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Using a well-being approach to develop a framework for an integrated socio-economic evaluation of professional fishing

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Using a well-being approach to develop a framework for an integrated socio-economic evaluation of professional fishing

Abstract

The principles of Ecologically Sustainable Development and Ecosystem Based Fisheries Management require that fisheries be managed for social as well as environmental and economic objectives. Comprehensive assessments of the success of fisheries in achieving all three objectives are, however, rare. There are three main barriers to achieving integrated assessments of fisheries. Firstly, disciplinary divides can be considered "too hard" to bridge with inherent conflicts between the predominately empirical and deductive traditions of economics and biophysical sciences and the inductive and interpretative approach of much of the social sciences. Secondly, understanding of the social pillar of sustainability is less well developed. And finally, in-depth analysis of the social aspects of sustainability often involves qualitative analysis and there are practical difficulties in integrating this with largely quantitative economic and ecological assessments. This article explores the social well-being approach as a framework for an integrated evaluation of the social and economic benefits that communities in New South Wales, Australia, receive from professional fish harvesting. Using a review of existing literature and qualitative interviews with more than 160 people associated with the fishing industry the project was able to identify seven key domains of community well-being to which the industry contributes. Identification of these domains provided a framework through which industry contributions could be further explored, through quantitative surveys and economic analysis. This framework enabled successful integration of social and economic, and both qualitative and quantitative information in a manner that enabled a comprehensive assessment of the value of the fishery.

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Title page

Using a wellbeing approach to develop a framework for an integrated socio-economic evaluation of professional fishing.

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Abstract

The principles of Ecologically Sustainable Development and Ecosystem Based Fisheries Management require that fisheries be managed for social as well as environmental and economic objectives. Comprehensive assessments of the success of fisheries in achieving all three objectives are, however, rare. There are three main barriers to achieving integrated assessments of fisheries. Firstly, disciplinary divides can be considered 'too hard' to bridge with inherent conflicts between the predominately empirical and deductive traditions of economics and biophysical sciences and the inductive and interpretative approach of much of the social sciences. Secondly, understanding of the social pillar of sustainability is less well developed. And finally, in depth analysis of the social aspects of sustainability often involves qualitative analysis and there are practical difficulties in integrating this with largely quantitative economic and ecological assessments. This paper explores the social wellbeing approach as a framework for an integrated evaluation of the social and economic benefits that communities in New South Wales, Australia receive from professional fish harvesting. Using a review of existing literature and qualitative interviews with more than 160 people associated with the fishing industry the project was able to identify seven key domains of community wellbeing to which the industry contributes. Identification of these domains provided a framework through which industry contributions could be further explored, through quantitative surveys and economic analysis. This framework enabled successful integration of social and economic, and both qualitative and quantitative information in a manner that enabled a comprehensive assessment of the value of the fishery.

Keywords

Social and economic valuation, wellbeing, resource conflict, integrated management, professional fishing

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1. Introduction

Ecosystem Based Fisheries Management (EBFM), sometimes also known as the Ecosystem Approach for Fisheries Management (EAFM), requires consideration of the full spectrum of environmental impacts of wild-harvest fisheries along with the social and economic costs and benefits that the industry provides to local communities (Engler, 2015; Fletcher, Chesson, Sainsbury, Hundloe, & Fisher, 2005; Fletcher et al., 2016). Managing fisheries for environmental, social and economic objectives also lies at the heart of the principles of Ecologically Sustainable Development now central to many of the world's fisheries policy and regulatory frameworks (Brundtland, 1990). Despite this, comprehensive assessments of fisheries against all three objectives are rare and there remains limited guidance for fisheries managers and researchers around how such an integrated assessment might be achieved. A number of key barriers exist to achieving this integrated approach to fisheries assessment and management approaches.

The first barrier is a function of the disciplinary divides that exist between the scholars and practitioners working on the different aspects of fisheries management. Traditional economic and ecological assessments largely draw on empiricist and positivist paradigms to develop improved understandings of the way natural systems and society work, using deductive methods and hypothesis testing (Creswell, 1998; Crotty, 1998). There are similar statistical approaches used in the social sciences, but in addition there are approaches that draw a more interpretive, 'constructivist' understanding of the world, recognizing that meanings are constructed by people, and that people develop their own subjective understandings of the world that influence the ways they live and interact with others, with nature, and with

regulation (Creswell, 1998; Crotty, 1998). There is considerable work currently being undertaken across all three disciplinary areas which attempts to bridge this divide – Social-Ecological Systems (SES) research for example, attempts to better integrate social and ecological understandings of nature (Berkes, Colding, & Folke, 2003; Folke, 2007; Kittinger et al., 2013; Partelow, 2015). Environmental and ecological economists are also interested in understanding the economic and non-market values of nature and the social and cultural benefits that humanity derives from nature (Bennett et al., 2017; Costanza et al., 2016). Truly integrated assessments, still remain the exception, rather than the rule, in fisheries management, with these disciplinary differences often considered ‘too hard’ to reconcile (Creswell, 1998; Miles & Huberman, 1994). In particular, inherent barriers exist around the importance of subjective understandings, including values, beliefs and norms in relation to natural and economic systems, which influence people’s attitudes and behavior (Stern, Dietz, Kalof, Guagnano, & Abel, 1999). Subjective understandings may be dismissed as ‘anecdotal’ within the positivist paradigm, which aims for objective, unbiased assessment and privileges empirical data over examination of people’s experiences or beliefs.

An additional barrier exists simply through the paucity of available information on the social aspects of fisheries, in comparison with much greater availability of ecological and economic data. In fisheries management, the contest between the most appropriate measure of sustainability of a fishery - maximum sustainable yield or maximum economic yield – has traditionally focused fisheries management (and associated data collection) on only two of the three ‘triple bottom line’ objectives by incorporating only economic and ecological variables into the modelling process. As a consequence there has been a sidelining of social

benefit considerations that look beyond the economic component of social systems. These social aspects have been relegated to occasional studies of the social impacts of policies, and fisheries management generally has a poor assessment framework for measuring the social aspects of the fishery management system, or integrating social assessments within fisheries management (K Barclay, 2012). In recognition of this knowledge gap, there has been some recent progress towards the development of social indicators to monitor the success of fisheries management in achieving social objectives (Anderson et al., 2015; Brooks et al., 2015; Hicks et al., 2016; Triantafillos, Brooks, Schirmer, & Pascoe, 2014). These studies have revealed the importance of consideration of all three aspects of 'triple bottom line' decision making by highlighting examples of socially successful fisheries based on depleted resources and healthy resources that do not support high social or economic outcomes (Anderson et al., 2015).

Finally, a third barrier to integrated triple bottom line assessments of fisheries exist on a practical level and relates to the primary forms of data collection across the three disciplines. Economic and ecological assessments rely primarily on large quantitative data sets. Social sciences may also involve quantitative analyses, however, qualitative social research is really useful for complementing the positivist biological and economic approaches with understanding of the subjective aspects of the human dimension driving behavior (K Barclay et al., 2017). Qualitative social research is often exploratory and inductive, qualitative data also plays a significant role, particularly in formulating theory, or new ideas about how social systems work, which can then inform the development of appropriate social indicators (Glaser & Strauss, 1967). It usually involves discrete data sets, often with small sample sizes

and cannot be used to make generalized findings because the practical realities of recruiting respondents for such work means they cannot be statistically representative (Maxwell, 2005). While this form of social inquiry provides useful insights, given some aspects of the human experience may be difficult to quantify, the nature of the data sets makes integration with ecological and economic data sets problematic (K Barclay et al., 2017).

‘Wellbeing’ has been proposed as a useful ‘comprehensive integrating ‘lens’’, or framework, through which more thorough assessments of fisheries might be conducted. In particular, the social wellbeing framework is a means of ‘unravelling and better assessing complex social and economic issues within the context of fisheries governance’ (Weeratunge et al., 2014 p255). The concept of wellbeing has received increased attention in recent times, particularly since the evolution of the Sustainable Development Goals (SDG) which incorporate an increased emphasis on wellbeing (Costanza et al., 2016). This paper evaluates the wellbeing approach as a framework for an integrated assessment of the professional fishing industry in coastal New South Wales, Australia. In so doing it assesses whether the wellbeing approach enabled researchers to respond to and address the three barriers to effective triple bottom line assessment identified above, namely 1) disciplinary barriers, 2) paucity of social data and 3) practical difficulties in integrating qualitative and quantitative data. The results outlined in this paper summarizes a large-scale project investigating the social and economic contributions, or value, of the professional fishing industry to coastal communities in NSW, Australia (for the full report see Voyer, Barclay, McIlgorm, & Mazur, 2016). It should be noted that the study combines both positivist and inductive research paradigms. For example, a positivist approach is taken in the measurement of the economic activity and contribution

being made by commercial fishers and measurement of the wider economic contributions from professional fishing is assessed by qualitative social methods. Future research could integrate wider analysis of non-monetary values using quantitative and inductive economic methods based around the indicators identified in this study and investigate the possible discreteness or degree of overlap of applied economic and social approaches.

1.1 Applying a social wellbeing approach to assessing the value of NSW coastal fisheries

The development of an integrated approach to considering both the social and economic contributions of the wild-catch industry was guided by a ‘social wellbeing’ framework, where wellbeing is defined as ‘a state of being with others, where human needs are met, when individuals can act meaningfully to pursue self-defined goals, and when they can enjoy a satisfactory quality of life’ (McGregor, 2008 p1).

Most studies into wellbeing conducted around the world now recognize the interplay of a variety of different factors in influencing community and individual wellbeing. The needs, freedoms and quality of life conditions that contribute to wellbeing vary across different geographical, societal and cultural contexts (Coulthard, Johnson, & McGregor, 2011). In recognition of this, development theory has increasingly moved away from measures of quality of life which focus exclusively on economic factors (Coulthard, 2012; Hicks et al., 2016; McGregor, Coulthard, & Camfield, 2015; MC Nussbaum, Sen, & World Institute for Development Economics Research, 1993; Sen, 1999; Sen, Muellbauer, & Hawthorn, 1987; Stiglitz, Sen, & Fitoussi, 2009). An important aspect of the wellbeing approach is its

recognition of the need to consider both objective and subjective aspects of wellbeing. Conventional, objective measures of wellbeing include factors such as income and education, and are essential to any studies of this nature. People's satisfaction with life and their standards of living, and how they feel about their lives will, however, also influence their wellbeing. Just as people's sense of wellbeing can differ considerably according to different conceptions of their economic circumstances and their relative wealth in relation to their community, so too can their beliefs around the value of different goods, services or activities to their wellbeing. These beliefs may be influenced by their economic or employment circumstances, but also by a range of other factors including other less tangible contributions to their physical, mental and social health (Himes-Cornell et al., 2013; Kasperski & Himes-Cornell, 2014; New Zealand Quality of Life Project, 2007; MC Nussbaum, 2000; M Nussbaum, 2003; MC Nussbaum et al., 1993; OECD, 2013; Partridge, Chong, Herriman, Daly, & Lederwasch, 2011; Stiglitz et al., 2009). Wellbeing can also be highly malleable, with people assessing their own wellbeing in the context of socially constructed meanings formed through their relations with others (Coulthard et al., 2011; Deneulin & McGregor, 2010; Gough & McGregor, 2007). The relationships that people have within their communities can strongly influence their own sense of wellbeing, and can also affect their capacity to improve their wellbeing. The 'social wellbeing' approach builds on these different influences of wellbeing by measuring three key aspects;

- Material: resources people have and the extent to which needs are met including food, income and assets, access to services and environmental quality.
- Relational: extent to which social relationships enable people to act to achieve (their own conception of) wellbeing.

- Subjective: level of satisfaction with the quality of life people achieve. A person's perceptions, values and beliefs that shape this level of satisfaction (Britton & Coulthard, 2013; Coulthard, 2012; Coulthard et al., 2011).

This approach combines an objective evaluation of circumstances in which people live with a subjective evaluation of those circumstances, whilst also giving emphasis to the social context by which these meanings are framed, and the social relations through which aspects of wellbeing are pursued (Britton & Coulthard, 2013). Work has been done in the past that uses the 'social wellbeing' approach to measure and assess current wellbeing within fishing communities (eg see Belton, 2016; Britton & Coulthard, 2013; Coulthard, Sandaruwan, Paranamana, & Koralgama, 2014). Our study, however, represents the first example of an evaluation of *the contributions the fishing industry makes to community wellbeing*, integrating qualitative social science with economics methods. Given its focus on contributions fishing makes to broader community wellbeing (rather than the wellbeing of fishers), our study used a slightly modified version of the 'social wellbeing' framework, as detailed below:

- Material: the extent to which the wild-catch fishing industry contributes resources for local communities to meet their needs, including food, income and assets, access to services and environmental quality.
- Relational: the extent to which the wild-catch fishing industry contributes to the development and maintenance of social relationships that enable coastal communities to achieve wellbeing.

- Subjective: levels of satisfaction with or awareness of the contributions made by the wild-catch fishing industry to the quality of life of local communities, which are shaped by values and beliefs about the importance of having a local fishing industry.

1.2 The NSW wild-catch professional fishing industry

The NSW professional fishing industry, like many other fishing industries around the world, has been in an almost constant state of reform and restructure for close to 150 years, with significant changes to fishing methods, gear and vessels since its beginnings not long after colonization. A defining characteristic of the NSW industry has been the relatively large numbers of small, often family-run businesses working a variety of methods to catch a diversity of species. This is a direct response to the unique environmental conditions in NSW, where coastal waters are characterized by relatively low levels of productivity due to largely temperate waters and relatively low nutrient levels. These environmental restrictions have meant that there is limited opportunity for larger, industrial scale fishing operations such as those seen in more productive areas like New Zealand and Japan (Wilkinson, 1997).

In the last 25-30 years the focus of fisheries management has been on rationalization of the NSW industry from a peak of over 4000 licenses in the 1980s to just less than a thousand in 2016. Current reforms are underway which aim to reduce this number further (NSW Department of Primary Industries, 2016). These changes have focused on reducing the number of small-scale fishers as well as latent licenses in order to improve profitability and security for larger-scale or more active operators. Changes implemented since the late 1980s have included a shift from open access to restricted fisheries, a freeze on new licenses, the

introduction of share management (including quotas) and significant increases in license fees and charges (Schnierer & Egan, 2012; Stevens, Cartwright, & Neville, 2012; Wilkinson, 2013). In addition, there has been a substantial reduction in professional fishing access through the expansion of the Marine Protected Area (MPA) network across the state and the establishment of recreational fishing havens (where all professional fishing is banned) in 30 NSW estuaries. These restrictions on access have resulted in a substantial loss of fishing grounds for the industry with only nine of the 24 most productive estuaries in NSW remaining completely open to professional fishing (Stevens et al, 2012). The industry has also been subject to increased scrutiny of its operations by both Government and the wider public. Concerns over an incomplete understanding of the impacts of the continued decline of the industry on community wellbeing were some of the key drivers of this research agenda.

2. Methods

The principle aim of this paper is to show how the social wellbeing approach may be used to develop a framework for an integrated assessment of the social and economic contributions fisheries make to their communities. In order to provide a foundation for our understanding of the different factors that influence community wellbeing we started with a detailed literature review of studies into wellbeing and quality of life. The literature review assembled a range of different indices currently used around the world and within Australia to measure wellbeing, quality of life and 'standards of living' (Australian Bureau of Statistics, 2013; Himes-Cornell et al., 2013; Kasperski & Himes-Cornell, 2014; New Zealand Quality of Life Project, 2007; MC Nussbaum, 2000; M Nussbaum, 2003; MC Nussbaum et al., 1993; OECD, 2013; Partridge et al., 2011; Stiglitz et al., 2009). Commonalities were identified across the

different indices used and categorized into a number of different aspects or ‘domains’ of wellbeing.

After identifying these commonalities across the literature we conducted the first round of fieldwork interviews. Given there was not yet enough data or comprehensive understanding of the social contributions of the industry to local communities to be able to do quantitative work an inductive, qualitative approach was needed to build a theoretical understanding of the potential nature and scope of these contributions. Using a grounded theory approach (Glaser & Strauss, 1967), we began with a number of largely unstructured interviews where general questions were asked about the participants’ beliefs about the contribution of the fishing industry to their local community. In total more than 160 interviews were conducted with people from across the state. The majority of the interview participants were directly engaged in the fishing industry as fishers, members of fishing families or co-operative staff (66%), with some interviews also conducted with people from a range of other perspectives as outlined in Table 1.

[INSERT TABLE 1]

Initial contact with interview participants was made in a variety of ways, including purposive sampling of industry bodies, co-operatives and community groups, opportunistic sampling (e.g. via advertising ‘drop in sessions’ through local media and industry channels) and ‘snowball’ sampling whereby people interviewed recommended additional people to contact. The interviews were audio recorded and transcribed in full. The social interviews were not

designed to be statistically representative but rather tried to capture a broad cross section of the industry. As such they reflected the primary characteristics of the industry in many respects (largely male, older and small operators) but also drew from a diverse range of backgrounds, ages and styles of fishing. These qualitative, unstructured interviews were used to develop a picture of the types of contributions different sections of the industry felt it made to the community.

All the interview transcripts and associated interview notes were entered into NVivo 10 and coded using a thematic analysis approach. This involved repeated coding, sorting and categorizing and allowed for the identification of major themes, as well as the examination of the intersections of ideas, concepts and beliefs across interview participants in relation to the value of the industry in their community (Bazeley & Jackson, 2013; Creswell, 2009; Maxwell, 2005; Miles & Huberman, 1994). As the analysis involved multiple coders, inter-coder reliability was checked regularly to ensure consistency across the project team.

Following on from the identification of major themes or categories of contributions of the industry to coastal communities, these ideas (termed ‘contributions to wellbeing’) were grouped under relevant aspects of ‘quality of life’ (or ‘domains of wellbeing’) identified in the initial literature review. Indicators were subsequently developed, which were used to triangulate the interview findings with other data sources and to ‘test’, validate and, where possible, quantify the nature of these contributions (Creswell, 2009). This process included examination of the material, relational and subjective aspects of industry contributions to each domain of wellbeing. Figure 1 highlights the pathway that led to the development of the

final wellbeing framework used in the research, beginning with the development of a theoretical and conceptual model through to a practical research instrument, incorporating social and economic, qualitative and quantitative data.

[INSERT FIGURE 1]

The additional quantitative data collection and analysis involved a range of techniques, including:

- an economic questionnaire (sent to all NSW professional fishers)
- a random phone general public questionnaire of 1400 people living in NSW coastal communities
- random and targeted phone questionnaires of fish co-operatives, fish retailers and wholesalers
- an internet survey of hospitality and tourism operators in NSW(Voyer et al., 2016).

The social and economic questionnaires were the primary tools used to measure material and subjective aspects of the identified contributions. For example, the economic questionnaire quantified the economic contributions of the industry while the community questionnaire explored the way the wider community perceived the economic importance of the sector. The qualitative interviews supplemented these findings, especially in domains which were difficult to quantify, as well as providing detailed information on the relational aspects of the contributions.

In this paper our discussion of results concentrates on the overall wellbeing framework and its usefulness in addressing some of the key barriers to improved integrated, triple bottom line assessment of benefits from fisheries. For a fuller discussion of results see Voyer et al. (2016).

3. Results

In order to provide a foundation for our understanding of the different factors that influence community wellbeing we conducted a detailed literature review of studies of community wellbeing and quality of life. The literature review assembled a range of different indices currently used around the world and within Australia to measure quality of life, sometimes also referred to as ‘standard of living’ (Nussbaum, 2003, Partridge et al., 2011, Nussbaum, 2000, Stiglitz et al., 2009, Himes-Cornell et al., 2013, Kasperski and Himes-Cornell, 2014, OECD, 2013, New Zealand Quality of Life Project, 2007). The literature review and fieldwork interviews identified seven of these key domains of wellbeing as being relevant to the contributions of the NSW professional fishing industry (Table 2). The nature of industry contributions to each of these seven domains are outlined in further detail below.

[INSERT TABLE 2]

It should be noted that there are many intersections between the identified domains of wellbeing and therefore clear distinctions between individual aspects of each domain are not always possible. The project team relied on detailed definitions and descriptions of each domain to ensure that contributions were allocated in a consistent manner. There is potential

for some contributions to be relevant to multiple domains, and this was acknowledged where it occurred whilst avoiding repeating or reporting on the same contribution in multiple domains.

3.1 A resilient local economy

The main themes to emerge from the fieldwork interviews in regard to economic contributions related to two key areas: 1) the revenue and employment created for local communities, especially in rural and regional communities and 2) the interactions between the industry and other important economic sectors in regional communities. Material, relational and subjective indicators were identified around these key themes (Table 3) and were explored and tested through subsequent fieldwork.

[INSERT TABLE 3]

Economic contributions were seen by interview participants to be direct and indirect, with fishers seen as making important economic contributions to a range of other businesses within their communities.

Our dollars go a long way ... I would replace one capital item every second year. I've just bought a new trailer, last year I bought a new outboard motor. There's \$3000 to \$6000 a year of my money and he [the mechanic] gets to service that equipment and my money goes through our local marine dealer here. Fisher (041114_2) Mid-north coast

The material, or tangible economic contributions of fishers to their communities was therefore highlighted as an important contribution and was subsequently measured through an economic survey of NSW professional fishers and analysis of catch and price data. This was

used to quantify the extent of these material contributions (Voyer et al., 2016). Whether the communities themselves see these economic contributions of the sectors as important was also considered as part of a large scale general public survey, which found that the majority (90%) of respondents felt professional fishing is an important industry for NSW, and 90% believed that the industry provides important employment opportunities in NSW towns. Inclusion of qualitative data in the overall wellbeing analysis allowed for a deeper understanding of some of the reasons which underlie this high level of support. For example, some interviewees highlighted the relative consistency of economic contributions from primary production, contrasting this with the more seasonal and, on occasion, fickle tourism and recreational fishing markets. While many interview participants acknowledged a decline in the economic importance of professional fishing in their communities as the industry shrank over time, there was still a sense that it provided relatively stable and ongoing employment opportunities and multiplier economic benefits that complemented and supported other economic activities in the region, including recreational fishing.

Economically I see the fishing industry as a baseline in our community. Whilst it is seasonal, generally year-to-year it's something that's been there for a hundred years providing a steady economic benefit to the town and the region. Other industries fluctuate and any region - whether it's in the city or country - needs baseline economic load for their economy to survive. The fishing industry provides that.

Secretary Chamber of Commerce and non-fishing business owner (050515_2) South Coast

These intersections between the industry and other sectors were a consistent theme of the interviews. For example, the link between a local fishing industry and tourism was frequently mentioned, with interviewees discussing how visitors to regional areas commonly visit fishing ports to watch fishing boats unload and stroll along fishing wharves. Locally sourced

seafood was also considered a major tourist attraction in coastal communities and having a visible fishing industry was therefore seen as an important factor in encouraging tourism. These results were again borne out in subsequent community and business surveys which assessed the subjective aspects of this contribution – for example, the general public questionnaire indicated that 89% of NSW residents expect to eat local seafood when they visit the coast, 76% feel that eating local seafood is an important part of their coastal holiday experience and 64% indicated they would be interested in watching professional fishers at work while on holidays (Voyer et al., 2016).

The relationship between recreational and professional fishing was also highlighted in many of the interviews conducted throughout the project. Both types of fishing were considered by interviewees to make important economic contributions to local communities and these contributions were often seen as inter-dependent. These intersections were therefore considered an important part of the relational aspects of the overall wellbeing framework and were subsequently explored further through economic and social data collection (as outlined in Table 3). The results of this analysis indicated that NSW professional fishers supply approximately a third of the bait (by value) purchased by NSW recreational fishers and that recreational fishers had overall high levels of support for the industry, in some cases significantly higher than non-fishers. Recreational fishers, for example, were more interested in watching professional fishers at work than non-fishers, were more likely to be interested in knowing the provenance of their seafood and were more likely to purchase seafood from their local seafood co-operative (Voyer, Barclay, McIlgorm, & Mazur, 2017).

3.2 Community health and safety

The contribution of the industry to the food and nutritional needs of local communities was one of the most frequently raised ideas within the fieldwork interviews (discussed by 68% of participants), and was therefore one of the primary indicators explored in this wellbeing domain (Table 4).

Well, basically, it's a food resource. In my opinion. We're only collectors. We harvest the community resource for them, and supply it in the best possible condition that we can... As a service for the community. We actually work for the community. They own the resource. We just harvest it for them.

Fisher (071014_2) Mid North Coast

[INSERT TABLE 4]

These discussions focused on the nutritional benefits of local product, which was perceived as being fresher and of higher quality than other seafood. Material, relational and subjective aspects of this idea were explored by asking how often people bought local or NSW seafood, where they bought that seafood from and about their views or beliefs regarding local seafood (that is, does it matter to them where their seafood comes from). The results of this analysis indicated high levels of interest in purchasing local seafood, however this did not necessarily translate into purchasing behavior, with likely impediments possibly including a lack of awareness of provenance, lack of availability and cost (Voyer et al., 2016).

The qualitative interview data also uncovered additional, unexpected contributions of the NSW wild-catch industry to other areas of community health and safety which were subsequently incorporated into the overall analysis. Benefits for Aboriginal health and

nutrition were identified including health and wellbeing contributions of employment in the industry, nutritional benefits provided to a generally low income group by ready access to cheaper, but culturally significant fish species, and facilitation and growth of community connections through the act of fishing together and sharing the catch amongst the community.

When we get an abundance of fish we take so much to the local community and share it with - around and then just drive around the mission and then back into town because there's so many Aboriginal relatives that live in town as well. We just go around to key family members that we know will pass it on to the rest of their families.

Aboriginal professional fisher (061114_7) Hunter Great Lakes

A contribution to community safety highlighted in the interviews was the role of fishers in search and rescue operations in local waterways. Of the fishers interviewed 62% discussed their first hand experiences of towing in vessels or vehicles that had run into trouble, being involved in rescues of people they had come across by chance or taking part in more coordinated search and rescue operations.

I've certainly towed broken down people from outside and on the river. Or (if) they haven't got a radio, I'll just radio in where they are and they (Marine Rescue) will come and get them. Yeah, probably half a dozen in a year would be normal.

Fisher (041114_2) Mid North Coast

3.3 Education and knowledge generation

The process of learning to be an effective fisher involves little in the way of formal training, and instead relies on many years of informal, practical and 'hands on' learning, often passed on over multiple generations or through mentoring, as well as individual trial and error. This knowledge includes familiarity with techniques and methods as well as building an understanding of fish movements and habits, the influence of weather events on catches and

the best fishing locations. Analysis of this domain demonstrated the importance of including qualitative assessment in the study given the difficulties in quantifying the predominantly informal transfer of knowledge associated with the sector. Its central role in the experience of being a fisher meant that it was considered important to incorporate as an indicator, measured using qualitative techniques (Table 5).

It's either passed on by your dad or you've got to try and learn it. That's very frustrating when you think there's nothing in this State to educate a professional fisherman on how to be a fisherman. You can't learn to tie a knot. You can't learn to catch nothing. But if I want to be a recreational fisherman, I can do a Tech course on how to go and tie lures.

Fisher (020615_1c) Central Coast-Hawkesbury

[INSERT TABLE 5]

For Aboriginal fishers there were additional, and highly valued, cultural elements to this training process which involves passing on customary knowledge and cultural practices. This transfer of cultural knowledge is an important aspect of subjective wellbeing in Aboriginal communities that is also difficult to quantify.

But it's part of our wellbeing, as well... I suppose it's like a lot of people meditate. To us, it's, I suppose, to some degree, our meditation. Getting out there with nature. Looking and seeing and observing, taking it in and learning. And it's about, you know, not just individuals, it's about the family. You come back with fish or what have you. Your family have got fish, and your extended family, they come around and you share it out.

Indigenous fisher (170215_1) Far North Coast

Our interviews uncovered a range of ways in which researchers and managers in state, federal and local governments, universities and businesses are currently benefiting from data and knowledge provided by the NSW professional fishing industry. Approximately a third of the

fishers we interviewed indicated they were currently or had been previously involved in formal research programs undertaken by government departments or university researchers.

I do a fair bit of work with Southern Cross Uni. Help them with water quality monitoring and all that sort of stuff. Sometimes every day for six months...Just (as) a volunteer. I got a bushman's pocket knife last time. A year and half I done. Every day. (laughs)

Fisher (180515_1e) Far North Coast

Another commonly discussed contribution of the NSW wild-catch industry to local communities related to public education or public relations activities undertaken by individual fishers in their daily activities (46% of fieldwork interviewees, including 56% of fishers interviewed during fieldwork). This occurred through regular interactions with customers, fellow users of the waterways, 'spectators' of fishing operations and recreational fishers, but also in some cases included visits to schools and universities to talk about their practices with children and students, or participation in open days or other educational events.

3.4 A healthy environment

Although a healthy environment can be assessed in ecological terms, it also has a bearing on the social and economic aspects of wellbeing and these were considered in the development of a range of indicators against this wellbeing domain (Table 6). In particular we considered how professional fishing contributes to a healthy environment that has benefits for social and economic aspects of community wellbeing.

[INSERT TABLE 6]

Our fieldwork interviews revealed that those directly engaged in the industry have a high level of confidence in the sustainability of their industry and their practices in contemporary times (many said that in the past unsustainable practices were more prevalent). Many of the interviews we conducted during fieldwork made mention of a range of voluntary measures undertaken within the industry to improve local environmental health. Interviewees noted the involvement of professional fishers in monitoring environmental conditions (38% of fishers interviewed), experimenting with gear modifications to improve bycatch and maximize productivity and quality (31% of fishers interviewed) or active engagement in stewardship activities, such as collection of litter, wildlife rescue or participation in environmental campaigns (48% of fishers interviewed).

Whether this confidence is shared by the wider community was also tested as a subjective measure. For example, 67% of the NSW public surveyed in the community questionnaire believed that the industry could be trusted to act in a sustainable manner and only 13% of respondents agreed with the statement: *“The NSW professional fishing industry should not be allowed to continue, because its environmental costs outweigh its social and economic benefits”*.

A relational aspect of the industry’s contribution to environmental health, which is difficult to quantify, is the accumulated environmental knowledge held by individual fishers and fishing families. Examples we uncovered included one family who had diaries spanning more than 100 years, documenting catches, weather and other environmental conditions for the lake system they fished. The ways in which knowledge such as this is shared with decision

makers, scientists and the wider community is largely ad hoc and occurs in variety of formal and informal ways. The most common formal method by which environmental knowledge is shared is through involvement in research projects and environmental committees.

Those anecdotal observations are so important that we've actually got a database. Not just for the professional fishers, but for others. They'll make notes on red spot disease. Or they'll make a comment about 'I've never seen it so cloudy'.... We just capture all of that because that's all part of that learned experience of being a professional fisher.

Council Natural Resources Manager (041214_1a) — Central Coast_Hawkesbury

3.5 Integrated, culturally diverse, & vibrant communities

A diverse range of indicators were identified to test the extent to which the NSW professional fishing industry contributes to integrated, diverse and vibrant communities. This included examining its contributions to cultural diversity, participation in cultural events and celebrations, as well as its role in building social capital, as detailed in Table 7. This domain is closely related to the additional 'cultural heritage' domain which explored the historical contributions of the industry to local communities.

[INSERT TABLE 7]

There was a great deal of discussion in the fieldwork interviews about the role of seafood in the cultural life of Australians from a diversity of ethnic backgrounds. Seafood was mentioned as being synonymous with key celebrations on the cultural calendar including Christmas, Easter and Lunar New Year. These ideas were confirmed in the social questionnaires, which showed a strong preference for seafood, and high seafood sales, during these periods. For example, 75% of respondents indicating that they consumed seafood the

previous Christmas and 68% of respondents indicated they had consumed seafood the previous Easter.

Good Friday is our single busiest day of the year here, and the Christmas, we open for 36 hours straight the day before Christmas. So, that's our busiest trading period, and it's amazing....when I started working here and saw this obsession with prawns at Christmas, it just amazed me because it's like one of the core foods for a lot of people...I guess it's also, maybe, a weather thing. People don't want to sit down and eat a roast, and turkey and ham, but prawns are kind of like the perfect celebration, easy to make, easy to eat food.

Employee Sydney Fish Market (250315_1) Sydney

The role of the fishing industry in contributing to community diversity included contributions to both cultural and socio-economic diversity. In relation to cultural diversity the contributions highlighted in the interviews were twofold. Firstly, the historical contribution of the industry to migration patterns of the last century was noted (see also Section 3.6). This included reference to Italian, Croatian and Vietnamese fishing families who migrated to NSW, bringing with them new traditions, tastes for seafood and ceremonies such as the 'blessing of the fleet' which are now long established rituals in some fishing ports (Clarke, 2011; Puglisi & Puglisi Inglis, 2008). Secondly, around a quarter of interview participants noted the role of the industry in providing seafood products to a culturally and ethnically diverse consumer base. The importance of seafood for different cultural groups in the community has opened new markets for NSW fishers and increased the popularity of a range of previously low value products.

Well, mud crabs used to be worth bugger-all. Bring on the Chinese and Vietnamese and now can almost plot the price relative to the abundance of those cultures in Sydney.

Fisher and co-operative board member (041114_2) Mid north coast

The contributions of the wild-catch industry extended beyond cultural or ethnic diversity, however, to also include contribution to class or socio-economic diversity. A large number of interview participants discussed the value of the NSW wild-catch fishing industry in providing opportunities for socially disadvantaged groups, particularly men of all ages with low levels of education. Nearly half (46%) of participants noted the prevalence of men in the industry who had not finished school, including a number with learning difficulties that would have otherwise severely limited their employment prospects. Some came from socially disadvantaged backgrounds, and this was especially noted in relation to deckhands with a history of drug or alcohol problems or criminal backgrounds. For others fishing was a career linked strongly with a desire to be engaged in physical, outdoors, largely autonomous work. These men often expressed the opinion that they would find more non-fishing forms of employment difficult or less rewarding.

I couldn't get a trade because I only went to Year 10, and to even get an apprenticeship when I left school, they really wanted Year 12..I wasn't good at school. I wasn't bad, but... I like it (fishing). It interests me. Fisher (190914_3) Central Coast –Hawkesbury

Relational aspects of this contribution were explored through examination of social capital using a range of qualitative and quantitative data sources. This included analysis of formal relationships through committees, contributions to community life through donations and involvement in community events. For example, a commonly discussed form of social capital came in the form of sponsorship and donations to community groups and individuals, sometimes through cash donations from co-operatives but more commonly through in-kind support including seafood trays or vouchers for raffles and donation of ice to sporting groups and community events.

We provide ice, and we give them vouchers for their raffles and their fetes. We provide prawn trays and...I think we donate about \$8,000 to the marine rescue, and that's in the form of forgiven rent for their moorings, and we give them fuel from time to time...We sponsor the lifesaver jet boat by keeping it fueled up, and that, I think, runs at about \$1500 to \$2000 a year.

Co-operative manager (180215_2a) Far north coast

More informal relationships were also explored, including industry concerns related to poor public perceptions of the industry, sometimes referred to as 'social license to operate' (Demuijnck, 2016). Concerns around social license were especially relevant to relationships with recreational fishers in the community. Some fishers had personally experienced abuse, vandalism or negative comments from members of the public who perceived their activities as destructive and wasteful.

You cop heaps...They just think we rape and pillage the local waterways, when our areas are proven sustainable.

Fisher (190914_3) Central Coast

Despite these concerns around social license, 72% of respondents to the general public questionnaire supported the continuation of the industry. This points to the complexity of social relationships that exist within local communities. In particular the support for the industry was seen to be highly contingent on the environmental sustainability of its practices, a finding supported by other similar research in this area (Mazur, Curtis, & Bodsworth, 2014).

3.6 Cultural heritage and community identity

The role of the fishing industry in contributing to a shared sense of community identity and contributions to the cultural heritage of local communities was an important theme of the

interviews, and was explored through quantitative and qualitative data against a number of indicators as outlined in Table 8.

[INSERT TABLE 8]

Material contributions to community identity come largely in the form of historical artefacts linked with the development and growth of the area. Today the identity of many coastal villages up and down the NSW coast is in part defined by fishing ports, with jetties, wharves and rows of fishing boats, located in visible places in the heart of the settlements. Fishing ports are regularly visited by residents and visitors and are the focal point for celebrations and events. In many towns we visited, evidence of the prominent role that many long-term fishing families have played in coastal communities was demonstrated by coastal suburbs, streets and sporting ovals being named after them. The subjective importance of this contribution was explored through the community questionnaire, which indicated that 67% of respondents were concerned about a loss of character or identity which might result from further reductions in professional fishing.

Analysis of data related to indicators associated with Aboriginal cultural heritage revealed the crucial role professional fishing has played in supporting Aboriginal communities along the NSW coast, not only as a source of employment and income for Aboriginal fishers but also as a means of survival. As colonial control over Aboriginal people in NSW increased it was not uncommon for the Government to provide boats and fishing gear to Aboriginal communities and individuals to encourage both active participation in the NSW economy and so that

seafood could supplement government issued food rations (Egloff, 1981; Feary & Donaldson, 2015; Goodall, 1996; Goodall & Cadzow, 2009; NSW Office of Environment and Heritage, 2012). Fishing therefore played a critical role in the survival of many Aboriginal families and communities on the coast of NSW and is inextricably linked to many personal histories as well as the histories of many Aboriginal settlements. As detailed previously, professional fishing has also played a role in sustaining intangible cultural heritage by providing opportunities to share catches and pass on important cultural knowledge, as families work together in beach hauling operations.

3.7 Leisure and recreation

The NSW professional fishing industry contributes to community leisure and recreation in a variety of ways including through public infrastructure such as wharves and jetties, which are popular locations for people to walk along, looking at the boats. Recreational fishers use these jetties and wharves as safe, accessible fishing platforms and recreational boaters use moorings, fuel pumps and slipways managed and maintained by the professional industry to moor and service their vessels (Table 9).

[INSERT TABLE 9]

The general public questionnaire included responses from recreational fishers, who made up 35% of the sample. In particular it revealed strong preferences for locally sourced bait, with 78% of recreational fishers agreeing or strongly agreeing that they preferred local bait, even

if it is more expensive. Their subjective reasons for these preferences included a desire to support the local industry and a belief that local bait assisted in catches.

4. Discussion

The framework presented here takes the task of doing integrated mixed method social and economic evaluations of the contributions of industry out of the ‘too hard’ basket. Evaluating the contributions of the NSW professional fishing industry using a wellbeing approach enabled the identification of a range of complex and intersecting contributions to wellbeing that would be difficult to identify using only economic valuation, or economic with social quantitative survey methods alone. Using an interdisciplinary approach, but working to a common agreed framework, allowed disciplinary and methodological divides to be bridged. In particular the wellbeing framework allowed for, and valued equally, positivist, empirical scientific, economic and social approaches with qualitative assessments of the subjective aspects of fisheries contribution to wellbeing. Significantly, the incorporation of qualitative data allowed for a richer appreciation of the suite of contributions that the sector makes to coastal communities, which are valued by local communities but are not necessarily easily quantified or measured.

Use of qualitative data to establish the initial building blocks for the framework was a crucial aspect of the development of the overall approach, a strategy supported by leading proponents of the social wellbeing approach (McGregor et al., 2015). Using qualitative interviews with a range of stakeholders to guide the development of indicators meant that the final framework was readily understood and accepted by the ‘end users’ of the research,

including policy makers, industry representatives and local community members. They were able to relate to the identified ‘contributions to wellbeing’ and the associated indicators because they had, in part, helped to define them.

The wellbeing framework employed in this study also addressed another key barrier to integrated triple bottom line assessments – the paucity of social data. The wellbeing framework developed through this project provided clear and direct guidance as to the most effective strategy for gathering additional social data. The qualitative data, in effect, provided a series of ideas and themes that could be tested and explored in greater depth through the quantitative analysis. Further work in this area could expand on this approach and incorporate additional social and economic assessment methodologies.

This process demonstrates how researchers and resource managers in other locations could develop frameworks and indicators to enable integrated evaluations of the social and economic benefits from fishing or other primary production industries. The framework developed takes an internationally accepted theoretical approach - social wellbeing – and adapts it to a specific research question that is being asked of fisheries around the world – what is the value of fishing, especially small scale fishing, and what do these fisheries contribute to society? We used this framework as the foundation for a detailed assessment of the contributions of industry to community wellbeing which incorporated, but was not limited to, an economic evaluation. The framework has subsequently been successfully trialed in an additional assessment of the contributions of the aquaculture industry in NSW (K. Barclay et al., 2016) and is currently being used as the basis for the development of a consistent

methodological approach to contribution studies for the seafood sector in Australia, and recreational fishing.

One reason the wellbeing approach is useful is that it allows for a broad conception of ‘value’ to communities. The framework enables consideration of both social and economic relationships across industries, and also provides scope for incorporation of ecological or biological data. In identifying and, in some cases, measuring benefits flowing from fishing it enables decision makers and communities to focus on building and supporting contributions the community values, rather than measuring importance by economic values only. There is considerable potential for this approach to be incorporated into valuation strategies across a range of sectors and geographical areas. In particular, the increasing focus on the expansion and growth of a Blue Economy around the world is likely to bring increased interest in understanding the contributions of different sectors and how they can be managed in order to maximize community benefits, whilst reducing environmental impacts (The Economist, 2015; WWF Baltic Ecoregion Programme, 2015). Detailed assessments of contributions of various marine industries contributing to a potential Blue Economy have been undertaken in many countries and regions around the world but, as yet, these studies have not extended to consideration of social contributions (e.g. see Australian Institute of Marine Science, 2014; Ebarvia, 2016; McIlgorm, 2016). The detailed, inter-disciplinary analysis made possible through the wellbeing framework would allow decision makers to identify and focus on the range of social and economic benefits most likely to be positively or negatively impacted by management approaches. Moreover, the framework provides a structure by which these contributions can be monitored over time. Application of this model in other areas or sectors

would require initial validation of the relevance of the identified domains of wellbeing to the context being studied, making reference to the suggested approaches to assessing wellbeing outlined in McGregor et al. (2015).

Finally, the wellbeing approach brings the interests and views of different sections of the community to light, including marginalized stakeholder groups, and therefore provides a mechanism through which equity considerations can be foregrounded. This a particular strength of incorporating relational aspects of wellbeing into the framework, as demonstrated by the insights provided into relationships between Aboriginal communities and the professional fishing industry in NSW. This aspect of the wellbeing approach recognizes the intersections and interdependencies that exist across different sectors, across communities and across human and non-human groups of actors. In the NSW example, the consideration of the ‘relational’ dimensions of wellbeing allowed for a more nuanced picture of the role of the industry in local economies. The social and economic interactions of the industry with other important sectors in coastal communities, particularly tourism and recreational fishing, was significant especially given these industries are often considered to be in conflict. The consideration of relational measures of wellbeing, necessarily forces an examination of areas of mutual interest, and provides a framework by which commonalities can be explored and developed (Voyer et al., 2017). This provides a basis on which successful conflict transformation or resolution can be built (Stepanova, 2015; Stepanova & Bruckmeier, 2013).

5. Conclusion

Integrated, triple bottom line assessments of fisheries are a fundamental requirement of ecosystem based fisheries management. However there are a number of potential barriers to adequately integrating social factors into existing models of assessment. Using a social wellbeing approach as a lens through which to develop new ways to assess and manage fisheries allows these barriers to be addressed. The framework allows for consideration of both objective and subjective measures of wellbeing, effectively providing a bridge between seemingly incongruent disciplinary approaches. It also provides a useful guide to direct and focus social data collection, in order to address a second major barrier relating to a lack of information on the social aspects of fisheries. Finally, it allows for meaningful analysis and comparison of both qualitative and quantitative data in an integrated manner, with both forms of data informing and complementing the other to provide an overall picture of influences on wellbeing. As it becomes more recognized by governments around the world that wellbeing is the appropriate goal for building a sustainable future, there is an increasing need to understand the multi-dimensional nature of wellbeing, and how it is influenced by patterns of resource use. This framework has significant potential to improve and inform fisheries management regimes around the world. Systematic and detailed examination of the way a resource sector benefits community wellbeing allows for a better understanding of the potential impacts of future changes to use patterns associated with resource management, environmental change or shifting economic conditions. The wellbeing approach allows for a broader understanding of the benefits provided by a sector by looking beyond purely economic measures to consider these contributions in context with a range of other factors. In particular inclusion of relational measures of wellbeing help to reframe resource conflict debates towards an examination of areas of mutual benefit and shared objectives.

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Tables

Table 1. Interview participants by relationship to Industry

Fishing Industry	Interviewees	Other	Interviewees
Licensed fisher	71	Local government (including councilors and mayors)	15
Fisher and fish merchant	9	Service Industry	8
Aboriginal fisher	5	Retail outlet/ restaurant/take away	7
Partner/wife	7	Industry representative body	5
Co-operative staff, managers or board	18	Community/Recreational fisher	6
		Wholesaler/processor	5
		Government (state)	3
		Tourism	3
		Other	2
Total	110	Total	54
Grand Total			164

Table 2. Dimensions of community wellbeing identified through literature review

Domains of wellbeing (from a review of Quality of Life/Standard of Living literature)	Description
A resilient local economy	Economic or financial wellbeing, including employment, income, housing as well as quality and stability of employment.
Community health and safety	Physical and mental health, including life expectancy and availability of safe and healthy food and water.
Education and knowledge generation	The capability to build one's skill set and knowledge, including access to and involvement in learning opportunities (formal and informal).
A healthy environment	Physical, social and mental health benefits associated with the natural environment, including ecosystem services.
Integrated, culturally diverse and vibrant communities	Opportunities for cultural expression and engagement in community life regardless of ethnic, cultural or socio-economic background. Feelings of connection within social or geographical groups (bonding social capital), across different groups (bridging social capital) and with decision makers (linking social capital).
Cultural heritage and community identity	Connections with heritage and tradition. A shared sense of community identity.
Leisure and recreation	Work-life balance, including opportunities for fun, play and participation in the arts and cultural events.

Table 3. Contributions of the NSW wild catch fishing industry to a resilient local economy

Domain of community wellbeing	Contributions of the NSW wild-catch fishing industry		Indicators	Methods and tools for of data collection & analysis
A resilient local economy	Material	Primary economic impact through direct revenue and business profitability	Gross Value Added (GVA) is preferred to Gross Value of Production (GVP)	<ul style="list-style-type: none"> • Analysis of catch and price data • Economic questionnaire • Regional Input/output analysis • Qualitative interviews
			Business profitability and employment	
		Secondary economic impacts (or multipliers)	Regional inputs (multipliers), including value added, household income and employment	
			Investments	
	Relational	Interactions between the professional fishing industry and the post-harvest sector	Value of the secondary (post-harvest) sector	<ul style="list-style-type: none"> • Catch and price data – DPI SFM • Qualitative interviews • Social questionnaire – fish merchants
			Post-harvest supply chain characteristics	
			Importance of the NSW wild-catch industry to the secondary (post-harvest) sector	
		Interactions between the professional fishing industry and the tourism sector	Professional fishing tourism products	<ul style="list-style-type: none"> • Qualitative interviews • Social questionnaire – general public
			Importance of the NSW wild-catch industry to the NSW tourism sector	
		Interactions between the professional fishing industry and the recreational fishing sector	Comparing the value of the NSW recreational and professional fishing sectors	<ul style="list-style-type: none"> • Social questionnaire – general public • Qualitative interviews
Value of NSW wild-caught bait market	<ul style="list-style-type: none"> • Catch and price data – DPI SFM 			
Subjective	Level of community support and understanding of the economic contributions of the fishing sector	Beliefs about economic importance of the industry (including amongst recreational fishers)	<ul style="list-style-type: none"> • Social questionnaire – general public 	

Table 4. Contributions of the NSW wild catch fishing industry to community health and safety

Domain of community wellbeing	Contributions of the NSW wild-catch fishing industry		Indicators	Methods and tools for data collection & analysis
Community health and safety	Material	Contributions to food security and the nutritional needs of local communities	Purchasing patterns – local seafood Seafood preferences – local seafood	<ul style="list-style-type: none"> • Social questionnaires – general public and fish merchants
		Contributions to community safety through involvement in maritime search and rescue operations	Rescues and maritime safety incidences	<ul style="list-style-type: none"> • Qualitative interviews
	Relational	Channels through which consumers access the products supplied by the NSW industry	Purchasing channels – local seafood	<ul style="list-style-type: none"> • Social questionnaires – general public and fish merchants
	Subjective	The level of importance the community puts on the provision of local product by a local industry for health and nutrition	Beliefs about importance of producing local seafood for community consumption	<ul style="list-style-type: none"> • Social questionnaire – general public
		Contributions to Aboriginal mental and physical health and wellbeing needs	Beliefs relating to role of professional fishing in Aboriginal communities	<ul style="list-style-type: none"> • Qualitative interviews • Literature review

Table 5. Contributions of the NSW wild catch fishing industry to education and knowledge generation

Domain of community wellbeing	Contributions of the NSW wild-catch fishing industry		Indicators	Methods and tools for data collection & analysis
Education and knowledge generation	Material	Formal training and learning opportunities provided by the professional fishing industry	Education and training levels and opportunities for informal learning in learning to be a fisher, including: <ul style="list-style-type: none"> • Fishing practices • Boat handling • Food handling • Regulatory knowledge • Environmental knowledge • Physical and mental strength/preparedness • Etiquette and ‘unwritten laws’ 	<ul style="list-style-type: none"> • Social questionnaire – fish merchants • Qualitative interviews
	Relational	Social learning and informal knowledge transfer	Community and sector based interest in ‘fisher knowledge’, including: <ul style="list-style-type: none"> • Researchers/managers • Aboriginal communities • Recreational fishers and the general public 	<ul style="list-style-type: none"> • Qualitative interviews
		Contributions to community knowledge, especially environmental knowledge		
	Subjective	Levels of trust and respect for the knowledge and skills of the fishing industry (social license)		

Table 6. Contributions of the NSW wild catch fishing industry to a healthy environment

Domain of community wellbeing	Contributions of the NSW wild-catch fishing industry		Indicators	Methods and tools for data collection and analysis
A healthy environment	Material	Practicing sustainable and environmentally friendly fishing	Sustainability assessment of the fishing industry	<ul style="list-style-type: none"> • Literature review • Qualitative interviews
		Involvement of the industry in stewardships activities	Involvement in environmental stewardship activities	<ul style="list-style-type: none"> • Qualitative interviews
	Relational	The role of the NSW fishing industry in wider environmental management networks	Involvement in environmental management programs and committees	<ul style="list-style-type: none"> • Qualitative interviews • Social questionnaire – fish merchants
	Subjective	The level of trust in the fishing industry to act in a sustainable manner	Community trust in industry/social license	<ul style="list-style-type: none"> • Social questionnaire – general public

Table 7. Contributions of the NSW wild catch fishing industry to integrated, culturally diverse & vibrant communities

Domain of community wellbeing	Contributions of the NSW wild-catch fishing industry		Indicators	Methods and tools for data collection and analysis
Integrated, culturally diverse and vibrant communities	Material	Contributions of the NSW wild-catch industry to the needs of a diverse community	Cultural significance of NSW seafood products	<ul style="list-style-type: none"> • Qualitative interviews • Social questionnaire – fish merchants
			Role of the fishing industry in providing opportunities for different socio-economic and cultural groups	
		Involvement in citizenship activities and community events	Contributions to cultural events	
		Sponsorship and donations		
	Relational	Role of the NSW Industry in building and maintaining social networks (formal and informal) in local communities (social capital)	Contributions to social capital – bridging, bonding and linking	<ul style="list-style-type: none"> • Qualitative interviews • Social questionnaire – fish merchants
	Subjective	Community awareness and beliefs in relation to the importance of the services provided by the fishing industry for community life	Importance of the role of the industry in community life	<ul style="list-style-type: none"> • Qualitative interviews • Social questionnaire – general public
Importance of seafood for community celebrations				

Table 8. Contributions of the NSW wild catch fishing industry to cultural heritage and community identity

Domains of community wellbeing	Contributions of the NSW wild-catch fishing industry		Indicators	Methods and tools for data collection and analysis
Cultural heritage and community identity	Material	Contributions to the history of NSW coastal towns/regions	Historical role of the industry in regional growth and formation	<ul style="list-style-type: none"> • Literature review • Qualitative interviews
			Contributions to cultural heritage (e.g. infrastructure or artefacts)	
	Relational	Contributions to cultural and community identity	Historical migration patterns associated with fishing	<ul style="list-style-type: none"> • Literature review • Qualitative interviews
			Historical role of fishing in Aboriginal communities	
Community identification with fishing heritage and notion of 'fishing villages'				
Subjective	Importance to the community of the contributions of the industry to a shared sense of community identity and to local cultural heritage	Levels of concern over loss of identity associated with decline in industry significance	<ul style="list-style-type: none"> • Social questionnaire – general public 	

Table 9. Contributions of the NSW wild catch fishing industry to leisure and recreation

Domains of community wellbeing	Contributions of the NSW wild-catch fishing industry		Indicators	Methods and tools for data collection and analysis
Leisure and recreation	Material	Contributions of the fishing industry to community recreation	Contributions of infrastructure for recreational users	<ul style="list-style-type: none"> • Qualitative interviews • Social questionnaire – fish merchants
			Contributions of bait for recreational fishing.	<ul style="list-style-type: none"> • Qualitative interviews • Social questionnaire – general public and fish merchants
	Relational	Social connections and interactions between the wild-catch industry and recreational users	Contributions of fishing knowledge to recreational boaters and fishers.	<ul style="list-style-type: none"> • Qualitative interviews
	Subjective	The level of importance recreational users put in the provision of local services and infrastructure by the fishing industry	Importance of local bait to recreational users	<ul style="list-style-type: none"> • Social questionnaire – general public

Figures

Figure 1. Methodological approach to examining industry contributions to wellbeing