial fishing responsibilities Bag limit fish sizes per fisherman Close off/no take period of some fish species like snapper, barramundi. Responsibility of local government toward sustainability of fishing.
I value my catch as meat. I am embarrassed by the wasteful practices at filleting tables and on trawlers which would often fish better off left to breed. Death as by-catch and incorrect releases could be as big of a loss to fish populations as the entire recreational catch.
I would like to see all fisheries managed by output controls across the commercial and recreational sectors. The concern is that the advent of GPS and larger recreational vessels has seen a rapid rise in the recreational fish take. THIS IS NOT SUSTAINABLE Quota systems need to be implemented for the recreational sector by way of using phone apps for their catch to be logged to the state management bodies to ensure sustainable limits to protect stock biomass.
It's a pity that a question of recfishers are they out numbering the commercial sector and what problems do they cause .
Natural environments
No, environment and sustainability are the most important thing for me.
Opportunities for a diverse range of people to participate in fishing
Preventing pillaging of our fish stocks by overseas countries and excess harvesting by commercial interests.
Proactive management is missing. Qld Fisheries (QF) monitor fish stocks, but if no effort is made to advance management through research stocks will decline more. QF lack the mentality that monitoring can only get you so far - progress is made through R&D. This costs money and there lies problems. Difficult changes (like a fishing license and body to voice that money like RecFishWest) are needed. We have the Great Barrier Reef as a world heritage site. Why are our fisheries not world class too?
Reducing bag limits and increasing size limits on popular species e.g. coral trout and large mouth nannygai.
the amount of GBR zones that no fishing
The amount of sharks taking more fish than you can get up. For everyone good fish you get up you can lose two or three in the process.

the general idea that we are entitled to fish species to unsustainable levels is unhelpful. There needs to be ownership from ALL SECTORS about the cumulative impact of everyone's activities, and protection for fisheries resources such that they do not end up overfished
Wilderness fishing experience
Yes, I think Commercial fishermen shouldn't be allowed to net fish anywhere along the east coast or in east coast rivers.

Appendix 8: Statement Rankings by Sub-Group

Statement		Sub-group A	Sub-group B	Sub-group C	Sub-group D	Sub-group E	Average Rank
Fishing is environmentally sustainable	Environmental	4	5	4	1	3	3.4
Accountability for industry participants who break the rules	Economic/Social	3	2	3	1	4	2.6
Having access to fish and fishing	Environ/Social/Cultural	5	2	1	3	2	2.6
Access to the ocean/sea	Environ/Social/Cultural	4	2	2	4	1	2.6
Catching good quality fish	Economic/Social	3	1	-1	4	5	2.4
Fish habitats are restored, improved and/or protected	Environmental	1	0	5	2	3	2.2
Catching fish to eat for myself and/or my family	Social/Cultural	2	-2	1	5	4	2
Everyone is working to improve the sustainability of fishing practices	Environmental	2	4	3	0	0	1.8
Providing locally caught/produced seafood to Australians	Economic	-2	3	0	3	3	1.4
Spending time fishing with family and friends	Social/Cultural	4	-1	1	1	2	1.4
Water quality and environmental flows are maintained/improved for fish	Environmental	2	1	4	-1	1	1.4
Biosecurity is maintained	Environmental	0	3	2	2	0	1.4
Catching only what is needed for a feed	Environmental/Social	1	-3	3	2	3	1.2
Native fish population sizes are healthy	Environmental	1	1	3	-1	2	1.2
Fish are caught in a natural/pristine environment	Environmental	2	1	4	-2	1	1.2
Fish as an important part of a healthy diet	Social/Cultural	0	-1	0	3	2	0.8
Access to the outdoors	Social/Cultural	3	-2	2	0	0	0.6
Fishing provides a connection to nature	Social	1	-1	1	3	-1	0.6
Participation in scientific research	Social/Economic	-1	2	2	-2	1	0.4
Mental health benefits from fishing	Social	2	-2	1	1	-1	0.2
Catching a variety of fish	Social	1	-4	-2	1	4	0
Fishing as "a way of life"	Social/Cultural	1	0	-3	4	-2	0
That introduced fish species are decreased	Environmental	-1	0	1	-1	0	-0.2
Fishing's contribution to the local economy	Economic	-2	3	-1	0	-1	-0.2
Co-management of fisheries	Social/Economic	-1	1	0	-2	0	-0.4
Contribution to food security	Economic	-3	3	-2	-1	0	-0.6
Catching only what is needed to make a living	Economic	-3	0	-1	2	-1	-0.6

Statement		Sub-group A	Sub-group B	Sub-group C	Sub-group D	Sub-group E	Average Rank
Physical health benefits from fishing	Social	0	-2	0	0	-1	-0.6
Fishing practices that protect animal welfare	Environmental	-1	1	2	-3	-2	-0.6
Being part of strong traditions of sharing fishing knowledge	Cultural	-2	-1	-1	2	-2	-0.8
Industry innovation/technical advancement	Economic	-2	2	-2	-1	-2	-1
Fishing's role in binding community together	Social/Cultural	-1	0	-1	0	-3	-1
Community acceptance of my fishing activities	Social/Cultural	0	0	-2	0	-3	-1
Catching fish for sport	Social/Cultural	3	-4	-3	-4	1	-1.4
Employment/income from fishing	Economic	-4	4	-3	-3	-1	-1.4
Fishing's economic returns	Economic	-3	4	-4	-1	-3	-1.4
Fishing as part of culture and heritage	Cultural	-3	-3	0	1	-3	-1.6
Catching large fish	Social	0	-3	-4	-4	2	-1.8
Fishing as part of personal identity	Social/Cultural	0	-1	-4	-2	-4	-2.2
Spending time fishing alone	Social	-1	-4	-2	-3	-2	-2.4
Catching lots of fish	Social	-2	-2	-5	-5	1	-2.6
Fishing's support of cultural practices and requirements	Cultural	-4	-3	0	-2	-4	-2.6
Fishing provides a connection to ancestors/previous generations	Cultural	-4	-1	-1	-3	-5	-2.8
Opportunity to barter and trade goods	Cultural	-5	-5	-3	-4	-4	-4.2