Title: Connections or conflict? A social and economic analysis of the interconnections between the professional fishing industry, recreational fishing and marine tourism in coastal communities in NSW, Australia.

Keywords: Resource conflict; fisheries disputes; wellbeing; recreational fishing; tourism; professional fishing; commercial fishing

Highlights

- Professional fishing can be seen as being in conflict with recreational fishing and tourism
- The social and economic relationships between sectors was examined
- The three sectors are highly interconnected and mutually beneficial
- Recreational fishers prefer locally caught seafood and bait
- Tourists are interested in watching fishers at work and eating local seafood

Abstract

Resource conflict is a common feature of coastal management. This conflict is often managed by using spatial planning tools to segregate uses, with access decisions made through a comparison of the economic costs and benefits of the competing sectors. These comparisons rarely include an in-depth analysis of the extent or nature of the conflict. One commonly experienced form of resource conflict in coastal communities involves professional fishing, recreational fishing and broader coastal tourism. In New South Wales, Australia the professional fishing industry is often seen as being in conflict with recreational fishing and tourism, and there are frequent calls to close areas to professional fishing, arguing that this will provide improved economic benefits to local communities. This research examined the relationships between the three sectors using economic valuations, qualitative interviews and a large-scale representative questionnaire of the general public. The results revealed highly interconnected and mutually supportive relationships, with professional fishing providing a range of services that benefit both tourism and recreational fishing. These results suggest that spatial management exercises that seek to segregate or remove one sector from an area, may be counterproductive to the interests of all these groups. Relying on economic valuations of each sector as if they stand alone is insufficient to adequately understand their roles in local communities. Resource allocation decisions should be based on evaluations that consider the interconnections between sectors, and consider whether negotiated sharing of resources may provide greater community benefits than excluding certain groups of users.

1. Introduction

Resource use conflict and disputes are a common, yet understudied feature of fisheries and coastal management.These conflicts can vary in scale and intensity but generally involve competing or incompatible uses of a common property or area. Disputes over a limited resource such as fisheries are a function of the scarcity of the resource and the social and economic characteristics of the stakeholders involved (Stepanova and Bruckmeier, 2013, Stepanova, 2015). One increasingly widespread conflict type in wealthy countries involves battles over resource allocation between recreational and professional fishing sectors (e.g. see Brown, 2016, May, 2016, Abbott, 2015, Freeman et al., 2016, Crowe et al., 2013, Islam and Berkes, 2016). Common methods of addressing these disputes include spatial management approaches, such as MPAs and recreational fishing only areas, which separate or segregate use types (Khanh, 2015, Abbott, 2015, Kearney, 2001, Brown, 2016, Islam and Berkes, 2016). These decisions are often made without an in-depth analysis of the nature of the conflict and an incomplete understanding of its extent (Brown, 2016).

The nature of fisheries management contests are influenced by conflicting values, beliefs and economic relationships with the resource and often include arguments based on who is most

'deserving' of greater access to the resource. These disputes focus largely on two key ideas: the environmental impact and economic worth of the competing sectors. While recreational fishers argue that their use of the resource is more environmentally benign than professional fishing, there is limited evidence to accurately test this assertion. In many developing countries, including Australia, professional fishing has become increasingly regulated and strictly controlled. In contrast, recreational fishing remains largely open access with the primary means of managing catch limited to output controls on individual fishers, such as possession or catch limits (Brown, 2016, Abbott, 2015, May, 2016). When considering the methods employed (eg hook and line), recreational fishing could be considered as having a relatively low environmental impact on an individual level in comparison with more intensive professional fishing methods, particularly amongst those fishers who use environmentally friendly methods and practice catch and release. When considering the cumulative impacts of recreational fishing, however, a number of recent studies have indicated that recreational catches are comparable, and in some cases exceed the professional sector (West et al., 2015, Brown, 2016, Cooke and Cowx, 2004). In practice spatial management measures employed to address conflict between the two sectors do not necessarily result in an overall decline in effort, but simply a reallocation of effort - that is the removal of access for one sector (professional fishing) as a direct means of providing benefits to another sector (recreational fishing and/or tourism)(Steffe et al., 2005). It is therefore unclear whether these reallocations result in a net environmental benefit.

The second area that recreational and professional fishing allocation disputes focus on is the relative economic worth of each of the sectors. In these cases, the contention is that recreational fishing, and associated tourism, provides greater economic returns and so should therefore be prioritised (Brown, 2016, Abbott, 2015). These arguments are commonly supported by economic valuation studies.

The use of economic valuation is common in fisheries and other marine industries around the world as a means of demonstrating the worth of an industry, and its importance to a region, state or nation (McIlgorm, 2016, McIlgorm and Pepperell, 2013, Ebarvia, 2016, Australian Institute of Marine Science, 2014). These valuations play an important role in the development of cost-benefit analyses, monitoring programs which measure the economic health of an industry over time and also assist in drawing the attention of the public and politicians to the economic value of marine industries, and associated employment benefits. These valuations, however, are often conducted in isolation of other sectors and can be used as an instrument to argue for the prioritisation of one industry over another, with unknown implications for the regional economy, or broader impacts on social wellbeing (Abbott, 2015, Brown, 2016). A more complete and integrated understanding of the social and economic benefits provided by industries such as professional fishing would allow policy-makers a more comprehensive understanding of the trade-offs involved in resource allocation exercises (Jentoft and Chuenpagdee, 2009). This paper emerged from a larger project investigating the social and economic contributions professional fishing makes to coastal communities in NSW (Voyer et al., 2016). Examination of the contributions professional fishing makes to recreational fishing and tourism highlighted problems with the prevalent discourse around coastal resource conflict, and the conventional policy tools used to 'resolve' such conflicts.

1.1 Background

NSW coastal communities vary from large urbanised metropolitan areas, including Australia's largest city, Sydney (>4 million residents), to small, fairly remote rural communities with a few hundred permanent residents. Professional fishing has traditionally played a significant role in these communities, particularly in some of the smaller 'fishing villages' dotted up and down the coast. The last thirty years, however, has seen a significant decline in the industry and a relatively rapid growth in the importance of tourism and recreational fishing to regional economies. Some of these changes are in response to the shifting demographics of coastal NSW, especially the 'sea change' and 'grey nomad' phenomena, which have seen rapid population growth on the back on internal migration of retirees from the cities to the coast, and a burgeoning caravan and camping industry as retirees also engage in extended coastal holidays (van Putten et al., 2014). Declines in the NSW professional fishing industry – now less than a quarter of its size during its peak in the 1970s and 80s – come as the

result of 30 years of reform for the industry and changing economic conditions. These reforms have included a shift from open access to restricted fisheries, a freeze on new licences, the introduction of share management (including quotas for some species), and significant increases in licence fees and charges (Schnierer and Egan, 2012, Stevens et al., 2012, Wilkinson, 2013). In addition, there has been a substantial reduction in professional fishing access through the expansion of the marine park network across the state and the establishment of recreational fishing havens (where all professional fishing is banned) in 30 NSW estuaries implemented in the early to mid 2000s. Today only 9 of the 24 most productive estuaries in NSW remain completely open to professional fishing and there are serious concerns about the ongoing viability of the industry in some regional centres (Stevens et al., 2012). An ongoing Government reform process is currently underway which will result in additional changes to the industry.

The NSW industry is dominated by small, family-run businesses, often operating at low levels of profitability. These businesses usually involve relatively low catch volumes in multi-species, multi-method fishing, focusing largely in the more productive estuarine areas (Dominion Consulting, 2001, Wilkinson, 1997). These are also the most popular locations in which people enjoy other recreational pursuits, especially recreational fishing. Appropriate allocation of resource access between the recreational and professional sectors has been a key flash point in debates in many coastal towns in NSW. It is common for these campaigns to reference the 'value' of recreational fishing or tourism to local communities, with the inference being that professional fishing in these areas is a constraint or hindrance to these sectors, or is undermining their economic potential. The campaign materials also tend to paint recreational fishing, and associated tourism, as a more environmentally benign use of the resource (Collins, 2015). These debates polarise communities and undermine the relationships between the various groups with many professional fishers reporting incidences of abuse, vandalism and threats (Voyer et al., 2016).

Economic valuations of the recreational fishing and tourism sectors have previously been conducted in NSW. These have indicated an estimated economic output for NSW of $3.42bn with an associated employment of 14,254 equivalent full time jobs for recreational fishing (McIlgorm and Pepperell, 2013) and an estimated economic output for NSW of $34.9 billion and associated employment of 272,000 people for tourism (Destination NSW, 2014). Similar studies had not been conducted for professional fishing in NSW until this study. Previous estimates of the professional fishing industry's value have relied entirely on data from the first point of sale and did not account for the value of the product as it moved through the supply chain or the benefits to local economies derived through support industries. This made comparisons across sectors difficult and reflected unfavourably on the economic contributions of the professional industry. It is common for assessments into the socio-economic contributions of an industry to end at these valuations, even despite methodological inconsistencies, leaving policy makers and stakeholders to weigh up the relative worth of the different sectors. The project from which this paper is derived, however, sought to look beyond a simple economic valuation to explore a broader suite of social and economic contributions of the professional fishing industry to local communities, using a mixed methods approach. In doing so important insights were gained into the relationships and interdependencies that exist between professional fishing and the other sectors that are important considerations in resource conflict resolution.

2. Methods

This analysis was conducted as part of a broader examination of the role of the NSW professional fishing industry in contemporary coastal communities (Voyer et al., 2016). This broader study was guided by a 'social wellbeing approach' to examining the various contributions of the industry and part of that approach was a specific examination of the relational dimensions of wellbeing – i.e. the interactions and relationships that help determine whether citizens are able to achieve what they value in life (Coulthard et al., 2011, Voyer et al., 2016, McGregor et al., 2015). This aspect of the study included detailed examination of how professional fishing interacts with recreational fishing and tourism sectors in coastal communities. The fieldwork commenced with a series of qualitative

interviews which identified features of these relationships that warranted closer examination. Further quantitative data was collected based on these key themes using economic and social questionnaires.

2.1 Fieldwork interviews

More than 160 interviews were conducted with people from across the state and included people involved in the professional fishing industry (as a licensed fisher, partner, or fish merchant/co-operative), representatives from government and tourism bodies and recreational fishers. Initial contact with interview participants was made in a variety of ways, including purposive sampling of industry bodies, cooperatives and community groups, opportunistic sampling (e.g. via advertising 'drop in sessions' through local media or industry channels) and 'snowball' sampling whereby people interviewed recommended additional people to contact. Interviews were audio recorded and transcribed in full. All the transcripts and interview notes were entered into NVivo 10 and coded to identify key themes (Bazeley and Jackson, 2013). As the analysis involved multiple coders, intercoder reliability was checked regularly to ensure consistency across the Project team.

2.2 Economic valuation methods

Economic methods were used to address several economic valuation questions. These included:

- Gross Value of Production (GVP): indicates primary economic activity through direct revenue. Measured through analysis of NSW DPI catch records and Sydney Fish Market (the central fish market for NSW) fish prices.
- Profitability of fishing businesses: measured using an economic questionnaire posted to all licenced fishers in NSW. This survey elicited 57 responses, or 5.8% of the 989 registered NSW fishing businesses to whom the questionnaire was posted[1].
- Secondary economic impacts (or multipliers) to regional economies through relationships with service industries providing inputs for professional fishing: input-output (IO) modelling. The economic information from the operational and financial data, collected from the economic questionnaires distributed to all professional fishing operators, was used to generate regional expenditure estimates. The expenditure estimates were then used to model the economic impacts of professional fishing on regional coastal economies and at the NSW State level. Modelling was undertaken for the financial year 2012/13.
- Catch sector relationships with the post-harvest sector. There are no accurate data available for either the quantities or prices in the secondary sector. The study made estimates of the possible regional economic contribution of secondary seafood sector state-wide by using the wild-catch regional results and information from previous site specific regional economic studies.

2.3 Social questionnaires

Three questionnaires were conducted to explore key ideas which had emerged from the qualitative interviews. These included more detailed exploration of the links between professional fishing and the recreational fishing and tourism sectors.

- General public: A total of 1423 interviews were completed via computer assisted telephone interview (CATI). This survey included a sample of both landline (65%) and mobile phones (35%) and had an overall response rate of 24%. The survey focused on coastal residents in the

[1] This response rate was lower than expected and was directly impacted by an ongoing Government reform process underway at the same time the research project. Industry confusion and distrust about the inter-relationships between the two concurrent processes (which were in fact independent of each other) resulted in many fishers choosing not to participate in this aspect of the research project.

8 study regions of NSW. The data was weighted so the sample matches ABS census data to ensure data was representative according to age and gender on a state level. 35% of respondents indicated that they were recreational fishers.

- Fish merchants and Co-operatives: A total of 77 interviews were completed via CATI. The sample was obtained partly from pre-existing contacts, especially the fishing cooperatives, and partly from a random selection from public phone records.
- Tourism and hospitality providers: An online questionnaire of the tourism and hospitality industry. The survey was distributed through a range of channels including regional and local tourism bodies and industry groups in coastal NSW. The online questionnaire resulted in 40 completed responses. These included responses across a broad cross section of the industry and throughout the state.

The data from all three questionnaires were analysed using a two tailed score test of proportion ($p=0.05$) in order to test for significant differences between regions and, in the case of the general public questionnaire, between recreational fishers and non-fishers.

3. Results

The data collected above identified a broad range of social and economic contributions to community wellbeing associated with the professional fishing industry in NSW. Specific intersections between professional fishing and other economic sectors were examined in detail and are outlined below.

3.1 Direct economic contributions of the NSW professional fishing industry

The statewide GVP of the 12,332 tonnes of fish catch in NSW was estimated to be $81.7m in 2012-13 (Voyer et al. 2016). The economic questionnaires distributed to all professional fishing operators provided economic information on the fixed costs, operating costs and profitability of professional fishing.

The majority of survey respondents were male (94%) and of Anglo-European descent (74%), with (4%) Indigenous and (8%) Mediterranean descent. The ages of respondents ranged from 28 years to 78 years, with an average age of 51 years. Those with Trade or TAFE certificates accounted for 26% of the sample, whilst those who had obtained an undergraduate degree amounted to 24% of those surveyed. Due to privacy constraints on licence data it is not possible to compare this with industry demographics as a whole, however it is likely that the responses were biased towards fishers with higher levels of education. These potential biases in survey responses are unlikely to have a significant impact on this analysis of the interactions between professional fishing and other marine users.

In interpreting the results, it is also important to note the limited number of survey responses (57 responses, or 5.8% response rate). Part of the reason for low participation was discontent among commercial fishers at the government's reform process, many fishers considering that questionnaire information may be "used by government against them" (Voyer et al 2016). The responses received constituted 10.5% of state-wide revenue, meaning the responding businesses had higher fishing activity than the non-responding businesses. The limited response rate means the results in the current study have an unknown amount of respondent bias. Many of 989 businesses are not engaged in fishing full time, so the activity levels of responding fishers are greater than the non-responding businesses and therefore may not be representative of all businesses in the NSW industry (Thomson 1991). This has more implications for the use of profitability results than for the estimation of regional expenditures below.

The economic rate of return (or profitability) across those commercial fisheries that responded to the questionnaire was found to be a -2.1% economic rate of return to capital, earning slightly below their opportunity costs of capital, but still being viable businesses (Voyer et al. 2016).

The cost data from the questionnaires results was used to generate statewide commercial fishing expenditure category estimates to put into a model of the NSW regional economy to calculate the economic impacts of professional fishing on regional coastal economies and at the NSW State level (Western Research Institute 2016). Modelling was undertaken for the financial year 2012-13. This analysis found that at the NSW State level, the initial expenditure of $65.5m by professional fishing generated an initial direct output of $79.44m and then a flow-on of $139.8m of indirect output giving a total impact of $219.2m of economic output on the NSW economy (Table 1).

The study was also able to make estimates of the possible regional economic contribution of secondary seafood sector state-wide by using the wild-catch regional results and information from previous site-specific regional economic studies (Harrison 2010, Kelsey et al. 2013, Powell et al., 1988, Tamblyn and Powell, 1988). These are estimates based on imputation because accurate information on the secondary sector was not available. There are two scenarios presented in the NSW site-specific regional seafood studies. One is where fish are landed and have little processing (Tamblyn and Powell, 1988; Powell et al., 1988) and the other is where fish are further processed as in the Northern Rivers (Harrison 2010). In estimating the state-wide secondary sector estimates, the ratio of primary to secondary output in the past studies was used to generate a low and a high imputed output value for the secondary sector. Table 1 indicates low and high estimates of the size of the secondary sector and associated jobs, and also estimates of the entire size of the wild-catch plus the secondary seafood sector in NSW. It found that at the NSW State level, professional fishing generated approximately $436m-$501m in revenue, $215m-$248m added value, $117m-$137m in household income and the sectors employ a total of between 3,291 and 3,857 full time jobs across NSW and would translate into many more part time and casual jobs among as seen across the fishing and secondary industries in NSW.

Table 1. The regional primary catching sector with retail and processing estimates (low and high).

All NSW	Output ($m)	Added Value ($m)	Income ($m)	Employment (FTE)
Catching sector	219.10	104.50	50.90	1,402.90
Retail and processing (est.) low	217.03	110.60	66.50	1,887.90
Total (est.) low	436.13	215.06	117.40	3,290.80
Retail and processing (est.) high	282.14	143.73	86.45	2,454.24
Total (est.) high	501.24	248.23	137.35	3,857.14

3.2 Social and economic interactions between the NSW professional fishing industry and recreational fishing

The fieldwork interviews suggested that the recreational and professional fishing sectors supported each other economically and socially through the bait industry. This was explored through examination of social and economic data. A 2013 survey of Recreational fishing in NSW estimated saltwater fishers spend $39 million/year on bait and burley (McIlgorm and Pepperell, 2013). An analysis of NSW catch and price data indicated that bait species such as school prawns and sardines caught by the NSW wild-catch industry are likely to account up to a quarter of this product. In particular packaging of sardines/sprats and school prawns often occurs in regional areas rather than through the central market, and therefore directly contribute to regional economies.

The importance of the bait market has led many within the professional fishing industry to specialize in this area only, with some professional fishers commenting that they receive a higher price for their

product as bait than for human consumption. A number commented on the high expectations of Australian recreational fishers in relation to the quality of the bait they purchase.

> *If you don't sell human consumption [standard] for bait you will not last, you will go broke… when people go in the shop for their bait they want top quality.*
> ***Wholesaler _South coast***

This was borne out in the results of the general public questionnaire, where 35% of respondents identified as recreational fishers. Of them, 78% agreed or strongly agreeing that they preferred local bait, even if it is more expensive. This support is primarily driven by a desire to support the local community (90% agree) (Table 2). In addition, the fish merchant questionnaire indicated that 43% of fish merchants surveyed sold recreational bait, and 91% indicated that their customers had a strong preference for locally sourced bait.

Table 2. Attitudes towards provenance of bait products by NSW recreational fishers

	Agree or strongly agree (%)
It is better for my local community to purchase local bait than bait sourced from other countries	90%
I prefer to use local bait even if it is more expensive	78%
It is better for the marine environment to purchase local bait for recreational fishing than bait sourced from other countries	79%
I can catch more fish when I purchase local bait than bait sourced from other countries	60%

Perhaps surprisingly, given their active role in catching fish for themselves, the community questionnaire also indicated that recreational fishers are some of the biggest supporters of their local seafood suppliers. Recreational fishers, in particular, were significantly more likely to say they 'often' purchase local when buying seafood products and were 'extremely interested' in knowing the source of the seafood they buy. In addition they were significantly more likely to indicate that they predominately purchase their seafood from their local fishing co-operative.

Table 3. Attitudes towards provenance of seafood products by NSW general public, including recreational fishers and non-fishers (with statistically significant differences highlighted $p<0.05$)

Agreement (i.e. agree or strongly agree) with the following statements (%)	**All respondents**	**Recreational fisher**	**Non-fisher**
Prefer to purchase from local fishermen's co-op or SFM	40%	47%	36%
'Often' purchase local seafood	40%	44%	37%
'Extremely interested' in knowing source of seafood	37%	44%	33%
I believe it is important we produce our own seafood in NSW and reduce our reliance on food imports	94%	94%	94%
I prefer local fish or seafood even if it costs more	89%	91%	88%
I prefer local fish or seafood because it is better for the local community	96%	97%	95%
I prefer local fish or seafood because it is better for my health	76%	78%	74%
I prefer local fish or seafood because it is better for the marine environment	67%	65%	68%

3.3 Social and economic interactions between the NSW professional fishing industry and tourism

The link between a local professional fishing industry and tourism was frequently mentioned in fieldwork interviews. These discussions fell into two main categories. The first involved discussion of the contribution of the industry to tourism through the provision of sought-after seafood meals for visiting tourists. The second contribution discussed was the provision of an experience for visitors wishing to witness fishing practices or a working harbour. These two contributions were seen as supporting the other. For example, hospitality businesses indicated that the presence of fishing boats in a harbour is seen as giving authenticity to the local seafood experience. Advertising that promotes product as fresh and local alongside the spectacle of fishing boats offloading a catch provides a point of differentiation from suburban fish shops or restaurants.

> *People come here to be able to have their lunch and watch the fishing boats come in, and fishermen unloading the catch, and just knowing it's a wholesale site gives a perception that the fish is fresher…it's so important to the authenticity of the site.*
> ***Sydney Fish Market representative***

Closely related to this were discussions about the many wharves and jetties associated with the professional industry, the majority of which are open to the public and are popular locations for people to walk along and look at the boats. Recreational fishers also use these jetties and wharves as safe, accessible fishing platforms.

> *We know that licenced jetty, we can fence it off… but we insist on leaving it open to the public because it's just making people realise where their fish come from. They always ask how long did the boat go out for. Is this a good catch? You know, they're the things that they ask… we're finding in December, January when there's a lot of tourists here, there'd be 20, 30 of them, people down on the jetties watching the boats unload, taking photos with their kids with tunas and stuff like that. We encourage it.*
> ***Co-operative Manager - South Coast***

The social questionnaires explored some of these ideas further (Table 4). It indicated that 89% of respondents expect to eat local seafood when they visit the NSW and 76% felt that eating local seafood was an important part of their coastal holiday experience. In addition, amongst the members of the general public surveyed, 64% of respondents indicated they would be interested in watching professional fishers at work while on holidays. Recreational fishers were significantly more interested in seafood being a part of their holiday experience and in watching professional fishers at work while on holidays.

Table 4. Attitudes towards seafood and the tourism potential of the professional fishing industry by NSW general public, including recreational fishers and non-fishers (with statistically significant differences highlighted <0.05)

Agreement (i.e. agree or strongly agree) with the following statements (%)	**All respondents**	**Recreational fisher**	**Non-fisher**
I expect to eat local fish or seafood from the local region when I visit the NSW coast	89%	92%	87%
Eating seafood caught or grown in the local region is an important part of my coastal holiday experience	76%	85%	70%

I would be interested in watching professional fishers at work when on a coastal holiday (e.g. unloading their catch)	64%	74%	58%
Seeing professional fishers at work detracts from my enjoyment of the coastal environment when on holiday	14%	14%	14%

These results were supported by the opinions of the tourism operators surveyed. This found that 100% of the tourism operators who responded to the questionnaire felt that visitors and tourists expect to eat local seafood when they visit the NSW coast, and 98% believed that eating seafood was an important part of their customer's holiday experience. They also strongly agreed that the history of the industry (83%) and the spectacle of watching fishers at work (75%) were important aspects of the tourism experience in their area. Of the businesses surveyed 84% said they are 'often' or 'always' asked to provide advice to tourists on where to access local seafood.

Despite this only half (50%) of the tourism operators surveyed had previously undertaken some form of promotional activity that featured the seafood industry and 58% said they participate in cross-promotional activity with seafood outlets. So, while recognising that tourists are looking for seafood product and seafood experiences when on holidays, this is an area with untapped potential.

> *There are a lot of people who wouldn't see that, particularly if you're from the larger city area… If you live in the country, those things are pretty normal to you. You see them everyday. But there is also lots of people who don't see them every day and don't realise what exactly happens and how that process works. I think absolutely it would be something that would be a marketable tourism experience.*
> ***Council tourism and marketing manager, Mid North Coast***

The link between recreational fishing and tourism was perhaps more readily understood by interview participants, especially tourism organisations and government officials. It was also recognised, however, that this link was not necessarily direct, that recreational fishing was just one of the activities that tourists participate in while on holidays.

> *So they come here for a fish because they know it's a good fishing place. But the sideline is they'll have a good time with their wives going shopping and playing golf and the kids will go to the beach, and they'll go out and fish. So I don't think we should minimise the fact that a great driver for tourism here is fishing. But we're not necessarily seen… as a fishing community but it's a place where you come and fish.*
> ***Mayor, South Coast***

3.4 Other services

The interviews also indicated a range of other ways that the professional fishing industry interacts with the other two sectors, or services the industry undertakes which have flow on benefits to these sectors. Many of the professional fishers interviewed discussed sharing some of their knowledge of fish and fishing with recreational fishers as a gesture of goodwill. Others discussed being 'followed' by recreational fishers who understood that professional fishers would likely have an intimate knowledge of the best fishing spots at any given time and sought to piggy back on that knowledge to maximize their own catches.

> *If you share some data with them, they love it. That's priceless, because they'll come back the next day and they'll say you were right, thanks, I caught a big flathead over there just like you said or yeah, there was plenty of whiting there just like you said, thank you very much and*

they, in turn, become your agents of goodwill and they tell other people that no, he's not a jerk, he's actually alright this bloke.
Professional Fisher, Great Lakes-Hunter

The professional fishers interviewed were also frequently involved in search and rescue operations in local waterways, with recreational fishers one of the primary beneficiaries of these services. Of the fishers interviewed, 62% discussed their first-hand experiences of towing in vessels or vehicles that had run in to trouble, being involved in rescues of people they had come across by chance, or taking part in more coordinated search and rescue operations.

I pulled four souls out of the water last year from an overturned boat; towed many, many more broken-down boats back to the ramp. Because of our presence on the water and because fish tend to run better in very, very bad weather, we tend to be out there and we tend to be the first responders when… something goes wrong.
Professional Fisher, Great Lakes – Hunter

Finally, the interviews revealed the active role the NSW industry plays in advocating for improved water quality and catchment management across the state. This is a primary concern for the industry given the direct relationship between environmental health and fish stocks. This is another area of common interest with recreational fishers. Of the professional fishers interviewed nearly half (48%) discussed having been actively involved in environmental or fisheries management committees either currently or in the past. For example, many of the local government authorities interviewed involved professional fishers in their estuary or catchment management committees as a means of tapping into their knowledge of local waterways. Other examples included a recreational fishing group who had enlisted the help of a few knowledgeable professional fishers to gain their insight and advice on a project to rehabilitate a degraded wetland system, and professional fishers acting as advocates to reduce pollution and contamination issues in a south coast estuary.

It's probably something the public don't realise - is that stewardship and advocacy that they do on the public's behalf which is often unrecognised… the public don't often make that link about their role as the stewards and eyes and ears.
Council Natural Resources Manager, Central Coast_Hawkesbury

4. Discussion

The NSW case study outlined above highlights how resource conflict can occur between user groups even when there are strong relations of interdependence in their shared use of the resource. In Australia, such conflict often manifests itself in campaigns to ban professional fishing in certain areas, especially in the most productive estuarine areas. These campaigns contend that recreational fishing is ‘worth’ more than professional fishing and therefore should be given preferential (often exclusive) resource access (Brown, 2016). This case study demonstrates that a more nuanced understanding of the complex social and economic relationships that exists in coastal communities may pave the way for a more balanced assessment of the best approach to resolving these conflicts.

4.1 Resource allocation based on economic valuation

Policy makers are often required to address apparent categorical conflict decisions based on ill-assessed economic valuations which can have perverse outcomes in terms of worsening the conflict and have high negative social impacts, even on the apparent beneficiary group. Conventional valuation approaches to fisheries were conducted as part of this project and they found that a direct comparison of the economic values of professional fishing with the other two competing sectors would likely result in a decision to favour the prioritisation of recreational fishing and tourism. Comparisons of this nature have been used in the past to justify calls to restrict professional fishing in

Australia (Victoria State Government, 2015, Queensland Government, 2015, Brown, 2016). The broader analysis, however, highlights the dangers inherent in such a narrow assessment of the value of a particular industry.

Relying solely on economic valuations is problematic for a number of methodological and ethical reasons. From a methodological perspective a true comparison of the values of different sectors would require 'like for like' economic assessments based around the marginal economic net benefits of each competing sector (Edwards, 1990). Where this is achievable, this analysis would not be likely to support the complete exclusion of one sector over another, but instead indicate a direction for potential re-allocation. In practice, accurate comparisons of the marginal value of the two sectors are extremely difficult, given fundamental differences in the economic and governance arrangements that exist around each sector, problems with obtaining useful data to guide these assessments and the influence of external factors – particularly in relation to recreational fishing - which will impact angler behaviour and catch landings (see Abbott, 2015 for a more indepth critic of the use of marginal net benefits in resource allocation decision making).

In the absence of studies of the marginal net benefits of each sector, expenditure data is assumed to be representative of "economic importance" of the sector and this generally leads to confusion over economic values. For example the economic valuation studies of recreational fishing in NSW use expenditure methods (McIlgorm and Pepperell, 2013, Destination NSW, 2014) and tourism sectors have been valued by non-market measures (Destination NSW, 2014). Both recreational fishing and tourism are a significantly different good to professional fishing. Professional fishing, as a form of primary production, is usually measured by its gross value of production, which is not suited for marginal net benefit analysis. Like-for like comparisons using studies of this nature are therefore methodologically problematic.

Perhaps more significant, however, is the failure of comparisons of this nature to recognise the high degree of interdependency that exists between different types of resource use. The approach taken in this study allowed for a broader understanding of the value and benefits provided by a sector by looking beyond purely economic measures to consider these contributions in context with a range of other factors – specifically how the industry supports and interacts with other important sectors in regional economies, and the extent to which local communities value those contributions.

Despite recreational fishing group spokespeople often fanning conflict and calling for the removal of professional fishing from popular fishing grounds, this mixed methods study showed that recreational fishers gain many benefits from professional fishing, and closures to professional fishing may result in a net negative impact for them. This project revealed that recreational fishers are much more engaged in questions around seafood quality and provenance than non-fishers and therefore are more likely to support their local industry, especially their local co-operatives, when purchasing seafood products. They are also major consumers of another important product supplied by the industry – bait. The high level of interest amongst the general public in eating local seafood and watching professional fishers at work while on holidays also indicates a strong link between the professional industry and tourism.

This data, therefore, demonstrates that recreational and professional fishing is not an 'either/or' proposition – both have socially and economically important roles to play in coastal communities, especially in regional areas, and furthermore they are interdependent. Similarly tourism (including recreational fishing tourism) and professional fishing are not mutually exclusive but support each other. These relationships are under-studied and relatively unrecognised, and these findings are at odds with popular discourse which tends to portray the sectors as being in conflict. The idea that the removal of one user group (e.g professional fishing) will result in an automatic flow of benefits to others (e.g. recreational fishing or tourism) is challenged by the results of this analysis.

This study therefore suggests that assessments of the contributions of competing resource users should not be considered in isolation, but should examine inter-sections and relationships that cut across sectors and provide insights into areas of common ground and conflict. The wellbeing approach

underpinned this methodological approach (Voyer et al., 2016, Coulthard, 2012, Hicks et al., 2016, McGregor et al., 2015), however alternative approaches, such as actor network theory, may also prove useful for this type of research (Scott and Harvey, 2016).

4.2 Conflict resolution mechanisms and processes

The high level of support for the NSW professional industry amongst the general public and the recreational fishing community in the NSW case study suggests that perceived conflict amongst resource users may only represent a small portion of the community and may even be limited to individual, or personality based disputes. Careful consideration therefore needs to be given to the process by which this conflict is examined and managed in order to avoid a decision being made which appeases the minority with detrimental impacts on wider community wellbeing. In particular consideration needs to be given as to the nature and extent of the conflict and the context in which it exists (Young et al., 2016). Increased crowding of fishing areas may not necessarily indicate a conflict, for example, if synergies exist in terms of use patterns (e.g. differing target species or methods), even if personal relationships between the individuals involved are strained. It should not be assumed, therefore, that conflict between users automatically translates into a resource use conflict. If wider synergies can be revealed through research, and skilfully used in communication and consultation with stakeholders, then better resource sharing strategies might result. For example, Stepanova (2015) determined that successful conflict resolution relies primarily on mechanisms which encourage joint learning and a realignment of power dynamics. Providing opportunities for competing stakeholders to interact and learn from each other was therefore considered crucial for breaking down some of the animosity that may exist in these situations. Stepanova (2015) contends that participatory processes are essential in this regard but need to be carefully managed, and should incorporate both informal and formal approaches. This is because more formal consultation exercises have the potential to escalate rather than alleviate conflict if they further entrench power inequalities (Stepanova, 2015).

4.3 Alternative approaches to segregation or removal

Segregation of use types as a tool for managing resource use conflict is problematic on a number of levels. Firstly, it fails to recognise the interdependency that exists between apparently competing sectors. Secondly it entrenches power inequalities by prioritising one user group over another. Thirdly, it discourages rather than facilitates negotiation, interaction and knowledge transfer between sectors, thereby risking escalating or entrenching conflict rather than encouraging resolution. Careful examination of the most appropriate tool to address resource conflict is important and alternative approaches to spatial segmentation should be considered. Spatial planning exercises could be refined beyond simply carving up areas and giving them to some groups and excluding others. For example, temporal shared use arrangements may be negotiated which allow for competing uses according to time of day or seasons, such as peak tourist periods. Consideration should be given to alternative approaches which promote and foster areas of mutual benefit and co-operation.

5. Conclusions

Examination of the complex social and economic relationships that exists between sectors that are considered to be in conflict has the potential to uncover new possibilities to develop and enhance areas of common ground. This approach may assist in avoiding unforeseen social and economic impacts from decisions based on simplistic arguments which call for one user group's economic contribution to be 'weighed up' against another. This may require reassessing the approach of attempting to handle user conflicts through excluding one use in favour of another. Instead a more inclusive, multi-disciplinary approach which recognizes the interconnections between resource use in coastal communities and develops equitable outcomes that share the costs and benefits of resource use across stakeholders should be pursued. The first step in achieving this objective is understanding the range of socio-economic contributions and relationships between use types. A deeper appreciation of the areas of synergy between user groups, and an appreciation of the contextual factors that influence

user conflict will provide a foundation upon which mediation strategies can be built as a means of improving stakeholder relations and negotiating appropriate resource management responses.

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