Whose Fish is it Anyway? Investigation of co-management and self-governance solutions to local issues in Queensland's inshore fisheries.

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

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Executive Summary

Addressing specific issues in the marine environment at a regional or local level is recognised as one of the most significant challenges faced by management. This project trialled regionally based co-management at three locations on the Queensland east coast – Port Douglas, Hinchinbrook and the Burdekin. The project followed a review of the East Coast Inshore Finfish Fishery, which identified a desire for more regionally focussed management. East Coast Inshore Finfish Fishery is one of the more complex fisheries in Australia, and this was clearly an ambitious project. The project represented in part an attempt to implement the "negotiation model" for resource allocation.

The three different case studies utilised had a range of different issues but reflects the level of diversity in the fishery as a whole. In terms of the two major fisheries stakeholders (commercial and recreational fishers), the case studies can be categorised as follows. In Port Douglas, recreational fishers sought a change to commercial net fishing (a closure), while commercial net fishermen desired the status quo. In the Hinchinbrook case study, commercial fishermen sought a change, limited additional areas for locals to undertake commercial net fishing, while recreational fishers desired the status quo. In the Burdekin case study, both the recreational and commercial fishermen involved sought changes to management arrangements including the betterment of both fishing sectors.

In the Port Douglas case study, there proved to be limited scope to negotiate management arrangements beyond those that were already in existence. The status-quo regarding net and line fishing (recreational and commercial) for Grey Mackerel remains, and conflict continues. In the Burdekin case study, the Burdekin Sustainable Fisheries Alliance was formed which successfully negotiated a significant change to marine park regulation which enhanced the protection at a local scale for Dugong by reducing net fishing interactions and did so with the support of local commercial fishers. This is the only example of "keyhole surgery" undertaken by Great Barrier Reef Marine Park Authority other than to rectify drafting errors. The Burdekin Sustainable Fisheries Alliance also developed a proposal to close Wunjunga Beach to commercial net fishing and to compensate for this, to reopen a section of the Burdekin delta that was closed to net fishing. This proposal proceeded through a formal consultation process that elicited significant public response. This proposal though did not proceed to a regulatory change due to the diversity of views put forward on the issue. It nonetheless represented a bottom-up management proposal rather than a top-down approach. In the Hinchinbrook case study, there were no tangible and achievable outcomes for all sectors that could be elucidated.

In terms of marine park planning and marine park regulation, regional co-management offers a way of fine tuning existing marine park zoning – "keyhole surgery". It is not, however, a mechanism for making significant changes to existing marine park zoning arrangements or marine park regulations in the Great Barrier Reef World Heritage Area. The Great Barrier Reef Marine Park Authority considered that any changes as a result of regional management should be minor and clearly focussed on demonstrably improving biodiversity conservation outcomes. Overall, for such changes to occur in the Great Barrier Reef World Heritage Area they should meet the following criteria:

- No changes to highly protected zones (i.e. national park and preservation zones) green and pink zones).
- Any proposals for changes should deliver a net conservation benefit or at the very least maintain the status quo.
- Any proposals for change should advance the objectives of the Great Barrier Reef Zoning Plan.
- Any proposals for change should have a scientific basis.
- Community support for any proposals for change can be demonstrated.

- Due consideration is given of unintended consequences of any proposed changes.
- Any proposed changes should be very limited in spatial extent.
- Any proposed changes need to be undertaken with the support of the Great Barrier Reef Marine Park Conservation Reef Advisory Committee.

The Burdekin case study has demonstrated that such changes can be made and represents the only example of where marine park regulations (other than to rectify drafting errors) in the Great Barrier Reef Marine Park has been made and is testimony to the potential that regional management offers. The changes that were developed and implemented met the eight criteria listed above. Overall, the process delivered an improved conservation outcome (reduced Dugong mortality) and did so without a significant cost to the commercial fishing industry.

From the co-management literature, the development of co-management situations requires empowerment, strong leadership from policy entrepreneurs, the willingness and ability to negotiate, the development of trust, and relationships and social networks within and between stakeholders at various levels. The project reinforced these general findings. Of the three case studies, the Burdekin case study had the strongest policy entrepreneurs and importantly the policy entrepreneurs were from both the commercial and recreational fishing sectors. Where local policy entrepreneurs are lacking or are ineffective, co-management is unlikely to succeed. In fact, strong leadership along with trust and the ability to work together for mutually agreed outcomes are most important determinants for successful co-management.

There was and indeed remains significant interest in regional management in Queensland fisheries, but this project highlighted significant practical challenges. A key to implementing co-management at the regional level in Queensland East Coast Inshore Finfish Fishery is zoning of the net fishery to facilitate greater regional stewardship of the resource. Zoning is not practical for the recreational fishery. The need to zone the East Coast Inshore Finfish Fishery was a recurring theme across the various sectors in all three case studies. If regional management is implanted throughout the East Coast Inshore Finfish Fishery following zoning of the fishery, the management agency will need to refine the spatial scale at which commercial fishing data is collected and provide greater transparency in public reporting of the commercial fishing data. The project identified a lack of trust in the veracity of the commercial fishing data.

Keywords

Grey Mackerel, Hinchinbrook, Port Douglas, Burdekin, co-management, regional fisheries management, resource allocation, Queensland East Coast Inshore Finfish Fishery.

Introduction

The management of inshore fisheries represents one of the most significant challenges for fisheries management. Inshore fisheries and their management are facing an unprecedented level of attention on economic, social and environmental grounds (Phillipson and Symes, 2010). Such fisheries are typically small scale, accessed by competing stakeholders, standing stocks are often highly variable due to climate factors, and in many areas, coastal development of various types potentially impacts fishing access as well as habitats that many of the key species fisheries are dependent upon. In essence fisheries management is about managing people and their relationships – the fish themselves are not managed. It is the human activities that impact the fish stocks that are the subject of management arrangements (McPhee, 2008). Since the 1990s inshore fisheries in Australia, like in many developed countries, has seen an increase in recreational fishing effort, and the number of commercial fishing operators has decreased, as has the spatial area due to marine park and fisheries legislation defining where the latter can access. In Australia there are two further significant challenges. The first is the implementation of marine parks by both State and Commonwealth governments, which has altered the spatial pattern of fishing effort and led to a redistribution of fishing effort (Leédée *et al.*, 2012). The second is the diversity of target species which, for the commercial fishing sector, has resulted in a multitude of very small-scale fisheries each with subtle, but important differences. Both these challenges are of prominence in Queensland.

Co-management is an established approach for managing small scale fisheries, including inshore fisheries and is of particular interest in developing countries (e.g. Evans *et al.*, 2011). Co-management is not limited to fisheries but is employed in natural resource management in general (e.g. Borrini-Feyerabend *et al.*, 2000). It is a form of governance which involves a shift from "top-down" to "bottom-up" management, and of the government sharing responsibility with stakeholders (McCay and Jentoft, 1996). Co-management has the potential to realise (or at least approach) the ideals of social equity, economic efficiency, and ecological sustainability, fundamentally through seeking to encourage more collaboration and less conflict. Co-management should be seen as a social process through which the partners gradually and voluntarily establish a close relationship of long-term duration through increased responsibility, commitment and trust (Chuenpagdee and Jentoft, 2007). Evans et al. (2011) reviewed two hundred and four examples of co-management implementation in over 50 countries, with the largest percentage of case studies from Asia (47%), followed by Latin America and the Caribbean (21%), Africa (18%) and the Pacific region (14%). Overall, 70% of the case studies lacked any data to determine whether they had made an impact.

In Australia, investigating and trialling co-management arrangements was, deemed a national priority. Many definitions of co-management exist in the literature and are used around the world. In Australia, the nationally agreed definition of co-management is an: "*arrangement in which responsibilities and obligations for sustainable fisheries management are negotiated, shared and delegated between government, fishers, and other interest groups and stakeholders*" (Neville *et al*., 2007). Co-management differs from community-based resource management (CBRM) because the government is also involved in the decision-making process (Sen and Nielsen, 1996). Co-management is similar to, and in a number of instances borrows from, broadly similar approaches in natural resource management that have a range of terms including 'collaborative planning' or 'shared decision making' (Day *et al.*, 2003).

While the concept behind co-management is logical, it is not without its challenges in terms of practical implementation. The key and somewhat interrelated challenges include:

- the existence and maintenance of sufficient "social and human capital" and the presence of policy entrepreneurs;
- the willingness and ability of stakeholder groups to undertake meaningful negotiation;

- the current fisheries management and marine park regimes; and,

- the history of fisheries management including previous relationships between stakeholder groups and between stakeholder groups and government.

Social and human capital is a key consideration for the development and implementation of co-management arrangements (Pomeroy *et al.*, 2001) and has increasingly been viewed as a key component for fisheries governance and biodiversity conservation in general. The term social capital is an all-encompassing term for the norms and social networks that facilitate co-operation among individuals and between groups of individuals (Grafton, 2005). Social capital is about the value of social networks, bonding similar people and bridging between diverse people. As such, social capital is generally recognised as consisting of two main components – "bonding social capital" which is an inward-looking network that can reinforce specific identities and homogenous groups and "bridging social capital" which is outward looking and emphasises relationships among diverse groups. Social capital is *both* a private and a public good, with benefits accruing not only to those persons making the investment in social networks but also to the wider community in the form of positive externalities. Linked to the concept of social capital is presence of policy entrepreneurs, respected leaders that can look beyond the immediate horizon and identify relevant solutions and drive change. Beem (2007) identifies that these policy entrepreneurs may be in government or industry but that the strength of the ties the advocate has with the fishing community is the key issue.

Allied to the terms bridging and bonding social capital is the term "social network" which refers to a set of individuals and the social relationships or ties among them (Butts, 2008). These ties or relationships can take forms such as trust, friendship and interpersonal communication (Butts, 2008). Negotiation requires trust and mutual respect. From a fisheries management perspective, the structure of social networks can facilitate or impede the transfer of information and the diffusion and acceptance of management approaches and regulations (Mueller *et al.*, 2008). Implicit in the definitions of social capital and social networks is the ability to be able to undertake negotiations to support an outcome (Borrini-Feyerabend *et al.*, 2000).

The management of inshore fisheries is often complicated due to their multi-sector nature, the diversity of fishing methods and motivations, and the contribution of the fishery to the social and cultural identity and economies of coastal communities. In Queensland, a review of management arrangements for the East Coast Inshore Finfish Fishery ("the Inshore Fishery") revealed a large number of local issues that could not be addressed via generic State-wide management. Many coastal communities have argued that certain general fishing rules do not suit their region. Co-management at the regional/local level was considered a potential approach to addressing the various concerns. Addressing specific issues in the marine environment at a regional or local level is recognised as on the most significant challenges faced by management (Cook et al., 2013).

The vast majority of co-management initiatives have focussed on commercial or subsistence fisheries. McPhee (2009) has previously examined co-management opportunities for commercial fisheries in Queensland. There is however also emerging interest in non-regulatory approaches for managing recreational fisheries. The vast majority of inshore fisheries in Queensland are multi-sector fisheries that also involve recreational and Indigenous fishing activities. This is not a unique circumstance and occurs in other Australian States and in many countries (e.g. Ruddle and Segi, 2006). Such fisheries represent a significant challenge for fisheries management, and this is further exacerbated in the case for most of Queensland, due to the need for high environmental performance as a result of the biodiversity conservation requirements of the Great Barrier Reef World Heritage Area. For co-management to be more widely applicable, particularly in Australia, it needs to be trialled in multi-sector fisheries including those with significant recreational fishing components. It is these fisheries that are common in inshore regions, and those that are often most in need of cost-effective alternative management regimes. Co-management approaches for multi-sector fisheries need to be cognisant of resource allocation and resource access issues as well as the political dimensions of fisheries

management decisions. Indeed, issues associated with resource allocation and equitable access arrangements may be a driver for developing co-management arrangements, or they may be a factor which compromises them.

The management arrangements for the Queensland East Coast Inshore Finfish Fishery (ECIFF) were the subject of a Regulatory Impact Statement (RIS) and consultative process in 2008. Whilst many generic decisions that focussed on sustainability of overall harvests were taken for the ECIFF following the consultation process (phase 1 implementation), it was identified a large number of local issues still need to be addressed in phase 2. The ECIFF is not a homogenous fishery; it has considerable regional differences and occurs over a large geographic area. These differences are not restricted to target species, but importantly also relate to the subtle but important differences in how the fishery operates "on the water". A net fishing practice that is effective in one location is not necessarily effective in another location. Likewise, an identical net fishing practice in one location may result in deleterious environmental impacts (e.g. high bycatch) but may not result in such impacts at another location.

The Queensland State fisheries management agency identified a clear desire and need to trial co-management focussed at a regional level as a tool to meeting the challenges faced in inshore fisheries management. These include resource allocation, meeting and managing the challenges and aspirations of Indigenous communities and interactions with non-fishing stakeholders. *The Queensland Fisheries Strategy 2009-2014* identifies specifically the need to "*Develop models of co-management and regional management to share the responsibility of resource management with both users and the wider community*". While resource allocation is one issue for consideration in co-management, it is not the only issue. Concerns over distributive justice and allocation can often be a key driver for changes to fisheries management regimes (Beem, 2007). In the context of resource allocation, there are a number of different models for addressing the challenge, and these models (or some of their elements) are also more broadly applicable to fisheries management. These are reviewed in Neville et al. (2012) and include the following:

> (i) Government Driven model – government "politically" sets the objective and drives the allocation outcome.
>
> (ii) Negotiation Based model – the driver is a willing negotiation among parties to come to an agreed position.
>
> (iii) Administrative Based model – an independent advisory committee of "experts" is used to drive the analysis and recommend on allocation.
>
> (iv) Statutory Based model – a broad based statutory committee drives the process with a statutory responsibility and powers to recommend on access and allocation issues to government.
>
> (v) Market Based model – the driver is either the trading of shares/rights in an established market, or the application (by administrative decision) of applying economic valuations to competing uses of the resource to maximize returns in an "implicit" market.

This project constitutes an attempt to use the Negotiation Based model for resource allocation in inshore fisheries. The models are not necessarily mutually exclusive. For instance, in a government driven model the objective set by a government may be for the implementation of a negotiated based outcome. However, regional management has broader potential applicability to fisheries management issues other than just resource allocation. Following the review of the ECIFF in 2007, Fisheries Queensland (now DAFF) identified three regions for trialling the development of co-management arrangements at the regional level: Port Douglas/Mossman, the Hinchinbrook region and the Burdekin region. Although some commonalities exist, all three fisheries are different and reflect a range of issues that are far from unique.

The structure of this report is centred on three case studies with these being Port Douglas, Hinchinbrook and the Burdekin followed by an overarching discussion that provides detailed analysis and reflection on the project as a whole. This provides important information for co-management, resource allocation, and the management of Queensland inshore fisheries in general. This report highlights the significant challenges and contentions that fisheries managers face with shared inshore fisheries in general, and not just in Queensland.

Objectives

The project had the following four objectives:

1. Trial the implementation of a locally based co-management approach in three project areas.
2. Empirically assess the local socio-economic environment as it pertains to the fishery and identify the various tools that may be applied to local management issues.
3. Assess the applicability of the identified management tools to each local circumstance, and the socio-economic cost and benefits of their application.
4. Develop appropriate proposals for local area fisheries management and identify the pathways and timeframes necessary to implement them.

Method

Overall, the project was based on three case studies (Port Douglas, Burdekin and Hinchinbrook) with the case studies identified by the Queensland State fisheries management agency following a review of sustainability in the ECIFF. The three different case studies that had a range of different issues but reflected the level of diversity in the fishery as a whole. The overall project had a steering committee with representatives from the peak bodies and management agencies, the membership of which was as follows:

- Randall Owens (GBRMPA)
- Keith Hall (Charter Division of Marine Queensland)
- Barry Pollock (Sunfish)
- Winston Harris (QSIA)
- Nick Heath (WWF)
- Mark Lightowler (Queensland Fisheries)
- Phil Kliese (Ecofishers)

A group of participants for the initial meeting of each of the three case study regions was provided to the principal investigator, principally from GBRMPA and Queensland Fisheries as a result of the previous consultations for the ECIFF and consultation and consultative processes run by GBRMPA (e.g. the Local Marine Advisory Committees). In addition, stakeholder groups also provided contact details for initial attendees. Importantly, initial participation was not limited to those contacted directly by project staff; invitees could contact other local people whom they considered to have expertise and were willing and able to contribute. In effect the survey approach was akin to snowball sampling (for instance see Heckathorn, 1997) although the participants were not actual samples *sensu stricto*. The initial meeting in each case study region was chaired by an independent facilitator, Ms Brydget Barker-Hudson (Medius Solutions) who had specific expertise and experience in dispute resolution. The use of an independent facilitator is common in natural resource management for dispute resolution and/or to ensure that all voices present had an opportunity to be heard.

Following the initial meeting, each of the three case study groups were asked to decide the structure and detail of the next meeting, or indeed whether they desired another meeting at all.

The three case study groups were empowered to design an approach or approaches that could be used to progress co-management opportunities. Given the justified importance of the biology and ecology of Grey Mackerel (*Scomberomorus semifasciatus*) to the debate at Port Douglas a review of relevant information was undertaken. In the Port Douglas Case Study, the agreed upon priority was an oral history assessment of the local Grey Mackerel fishery. The methodologies for this assessment are thoroughly described in Appendix 1 of this report. The assessment of the oral history was the end point of the case study as common ground to progress any other arrangements was not achieved.

At the first meeting of the Burdekin Case Study, participants agreed to be known as the Burdekin Sustainable Fisheries Alliance. The Alliance identified four main issues currently being considered by the committee are:

1. amending, reducing or introducing commercial netting closures
2. adopting best practice commercial netting to minimise the impact on protected species and address ongoing issues with recreational fishers
3. amending marine park arrangements regarding conservation park (yellow zones)
4. implementing an education program for recreational fishers on appropriate fishing practices in the Burdekin region.

The alliance worked collaboratively towards a set of management arrangements that they deemed locally appropriate and balanced for all stakeholders and cognisant of marine park objectives for contributing significantly to the first three objectives. This report documents the two major initiatives the Alliance embarked upon:

- Netting arrangements to enhance dugong protection in Bowling Green Bay; and,
- A proposal to close Wunjunga Beach to commercial net fishing and in exchange open a small section of the Burdekin River.

The former proposal is described in Appendix 2 of this report. The latter proposal was released for formal community consultation (see Appendix 3). This report includes an analysis of the submissions received for this initiative. The Alliance was unable to progress its fourth objective to any relevant degree.

The Hinchinbrook Case Study Group was not able to agree on progressing any initiatives and the reasons why this was the case are described in this report.

Results

Port Douglas Case Study

The Port Douglas case study is focussed on the capture of Grey Mackerel in the Douglas Shire region. Most of the focus is centred around Snapper Island, a continental island approximately three kilometres from the mouth of the Daintree River, however a broader regional view is taken. The major concern was the issue of local depletion of the Grey Mackerel around Snapper Island by offshore net fishing with a concomitant decline in recreational and charter catches, and the catch of commercial line fishermen.

The Douglas Shire is part of the Wet Tropics World Heritage Area (WTWHA). The Douglas Shire runs along the eastern coast of Far North Queensland from just north of Cairns, near Wangetti, to the Bloomfield River, south of Cooktown**.** The three larger population centres in the region are Port Douglas, Cooktown and Mossman. Mossman was the former centre of the timber industry while Port Douglas and Cooktown were the centres of port activities. Port Douglas became an important tourism destination in the 1980s and remains so.

Growing then from a small, coastal fishing village, Port Douglas became established as a major tourist destination and investment hot spot in 1987 with the construction of the Sheraton Mirage Hotel (Douglas Shire Historical Society Inc. 2006). During 1986-91 the population of the town of Port Douglas increased 270% (Centre for the Government of Queensland 2011), and in 2006 the Douglas Shire had a permanent population of 10,193 (Australian Bureau of Statistics, 2007). Tourism is important to this area, and the 2001 Population Census recorded 7,900 visitors in the Douglas Shire on Census night 7 August 2001, a time which corresponds with the peak tourist season. Most of these visitors stayed in Port Douglas itself, while 10% were accommodated in the Daintree / Cape Tribulation area and 17% elsewhere in the Shire (Tourism Websites Australasia P/L, 2009).

The coastal morphology of the Douglas Shire as a whole is generally characterised by a narrow coastal strip, rivers with small catchments and relatively small tidal inlets. There are four main catchments within the Douglas Shire: Daintree, Saltwater, Mossman and Mowbray (Bartley et al., 2004). The Daintree River is the most significant estuarine/riverine feature of the region. The estuary of the Daintree River is classified as a near pristine river dominated estuary with a tide dominated delta[1]. A diverse mangrove assemblage is a feature of the estuary with saltmarsh being limited and seagrass generally lacking in the river itself. The coastline of the region itself consists of a number of tide-dominated beaches interspersed with fringing reef. Intertidal seagrass meadows in the region are situated along nearshore sand and mud banks and mostly consist of *Halodule uninervis* and *Halophila* spp. dominated meadows. Shallow sub-tidal coastal meadows consist of *H. uninervis* and *Halophila* spp. communities mostly found along the sheltered coasts and bays. Compared to many other areas of the Queensland, the river systems that drain into the region are relatively small. The marine fish assemblages and the interaction between these fish assemblages and their habitat in the Port Douglas Shire have not been the subject of detailed study.

Biology and Ecology of the Grey Mackerel

Given the focus of this case study on Grey Mackerel and contentions in the community regarding aspects of the biology of the Grey Mackerel, it is pertinent to discuss it here. There are four species of Mackerel (Family Scomberidae) commonly harvested in Queensland waters. In addition to Grey Mackerel there are Spanish Mackerel (*S. commersoni*), Spotted Mackerel (*S. munroi*) and School

[1] http://www.ozcoasts.gov.au/search_data/detail_result.jsp

Mackerel (*S. queenslandicus*). While there are knowledge gaps, there is information available of relevance for fisheries management.

The Grey Mackerel is a widely distributed throughout tropical and subtropical Australian waters ranging from Moreton Bay (south east Queensland) northwards around northern Australia to Shark Bay in Western Australia (Collette and Nauen, 1983). It tends to be more of an inshore coastal species than the other Mackerel species, but it does range into more offshore waters (Blaber *et al*., 1995; Baker and Sheaves, 2005). Given this reliance on inshore habitats, Grey Mackerel are likely to be impacted at the local level by coastal development and catchment run-off due to their dependence on coastal habitats. These impacts are closely linked with habitat loss and degradation associated with increasing coastal population.

Grey Mackerel grow rapidly, attaining a maximum size of 10 kg and 120 cm fork length (FL). Male and female fish attain sexual maturity at 55-60 cm and 65-70 cm FL respectively, at approximately two years of age (Cameron and Begg, 2002; Welch *et al.*, 2009). They have a protracted spawning period extending from October to January (Cameron and Begg, 2002). On the Queensland east coast, Grey Mackerel was determined to represent one genetic stock although there is apparent division into a northern and a southern stock, with a separation apparent somewhere between Townsville and Mackay (Charters et al., 2010; Welch et al., 2015). Although the species is fast growing and highly fecund (high production of spawn), they form predictable aggregations (spatially and temporally) to be targeted by experienced fishers – recreational and commercial (although predominantly the latter in most regions).

A total allowable commercial catch (TACC) of 250 tonnes was implemented in 2009 as part of a suite of revised management arrangements for the ECIFF as a whole. New management arrangements for the species and fishery as whole are currently being developed by the Queensland government through their current fisheries reform process. Throughout Queensland, the Grey Mackerel catch is dominated by the commercial sector (~95% of the catch). Grey mackerel are a minor component in general of recreational fisheries in Queensland; however, their importance for the recreational sector around Snapper Island and Port Douglas more generally is established. Grey Mackerel are more abundant and are targeted by recreational fishers during the cooler months[2].

In addition to fishing pressure, there is some evidence that larvae and juveniles are dependent on estuarine and coastal nursery habitats, and fishers report the availability of Grey Mackerel is correlated with freshwater flows from estuarine systems (Jenkins *et al.*, 1985). Thus, Grey Mackerel populations may be influenced by local land-use practices, stream flow regulation in river catchments and various other estuary modifications. Like inshore tropical species in general, Grey Mackerel may be a species directly affected by climate change through the effects of ocean warming, changes in rainfall patterns and acidification on pelagic larval stages or indirectly via impacts on the inshore habitats on which they rely (Munday *et al.*, 2007).

According to the Status of Australian Fish Stocks, the harvest of the north-east stock (and all other Australian stocks) of Grey Mackerel is classified as sustainable[3]. However, local depletions of a stock may impact commercial catch rates and recreational fishing satisfaction, and these may not manifest themselves when considering the status of a biological stock unit (McPhee, 2017).

[2] http://www.fishingportdouglas.com.au/assets/lineburner/lineburner0718.pdf, http://fishingmonthly.net.au/Articles/Display/18557-Boom-times-in-the-tropics
[3] http://www.fish.gov.au/report/257-Grey-Mackerel-2018

The Debate

This case study was highly polarised. There were a core group of community members (including Indigenous people) and commercial line fishers that stridently considered that the increase in commercial netting of Grey Mackerel impacted recreational fishing, the Grey Mackerel stock, and World Heritage Values. Their views and concerns are well documented in various documents[4]. The commercial Grey Mackerel fishermen were based in Cairns and more readily utilised the Snapper Island region, following marine park closures at their traditional local fishing grounds closer to Cairns. Most line fishers across sectors (i.e. recreational, charter and commercial) stated that their satisfaction with Grey Mackerel fishing had declined and believed that their catches had decreased in recent years. Those who believed their catches had decreased consistently held commercial net fishing responsible.

Predating this project, in July 2006 the Douglas Local Marine Advisory Committee (LMAC) Sub-committee on Fishing reported widespread local concern that gillnetting was considered to be causing local overfishing and Dugong and turtle deaths in the Douglas Shire inshore waters. Fisheries Queensland were advised of the concerns of the Douglas LMAC and by June 2007 three public meetings had been held discussing these and related issues. The main recommendations emerging from these meetings were:

- make the local, inshore Grey Mackerel fishery line only;
- close local waters to all roving or out-of-town gillnetters; and,
- buy-back locally held gillnet licences after five years.

The community members considered that they had already thoroughly discussed issues related to Grey Mackerel and these previous recommendations simply needed to be enacted before any further meaningful discussions of regional co-management proceed. The community members considered that the main role of this project should have been to enact these recommendations, before potentially moving on to address other recreational fishers/community concerns. Commercial gillnetters produced a proposal which included further temporal and gear restrictions, and were willing to negotiate further on the issue, but the proposal and further negotiation were rejected by community members: "*No amount of debating whilst* any amount *of offshore netting of pre-spawning aggregations of greys at Snapper Island continues through this coming season will solve the problem.*[5]"

Such strong views regarding commercial net fishing are not unique to the Douglas Shire region, and they occur elsewhere in coastal Queensland (e.g. Mackay and Hervey Bay). The Department of Agriculture, Fisheries and Forestry (DAFF) through the development of the management plan for the ECIFF identified that the issue was a resource allocation issue and not a stock sustainability issue, although this continues to be disputed by stakeholders in the Port Douglas region.

An outcome that stakeholder participants agreed to was the collection of an oral history of Grey Mackerel fishing in the Port Douglas region with the aim of documenting observations by locals on the Grey Mackerel stocks including observations that pre-date contemporary fisheries management. Appendix 1 contains the results of this study. The focus of this study was on Grey Mackerel specifically as this was the focus of the case study.

[4] See http://www.ffc.org.au/Grey_Mackerel.html and the associated links.
[5] David Cook, Fish n Boat May 2010, p.5.

Reflections

An important part of the debate related to whether the issue at hand was related to the sustainability of Grey Mackerel stocks or resource allocation. In fisheries management the two are frequently, but not always related - a reduction in stock caused by one fishing sector can lead to reduced catch rates (or amenity/satisfaction) for the other. The dividing of the issue into stock sustainability and resource allocation is potentially an artificial construct, and this construct was a source of conflict that could have been avoided by accepting that both are potentially relevant in this example. The importance of stock status is not downplayed by admitting that there is a resource allocation issue, and likewise the importance of resource allocation is not diminished by identifying that there may be underlying stock concerns.

This project attempted a negotiation-based approach to addressing the problem. It became clear that the recreational fishing and community representatives involved did not want a negotiated solution, but rather a government driven (political) approach to addressing the problem through implementing the three points identified. This is not a criticism and it is the community's prerogative; however, it caused a mismatch with the research approach. In effect, the outcome from the government driven approach was the implementation of the management plan for the ECIFF which concluded that the fishery in the Douglas Shire region (including the Grey Mackerel fishery) would be a shared fishery. An additional outcome from the government driven approach was to attempt to enact a negotiated approach to access arrangements and commercial fishing practices in the region. This highlights how approaches are not mutually exclusive. While the government can obviously revisit the issue and implement a no take by net of Grey Mackerel in the Douglas Shire area, various State governments have not done this over (at least) a seven-year period. Arguably, a negotiated outcome could have contributed to resolving the issue (clearly not completely), but as is, the status quo has remained. Working towards a negotiated outcome would not have precluded a government driven approach (or any other) later.

Case Study Conclusions

It is clear that co-management is not currently the appropriate solution to conflict between commercial and recreational line fishers and commercial net fishers over shared Grey Mackerel stocks in the Port Douglas region. Without the ability of all sectors to find a compromised solution amongst themselves, it will remain necessary for a third-party decision to be made (e.g. by fisheries managers). This decision may be to: a) retain the status quo, b) remove commercial net fishing from the region, or c) attempt to resolve the conflict by improving the availability of, and trust in objective information related to the cause of the conflict, and encouraging dialogue to build respect between line and net fishing sectors.

Retaining the status quo does not resolve the conflict in the region. Line fishers will continue to be concerned about commercial net fishing in the region while they believe it affects their catch, is unsustainable, is non-selective, and targets breeding aggregations. Conflict can have significant negative social effects for those involved, and if left unresolved, it has the tendency to escalate (Wall and Callister, 1995; Yasmi et al., 2006). Therefore, some action is required. If commercial net fishing were to be removed from the region, serious consideration needs to be given to the potential flow-on effects of such action. Given their reliance on Grey Mackerel in the Port Douglas for a quarter of their fishing income, excluded net fishers will need to replace this harvest from another region or see a shift in targeted fishing effort to another species. Further, given the Grey Mackerel stock of interest extends beyond the Port Douglas region, removing effort from one coastal community within the stock's bounds may not reduce overall harvest of the stock but see a spatial shift in effort to other regions, which in turn might challenge local stock sustainability.

The first step in any conflict resolution is to address the cause of the conflict (Jacob and Schreyer, 1980). In this case study it has been clearly demonstrated that contrasting perceptions are the root of

the cause – commercial and recreational line fishers believe that commercial net fishing negatively impacts line catches of Grey Mackerel, and commercial net fishers believe that it does not; and the parties differ in their perception regarding whether commercial net fishing is sustainable for targeted Grey Mackerel and bycatch species (including threatened species). Such contrasting perceptions are a feature of fisheries resource allocation debates, both within and between sectors (McPhee, 2008).

What is needed is additional objective information to support or refute those perceptions. For example, information about net fishing sustainability for target and bycatch species, including within small areas, needs to be outlined, and information regarding recreational catch and effort is required to determine whether line catches are being affected by net catch. This information needs to be extended and communicated in an appropriate way. Simply having that information though will not be enough. The information needs to be trusted by all stakeholders. For example, information regarding commercial Grey Mackerel catch and harvest is available, but it is not well accepted. It is also not necessarily at an appropriate scale to objectively assist decision-making at the regional level. Managers, researchers, and stakeholder groups need to work in partnership to find ways to best disseminate information in a way that will increase trust in the information (Aslin and Byron, 2003; Tobin, 2010). Independent fisheries data collection at the local level is potentially a way to determine the local status and availability of Grey Mackerel stocks. Another approach is representatives from other sectors could accompany the commercial net fishers on-board to witness the operations for themselves and report back to their sector.

Once the background information relating to the conflict is understood and accepted, attempts need to be made to build relationships and trust between sectors. Individuals and groups need to think about the conflict from their own and others' position (Wall and Callister, 1995), and to communicate and discuss issues from each of their perspectives (Murshad-e-Jahan et al., 2009). It is well recognised that effective communication and participation can improve relationships, increase trust, and reduce conflict (Redpath et al., 2013). Communication may also lead to stakeholders finding common goals and a potential co-operative approach (Schusler et al., 2003). They may find they each have the best interests of the resource in mind and work together to mitigate potentially greater threats to their shared resource (Henry, 1984; Kearney, 2002). The most appropriate methods to improve dialogue and communication need further exploration.

Conflict over shared fish stocks is not an easy issue to resolve. However, if improved trust and dialogue between sectors can be achieved, perhaps co-management can be revisited in the Port Douglas region. Co-management may not necessarily reduce incidences of conflict in all cases, but by including all stakeholders in decision making and discussion it can change the nature of the conflict and provide opportunities for resolution (Ebbin, 2004).

There remains no agreement on the spawning period of Grey Mackerel in the Port Douglas region. The scientific information presented by Cameron and Begg (2002) clearly identifies that the spawning period of Grey Mackerel on the east coast is between October and January. The timing of the presence of Grey Mackerel larvae and small juveniles recorded by Jenkins et al. (1985) is consistent with the spawning period identified by Cameron and Begg (2002). Cameron and Begg (2002) record that there is some gonadal development in September, but this does not constitute the main spawning period. The main recreational fishing period for Grey Mackerel in the Port Douglas area is in the winter months. Stakeholder representatives remain adamant that Grey Mackerel reach spawning condition in the Port Douglas area.

Burdekin Case Study

The Burdekin Case Study is focussed on the Burdekin area of the dry tropics, and includes areas of the Burdekin River, Upstart Bay and Bowling Green Bay. There are two major settlements in the area - Ayr and Home Hill. The commercial net and crab fisheries are regionally important, and the commercial fishing operators generally fish in both fisheries. The area supports a diverse recreational fishery that is significant for locals, and also supports a seasonal tourist fishery

The Burdekin River catchment is Queensland's second largest east coast river basin after the Fitzroy. Including the coastal plains between Giru and Bowen, the catchment covers 136,000 square kilometres, or 8 per cent of the area of Queensland. The population of the catchment including its adjacent coastal plains is around 55,000. From early settlement, the catchment's economy has been heavily based on primary industries. Sugar and horticulture cropping as well as fishing are the main primary industries on the coast. The wetland systems have been affected by changes in water flows, changes to catchment land-use, loss of riparian vegetation, habitat breakup, hot fires and weed invasion. As a result, the habitat and water quality of these wetland areas have deteriorated. Overall, tourism is not as significant as industry in the region compared to many other parts of coastal Queensland. The focus of marine tourism in the region is Alva Beach and Wunjunga Beach.

In the Burdekin region, an existing informal network of commercial and local recreational fishers existed. These fishers also had good linkages with the local council and other groups and businesses in the Ayr and Home Hill region. This existing informal network formed the core of the initial regional fisheries management group, and this group became known as the Burdekin Sustainable Fishing Alliance. The group elected a local recreational fisher (Bob Kennedy) as a Chair. The group was focussed on changing management arrangements through negotiated outcome. After initial meetings, the alliance decided to disband the original committee, and call for membership and votes from the community. A public meeting was called, advertised and held on the 8th April 2011. The Burdekin Sustainable Fishing Alliance principally attempted to address two issues. The first was changes to net fishing arrangements in Cape Bowling Green Bay to reduce or eliminate netting induced Dugong mortality. The second was the closure to commercial fishing in the Wunjunga Beach area and an opening to commercial fishing of an area of the Burdekin River delta which was traditionally accessed by commercial fishers to catch mixed fish sold locally including Diamond-Scale Mullet (*Liza vaigiensis*), Sea Mullet (*Mugil cephalus*) and Blue Salmon (*Eleutheronema tetradactylum*). The first issue arose early in the project in response to a number of Dugong deaths attributed to net fishing in Bowling Green Bay.

Dugong and Net Fishing Interaction in Bowling Green Bay

In July/August 2010 a number of Dugong deaths were reported in Bowling Green Bay that were attributed with a high level of certainty to net fishing. Local commercial fishermen considered that the deaths could be attributed to "out-of-town" commercial reel boats, while fishing lawfully, were not following accepted local practices. Local commercial fishermen had a detailed understanding of local Dugong movements and considered that there were areas where fishing with certain permissible apparatus posed a significant localised threat to Dugong, and hance, avoided accessing this area with these apparatus. Local commercial fishermen reported previously providing this information to management agencies, but that it had not been incorporated into management planning.

Commercial fishermen realised there was a problem and provided the solution. Commercial fishermen presented the solution and the logic behind the solution to senior staff in State and Commonwealth environment agencies and the Queensland fisheries agency. The information presented swayed the Commonwealth to amend the Great Barrier Reef Marine Park Regulation to provide greater protection for Dugong. The solution involved an additional area where no netting (other than bait netting would occur), and an area where netting arrangements were modified to reduce or eliminate the risk to

Dugong. The area where no netting was proposed was an area that local fishermen considered the risk of Dugong interaction was high. The modified netting arrangements were for up to three set mesh nets only with each net:

- up to 120 metres long,
- with mesh size at least 100 mm but no more than 215 mm,
- weighed down only with continuous lead core rope, and
- a drop of no more than 16 meshes for nets with mesh size between 150 mm to 215 mm.

Appendix 2 provides the full detail of the solution that was enacted by the Great Barrier Reef Marine Park Authority (GBRMPA). In enacting the solution, management agencies were acknowledging and accepting the practical knowledge put forward by local commercial fishermen. That the knowledge was put forward after discussion within the regional management group, further added to the legitimacy of the proposal in the eyes of regulators. Since enacting the changes there have been no Dugong deaths in Bowling Green Bay attributed to commercial net fishing.

Wunjunga Beach Proposal

Wunjunga Beach is a small township located in the Burdekin Shire 35 km south of Home Hill. It contains permanent settlements and campgrounds and is a focal area for tourism in the region. It is one of only two beach locations promoted by the Shire for tourism. Beach based recreational fishing is an important drawcard as it provides an opportunity for shore based anglers and locals to catch a wide variety of fish in relative comfort. Commercial net fishing activity along the Wunjunga foreshore causes conflict. It is one of the few foreshore locations in the area where there is foreshore settlement. Due to the available amenities and ease of access, the area is heavily frequented by "grey nomads". A number of commercial fishers consider that the Wunjunga foreshore is not an essential location for net fishing, and that there are other better options away from an area of focus for public recreation (including fishing).

The local Wunjunga Progress Association have always wanted the area free of net fishing. The Wunjunga Progress Association sought out the Burdekin Regional Management Group to ascertain whether regional management could potentially address their issue. The Burdekin Regional Management Group had formed the view that local fishing access should be optimised and if additional areas were closed to commercial net fishing, such additional closed areas should be traded-off with the opening of new areas agreed upon. The Burdekin Sustainable Fisheries Alliance negotiated with the Wunjunga Progress Association over a period of time in regard to the exact boundaries of the proposed closure, and also the area proposed to be opened. The initial proposal was not fully to the liking of the Wunjunga Progress Association as they wanted the net fishing closure to link with the Burdekin delta so that fish could have a net free passage into and out of the system. After negotiation this was able to be accommodated in the final proposal.

The exact final proposal is shown in Figure 1. The area proposed to be opened was outside the boundaries of the Great Barrier Reef Marine Park and the Great Barrier Reef Coastal Marine Park, and as such, marine park zonings would not be changed by the proposal. The area proposed to be opened has no land-based access and only limited access via boat ramps. It is not an area that local recreational fishing representatives identified was heavily utilised by locals or by tourists. Following agreement of the proposed boundaries, a public meeting was held on the 18th March 2011 to discuss it. A formal consultation document was developed and released prior to the meeting, which also included details of the public meeting and the opportunity for input. The document included a clear map outlining the proposed area and the document is included as Appendix 3.

Despite the inclusive and consultative process used to develop the proposal, it was met with a mixed response from the various stakeholder groups. The proposal to open the section of the Burdekin River in particular was met with coordinated opposition that was largely based in Townsville. Respondents were asked to identify whether they "strongly agree", "agree", "neutral", "disagree" and "strongly disagree". A total of 417 responses were received including 194 signatures from a petition organised by the Wunjunga Progress Association in strong agreement of the proposal. Subsequent to the consultation period, an additional petition originating from Townsville that strongly disagreed with the proposal was circulated and was signed by over 1,000 people but was not submitted formally to the process within the submission timeframe. Figure 2 and Figure 3 show the overall responses[6] and respectively these two figures show the data excluding and including the Wunjunga Beach Progress Association petition. Figures Figure 4 and Figure 5 provide information on the responses in terms of respondents that identified themselves as either commercial or recreational fishers. Respectively again, the two figures exclude and include Wunjunga Beach Progress Association petition. The "other" category included seafood marketers, consumers and residents who did not identify themselves as either a commercial or recreational fisher.

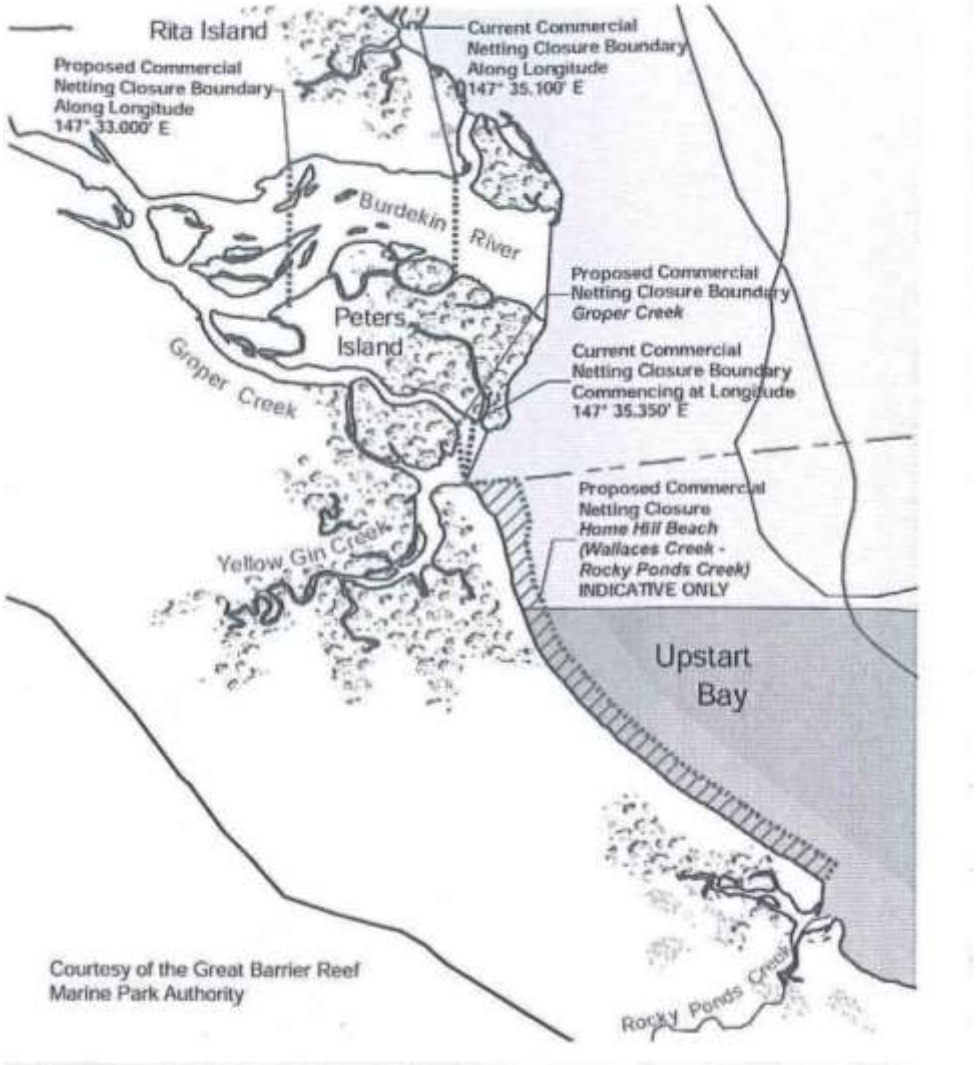

Figure 1 Map showing the proposed closure to net fishing at Wunjunga Beach and the proposed opening to net fishing in the Burdekin Delta.

[6] This does not include the petition originating from Townsville as this was not provided to the authors.

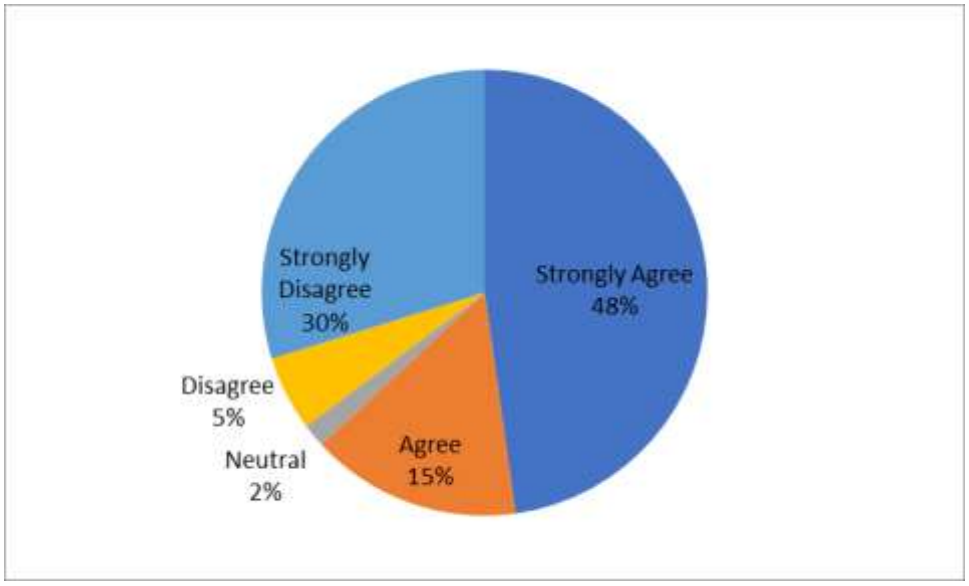

Figure 2 The percentage of respondents that identified that they "strongly agree", "agree", disagree", "strongly disagree" or had neutral views to the Wunjunga Beach/Burdekin Delta Proposal. These percentages exclude the Wunjunga Beach Progress Association petition.

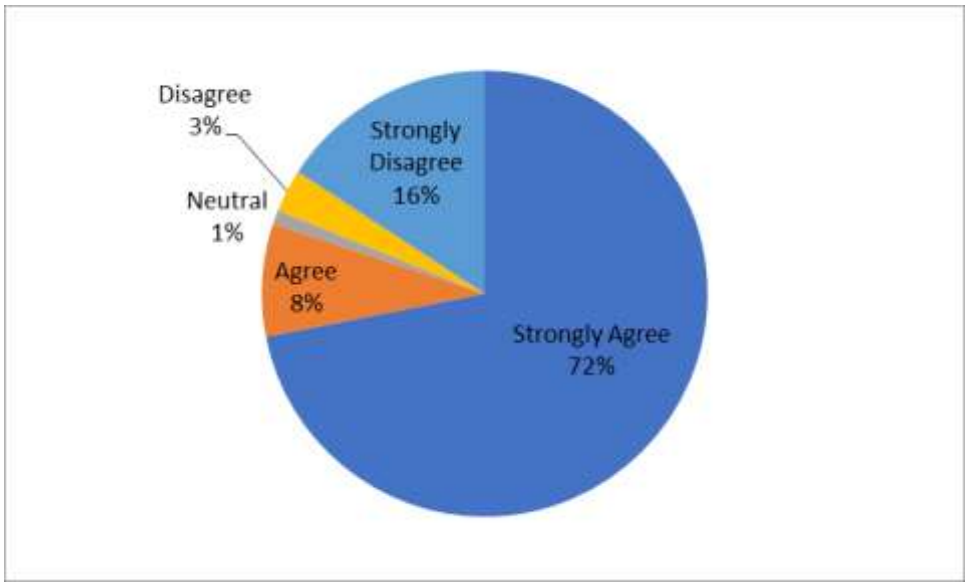

Figure 3 The percentage of respondents that identified that they "strongly agree", "agree", disagree", "strongly disagree" or had neutral views to the Wunjunga Beach/Burdekin Delta Proposal. These percentages include the Wunjunga Beach Progress Association petition.

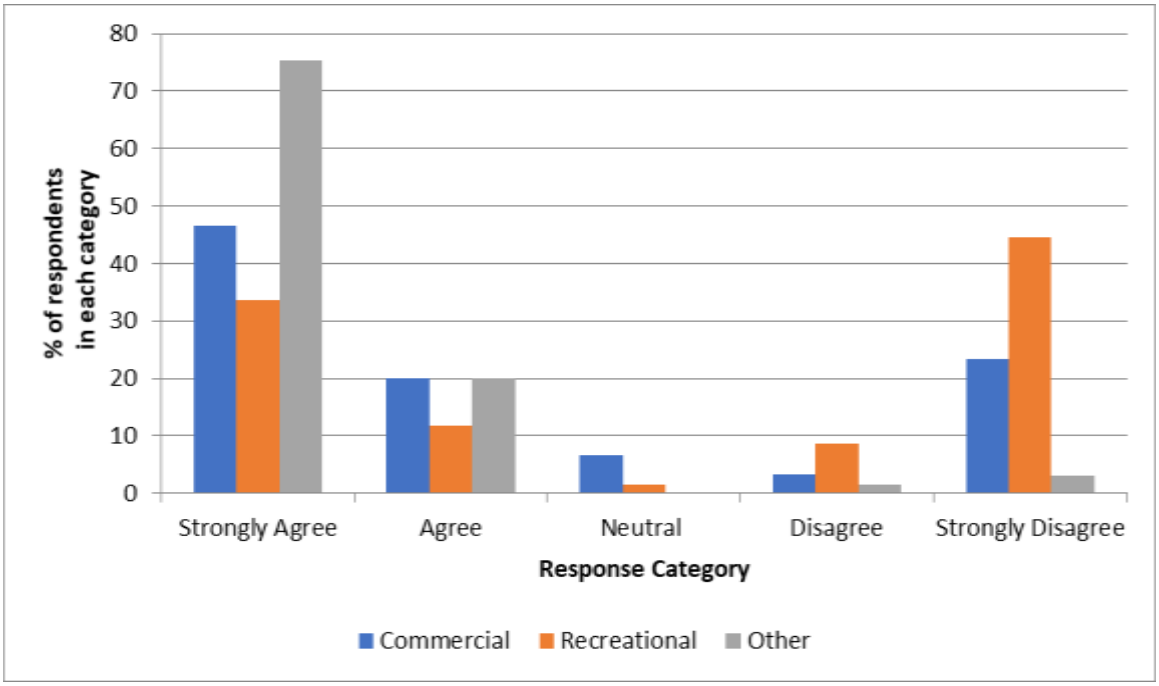

Figure 4 The percentage of respondents that identified that they "strongly agree", "agreed", disagree", "strongly disagree" or had neutral views to the Wunjunga Beach/Burdekin Delta Proposal. These percentages exclude the Wunjunga Beach Progress Association petition.

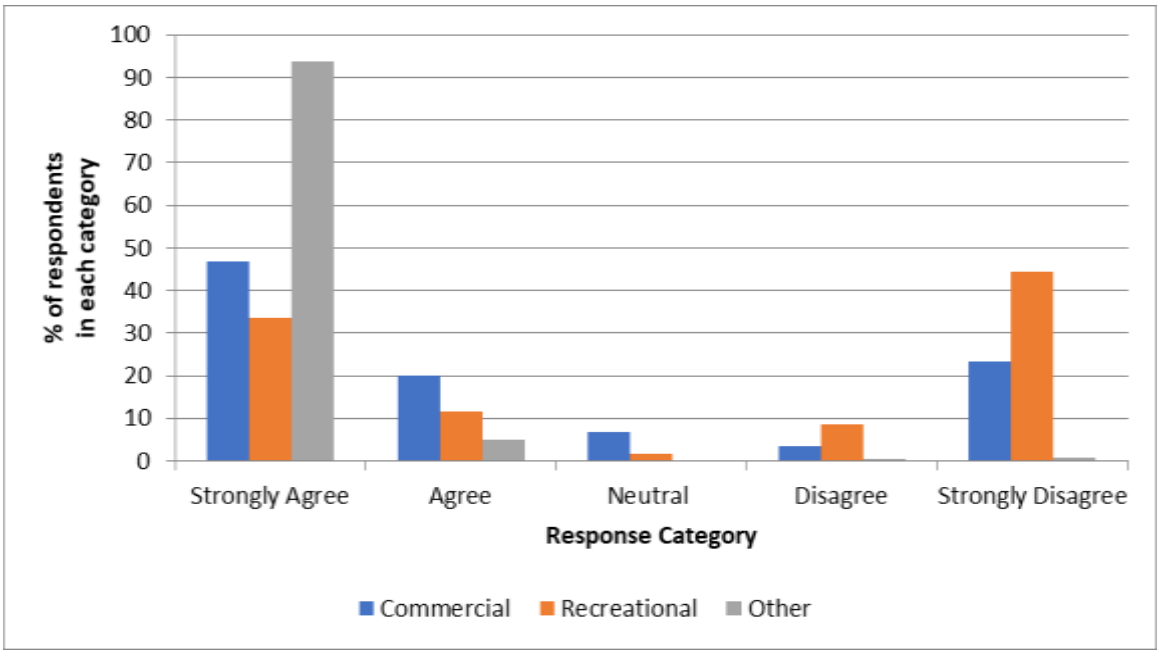

Figure 5 The percentage of respondents that identified that they "strongly agree", "agree", disagree", "strongly disagree" or had neutral views to the Wunjunga Beach/Burdekin Delta Proposal. These percentages include the Wunjunga Beach Progress Association petition.

A number of salient points can be extracted from the public responses received. First, there was a relatively large number of responses (even excluding petitions). The large number of responses highlights that the Burdekin Sustainable Fishing Alliance were effective in raising awareness in the community regarding their activities and the proposal. It also highlights that when an issue is of local relevance and of a tangible nature, people will take the time to respond. Overall both including and excluding the petition, more respondents agreed or strongly agreed with the proposal than either disagreed or strongly disagreed. When examined on a sectoral basis it is clear that no sector universally expressed agreement (agree or strongly agree) or disagreement (disagree or strongly disagree) with the proposal. Some commercial fishers strongly disagreed with the proposal while others strongly agreed, and likewise for recreational fishers. Inclusion or exclusion of the Wunjunga Beach Progress Association petition did not alter the overall pattern of results.

Overall, given the diversity of views expressed, the fisheries agency at the time did not wish to proceed with the proposal. On reflection, the Burdekin Sustainable Fishing Alliance considered that while the proposal had clear logic and merit, and was widely discussed within the group; and in particular with the Wunjunga Beach community representatives, more time should have been provided for the community to consider the proposal, and to allow some further fine tuning to it. Nonetheless, the Burdekin Sustainable Fishing Alliance considered that the proposal still represented a good opportunity to provide additionally amenity for recreational fishing at an important location for locals and tourists, while compensating commercial fishers for the loss of these access by providing additional access in the Burdekin River.

A challenge with the proposal that became apparent was that in terms of recreational fishing access it was not a “like for like” swap. Recreational specialisation is the favoured paradigm for understanding the multi-dimensional aspects of anglers’ attitudes and behaviours (Bryan, 1977; Ditton et al., 1992; Oh and Ditton, 2006). Along a continuum of specialisation, various different groups of anglers can be identified based on factors such as frequency of participation, choice of equipment, the importance of catching fish, social setting of the activity, and fishery resource management preferences (Bryan, 1977). At one extreme along the continuum are the once a year fisher that may fish for a few hours on an annual holiday. Recreational fishing may be one of many leisure pursuits undertaken during such a holiday and the holiday anglers frequently do not have a specific target species in mind and may simply be just “wetting a line”. Such anglers tend to target areas that are easy to access, and which have suitable amenities. Wunjunga Beach fits the bill for such a place.

At the other extreme along a continuum are recreational fishers who consider the activity a central activity. They fish frequently, are generally highly skilled fishers, and have significant investment in fishing gear and equipment. Recreational fishers from this group are more likely to be a member of an angling club and participate in fishing tournaments as well as more likely to be directly involved in fisheries management (Hilborn, 1985). Many anglers from this end of the continuum may practice catch and release for all or part of their catch even when this catch can be legally retained. They have the knowledge and equipment to access more remote areas safely. The Burdekin River delta fits such a location – it is difficult to access without knowledge and is lacking general amenity. While the number of people that access the area is low compared to Wunjunga Beach, it tends to be utilised by a smaller number of more avid specialised anglers. Avid anglers tend to be more vocal and active in leading debate and mobilising individuals to their cause (Hilborn, 1985).

Hinchinbrook Case Study

The Hinchinbrook region is focussed on the Hinchinbrook Channel and the areas immediately north and south. The two major coastal townships are Lucinda at the southern entrance to the channel and Cardwell towards the northern part of the channel, with the commercial centre of Ingham being off the coast. Girringun Aboriginal Corporation represents the traditional owners of the region and surrounding areas. Land use in the area is dominated by sugar cane farming.

Hinchinbrook Channel is an iconic recreational fishing destination due to the calm water; relatively ease of access and the diversity of estuarine sportfish. It supports several long-standing charter fishing businesses. Hinchinbrook Island is world heritage listed and the Hinchinbrook Channel was declared a Dugong Protection Area "A" in 1997. The establishment of the Dugong Protection Area eliminated the use of commercial set mesh nets. Commercial net fishing continues in the area immediately adjacent to Hinchinbrook Channel. Commercial fishers in the region have previously developed and implemented an Environmental Management System. Previously, there was significant conflict over resource access and allocation (focussed on Barramundi Lates calcaifer) between recreational and charter fishing interests, and the commercial set net fishery.

In December 2005, Girringun traditional owners signed the first ever Traditional Use of Marine Resource Agreement (TUMRA) in Australia for the management of traditional hunting of protected species (Dugong and marine turtle) in the greater Hinchinbrook Island area. The TUMRA is a formal agreement between Girringun traditional owners, the Great Barrier Reef Marine Park Authority, and the Queensland government. Under the TUMRA, Girringun community members agreed to a moratorium on Dugong hunting and a limited marine turtle hunt in specified hunting areas. Girringun considered that co-management offered an opportunity to build on the work they undertook on their TUMRA and fisheries co-management work in general.

Commercial fishers considered that the Great Barrier Reef Representative Areas Program had substantially reduced the area in which commercial net fishermen could operate, and the associate structural adjustment package had not effectively removed displaced fishing effort. Prior to this, commercial fishermen also considered that the declaration of the Hinchinbrook Channel as a Dugong Protection area and the associated displacement of fishing which was not adequately addressed by the structural adjustment program for that particular conservation initiative (McPhee, 2008). Commercial fishers desired to work with other local and regional stakeholders to identify ways in which access to local waterways could be restricted to local commercial fishers only, and to work through options for providing more access to commercial net fishers.

Two meetings were held at Cardwell. From the outset there was strong opposition from recreational and charter fishers regarding any suggestions to open additional areas to commercial fishing. This is not surprising given the iconic status of the Hinchinbrook region to the recreational fishing sector and the charter sector. Further, a major issue with the case study is that commercial fishers had strong desires to make significant change to the zoning arrangements of the Representatives Area Program. This included changes to the location of yellow zones and the rotational use of green zones in the Hinchinbrook region. The latter was also supported by several recreational fishing representatives. In discussion with the stakeholders, it was made clear from the outset that significant changes to marine park zoning arrangements, such as those that were desired, were not feasible. This dampened the enthusiasm of participants, but nonetheless it was appropriate to provide this advice from the outset.

The case study focussed on the inshore net fishery, but various discussions with stakeholders also focussed on whether the Mud Crab fishery should also be included. Commercial fishers considered that the new Mud Crab management plan was imminent (at the time), and the fishery should only be included in the consideration of co-management after the regulatory arrangements for the fishery have been finalised.

At the first meeting a range of local concerns were raised at the meeting including marine park zoning, local versus transient commercial fishing effort, and river mouth boundaries. It was acknowledged by attendees that there was a need to ensure any regional management group had broad representation from all relevant stakeholder groups. Some additional names were put forward to project staff to follow-up. The meeting agreed to move forward with regional management and nominated a small subset of commercial fishing attendees to be involved. In terms of getting broader attendance from stakeholders the timing of any subsequent meetings was discussed and it was decided to hold them in the early evening. The meeting was not well attended by recreational fishing representatives due to timing and the venue.

Subsequent to the first meeting concerns were raised in the media about the dominance of the commercial fishing sector at the first meeting, the timing and venue for the first meeting, and the potential for set netting to be reintroduced into Hinchinbrook Channel. The project team put in considerable effort in explaining the project, one on one with interested members of the community, who were generally happy with the advice received and understood what was trying to be achieved.

The second meeting was held in Cardwell on the 28th January 2011, and attendance by a broad range of stakeholders was achieved. It was attended by several recreational fishers and business operators associated with recreational fishing. The meeting was also attended by a local councillor. The meeting was constructive and well received. Girringun were well represented at the meeting by their Executive Officer and two staff members. Girringun have a desire to pursue their goals through working collaboratively with the community and government and have considerable professional expertise and experience in co-management. The meeting commenced with a presentation by the principal investigator and four principles were presented:

- Recognition of Girringun's sea country and the right to self-determination and community development.
- The need to enhance the profitability of local commercial fishing without compromising sustainability.
- The iconic value of the Hinchinbrook Channel for the recreational fishing sector.
- The important contribution of the charter sector for fishing tourism.

No dissenting views on these principles or any suggested edits were forthcoming from the meeting. The meeting discussed a range of topics. The commercial fishing sector stated that the opening up of the Hinchinbrook Channel to commercial set netting would not be pursued through this regional management project. The meeting again reiterated the desire to limit fishing participation in the region by "out of town" commercial fishers and to gain an understanding of the overall take of Barramundi and whether it is sustainable or not.

Although there was goodwill among the various participants to discuss matters, no specific issues within the construct of fisheries management could be agreed upon to progress, apart from zoning of commercial net fishers to limit access by "out of towners". That is, while some general principles were agreed to, the pathway for implementing them in the context of fisheries management were not present. Several meeting participants considered that the project team should develop and implement management actions to address the principles, which in effect is not co-management. At the time, the fisheries management agency would not commit to zoning arrangements of the commercial fishery. The rationale being that it was considered in the formal review of the management of the fishery prior to this project but was ultimately rejected. The realisation that the project could not in practice lead to limiting net fishing to locals only further dampened enthusiasm for the project. Zoning as a potential management tool for the fishery and its importance for regional management is discussed in more detail later in this report. Other issues of interest such as impacts on water quality from sewage discharge were under the auspices of the local council and could not be addressed directly by this

project. There were recognition that commercial and recreational fishers would be better off working together and would have potentially had a better opportunity at influencing decisions (including those by the local council regarding sewage upgrades). Overall though, there were no strong drivers fromthe recreational fishing sector for achievable regional change.

Discussion

There is no overall fisheries management regime, or suite of fisheries management tools that are universally considered optimal by all stakeholder groups (or sub-sectors of stakeholder groups). Likewise, there are no consultation processes in contentious issues in fisheries management that are universally lauded. The results of fisheries management are invariably a suite of compromises across several dimensions. These compromises may be layered upon and/or attempting to deal with previous historical decisions (e.g. the overall initial number of licences allocated), which may have seemed like a logical approach at the time but have unintended consequences that potentially compromise profitability and environmental performance.

Addressing specific issues in the marine environment at a regional or local level is recognised as one of the most significant challenges faced by management (Cook et al., 2013). While stakeholder groups can often agree on broad strategies, objectives and visions; such agreement do not always flow through to specific local or regional actions (Been, 2007; Cook et al., 2013). The ECIFF is one of the more complex fisheries in Australia, and this was clearly an ambitious project. The ECIFF captures a suite of species important for recreational fishers and occurs in or directly adjacent to the Great Barrier Reef World Heritage Area with concomitant requirements for high environmental performance – particularly with respect to World Heritage values. The geographic spread of the fishery and the importance of a large range of target species add further complexity, as does the commercial sectors overcapacity. The fishery has issues related to profitability, but for some individuals the fishery is highly profitable. It also has a large number of part-time operators. It is difficult to find an individual that considers the management of the fishery to be optimal in all key aspects. A structural adjustment program is currently being implemented for the fishery. The structural adjustment program is an integral part of the future management of the fishery, however by itself; it cannot necessarily deliver stakeholder aspirations for fisheries management.

This project was designed to trial a regionally based co-management approach and to provide guidance on whether such an approach could be implemented. Any fisheries management regime has practical challenges; the existence of the challenge should not by itself preclude the consideration or adoption of a process or a suite of management measures. The project has identified that on-ground implementation of regionally based co-management is a practical challenge. In the example of the Burdekin case study, a significant outcome was achieved in terms of modifications to net fishing for Dugong conservation. The alternative to this outcome would most probably have been the closure of commercial fishing for conservation purposes in a much larger part of Bowling Green Bay. The provision of high quality and logical local information by commercial fishermen (particularly Neil Green), backed up by the support of the Burdekin Sustainable Fishing Alliance, allowed the root cause of the Dugong interactions in Bowling Green Bay to be identified and addressed specifically by management. Importantly the information was specific to the local area. Regional management allowed the translation of local traditional fishing knowledge into a management change implemented by government.

Pomeroy and Berkes (1997) proposed three necessary steps focussed on role and attitude of government for implementing co-management. These three steps should be considered a bare

minimum of what is necessary. The first step is that governments must establish conditions (or at least not impede) co-management systems in order for them to prosper. The State government fisheries agency and GBRMPA were strongly supportive of the co-management trials; however, the lack of commitment on behalf of the State government to zone the ECIFF was a condition lacking for successful co-management. The second step is stakeholders must be given access to government and government officials to express their views. The third step is that fishers should be given the right to develop their own organisations and to form networks and coalitions for cooperation and coordination. Both the second and third steps were met (both formally and informally) in the three case studies.

While the project did not lead to the establishment of three "winning" case studies, the learnings from this project are nonetheless important. There can be a dearth of "negative" findings in the literature in general, which potentially leads to similar mistakes being repeated.

Interest and Participation Levels

There was and indeed remains significant interest in regional management in Queensland fisheries. The number of responses to the survey to change commercial fishing access arrangements in the Burdekin region was reflective of this. The interest was also reflected in the amount of media (positive and negative) generated by the project. Some members of the public criticised the approach in regard to it not involving the participation of all members of the community. Participation by all members of the community in natural resource management (including fisheries) is not feasible (Trimble et al., 2014). While a high as possible number of participants in regional management can be desirable, it is not essential or indeed realistic that 100% of those interested in fisheries and fisheries management participate or agree with the direction that regional co-management may be taking. The well-established Landcare program, which is generally deemed by government to be highly successful, has participation rates of about 30% (Campbell, 1997).

While specific stakeholder groups such as commercial and recreational fishers can be defined. There can be substantial heterogeneity within such defined groups. For example, all commercial net fishers in an area may not agree on the direction of management. Likewise, it is well known that heterogeneity within the recreational sector is substantial. For example, the motivations and aspirations of a once a year holiday angler vary compared to an avid tag and release fisher (McPhee, 2008). A challenge in community owned resources is who represents the "community". A community is generally defined as a group of people living in the one locality, but such a definition does not imply homogeneity of thinking, ideas of values ideas (Harrington et al., 2008). To be a true community representative, a person or persons would bring a diversity of views for consideration in management, not just their personally held view or a view held by a small section of the community. This is a challenge, and while not a criticism of participants in this study, it was arguably not achieved except for the Burdekin River case study.

Participants in fisheries consultation may judge a successful "process" as being the adoption of their point of view in its entirety. As such, it is often not the consultation and management process itself that is the real objective of criticism but rather the failure of adopting or implementing a specific outcome desired by an individual or group of individuals. When there are competing strongly held views and the outcome is a considered mix of these views, then criticism will ensue. Any fisheries management system should provide for the right to be heard and the right to voice an opinion, but it cannot provide for the adoption of every single point of view. The processes used in this project allowed for the right to be heard, and the right to voice an opinion.

Were the Case Studies the Right Ones at the Time?

The project utilised three different case studies that had a range of different issues but reflects the level of diversity in the fishery as a whole. In terms of the two major fisheries stakeholders (commercial and recreational fishers), the case studies can be categorised as follows. In Port Douglas, recreational fishers sought a change to commercial net fishing (a closure), while commercial net fishermen desired the status quo. In the Hinchinbrook case study, commercial fishermen sought a change, limited additional areas for locals to undertake commercial net fishing, while recreational fishers desired the status quo. In the Burdekin case study, both the recreational and commercial fishermen involved sought changes to management arrangements including the betterment of both fishing sectors.

Port Douglas was focussed on a resource allocation conflict specifically related to the taking of Grey Mackerel, but more broadly was related to the taking of desirable recreational fish species by net and associated sustainability concerns as a result of net fishing for the target species and the ecosystem. Hinchinbrook was focussed on net fishing arrangements in the Hinchinbrook region with a desire from commercial net fishers to negotiate an expansion of commercial fishing grounds in the region as a result of what they considered to be redistribution of fishing effort post-RAP. Léedée et al. (2012) identified that such a redistribution of fishing effort occurred in the commercial line and trawl fisheries, and the charter fishery, but that study did not assess such changes in the ECIFF. The Burdekin case study was focussed more broadly on optimising access for both recreational and commercial fisheries, and further addressing Dugong – net fishing interaction.

From extensive consultation undertaken as part of developing the ECIFF, these three locations were identified for co-management trials. The principal investigator was not involved in that process, but accepted initially that these three locations were chosen with regard to not only the call for co-management at the regional scale, but also that the case study groups understood what it meant and what it required from them, in particular the need to negotiate. As the case studies progressed, with the exception of the Burdekin case study, it was clear that the groups did not have a solid understanding of what could and could not be achieved. The study would have benefited from the outset by a process that assessed the specific preconditions for co-management across all sectors and then better paved the way by ensuring expectations were achievable. The preconditions applicable to Queensland fisheries are contained in (McPhee, 2009), although these preconditions specifically focussed on commercial fishing only. A number of these preconditions related to social capital are however also relevant for the recreational fishery - in particular, the willingness and ability to negotiate an outcome. Even when detailed preconditions are met it does not guarantee that co-management will succeed and conflict will cease or be avoided (Beem, 2007).

Although the three case studies groups had all expressed a desire in the development of the ECIFF for co-management at the regional level, except for the Burdekin Case Study, it became clear that there was limited ability to negotiate outcomes, which is necessary for co-management. Some of the reasons for this are discussed in the next section.

Social Issues – Empowerment, Trust, Relationships and Negotiation

There are a number of social issues regarding participants and processes that are necessary for co-management to be successful. Development of co-management situations requires empowerment, the willingness and ability to negotiate, the development of trust, and relationships and social networks within and between stakeholders at various levels (Jentoft, 2004; Natcher *et al*., 2005; Neville, 2008; Berkes, 2009; de Vos and van Tatenhove, 2011).

Empowerment is a well-established issue in psychology, public health, social work and education, but its applicability to fisheries is only just being recognised (Jentoft, 2004). Empowered communities are generally better able to deal with change (Buchy and Race, 2001). Generally, empowerment is defined as the process through which individuals or groups become strong enough to participate within, share in the control of and influence, events and institutions affecting their lives (Torre, 1986). Specific to fisheries, empowerment is defined as a mechanism to give people within fishing communities a chance to influence their own future in order to cope with the impacts from globalisation; competing use of freshwater, marine and coastal environments; and other fisheries-related issues (Raakjaer-Nielsen et al., 2003). This project provided the opportunity for empowerment.

Providing opportunities for greater empowerment and responsibility that are taken up by community members, however, can have costs for those individuals. The obvious cost is in time, which for a commercial fisher can mean reduced time fishing (income) and this cost may not be incurred by other commercial fishers who may also benefit from positive outcomes that may accrue. Recreational fishing representatives may have full-time jobs, which also limit their commitment. More insidious and not well documented is that individuals (and their families) may experience individual repercussions in their local community as a result of taking on the responsibility. Fisheries management is contested terrain and any decision is not universally popular. No longer is a remote bureaucracy or a distant Minister the target of anger for what an individual may consider a "bad" decision, but rather it is an individual in *their* local community. Local community members who are unhappy with proposed management arrangements, or simply not understanding the arrangement, its rationale, or the process to arrive at them, can take out their frustrations on those in the community that are driving them. These frustrations can manifest themselves beyond just specific debate and an open and frank exchange of views, to what we be regarded as bullying and/or attempts to ostracise a person or a member of that family, and in extreme cases damage to personal property and violence. This was unfortunately observed in this study, but it is a co-management issue that has not been well documented. There is no easy fix for this issue, and it can deter individuals from being involved or have their involvement cease or be reduced.

The willingness and ability to negotiate is a key skill necessary for successful co-management, and successful negotiation requires taking other individual's points of view into consideration (Borrini-Feyerabend *et al.*, 2000). However, an individual has the right to be unwilling to negotiate or compromise. In the Port Douglas Case Study, the survey undertaken documented that it was understood the regional management required negotiation, but that negotiation on the Grey Mackerel issue was highly unlikely to succeed as participants did not trust each other, thus failing one of the key principles for successful co-management. The project was unable to break through this distrust and assist in negotiating an outcome. Trust is clearly identified as being critical for success of co-management and indeed self-management (e.g. de Vos and van Tatenhove, 2011; Gilmour et al., 2013). Trust existed among the members of the Burdekin Sustainable Fishing Group. In terms of trust among the participants, the Hinchinbrook case study fell somewhere between the other two but could not be built on due to a lack of tangible mutually beneficial outcomes to pursue. In the example of the Port Douglas Case study the lack of willingness to negotiate has contributed to the management of the status quo continuing. While this may change in the future, arguably some compromises may have been able to be negotiated which may have built trust and improved relationships.

Policy Entrepreneurs

Regional management in the Burdekin River case study delivered a clear outcome, and an important outcome. This was in large part due to policy entrepreneurs (= leaders). Of the three case studies, the Burdekin case study had the strongest policy entrepreneurs and importantly the policy entrepreneurs were from both the commercial and recreational fishing sectors. Where local policy entrepreneurs are lacking or are ineffective, co-management is unlikely to succeed (Beem, 2007). Strong leadership is

consistently identified as an important determinant for successful co-management (Pomeroy et al., 2001; Bodin and Crona, 2008; Gutiérrez et al., 2011; Ho et al., 2016; Crona et al., 2017).

To be a policy entrepreneur, an individual must possess bonding and bridging capital. They must be supported by other key members of their stakeholder group and must be able to communicate and be respected by other groups, particularly government representatives (Bodin and Crona, 2008). A policy entrepreneur in the context of fisheries management understands government and government processes and has a willingness to negotiate a solution, taking into consideration other views. They must have tenacity and commitment to community vision. A policy entrepreneur is not necessarily the loudest and squeakiest wheel among a set of individuals. They must be able to understand, predict and influence local behaviour, and such an attribute may be more important than local ecological knowledge (Sutton and Rudd, 2014). Although, they may garner these social attributes in part from community recognition of their local ecological knowledge.

The success in the change to the net fishing arrangements in Bowling Green Bay was related to the efforts of the policy entrepreneurs that worked out a solution to an established problem and were able to communicate it effectively and professionally to decision makers and other stakeholders (e.g. NGOs). Government accepted the advice and navigated a regulatory approach to implement the solution that was aligned with the desires of commercial fishermen, and improved conservation outcomes.

Boundaries and Who Belongs?

For co-management to be effective, it often requires clearly defined boundaries (e.g. MacNeill and Cinner, 2013). However, in reality socio-ecological systems are rarely closed or indeed static (Brewer, 2012). A challenge for regional management in Queensland is defining the boundaries being considered – what is in fact the region? Who belongs to a region? Is someone that regularly travels from Townville to Cardwell to fish recreationally constitute someone that belongs to a region, even though they have a different postcode? Do they have an equal right to be involved in regional co-management as does a third-generation local resident? In the example of the Burdekin Case Study, there was support for the proposal from the Wunjunga Beach community and recreational fishing respondents in Ayr and Home Hill, but a level of opposition from Townsville. Whose point of view is more important? Should the desires of the residents be considered more important than those of the larger neighbouring town who may visit the area? These are difficult questions to answer, with no "right" or "wrong" answer.

As a starting point, regional management should aim to be inclusive rather then exclusive. Artificial boundaries to membership such as a postal address should be rejected in favour of focussing on an *ongoing linkage* or *reliance* on the region for fishing. In most instances though, this linkage will also coincide with postcode of residence. Genuine once a year-tourist anglers for example, may have their needs looked after by a member of local group such as a member of a Chamber of Commerce, a charter vessel operator or a representative of a local tourist business.

In terms of specific boundaries, a number of approaches were suggested, including following local council boundaries. An approach that could be adopted holistically is one that focusses on catchment or sub-catchment boundaries and makes minor adjustments to better fit into the fisheries management regime. There is generally a linkage between the biophysical attributes of the environment and the location of fishing communities (Erisman et al., 2011). Such an approach has the advantage in that it represents a natural boundary and may also allow for better synergies with catchment management groups. In Queensland, some catchment management groups often have an interest in fisheries and fisheries habitat and likewise fishing stakeholders have an interest in catchment management. As a starting point, designing a system of regional fisheries management should begin at the catchment level, and make adjustments where common-sense dictates.

Keyhole Surgery of Marine Park Regulation

In terms of marine park planning and marine park regulation, regional management offers a way of fine tuning existing marine park zoning – "keyhole surgery". It is not however a mechanism for making significant changes to existing marine park zoning arrangements or marine park regulations in the Great Barrier Reef World Heritage Area. Any changes as a result of regional management should be minor and clearly focussed on demonstrably improving biodiversity conservation outcomes. Overall, for such changes to occur they should meet the following criteria:

- No changes to highly protected zones (i.e. green and pink zones).
- Any proposals for changes should deliver a net conservation benefit.
- Any proposals for change should advance the objectives of the Great Barrier Reef Zoning Plan.
- Any proposals for change should have a scientific basis.
- Community support for any proposals for change can be demonstrated.
- Due consideration is given of unintended consequences of any proposed changes.
- Any proposed changes should be very limited in spatial extent.
- Any proposed changes need to be undertaken with the support of the Great Barrier Reef Marine Park Conservation RAC.

The Burdekin case study has demonstrated that such changes can be made, and represents the only example of where marine park regulations (other than to rectify drafting errors) in the Great Barrier Reef Marine Park has been made and is testimony to the potential that regional management offers. The changes that were developed and implemented met the eight criteria listed above. Overall, the process delivered an improved conservation outcome (reduced Dugong mortality) and did so without a significant cost to the commercial fishing industry.

Zoning of the ECIFF

Zoning of the fishery is required or should be considered to provide a better approach to managing fishing effort, tailoring exact fishing practices to a local area to minimise environmental impacts and produce a greater level of social cohesion. Tailoring of fishing practices can include fine tuning arrangements with respect to "net drop", which is an important factor in the interaction of net fishing apparatus with species of conservation significance. A continual challenge for implementing effective codes of conduct in the net fishery is that any agreement can be violated by "non-locals". The best example of where such codes, and indeed co-management at the regional level, have been successful in Australia is the Spencer Gulf Prawn Trawl Fishery and a key aspect of the management of that fishery is that, in effect, it occurs in a single zone.

Zoning in this context does not relate to marine park zoning, but rather the limitation of a licence to a specific area. Zoning is not new to Queensland net fisheries. The Ocean Beach Fishery consists of a number of zones where the K symbols are linked to a specific area and fishers can only fish in their zone. For example an operator with a K1 symbol can only fish the ocean beach between the NSW border and the Southport Seaway. If an ocean beach fisher wants to fish in another area, they must purchase or lease a symbol for that area – they cannot simply fish in another location with their existing symbol. Implementing zoning will involve allocating each individual licence holder to a specific zone. It is acknowledged that any allocation process is difficult, but this in itself is not a

reason to forgo the option. Among grassroots commercial net fishers there is a diversity of views on zoning from strong support to strong opposition.

While it is beyond the scope of this report to design zoning arrangements, a general approach can include allocating an individual to a zone based on licence history from compulsory logbook information with clauses to allow for "exceptional circumstances". The reliance on fishing history is a common approach to allocation (Kaufmann et al., 1999; Shotton et al., 2001; Lynham, 2012). Provisions to consider exceptional circumstances in allocating is also a common approach, however, there is a need to clearly define what constitutes an exceptional circumstance and apply the concept consistently. An independent panel supported by the fisheries management agency should administer the allocation process. Failure to implement zoning will compromise the opportunities that regional management and indeed co-management offer for future management of the ECIFF. Zoning should not apply to recreational fishing.

Participants in the three case studies, including both recreational and commercial fishers almost without exception identified the need to zone the commercial net fishery in order to make regional management work. The lack of formal zoning arrangements of commercial net fishing is the single biggest impediment for regional management in Queensland, and without it regional management will not come close to meeting its potential.

Conclusion

This project trialled regional co-management in three locations: Port Douglas, Burdekin and Hinchinbrook. In the Port Douglas case study, there proved to be limited scope to negotiate management arrangements beyond those that were already in existence. The status-quo regarding net and line fishing (recreational and commercial) for Grey Mackerel remains, and conflict continues. In the Burdekin case study, the Burdekin Sustainable Fisheries Alliance was formed which successfully negotiated a significant change to marine park regulation which enhanced the protection at a local scale for Dugong by reducing net fishing interactions and did so with the support of local commercial fishers. This is the only example of "keyhole surgery" undertaken by GBRMPA other than to rectify drafting errors. The Burdekin Sustainable Fisheries Alliance also developed a proposal to close Wunjunga Beach to commercial net fishing and to compensate for this, to reopen a section of the Burdekin Delta that was closed to net fishing. This proposal proceeded through a formal consultation process that elicited significant public response. This proposal though did not proceed to a regulatory change due to the diversity of views put forward on the issue that could not be reconciled. It nonetheless represented a bottom-up management proposal rather than a top-down approach. In the Hinchinbrook case study, there were no tangible and achievable outcomes for all sectors that could be elucidated.

The project identified that zoning of the ECIFF is the critical missing ingredient to facilitate the likely success of regional co-management. This was identified by participants across the various sectors and case study groups. Without it, co-management at the regional level is unlikely to meet with widespread success. If regional co-management is to proceed, ideally the State government also needs to commit to developing it across the entire ECIFF, with catchment boundaries offering a good initial template for boundaries. To underpin regional co-management, the fisheries management agency also needs to rethink the spatial scale that data is collected at, and the level of public access to that data. The success of negotiating the change to the marine park regulation demonstrates that regional management offers a salient vehicle for transferring local fisher knowledge to management action.

Implications

While the project failed to produce a viable approach for implementing co-management based on a negotiation model, it has had an influence on the direction of fisheries management in Queensland. In general, "negative" findings or results can still produce relevant outcomes and constitute important information that contributes to the knowledge base (e.g. Johnson and Dickersin, 2007; Matosin et al., 2014). Interest in regional management and co-management opportunities remain high in Queensland (MRAG, 2014). However, as this project demonstrates, the practical challenges of regional management and co-management are significant and are unlikely to be overcome, at least until a spatial zoning arrangement for the ECIFF is implemented and matures.

In terms of the influence of this project, it is noteworthy that Queensland Fisheries have not attempted to progress any other trials of regional management based on a negotiated model of co-management. Thus, the learnings from this project have directed the government's approach to fisheries management. As part of the current fisheries management reforms, regional management has been trialled in Moreton Bay, although the model used is substantially closer to an advisory model than the negotiation-based model used here. It is too early to determine the success of this approach.

The need for spatial zoning of the ECIFF is identified in this report as important for any further consideration of regional management in Queensland inshore fisheries. A spatial zoning model for future management of the ECIFF is now being developed and the findings of this report have contributed to catalysing this important fundamental management change. The current fisheries management reforms are considering and addressing a range of issues associated with Grey Mackerel, including those raised in Gunn (2008) and by GBRMPA in their vulnerability assessment for the species[7]. The reforms are also addressing validation of commercial logbook information which will over time provide greater confidence in the accuracy and precision of this important data.

Recommendations

This project demonstrates, the practical challenges of regional management and co-management are significant and are unlikely to be overcome, at least until a spatial zoning arrangement for the ECIFF is implemented and matures. Currently, it is not recommended that co-management at the regional level be pursued in Queensland inshore fisheries unless the significant challenges identified in this project can be overcome.

Further development

Regional management can work in Queensland, and the lessons learnt from this project can assist in its implementation in Queensland. Implementation is not an easy task, although arguably maintaining the status quo is also not a realistic long-term option. As discussed, zoning of commercial net fishing licences is a critical pre-requisite for pursuing regionally based co-management. It was identified as such by both commercial and recreational fishing interests in the process.

[7] http://www.gbrmpa.gov.au/__data/assets/pdf_file/0016/21733/gbrmpa-VA-GreyMackerel-11-7-12.pdf

Rather than proceeding on a case by case basis, regional management should be designed to be applicable for the whole of the Queensland east coast. The speed of uptake across the geographic area will vary and it is also acknowledged that how much or how little the government or community takes the lead in each region (how much "co" in co-management) will vary. There needs to be a clear role for industry peak bodies in the process and peak bodies can also provide assistance on the geographic boundaries.

If regional management is to be successful, it will also require changing the way fisheries catch and effort data is reported and managed. Current reporting requirements are too spatially coarse to be effective in many cases for management at a regional level. There has been a longstanding government policy of not allowing access to catch and effort in logbook grids where less than five boats have fished. The historical reason for this is to maintain a level of individual anonymity and to ensure commercial in-confidence data is not publicly available. However, as the number of fishing operators in a given fishery decreases over time due to structural adjustment and other issues, the potential prevalence of logbook grids with less than five boats fishing will increase. All things being equal, the amount of catch and effort information that can be publicly accessed will decline over time unless current access policies are changed. Additionally, any further attempts to record catch and effort at a finer spatial scale will also increase the prevalence of less than five boats operating in a designated recording area. It should not be assumed that if less than five boats are fishing in a grid that the catch itself is insignificant, or indeed that the grid is not an important area for operation of the ECIFF.

Particularly in the case of the Port Douglas case study, "the five boat rule" was an impediment. Publicly available catch and effort information should have been integral to informing factual debate about fisheries management regarding this issue, but its absence created legitimate concerns regarding transparency of decision-making. There is a need to review the arrangements and policies related to the public disclosure of logbook information across Queensland fisheries. Commercial fishing represents the harvesting of a common property resource and as such the community should have free access to comprehensive information on catch and effort in fisheries. Regardless of the five boat rule, this study identified that there was a potential lack of trust among stakeholders in terms of the accuracy and veracity of the commercial logbook data. This is a long-term issue that extends throughout the fishery in general and the fisheries management agency. The current fisheries reform process is addressing the issue of data veracity. In the case of recreational fishing, which also represents the harvest of a common property resource, surveys of catch are expensive and only carried every few years. The spatial scale (at the level of statistical division) of these surveys is also too coarse to inform fisheries management at a relevant regional level. In terms of balancing legitimate confidentiality concerns of commercial fishers with the benefits of utilising finer scale information, an embargo period of for example two years could provide an optimal outcome. Finer scale access to commercial data should be by application to the Department rather

Fisheries management needs to provide clear guidance as to what an "acceptable level of agreement" is on any specific proposal emanating from regional management. As an example, the proposed closure of Wunjunga Beach to commercial fishing and the opening of an additional part of the Burdekin Delta had a level of agreement from respondents. However, it was deemed by the fisheries management agency to not to have a sufficient level of agreement to proceed. As virtually all proposals will elicit a level of opposition, the mere existence of such opposition is not a rational reason for not progressing it. Likewise, a specific "threshold of agreement" may be challenging as it will be location and context specific and may encourage "gaming" by participants to reach or not reach a certain (hypothetical) threshold.

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Appendices

Appendix 1. Grey Mackerel Fishing in the Port Douglas Region: An Oral History

FISHING AND FISHERIES RESEARCH CENTRE

TECHNICAL REPORT No. 13

GREY MACKEREL FISHING IN THE PORT DOUGLAS REGION: AN ORAL HISTORY

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FRDC Project No. 2009/211

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Non-Technical Summary

2009/211 Grey Mackerel Fishing in the Port Douglas Region: An Oral History.

This report forms a part of FRDC project 2009/211: Whose fish is it anyway? Investigation of co-management and self-governance solutions to local issues in Queensland's inshore fisheries.

Objective

Collect an oral history on issues surrounding Grey Mackerel fishing in the Port Douglas region, in relation to the co-management project.

Summary

Outline

The management of inshore fisheries is often complicated due to their multi-sector nature, the diversity of fishing methods and motivations, and the contribution of the fishery to the social and cultural identify and economies of coastal communities. In Queensland, a review of management arrangements for the East Coast Inshore Finfish Fishery ("the Inshore Fishery") revealed a large number of local issues that could not be addressed via generic state-wide management. As a result, the state fisheries management agency, Fisheries Queensland (within Queensland's Department of Agriculture, Fisheries and Forestry, DAFF Queensland) committed to trialling regionally-based management.

Subsequently, the coastal community of Port Douglas (in north Queensland), was chosen as one of the three case study communities for a Fisheries Research and Development Corporation (FRDC) funded project to trial regional co-management. There is an apparent long history of commercial and recreational fishing in the region, and local fishers in the area were becoming increasingly concerned about perceived overfishing of local Grey Mackerel (*Scomberomorus semifasciatus*) by commercial net fishers. An attempt was made to establish co-management arrangements for the Port Douglas region, with efforts initially focussing on Grey Mackerel.

Public meetings with invited community members, fisheries and marine park managers and project researchers were held to discuss the issues and determine if co-management could be supported by the community. Unfortunately no agreement could be reached at the meetings, and it was decided co-management was not the appropriate method to resolve the ongoing debate surrounding Grey Mackerel fishing. The project research team did, however, collect an oral history from fishers accessing the Port Douglas region, to document the concerns surrounding Grey Mackerel fishing.

This report outlines the findings of the oral history surveys of fishers accessing the Port Douglas region, and fishing related businesses operating in the region. The report aims to explore issues

surrounding Grey Mackerel fishing in the Port Douglas region, determine if and when conflict regarding Grey Mackerel was apparent, and discuss potential solutions to any conflict, including the appropriateness of co-management.

Methods

Surveys for each stakeholder group were developed based on a number of goals which were agreed upon by the co-management project team and Fisheries Queensland. All surveys were completed face-to-face with individuals from all target sectors – i.e. recreational (local and tourist) fishers, commercial line and net fishers, and charter operators that target Grey Mackerel and operate within the Port Douglas shire region as well as any associated businesses (including bait and tackle store and caravan park owners/managers and seafood retailers) and traditional land owners. The focus for the survey included people who lived or operated (worked or fished) in the Douglas shire and adjacent waters, particularly those that accessed waters between Snapper Island and Port Douglas. The final sample size was 67 completed surveys across all stakeholder groups.

Findings

Is there an issue surrounding Grey Mackerel fishing?

It is clear that there is significant angst among local fishers and related businesses about commercial net fishing for Grey Mackerel in the Port Douglas region. This was the most pressing fisheries issue in the region for many recreational and charter fishers and for most commercial line fishers, though not for related businesses. Most line fishers across sectors (i.e. recreational, charter and commercial) stated that their satisfaction with Grey Mackerel fishing had declined, and believed their catches had decreased in recent years. Those who believed their catches had decreased consistently held commercial net fishing responsible. Key concerns raised about commercial net fishing included issues of stock sustainability of targeted Grey Mackerel, targeting of 'breeding' aggregations of Grey Mackerel, and bycatch including of Species of Conservation Interest (SOCI).

For most fishers this issue became apparent between 2004 and 2006, a period when recreational and commercial line fishers believe commercial net fishing began in the region, and charter fishers believe it increased. Some respondents related this initiation or increase in Grey Mackerel netting in the region to the Great Barrier Reef rezoning (via the Representative Areas Program, RAP) which occurred in mid 2004. When commercial catch logbook data were explored for the Port Douglas and other nearby regions, it does appear that there was an increase in net fishing effort and associated catch in the region in the years post-RAP. Although the number of days Grey Mackerel were landed increased in all three examined regions (Port Douglas, Cairns and Innisfail).

Interestingly, while line fishers across all sectors suggested that Grey Mackerel stocks were declining in the region, investigations of commercial net fishing logbook data from multiple years pre- and post-RAP implementation revealed increases in landed catch in Port Douglas (and

Innisfail) in the years post-RAP. This was the result of the combined effect of increased days Grey Mackerel were landed as well as significant increases in catch-per-unit-effort (CPUE) of Grey Mackerel in the post-RAP period. Given this increase in CPUE for the commercial fishery in the region, it is possible that the perceived declines in recreational, charter and commercial line harvest were due to allocation of the available stock rather than overall stock declines – i.e. commercial net fishers were taking a greater share of the stock, at the cost to the recreational, charter and commercial line fishers. However, the commercial logbook data did not support the perception of decreased landings for commercial line fishers. Unfortunately there are no catch data available for the recreational sector to verify reported declines in catches since the increase in net fishing effort: without such data it is unknown if declines in recreational catches are real or perceived.

While the status of the Grey Mackerel stock in the region cannot be verified without examination of temporal data for both recreational and commercial catches, many of the responses provided by recreational fishers who had been in the area for multiple generations strongly suggest that current fishing for Grey Mackerel is substantially worse than previous decades. Some of the responses suggest that the decline in catches may have been occurring over a longer time period than when the issue surrounding netting first became apparent to most respondents. Some consideration needs to be given to historic catches from all sectors taking into account increases in effort and technology improvements to test this theory. Some respondents also suggested environmental issues such as habitat degradation needed consideration.

The importance of Grey Mackerel

An important element to consider in the context of conflict over shared fish stocks is how important the focus species is within the region to each group. All surveyed fishers were very attached to the Port Douglas region, having lived or visited and fished there for many years. Most respondents from all sectors had caught or targeted Grey Mackerel prior to the surveys. The issues surrounding Grey Mackerel did not stop people for fishing for them in this region, although many line fishers suggested they had reduced their Grey Mackerel fishing effort recently.

All commercial fishers considered Grey Mackerel as very important to their sector, and also to seafood consumers. Both commercial line fishers and net/line (i.e. those who use both net and line methods) fishers who actively fish for Grey Mackerel relied on their Grey Mackerel catch specifically from the Port Douglas region for approximately a quarter of their fishing income in the year prior to the survey – i.e. a significant proportion of their fishing income. Many commercial net/line fishers also caught Grey Mackerel in other regions, further adding to their reliance on this species, and interestingly more than twice the proportion of commercial net/line fishers stated that Grey Mackerel was their most important harvested species as compared to commercial line fishers.

For recreational and charter fishers, however, the importance of Grey Mackerel specifically appeared less critical. Recreational fishers considered Grey Mackerel as important to their sector, and fished for Grey Mackerel between a quarter (for local fishers) and 45% (for tourists) of their fishing days in the previous 12 months – given the seasonality of this species, this proportion of fishing days can be considered high. However, the majority of recreational fishers considered Grey Mackerel to be only one of many species they targeted, and not the most important. Interestingly, while local charter fishers had a high dependence on the inshore fishery for their income, their dependence on Grey Mackerel fishing was low, spending only 6% of the previous year's fishing days targeting Grey Mackerel.

The importance of Grey Mackerel specifically for related businesses was unclear, though it didn't appear high and they appeared largely unaffected by the issue.

The importance of Port Douglas caught Grey Mackerel to local consumers was also unclear: It appears most commercial caught product was sold in Cairns, 70km to the south of Port Douglas, although where it was sold from there is unknown. Some local seafood retailers did sell Grey Mackerel to consumers, generally as a "fish and chip" product and marketed generically as "mackerel".

How to resolve the issue

Most recreational, charter and commercial line fishers and related businesses strongly disapproved of commercial netting and were concerned about the sustainability and non-selectivity of commercial net fishing. Some were also concerned about the ability of nets to target what they believed were "breeding" aggregations of Grey Mackerel. Not surprisingly, then, most of these respondents believed the main solution to this issue is to implement a net exclusion zone in the Port Douglas region.

Commercial net/line fishing respondents suggested the government implement a net buy-back if the issue was ongoing in the region, believing if they had to be excluded they should be appropriately compensated. Alternatively, they suggested the government should support the industry in terms of providing information to the public about the industry's sustainability and operations, to debunk what they see as 'myths' surrounding their industry, potentially providing an opportunity for informed discussion and debate.

Complete exclusion of a sector, while removing conflict in the immediate area, is obviously not an amicable solution for all parties involved. Exclusion may remove the 'problem' from the focal area in the immediate term; however it does not solve the issue at a larger spatial or temporal scale and may set a precedent for surrounding areas to follow the same suit. Many respondents supported commercial net fishing in general, however they preferred it to occur in areas outside of their immediate local region – i.e. 'Not-in-my-backyard' ('NIMBY'). Interestingly, however, research suggests that the Grey Mackerel stock found seasonally in the Port Douglas region extends significantly further than the suggested exclusion area (Welch et al. 2009); which brings

to question the concern respondents have regarding stock sustainability in their region Is this an issue of stock sustainability or of resource allocation in a localised area?

Most commercial fishers and approximately half of the recreational and charter fishers surveyed were aware of the co-management trial in the Port Douglas region. It is clear that co-management is not currently the appropriate solution to conflict between line and net fishers over shared Grey Mackerel stocks in the Port Douglas region. Without the ability of all sectors to find a compromised solution amongst themselves, it will be necessary for a third party decision to be made (e.g. by managers). This decision may be to: a) retain the status quo, b) remove commercial net fishing from the region, or c) attempt to resolve the conflict by improving the availability of, and trust in objective information related to the cause of the conflict, and encouraging dialogue to build respect between line and net fishing sectors and other stakeholders

a) Retaining the status quo does not resolve the conflict in the region. The conflict is likely to re-escalate, and hence some action is required.

b) If commercial net fishing were to be removed from the region, serious consideration needs to be given to the potential flow-on effects of such action, including shifting of effort to other regional areas, and potential replication of exclusion along the coast. Compensation may also be requested given the reliance on Grey Mackerel from this region within net fishers' income.

c) Attempts to resolve the conflict within this region are required. The first step – identify the cause of the conflict – has been completed with this review: i.e. contrasting perceptions about the sustainability and impacts of commercial net fishing on Grey Mackerel stocks and bycatch within the Port Douglas region. What is needed now is objective information to confirm or refute held perceptions – i.e. information on stock status based on data from both the recreational and commercial sectors, information regarding bycatch, etc.

   Importantly, however, this information needs to be trusted and accepted by the Port Douglas community. To achieve this it is important to involve the fishing community in the collection of the data, and for managers, researchers and fishers to work together to determine the best way to provide information in a way that will promote trust and avoid barriers to acceptance of those data.

   Part of the conflict resolution process requires the building of relationships which include mutual respect and trust between sectors. This element will require significant time and ongoing effort, likely from a third party as a mediator initially. There is potential to build this element into any data collection efforts.

This case study has revealed significant challenges for resolving localised issues within inshore fisheries. There is clearly an issue of conflict over shared Grey Mackerel stocks in the Port

Douglas region. In part this revolves around contrasting perceptions about commercial net fishing sustainability and impacts, and the perceived negative impact of one sector (commercial net fishers) on the other (line fishers across sectors). Conflict over shared fish stocks is very common, particularly in inshore areas, and it is not an easy issue to resolve. Co-management may be an option to reconsider in the future, if considerable efforts are made to build trust and dialogue between sectors. Part of this process for shared fisheries resources requires improved data availability for all sectors, and trust in those data by the community. This will require a long term commitment, rather than a 'quick fix' through exclusion of one sector which has significant potential for flow on consequences.

Key words:

Inshore Fishery, oral history, Grey Mackerel, conflict, allocation, co-management

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Acknowledgements

First and foremost we would like to thank the recreational, charter and commercial fishers, Traditional Owner and related business owners/managers that took part in the surveys for their time and information. Their assistance in helping us to expand our sample to include as many people relevant to this issue as we could was also vital and greatly appreciated. These surveys were funded within the FRDC funded co-management project (2009-211 “Whose fish is it anyway? - Investigation of co-management and self-governance solutions to local issues in Queensland's inshore fisheries”), and would not be possible without their financial support.

Background

Inshore fisheries typically attract complex localised issues, due to their relative ease of access to multiple sectors, their proximity to coastal towns, and the diversity of species and habitats that occur along the coast. Managing inshore fisheries is complicated given the multi-sectoral nature of the fishery, the diversity of commercial fishing methods and operations and the contribution of the fishery to the social and cultural identity and economies of coastal regions (DEEDI 2010a; Phillipson and Symes 2010).

In Queensland, a recent review of management arrangements for the East Coast Inshore Finfish Fishery ("the Inshore Fishery") revealed a large number of local issues that could not be addressed via generic state-wide management. As a result, the State fisheries management agency, Fisheries Queensland (within Queensland's Department of Agriculture, Fisheries and Forestry, DAFF Qld), committed to trialling more regionally-based management in selected areas. This commitment was initiated by a Fisheries Research and Development Corporation (FRDC) funded project (2009-211 "Whose fish is it anyway? - Investigation of co-management and self-governance solutions to local issues in Queensland's inshore fisheries") to trial regional co-management in three case-study areas along the Queensland east-coast.

The Port Douglas region was nominated by the Queensland Fisheries Minister as one of the candidate areas for the regional co-management trial. Port Douglas was established in the 1870's as a Port, with the population fluctuating and receding to the 1960s. Growing then from a small, coastal fishing village, Port Douglas became established as a major tourist destination and investment hot spot in 1987 with the construction of the Sheraton Mirage Hotel (Douglas Shire Historical Society Inc. 2006; Tourism Websites Australiasia P/L 2009). During 1986-91 the population of the town of Port Douglas increased 270% (Centre for the Government of Queensland 2011), and in 2006 the Douglas Shire had a permanent population of 10,193 (Australian Bureau of Statistics 2007). Tourism is very important to this area, and the 2001 Population Census recorded 7,900 visitors in the Douglas Shire on Census night 7 August 2001, a time which corresponds with the peak tourist season. Most of these visitors stayed in Port Douglas itself, while 10% were accommodated in the Daintree / Cape Tribulation area and 17% elsewhere in the Shire (Tourism Websites Australiasia P/L 2009).

There is an apparent long history of commercial and recreational fishing in the region. Recently local fishers in the area were becoming increasingly concerned about perceived overfishing of local Grey Mackerel (*Scomberomorus semifasciatus*) by commercial net fishers. Issues surrounding Grey Mackerel net fishing resulted in significant ongoing press attention, public meetings, and letters and petitions to State fisheries managers and ministers requesting the removal of offshore gillnet fishing from the Port Douglas regional waters (see Cook 2008; Network for Sustainable Fishing 2010). As such, Grey Mackerel fishing was the primary focus for the regional co-management initiative in this region.

Grey mackerel

Grey mackerel are pelagic fish that occur in coastal waters, particularly around headlands and rocky reefs. They are endemic to northern Australian waters and occur from Shark bay in Western Australia, across northern Australia and along Queensland's east coast to northern New South Wales (Welch et al. 2009; DEEDI 2010b). Recent research using multiple stock identification techniques concurrently has identified three separate stocks of Grey Mackerel across northern Australia (see Figure 1).

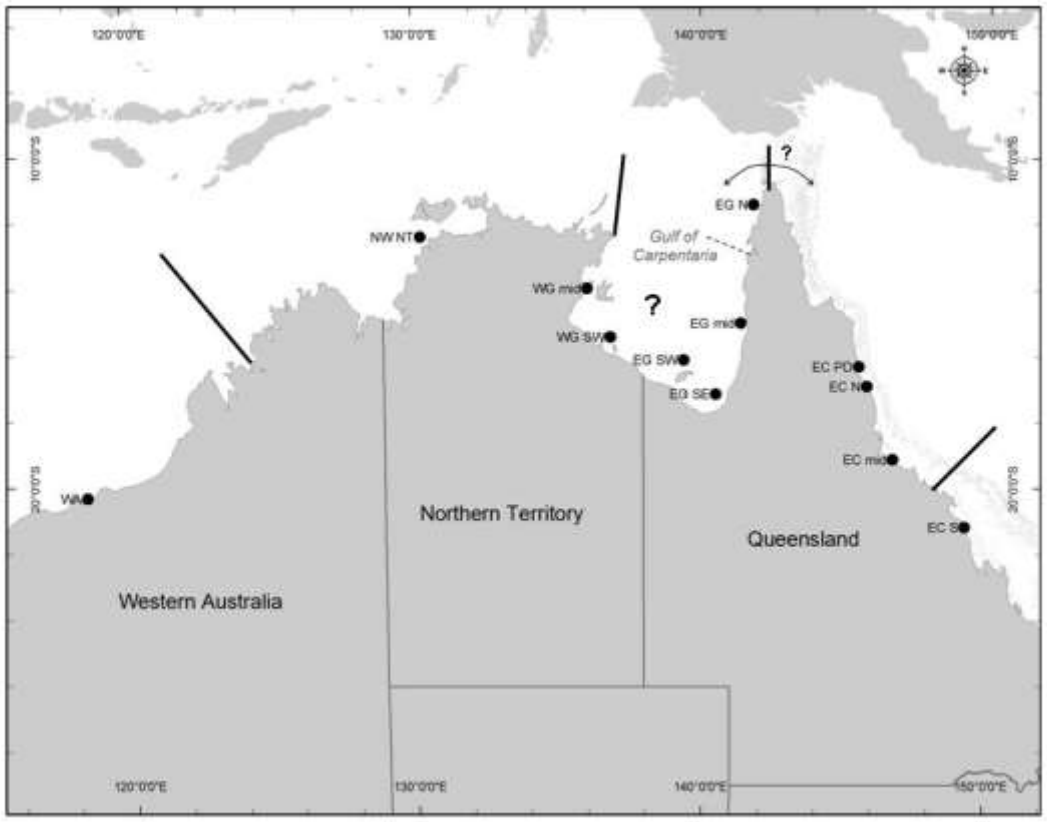


Figure 1 Map of northern Australia showing the study sample locations and the approximate boundaries separating Grey Mackerel stocks. These stock boundaries are approximate due to the inability to sample at finer spatial scales during this study; however sampling locations are indicative of major regions of Grey Mackerel fisheries. Dotted lines within the Gulf of Carpentaria show where stock division was evident and indicate the possibility of more localised stocks. The question maek identifies further uncertainties with stock structure in the Gulf of Carpentaria (From Welch et al. 2009, p137).

Grey mackerel are an important targeted species harvested across northern Australia predominantly by commercial 'offshore' gillnet fishers operating within the East Coast Inshore Fin Fish Fishery and the Gulf of Carpentaria Inshore Fin Fish Fishery. Reported annual commercial landings of Grey Mackerel from the gillnet component of the Queensland inshore fishery have increased from less than 50 t in 2000 to more than 200 t from 2003 to 2006. Small quantities are also landed in the commercial line fishery (see Figure 2 for commercial net and

line catch trends combined). Most of the commercial Grey Mackerel landed in Queensland waters are sold domestically, often as the fish bought with chips at the local fish shop. There is also a small export market for the species (Welch et al. 2009; DEEDI 2010b).

Grey mackerel are also targeted by the recreational and tourist fishing sector, particularly in the Gulf of Carpentaria, for whom Grey Mackerel are considered by some as a highly prized light game fish. The take of Grey Mackerel via charter fishing was anywhere between 0.01 and 0.10 t per year retained for the years 1995 to 2007, with the estimate depending on whether 'unspecified mackerel' are included (Begg et al. 2005; Welch et al. 2009). Based on various reports and recreational survey data (Cameron and Begg 2002; Begg et al. 2005; McInnes 2008), the recreational retained catch can be roughly estimated at 26 t for 1997, 14 t for 1999, 4 t for 2002 and 29 t for 2005 along the east coast of Queensland (Welch et al. 2009). More recent harvest estimates for Grey Mackerel by the recreational sector are unavailable within the latest recreational fishing survey report (see Taylor et al. 2012).

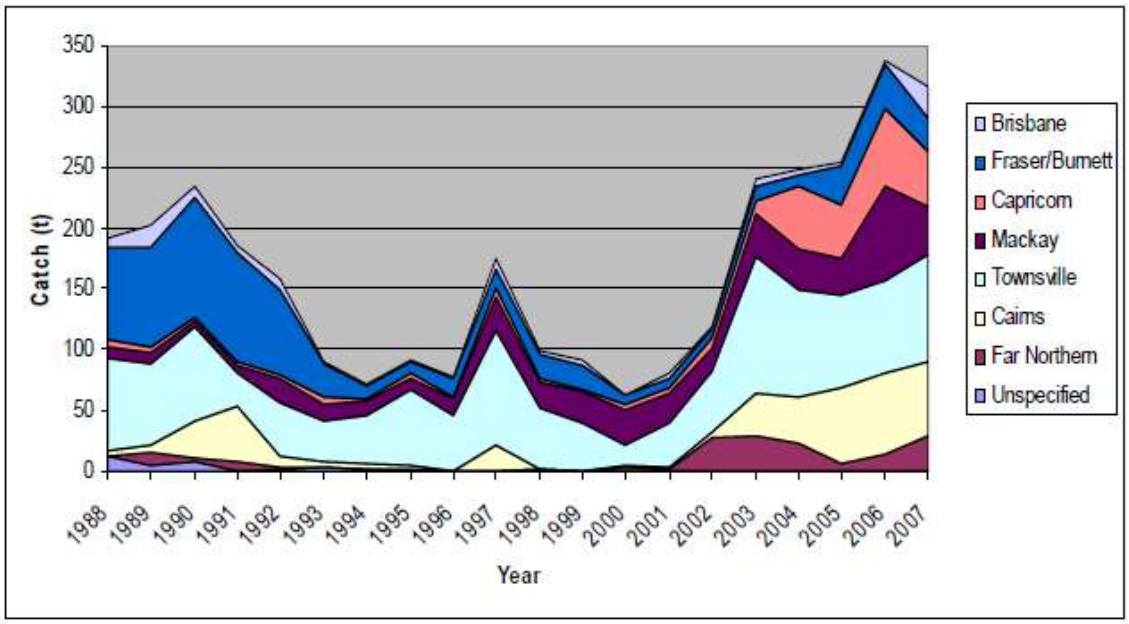
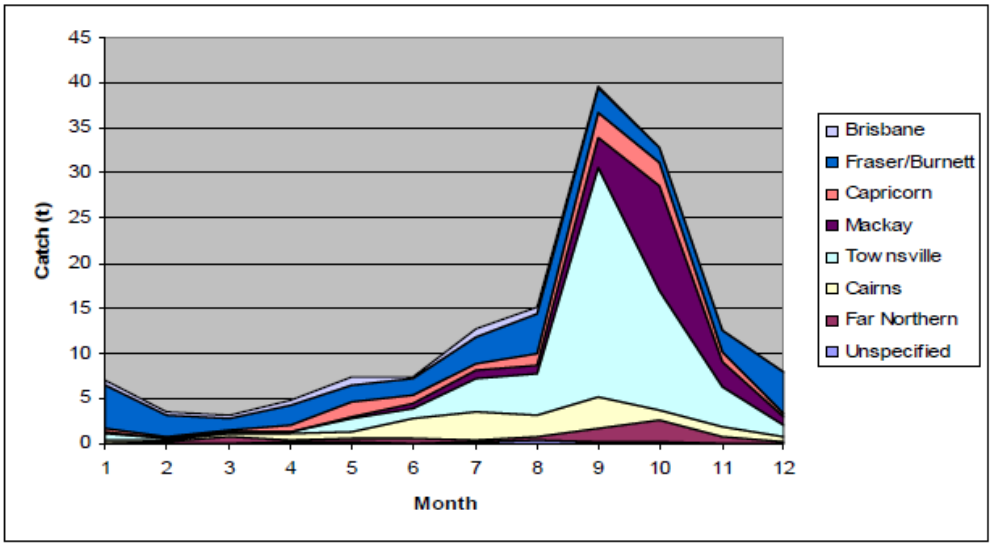


Figure 2 Annual commercial net and line catches of from 1988 – 2007 for each region of the Queensland east coast.

(From Welch et al. 2009, p15).

Commercial Grey Mackerel catches are highly seasonal in most regions along the Queensland east coast. While the Fraser/Burnett region shows relatively consistent catches throughout the year, most other regions show peak catches in September and October. Peak catches in the Cairns region (which includes Port Douglas) appear during June-September (see Figure 3) (Welch et al. 2009).

a)



b)

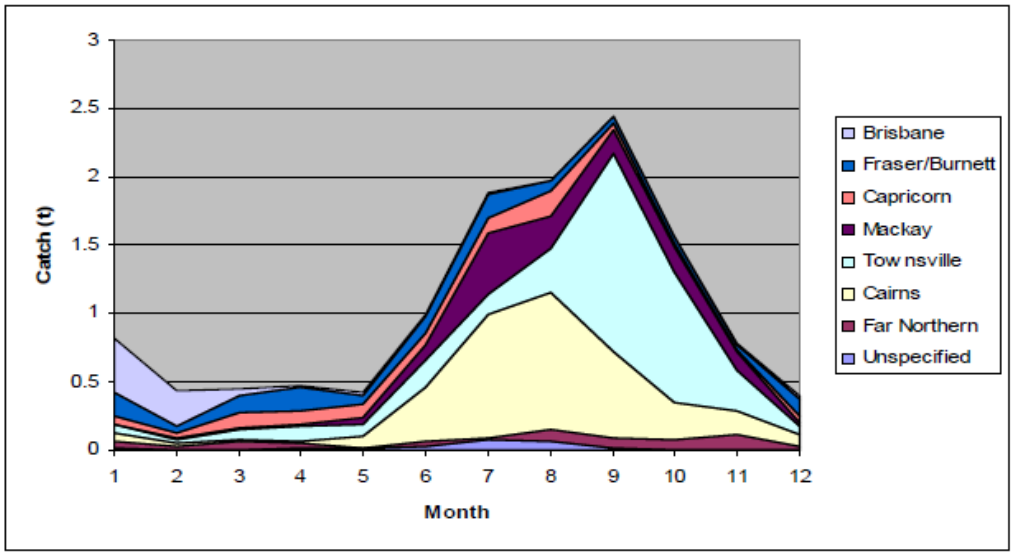


Figure 3 Seasonality in a) commercial net catches, and b) commercial line catches of Grey Mackerel from each region of the Queensland east coast.

The y-axis gives mean monthly catches in tonnes pooled. (From Welch et al. 2009, p16).

Conflict regarding Grey Mackerel fishing in Port Douglas has increased in recent years, with concerns from recreational and commercial line fishers that offshore commercial net fishing for Grey Mackerel was harming fish stocks. According to Cook (2008), since 2003, when the offshore net boats were perceived to have started coming to the area, the local line fishery for

Grey Mackerel has collapsed with each year fewer fish being caught by line. This is believed to be due to large catches, particularly in 2006 and 2007, from the offshore net boats noticed in the area, and the perception that gillnet fishers were targeting what Cook terms “pre-spawning aggregations”. Fisheries Queensland (at the time the Queensland Department of Primary Industries and Fisheries, QDPI&F) held a number of community and industry meetings to outline what was known regarding the fishery and listen to concerns. They also provided funding for Grey Mackerel biological samples from the Port Douglas region to be included in independent stock structure research (see Welch et al. 2009).

Co-management and Grey Mackerel

An attempt was made to establish co-management arrangements for the Port Douglas region, with efforts initially focussing on Grey Mackerel. Co-management “is an arrangement in which responsibilities and obligations for sustainable fisheries management are negotiated, shared and delegated between government, fishers, and other interest groups and stakeholders” (Fisheries Research and Development Corporation 2008, p1). Public meetings were held in late 2009 and early 2010 to discuss the issues and determine if co-management could be supported by the community. Unfortunately no agreement could be reached at the meetings, and it was decided co-management was not the appropriate method to resolve the ongoing issues surrounding Grey Mackerel fishing. Following the second meeting with invited community members, fisheries and marine park managers and project researchers, it was decided to abandon the co-management process at this time. The FRDC Co-management project research team did, however, agree to collect an oral history from fishers accessing the Port Douglas region, to document the issues surrounding Grey Mackerel fishing and gain a better understanding of the issues. This information may assist in determining how such issues may be resolved in the future.

Objectives of this report

This report outlines the findings of the oral history surveys of fishers accessing the Port Douglas region, and fishing related businesses operating in the region, with a particular focus on Grey Mackerel fishing. The report aims to explore issues surrounding Grey Mackerel fishing in the Port Douglas region, determine if and when conflict regarding Grey Mackerel was apparent, and discuss potential solutions to any conflict, including the appropriateness of co-management. In addition to the oral history surveys, any available published information relating to Grey Mackerel is presented.

Methods

Survey development

Surveys for each stakeholder group were developed based on the following goals which were agreed upon by the Co-management project team and Fisheries Queensland:

1. Determine importance of Grey Mackerel for the recreational and commercial (line and net) fishery and seafood consumers in the Port Douglas region (relative to other species);
2. Determine the relative importance of the Port Douglas region for the commercial sector in terms of proportion of Grey Mackerel catch obtained from the region;
3. Determine community aspirations with respect to recreational fishing in the region (e.g. number of Grey Mackerel caught per day/week, whether fishers are satisfied with current catches, changes in catches over time);
4. Determine the level of awareness of commercial netting in the general community;
5. Determine the perceptions of the Grey Mackerel fishery and how these perceptions have been derived (observations, word of mouth etc.);
6. Determine the origin of any issues surrounding Grey Mackerel – where, from whom, when;
7. Collect opinions regarding potential solutions to any issues surrounding Grey Mackerel.

The surveys also collected information regarding demographic and fishing characteristics.

See Appendices 1-6 for the final surveys.

Target population

The target population for the Port Douglas region surveys consisted of all recreational (local and tourist) fishers, commercial fishers, and charter operators that target Grey Mackerel and operate within the Port Douglas shire region as well as any associated businesses (including bait and tackle store and caravan park owners/managers and seafood retailers) and traditional land owners.

Survey distribution

All surveys were completed face-to-face with individuals from all target sectors, by researchers from the Fishing and Fisheries Research Centre. Contact methods for each sector differed given the relative availability of contact information:

- Recreational fishers were contacted via snowballing, with initial contacts including those who attended the prior Co-management meetings. These initial fishers provided contact details for other recreational fishers within the community, and so on. These contacts were supplemented with surveys employed at the two main boat ramps (Daintree River and Rocky Point).
- Charter operators were contacted through a combination of snowballing from Co-management meeting participants and contacts available in the local telephone listings and advertising.

- Commercial fishers who fished for Grey Mackerel were contacted via contact information provided by Fisheries Queensland and the Queensland Seafood Industry Association (QSIA).
- Tourist fishers were approached at caravan parks within the Port Douglas region. This method favoured longer-term tourists that visit the area for extended periods.
- Business operators were approached directly at their place of business, identified via the local telephone listings and advertising, as well as word-of-mouth.
- A traditional owner for the Port Douglas shire was contacted through the Jabalbina Yalanji Corporation.

Surveys were conducted in the Port Douglas region and Cairns during two separate week-long blocks in September 2010. Locations where surveys were conducted were varied and at the discretion of the respondent, with surveys conducted on both weekdays and weekends between 7am to 10pm. Up to six attempts were made to contact each individual we had contact information for, after which the respondent was considered non-contactable.

Stakeholders were given a brief explanation of the research at initial contact and asked if they would like to complete the survey. When the selected respondent was not available, an appointment was made and the individual was met or called at the appointed time. Each completed survey was approximately 30 minutes to 1 hour in length.

The final sample size was 67 completed surveys between all stakeholder groups including 28 local recreational fishers, 15 tourist recreational fishers, 9 commercial net and line fishers, 4 charter operators, 10 related business owners/managers (4 caravan park owners, 3 bait and tackle shop managers, and 3 seafood retailers) and 1 traditional land owner. The focus for the survey included people who lived or operated (worked or fished) in the Douglas shire and adjacent waters, particularly those that accessed waters between Snapper Island and Port Douglas (Figure 4).

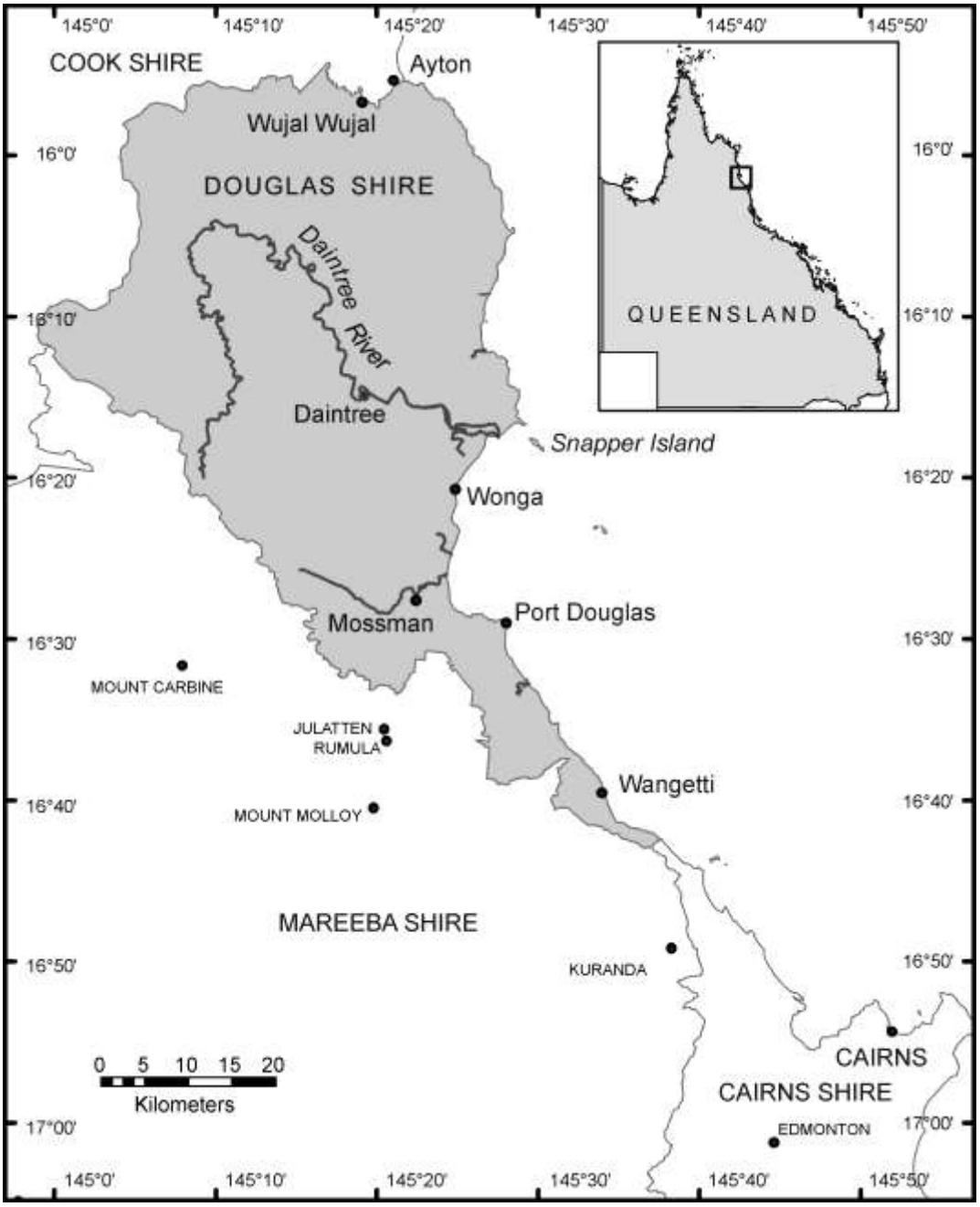


Figure 4 Map of the Douglas shire (shaded) within Qld, including in relation to the nearby city of Cairns and Cairns Shire.

Data analysis

Oral history surveys

All data from the surveys were analysed descriptively using Microsoft Excel®. Given low sample numbers for some sectors, some groupings were made to ensure individuals could not be identified:

- Tourist recreational fishers were grouped with local recreational fishers,
- The traditional owner was grouped with recreational fishers,
- Commercial fishers were made up of two sub-groups depending on how they fished for Grey Mackerel: those who line fished but did not net fish were called '*line*' fishers (n=5), and those who both line and net fished, or only net fished, were grouped together as '*net/line*' fishers (n=4).
- In most cases commercial *line* and *net/line* fishers were grouped together.

However, where specific, key differences were found within groupings, they were outlined.

All 5-point scales (e.g. 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, etc) were collapsed to 3-point scales (e.g. disagree, neutral, agree), with the extreme responses (1 or 5) highlighted only when they were substantially higher than the less extreme responses (2 or 4).

Other data sources

Where other data sources were available – i.e. catch data – they were included in the results and any relevant methodologies associated with their collection was also included. Given they were additional to the focus surveys, associated methods for included with the results for ease of reading.

Results

Description of respondents

A total of 67 people completed a survey about fisheries issues of concern to them in the Port Douglas region. Of the 67 people who responded, the sample was dominated by recreational fishers overall (66%), as was to be expected given the proportion this stakeholder group made up of the local fishing (and related) population (Figure 5).

Demographics

The majority of survey respondents were male (Figure 5). Stakeholders were from a range of age groups, with over a third (37%) of all respondents aged 65 years or older (Figure 6). Just over half (51%) of all community members who responded had completed Year 10 or less (Figure 7). Respondents reported a limited range of household incomes for the previous financial year with most stakeholders (75%) earning less than $150,000 per year (Figure 8). Nearly a third (28%) of all recreational fishers who responded were retired, although the majority of these (78%) were tourist recreational fishers (also known as “grey nomads”).

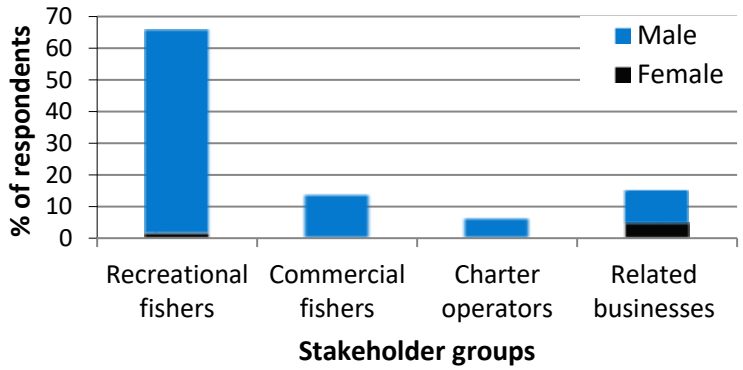


Figure 5 Gender distribution among stakeholder groups

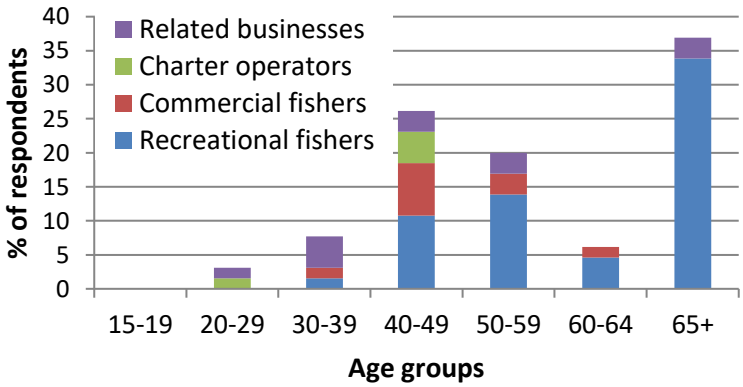


Figure 6 Age distribution among stakeholder groups

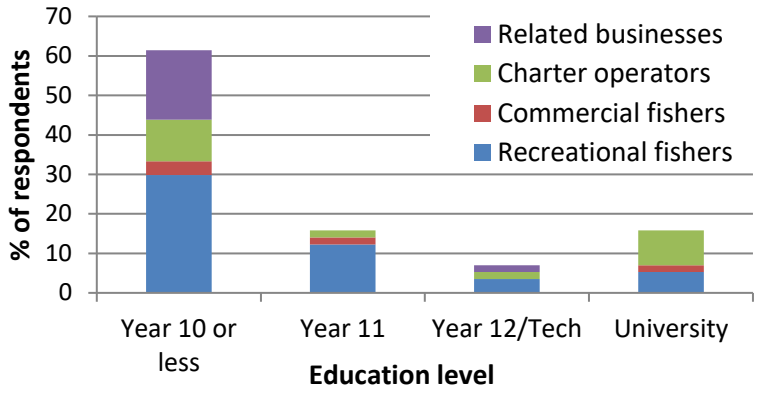


Figure 7 Level of formal education among stakeholder groups

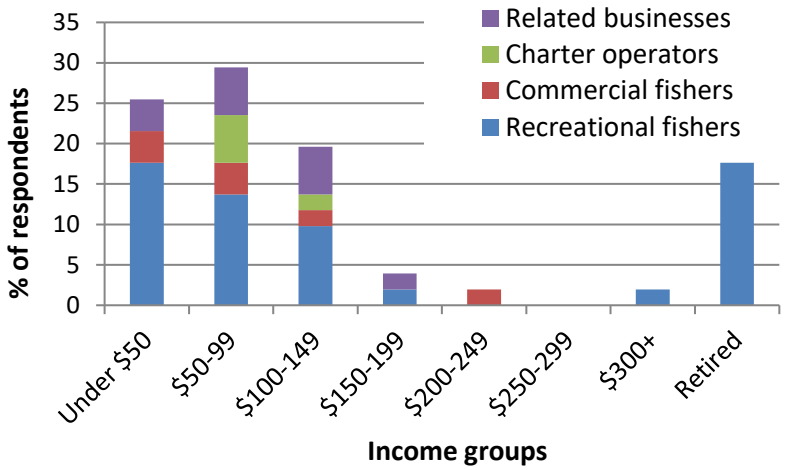


Figure 8 Income level among stakeholder groups (in $50,000 increments)

Local recreational fishing respondents had been living in Port Douglas for between 3 to 72 years, with an average of 26 years (median of 20 years) (Figure 9). Tourist recreational fishing respondents had been visiting Port Douglas for between 2 to 48 years (average of 13 years, median of 7 years) with an average stay of 4 months each time (range of between 2-6 months). At the time of this survey, commercial fishers who were residents of Port Douglas (78%) had been living in the area for between 7 to 54 years, with an average of 35 years (median of 43 years). One of the commercial fishers who was residing outside of Port Douglas at the time of the survey had been visiting the area for work (fishing) for 40 years. Charter operators had been living in the area for between 6 to 41 years with an average of 21 years (median of 18 years). Related business respondents had been living in the Port Douglas shire for between 2 to 41 years with an average residency of 19 years (median of 22 years); this varied somewhat between business types, with bait and tackle shop respondents reporting an average residency nearly twice (24 years) that of either caravan park owners (14 years) or seafood retailers (13 years).

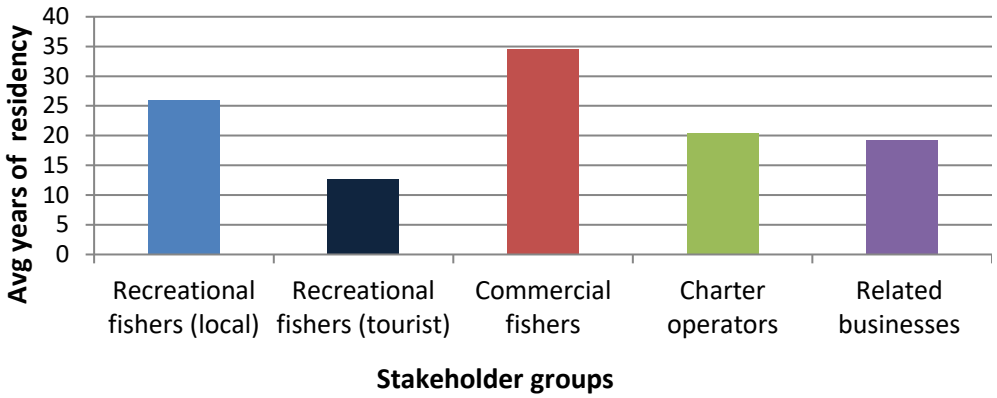


Figure 9 Average length of residency (or visitation for tourists) among stakeholder groups in the Port Douglas region.

Fishing characteristics

Recreational fishers

Fishing characteristics differed slightly between *local* and *tourist* recreational fishers, so they are described separately here. *Local* recreational fishing respondents had been fishing recreationally (at any location, not Port Douglas specifically) for an average of 42 years (median 45 years) with an overall range of 10 to 67 years (Figure 10). Within the past 12 months they had fished for an average of 23 days (median of 15 days) and the majority (64%) rated fishing as their most important recreational activity. *Tourist* recreational fishers had been fishing recreationally for longer with an average of 54 years (median of 60 years) and an overall range of 35 to 70 years (Figure 10). This likely reflects the dominance of older, retired respondents in the tourist sample. Within the 12 months prior to survey the tourist anglers had fished for an average of 44 days (median of 30 days) – nearly twice the amount of time as local recreational fishers. Similar to local recreational fishers, most tourist fishers (60%) also rated fishing as their most important recreational activity.

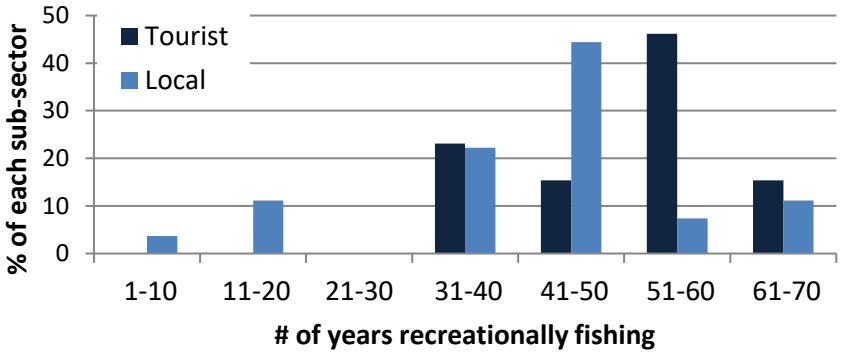


Figure 10 Number of years spent fishing recreationally (at any location) among local and tourist recreational fishers surveyed in the Port Douglas region.

Commercial fishers

Commercial fishers were asked how long they had been fishing in the Port Douglas region specifically, rather than the longevity of their total fishing experience. On average respondents had operated in the area for between 6 and 40 years (average and median 22 years). Most respondents (67%) were owner-operators. Commercial fishing was the sole source of both individual and household income for 44% of commercial fishers, with fishing comprising 50-100% of both their individual and household income for 90% of fishers. For the 12 months prior to this survey, half of the fishers received all of their fishing income from the East Coast Inshore Fin Fish Fishery ("the Inshore Fishery"); 75% received 50-100% of their fishing income from the Inshore Fishery.

Charter operators

Charter operators were also asked how long they had been fishing in the Port Douglas region, rather than for their overall history. Respondents had been fishing in the Port Douglas region for between 6 to 22 years with an overall average of 13 years (median of 12 years). The number of days spent fishing within the past 12 months ranged from 165 to 320, with an average of 232 days. Charter fishing was the sole source of individual income for 100% of respondents and for most (75%) it was also the sole source of their household income. Most charter operators who responded received an average of 73% of their income from inshore fin fish fishing specifically, with individual estimates ranging from 60-100%. Most (75%) took 4 clients on a typical inshore fishing trip, although half of respondents could accommodate up to 8.

Related businesses

The surveyed fishing related businesses had been operating in the region for between 8 and 55 years with an average of 26 years (median of 25), although the respondents themselves had been managing the businesses for comparatively less time with an average of 10 years (for caravan park owners the average was 19 years, while bait and tackle and seafood store respondents were involved in the business on average for 4 years). Most respondents were either managers (50%) or business owners (40%) (others were caretakers or within family business) and most (70%) stated that they received 100% of their household income from this business.

Fisheries issues in the Port Douglas region

Before we asked any questions relating to Grey Mackerel fishing (the focus of the survey), we asked respondents what they thought was the most pressing fisheries issue in the Port Douglas region. Most respondents in all sectors listed some form of commercial netting as the most pressing issue for the region (see Table 1), including the one Traditional Owner surveyed (included with local recreational fishers in the table). Further, many fishers also listed issues with Grey Mackerel fishing specifically: including the one fisher who stated Grey Mackerel were declining but did not link the decline to netting specifically, 45% of recreational fishers, 50% of charter operators, 40% of commercial *line* fishers and 25% of commercial *net/line* fishers considered Grey Mackerel to be the most pressing issue. The comments surrounding these responses vary slightly between sectors (see Box 1), but give an indication of the sentiment from respondents.

Table 1 Coded responses (as proportion within each sector) from fishers regarding what they consider to be the most pressing fisheries issue in the Port Douglas region.
More than one response was given by some fishers. Only those responses listed by more than one fisher are included here.

Fisheries Issues	Recreational fishers		Charter operators	Commercial fishers	
	Local	Tourist		Line	Net/line
Netting TOTAL	73	83	100	80	50
Netting – Grey Mackerel	42	42	50	40	25
Netting (unspecified)	15	17	50	20	
Netting - inshore species / habitats	12	8		40	25
Netting - offshore by non-locals	8	8			
Netting - breeding grounds	4	8			
Netting - Snapper Island	4	8			
Trawling / trawling close to shore	16				
Fish decline (no reason given)	4	8			
Zoning	4	8	25		25
Conflict - inshore commercial and recreational	4			20	
Illegal rec/commercial fishing	4			40	
Loss of access					25
# of respondents who gave responses	26	12	4	5	4

Contrary to all fishing sectors surveyed, when related business stakeholders were asked what they saw as the most pressing fisheries issue in the Port Douglas region, most (90%) did not list "Grey Mackerel netting" or even "netting" in general (60%). While 66% of seafood retailers specifically did list "netting" as the most pressing fisheries issue, most (57%) caravan park and bait and tackle shop respondents cited "area closures".

Box 1. Selected fishers' comments explaining what they saw as the most pressing fisheries issue in the Port Douglas region

Recreational fishers:

"*Netting of Grey Mackerel. There are a lot of other issues, but that is the biggest now. It's getting flogged out"*

"Professional netters taking Grey Mackerel. It leaves no fish for the recreational fishers"

"Long nets across the mouth of the Daintree River, from the southern tip of Snapper Island to 1km north. I've seen them throwing dead Spanish mackerel overboard because they can't keep them. It's disgraceful. We need to stop the nets so close to shore"

"Everyone complains fishing isn't what it used to be. There's a number of reasons for that – Grey Mackerel subjected to netting, prawn trawlers..."

"Mackerel – and I mean any mackerel – netting. Personally, I've caught big fish and then the net boats came through and then I only catch small fish"

"It's an issue because it's a tourist area and recreational area for retirees – it's what keeps Port Douglas going. Netting depletes the area so heavily – fish disappear for a couple years especially Grey Mackerel and it takes many years for them to pick up again. Also true for barramundi, fingermark..."

Charter operators:

"Grey mackerel netting. The rest of the world banned drift netting, etc – why is Australia or Queensland so backwards? Why not ban the sale or market of Grey Mackerel in Queensland if it's netted? Rest of the world don't accept it"

Commercial *line* fishers:

"*Grey mackerel is the main issue. Shark netters are supposed to be catching shark, but they're catching Grey Mackerel. I wouldn't mind if they fished with lines*"

Commercial *net/line* fishers:

"Grey mackerel is the most talked about, the most publicised issue"

Grey mackerel fishing – importance and satisfaction

Grey mackerel were the focus of this survey, and hence most questions focussed on gaining an understanding of the current importance of Grey Mackerel to fishers, consumers and associated businesses, and satisfaction with current Grey Mackerel fishing in the Port Douglas region.

Do fishers target Grey Mackerel?

Most fishers surveyed, in all sectors, had targeted or caught Grey Mackerel prior to the survey (Figure 11). The Traditional Owner for the Port Douglas region (included with local recreational fishers in the figure) stated that he did catch Grey Mackerel, usually by trolling with a line from a boat.

There is some distinction between those commercial fishers who fished for Grey Mackerel using line only ('*line*' fishers) and those who used line and/or set net ('*net/line*' fishers) fishing methods (see Figure 11). Of interest to note, most commercial fishing respondents surveyed used line-only (56% of surveyed fishers – this also includes one line only fisher who does not target Grey Mackerel specifically) with the rest divided between using a set-net only (11%) and both net and line (33%) (both of the latter are grouped as '*net/line*' fishers).

It should be noted here, while attempts were made to contact recreational and charter respondents randomly (commercial Grey Mackerel fishers were targeted specifically), those who catch Grey Mackerel were more likely to be interested in the issues surrounding this project and hence more likely to respond to the survey. A measure of bias in this aspect is not available. Regardless, this result should not be interpreted as representative of all fishers from all sectors.

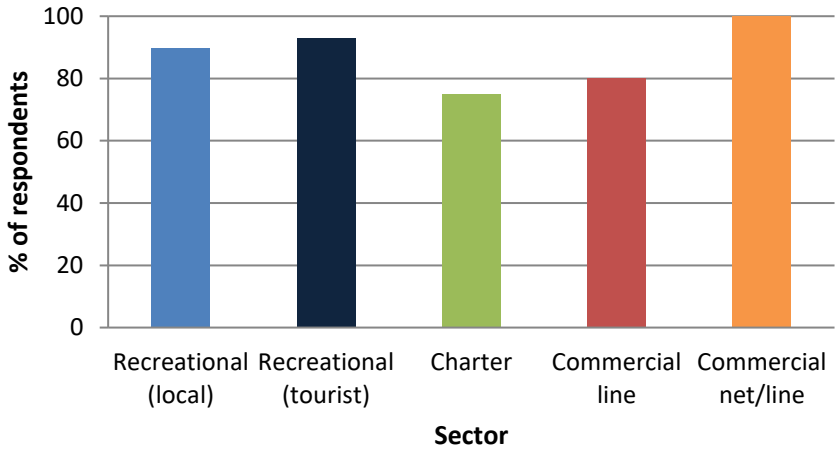


Figure 11 Proportion of respondents who have caught and/or targeted Grey Mackerel.

How long have people been targeting Grey Mackerel?

Recreational fishing respondents had spent an average of 15 years (median of 10 years; range 0-43 years) fishing for Grey Mackerel specifically in the Port Douglas area, although local fishers had spent nearly twice as many years (18 on average) targeting Grey Mackerel in the area than visiting tourists (9) (Figure 12). Caravan park respondents estimated that tourists had been coming to the Port Douglas area to catch Grey Mackerel for an average of 27 years.

Surveyed charter operators had spent an average of 18 years (median 17 years; range 6-32 years) targeting Grey Mackerel in the Port Douglas region.

Commercial fishing respondents had been catching Grey Mackerel in the Port Douglas region for 19 years (median of 15 years), with individual estimates ranging from 3 to 37 years. Note this is lower than the overall fishing history in the region (see above). There was a slight difference between commercial fishers who fished with line only and those who line and/or net fished for Grey Mackerel: *Line* fishers had been fishing for Grey Mackerel in the Port Douglas region for 26 years on average (median 25 years), while *net/line* fishers had been fishing for Grey Mackerel in the region for 12 years on average (median 10 years) (Figure 12). Both groups, however, contained fishers that had been accessing the area for Grey Mackerel for many years (max 37 years for one *line* fisher; max 25 years for one *net/line* fisher).

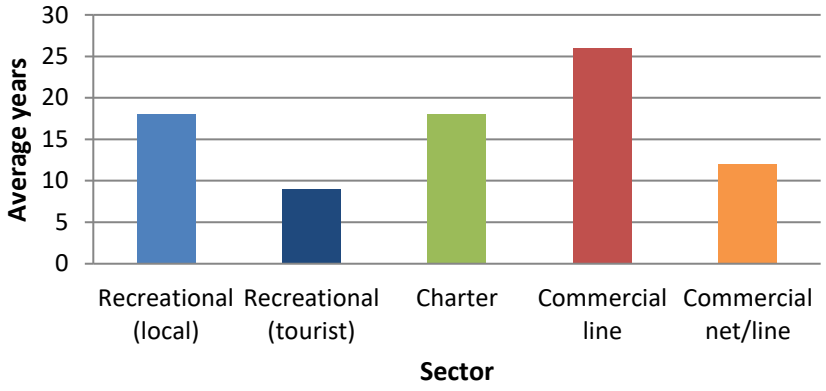


Figure 12 Average number of years respondents from each sector had been fishing for Grey Mackerel in the Port Douglas region.

How often do fishers target Grey Mackerel?

Recreational fishing respondents spent an average of 7 days targeting Grey Mackerel in the 12 months prior to this survey, with individual estimates ranging from 0 to 50 days (median of 3). In relation to total fishing days for the previous year, *local* recreational fishers spent 25% (0-100%, median 10%) of their total fishing days fishing for Grey Mackerel, and *tourist* recreational fishers spent 45% (0-100%, median 50%) of their fishing days fishing for Grey Mackerel (perhaps reflecting their holiday time). Charter operators spent between 0 and 60 days fishing for Grey Mackerel (average 18 days, median 5 days), which was on average 6% of their total charter fishing days (0-20%) for the 12 months prior to survey.

Commercial *line* fishers stated that they had spent an average of 19 days (median of 22 days) targeting Grey Mackerel (anywhere) in the 12 months prior to this survey, and all of this time was spent fishing in the Port Douglas region (n=3 useable responses). In contrast, commercial *net/line* fishers reported a much higher average of 71 days targeting Grey Mackerel, however only 5-35% of this time was spent fishing in the Port Douglas region: back calculations revealed an average of 25 days spent Grey Mackerel fishing in the Port Douglas region (n=2 useable responses).

We were unable to calculate the proportion of total fishing days commercial fishers spent targeting Grey Mackerel, however we asked commercial fishers to list the percentage of their

income that comes from Grey Mackerel to indicate relative importance: The proportion of fishing income that came from selling Grey Mackerel in the 12 months prior to this survey varied considerably between sectors with commercial *net/line* fishers reporting an average of 33% (median 25%, n=4) as compared to commercial *line* fishers who reported a much lower average of 13% (median 10%, n=5). Only including those fishers who sold Grey Mackerel in the 12 months prior to survey (i.e. *active* Grey Mackerel fishers), the average income from Grey Mackerel increases, reflecting greater dependence on this species: *active net/line* fishers received an average of 65% of their fishing income from Grey Mackerel (median 65%, n=2), while *active line* fishers received an average of 22% (median 25%, n=3). Back-calculating for these active fishers, given the reported proportion of catch from the Port Douglas region (100% for n=3 *line* fishers, 5-40% for n=2 *net/line* fishers), fishers received 25% (*net/line* fishers) and 22% (*line* fishers) of their overall fishing income from Grey Mackerel caught in the Port Douglas region.

What is the perceived level of importance of Grey Mackerel fishing among various stakeholder groups in Port Douglas?

Respondents were asked to rate the level of importance of Grey Mackerel fishing among various stakeholder groups within the Port Douglas region.

Most recreational fishing respondents stated that Grey Mackerel fishing was very important to *local* (76%) and *tourist* (74%) recreational fishers as well as to commercial fishers (63%), although we did not ask them to specify between *line* and *net/line* commercial fishers (see Table 2). Recreational fishers were divided in their opinion regarding the level of importance for local seafood consumers and most (46%) were unsure of the importance of Grey Mackerel to traditional owners in the region.

Table 2 The level of importance of Grey Mackerel to each stakeholder group, as perceived by recreational fishing respondents.
Responses given by the highest percentage of respondents are shown in bold.

Sector	Not at all important	Minor importance	Moderate importance	Very important	Can't say
Local recreational fishers	0	3	16	**76**	5
Commercial fishers	3	0	16	**63**	18
Local seafood consumers	13	16	**26**	21	24
Tourist recreational fishers	3	11	11	**74**	3
Traditional owners	22	14	8	12	**46**

Responses varied between commercial fishing sectors with 100% of commercial *line* fishers stating that Grey Mackerel fishing was very important to local recreational fishers whereas most commercial *net/line* fishers were unsure of its importance among local recreational fishers (see 0 3). Similar to recreational fishers, most commercial *line* fishers (100%) stated that Grey Mackerel

fishing was very important to tourist recreational fishers in the Port Douglas shire whereas commercial *net/line* fishers stated it was only of minor (50%) or moderate (50%) importance. Commercial fishers were in agreement as to the importance of Grey Mackerel fishing to the commercial fishing sector with the majority of both groups (80% of *line* and 75% of *net/line*) stating that it was very important. The majority of both groups (60% of *line* and 75% of *net/line*) also believed Grey Mackerel fishing to be very important to local seafood consumers, but were divided as to its importance within the local indigenous community (see Table 3).

Table 3 The level of importance of Grey Mackerel to each stakeholder group, as perceived by commercial *line* and *net/line* fishing respondents.
Responses given by the highest percentage of respondents are shown in bold.

Sector	Not at all important		Minor importance		Moderate importance		Very important		Can't say	
	Line	*Net/ line*	*Line*	*Net/ line*	*Line*	*Net/ Line*	*Line*	*Net/ Line*	*Line*	*Net/ Line*
Local recreational fishers	0	0	0	25	0	25	**100**	0	0	**50**
Commercial fishers	0	0	0	0	20	25	**80**	**75**	0	0
Local seafood consumers	0	0	40	0	0	0	**60**	**75**	0	25
Tourist recreational fishers	0	0	0	**50**	0	**50**	**100**	0	0	0
Traditional owners	0	**50**	0	0	20	0	**60**	25	20	25

Similar to recreational fishers and commercial *line* fishers, most (75%) charter operators stated that Grey Mackerel fishing was very important to local recreational fishers and half stated the same for tourist recreational fishers (see table 4). Unlike both recreational and commercial fishers, however, most charter operators believed Grey Mackerel fishing was of only minor importance to commercial fishers or local consumers. Charter operators were divided as to the importance of Grey Mackerel fishing among members of the local indigenous community (see table 4).

Table 4 The level of importance of Grey Mackerel to each stakeholder group, as perceived by charter fishing respondents. Responses given by the highest percentage of respondents are shown in bold.

Sector	Not at all important	Minor importance	Moderate importance	Very important	Can't say
Local recreational fishers	0	0	25	**75**	0
Commercial fishers	0	**75**	25	0	0
Local seafood consumers	0	**50**	25	25	0
Tourist recreational fishers	0	0	**50**	**50**	0
Traditional owners	**25**	**25**	**25**	**25**	0

Similar to most fishing sectors surveyed, the majority of related business respondents stated that Grey Mackerel fishing was very important to local (50%) and tourist (60%) recreational fishers (see Table 5), although this varied somewhat between individual sectors – the majority (75%) of caravan park respondents stated that Grey Mackerel fishing was very important to local recreational fishers whereas most (50%) bait and tackle shop respondents and seafood retailers felt it was of only of moderate importance. Similar to commercial and recreational fishing respondents, most related business respondents (60%) stated that Grey Mackerel fishing was very important to commercial fishers. Unlike commercial and recreational fishers, but similar to charter fishing respondents, most related business respondents felt that Grey Mackerel fishing was of only minor (50%) importance to local seafood consumers – this included seafood retailers (more detail regarding consumption is provided below). Similar to all fishing sectors surveyed, most (60%) related business respondents were unsure of the importance of Grey Mackerel to traditional owners in the region.

Table 5 The level of importance of Grey Mackerel to each stakeholder group, as perceived by fishing related business respondents. Responses given by the highest percentage of respondents are shown in bold.

Sector	Not at all important	Minor importance	Moderate importance	Very important	Can't say
Local recreational fishers	0	0	30	**50**	20
Commercial fishers	0	20	0	**60**	20
Local seafood consumers	30	**50**	10	0	10
Tourist recreational fishers	30	0	10	**60**	0
Traditional owners	30	0	10	0	**60**

The traditional owner for the region stated that, as a species, Grey Mackerel did not hold any particular historical significance nor was a customary species for the Yalanji Aboriginal community.

To allow more direct comparison, each sector's response in terms of those sectors which they considered Grey Mackerel to be VERY important to was graphed (see Figure 13). This shows the distinction in opinions between sectors: For example local and tourist fishers considered Grey Mackerel to be very important to their own sector more than any other; commercial line fishers considered Grey Mackerel to be important to recreational fishers (local and tourist), but commercial net/line fishers did not; commercial fishers considered Grey Mackerel important to seafood consumers, while the other groups did not; and few fishers understood the importance of Grey Mackerel to traditional owners (many respondents answered 'can't say', which is not outlined in this graph).

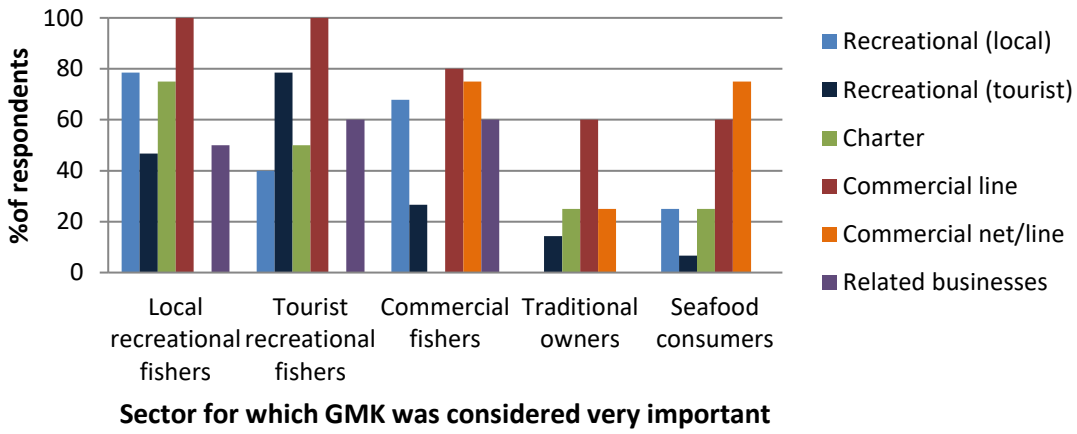


Figure 13 Proportion of respondents from each sector who considered Grey Mackerel to be VERY important to each of the sectors.

How important is Grey Mackerel fishing compared to other species?

Despite the dominance of Grey Mackerel fishing in the sample of respondents, most recreational fishers who had caught or tried to catch Grey Mackerel (67%) stated that Grey Mackerel was only one of many target species (see 0 2 for related comments): only 17% of these respondents (14% of all respondents surveyed) stated that Grey Mackerel was their most preferred target species (Figure 14). The proportion of *tourist* recreational fishers who considered Grey Mackerel their most preferred species was further reduced than that for local recreational fishers. While most (89%) commercial fishing respondents stated that they catch Grey Mackerel (Figure 11), their preference as a target species varied somewhat between those fishers who used different methods: More than twice the proportion of commercial *net/line* fishers stated that Grey Mackerel was their most important harvested species as compared to commercial *line* fishers (Figure 14).

Box 2. Recreational fisher comments regarding targeting of Grey Mackerel

"*It's a seasonal thing…I target what is in abundance…target Grey Mackerel when the Grey Mackerel are running"*
"Don't target them [Grey Mackerel] specifically…more Spanish mackerel and catch Grey Mackerel while I'm doing that"
"I'm not targeting Grey Mackerel in particular, just pelagics in general – Grey Mackerel is a "bonus fish"

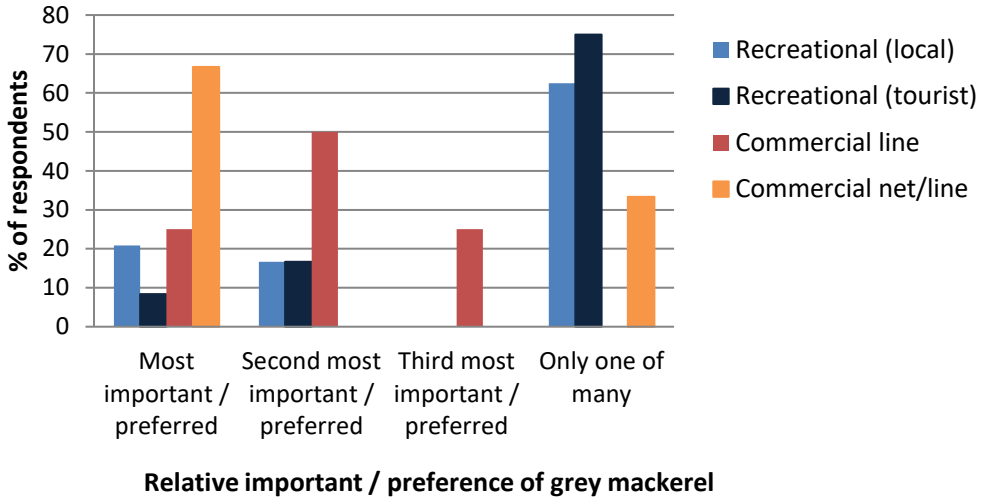


Figure 14 Relative importance for harvesting (for commercial fishers) and preference for targeting (for recreational fishers) Grey Mackerel for fishers in the Port Douglas region.

We did not ask the traditional owner or the charter operators to specifically state the relative importance of Grey Mackerel compared to other species. Most (75%) caravan park respondents stated that their tourists catch Grey Mackerel, although they also stated that only a third (33%) of those tourists came to the park to specifically catch Grey Mackerel (see Box 3 for related comments). All bait and tackle shop respondents agreed that some of their customers targeted Grey Mackerel when in season, but were evenly divided as to how many (33% stated most/all of their customers did, 33% stated some did and 33% stated very few did target Grey Mackerel).

Box 3. Caravan park owner comments regarding targeting of Grey Mackerel

"*Majority come to catch whatever they can catch – mostly mackerel, barramundi and trevally, but also some [target] bottom fish like nannygai…"*
"They target barramundi [and] catch bream, grunter"
"They [the tourists] *come for fishing in general"*

How satisfied are fishers with current Grey Mackerel fishing?

Most *local* recreational fishers (64%) and charter operators (50%) were currently dissatisfied with their Grey Mackerel fishing – 50% of *local* recreational fishers and charter operators stated they

were 'very' dissatisfied (Figure 15). In contrast, most *tourist* recreational fishers (73%) were satisfied (45% 'very' satisfied) with their current Grey Mackerel fishing. We did not ask this question of commercial fishers.

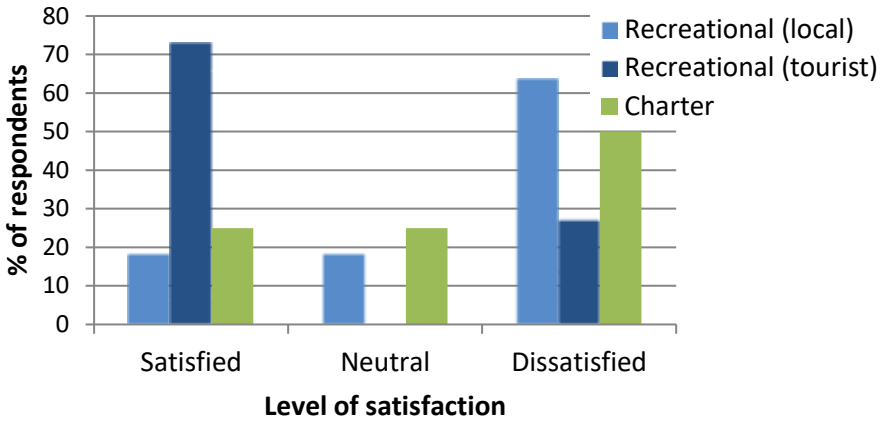


Figure 15 Level of current satisfaction with Grey Mackerel fishing among recreational and charter operators in the Port Douglas region.

In an attempt to better understand fishers' expectations of Grey Mackerel fishing, we asked recreational and charter operators how they would consider the fishing quality on a trip if they had caught three Grey Mackerel. The recreational bag limit for Grey Mackerel at the time of survey was 5 fish, each at least 60 cm in length. The majority (70%) of recreational fishing respondents and all charter operators stated that they would consider the fishing quality to be high if they personally caught three Grey Mackerel on a trip, (56% of recreational fishers and 50% of charter operators stated that they would consider it to be 'very' high). See Box 4 for related comments. The remainder thought three Grey Mackerel would be low quality (11%), or neither high nor low quality (19%).

Box 4. Recreational fisher and charter operator comments regarding fishing quality if they personally caught 3 Grey Mackerel in a trip

Recreational:

"I'd be very happy with three Grey Mackerel – could feed us for over a month!"
"Three Grey Mackerel would be exceptional – even one is a bonus! Haven't caught that since 12 months ago (last season)"
"Not about numbers, more about having the expectation or chance of catching at least one"
"...now considered high, but before you could catch 20 between 3 fishers!"
"What do you do with more than you need? Two Grey Mackerel is enough then I stop fishing"

Charter:

*"If that's what they (*the clients*) wanted – plenty of them available"*
"Shocking to catch <u>one</u> now...like New Zealand dodos – they're extinct!"

Consumption of Grey Mackerel

We wanted to gauge the importance of Grey Mackerel not just for fishing, but also for consumption within the local community of fishers and non-fishers. We did not survey non-fishers directly, but tried to gauge importance through fishers and related businesses.

How popular is Grey Mackerel as a species to consume?

Importance to fishing consumers

The majority of all recreational fishing respondents (97%), and all charter operators and commercial fishers stated that they had eaten mackerel (i.e. any species of mackerel) within the past 12 months. Most also self-caught their most recent mackerel meal (71% of recreational fishers, all charter operators and 78% of commercial fishers). Most recreational fishers (71%), half of the charter operators and most commercial fishers knew that at least some of their mackerel meals in the past 12 months was Grey Mackerel.

When asked about their most preferred species to consume, most recreational fishers (74%) and charter operators (75%) did not list Grey Mackerel. Half of recreational fishing respondents (54%), and most (75%) charter operators stated that, compared to other fresh seafood species, Grey Mackerel was only one of many species they chose to eat. In contrast, most commercial fishers (both *line* and *net/line*) (56%) stated that Grey Mackerel was their most preferred fresh seafood species to eat (Figure 16).

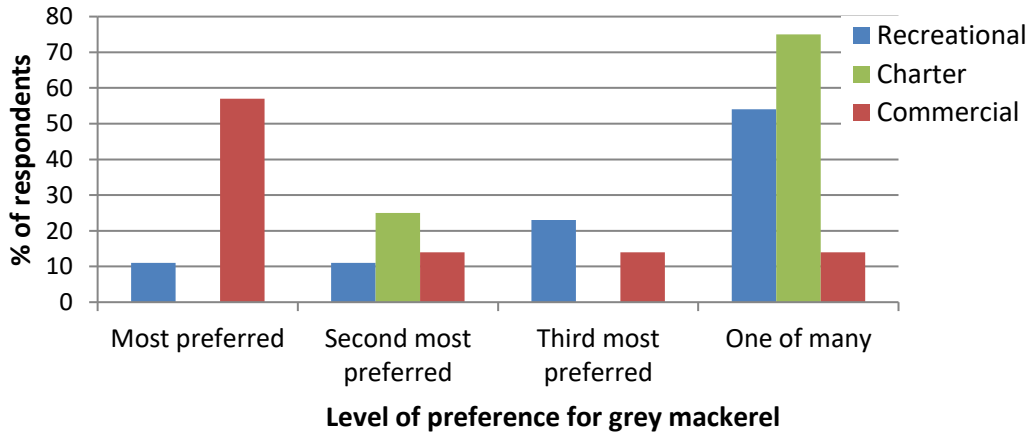


Figure 16 Level of preference for Grey Mackerel as a species of consumption as reported by recreational, charter and commercial fishers in the Port Douglas region

Two thirds (67%) of seafood retailers stated that, compared to other species, no-one specifically asks for Grey Mackerel, although the remaining seafood retailer surveyed stated that it was in high demand during the season as a “fish and chip” fish, but low demand during the season as a “fresh” fish (see Box 5 for related comments).

Box 5. Seafood retailer comments regarding the popularity of Grey Mackerel among customers

"If you talk them into buying it, they won't buy anything off you again"
"We sell a lot! It's the main fish used at the licensed café and is in high demand all year round as a "fish & chips" fish…"

Where is consumer Grey Mackerel sourced and sold?

All responding commercial *line* fishing respondents (n=3 for this question) stated that they sold at least some of their Grey Mackerel product locally within the Port Douglas region (20, 50 and 100% of their Grey Mackerel product for each responding fisher, respectively). The remainder of their product was sold in Cairns (Note: some may consider Cairns to still be a 'local' market, given it is less than 70 km from Port Douglas. That was not the case for these fishers). In contrast, none of the commercial *net/line* fishing respondents sold their Grey Mackerel product within the Port Douglas region directly, with the majority (75%) selling at least some product to Cairns (this was the sole market for 50% of *net/line* fishers). Other markets included Sydney (50% of *net/line* fishers), Brisbane (50%), Melbourne (25%), and Japan (50%). We did not collect more information on the proportion of product sold in these different markets.

Two thirds of seafood retailers surveyed stated that they sold Grey Mackerel in the Port Douglas region, although they marketed it as 'mackerel' and not 'Grey Mackerel' specifically. The single seafood retailer who did not sell Grey Mackerel cited product quality as the main reason (see Box 6 for related comment):

Box 6. Explanatory comments from the one seafood retailer who does not sell Grey Mackerel

"Not a good product…no demand in Port Douglas – never has been as far as I know…tried to sell Grey Mackerel to every restaurant between here and the Daintree, but no one wants it … only wholesalers in Cairns…"

Seafood retailers who sold Grey Mackerel in the Port Douglas region (n=2) stated that they did not buy fish from commercial netters operating in Port Douglas, but instead sourced it from local commercial *line* fishers as well as buying 'pre-prepared' product from the Tablelands (i.e. west of Cairns. It is unknown where this product is from directly). They stated they always advertise the product as locally caught.

Knowledge of commercial Grey Mackerel fishing

Given the apparent angst within the community about commercial net fishing for Grey Mackerel, we wanted to gauge people's knowledge, understanding and level of support for the industry in the region, which may influence people's opinions and concerns about potential changes to Grey Mackerel fishing.

Are stakeholder groups aware there is commercial netting for Grey Mackerel in the Port Douglas region?

Most respondents in all sectors (except related businesses) were aware of commercial netting for Grey Mackerel (Figure 17) particularly through personal experience (see Figure 18) – i.e. they had personally witnessed netting. Most of these respondents also heard about the netting from other sources, including other fishers, local community members, other tourists, and the media (including local newsletters).

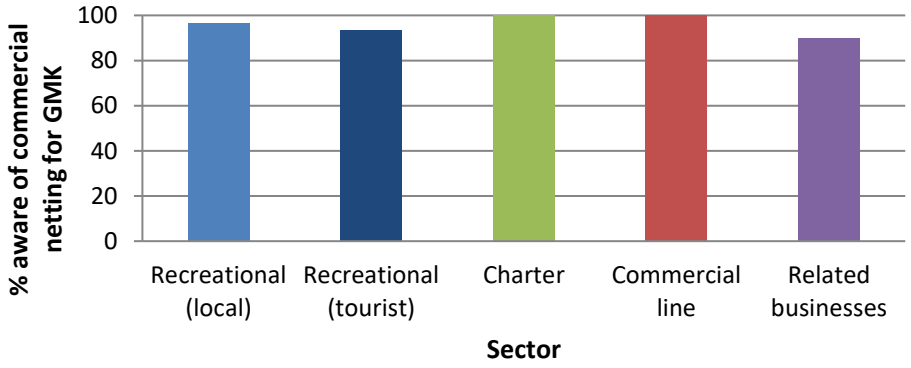


Figure 17 Awareness of commercial netting for Grey Mackerel in the Port Douglas region by non-netting fishers and related businesses.

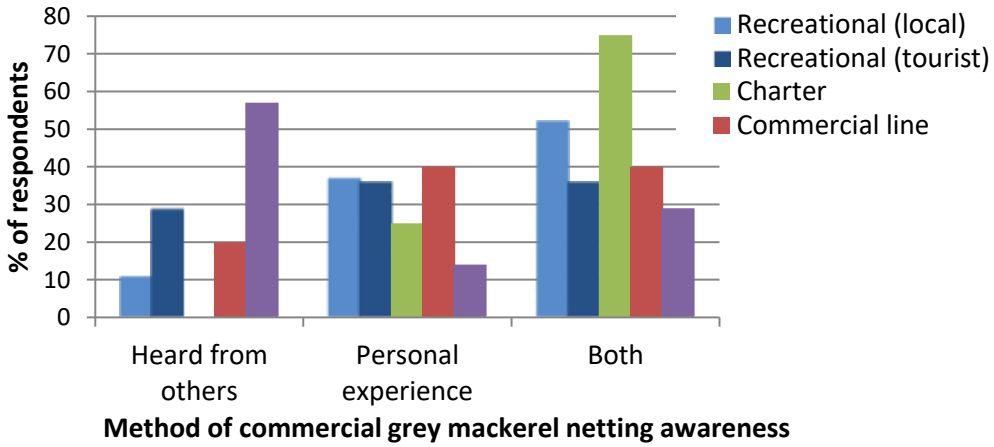


Figure 18 How non-net fishers and related businesses in the Port Douglas region became aware of commercial Grey Mackerel netting.

Apart from their own experience, the most common information source about commercial Grey Mackerel netting was by word of mouth; particularly other local recreational fishers (see Table 6). Commercial *line* fishers also heard about it via other commercial fishers, and related businesses heard about it via tourist recreational fishers. The media was also a predominant source for recreational fishers, charter operators and related businesses. Specific media included local newspapers and newsletters such as the 'Line burner'. Box 7 outlines some selected comments explaining recreational fishers' and charter operators' information sources.

Table 6 Where non-netting fishers and related businesses have heard about commercial netting for Grey Mackerel (not including personal experience), presented as a proportion of respondents in each sector.

Only those source listed by >1 respondent are shown here. More than one response per respondent was allowed. The response chosen by the greatest proportion in each sector is shown in bold.

Information source	Recreational (local)	Recreational (tourist)	Charter	Commercial line	Related businesses
Recreational fishers	**71**	**33**	**67**	50	**50**
Media	59	**33**	**67**		**50**
Commercial fishers	35			**100**	
Locals (not specified if fishers/not)	18	22	33		33
Tourist Recreational fishers	0	**33**			**50**
Charter operators	12		**67**		
# responses	34	15	7	3	11
# respondents	17	9	3	2	6

Do stakeholder groups approve of commercial netting for Grey Mackerel in the Port Douglas region?

Most line fishing sectors and related businesses disapproved (most fishers in all line fishing sectors 'strongly' disapproved) of commercial Grey Mackerel netting in the Port Douglas region (see Figure 19). Statements outlining reasons for disapproval were coded to cover broad themes (see 0 7), with the most common statement relating to the belief that net fishing for Grey Mackerel was unsustainable, non-selective or inappropriate for inshore areas or breeding grounds. Some were also concerned about allocation issues between sectors, and specifically about fishing spawning or breeding schools. Box 8 provides a number of original statements to provide more clarity of the opinions held, including statements from those who approve and those who disapprove of Grey Mackerel netting.

Box 7. Selected comments from fishers regarding how they were aware of commercial Grey Mackerel netting in the Port Douglas region.

Local Recreational fishers:

"I hear about it from other recreational fishers and local commercial fishers. It's reported in the Gazette and the Cairns Post too"

"Went to the local meeting at Wonga Beach ages ago. Also hear about it in the newspapers, and the NSF [Network for Sustainable Fishing] *committee newsletters"*

"I hear about it from commercial and recreational fishers, plus the papers - the Port Douglas Gazette. Also in the 'Line Burner' – written by great people, passionate about fishing and having their say"

Tourist Recreational fishers:

"Never seen it myself... been told by other tourists – "Them bastards are out there with their nets" is what they say"

"I saw a net reel boat anchored close to Newell Beach. Also hear about it through the media, community members, tackle shop, and the Boating patrol"

Charter operators:

"I've seen it. Plus you hear about it from everyone – recreational and charter fishers, members of the public..."

"The 'Line Burner' covers the issue well... One dude sends email threads to us – very passionate and Grey Mackerel are important to his business"

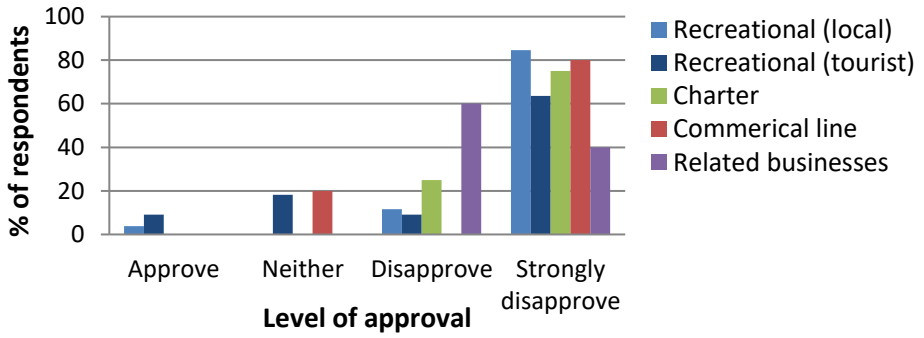


Figure 19 Non-netting fishers' and related businesses' level of approval of commercial Grey Mackerel netting in the Port Douglas region.

Table 7 Coded reasons explaining why line fishers in each sector and related businesses disapprove of Grey Mackerel netting.

Only those source listed by >1 respondent are shown here. Responses were frequently given >1 code. The coded response chosen by the greatest proportion in each sector is shown in bold.

Reasons for disapproval (coded)	Recreational	Charter	Commercial line	Related businesses	TOTAL
Unsustainable	**55**	**100**	**80**	**50**	**59**
Non-selective	43	**100**	**80**	40	49
Allocation	32	25	40	30	32
Spawning aggregation / breeding grounds	27	75	20	20	29
SOCI	23	50	40	10	24
Line ok, not net	18	0	40	20	19
Inshore is inappropriate area	7	0	0	10	6
Low quality product - waste / affects market	5	0	20	10	6
NIMBY	7	0	0	10	6
They are non-locals	2	0	40	0	5
# of coded responses	99	15	18	20	152
# respondents	44	4	5	10	63

Box 8. Line fisher comments regarding their level of approval/disapproval of commercial netting for Grey Mackerel

Recreational

"They have to make their living, but there is a lot of water out there and they could go a lot deeper. Everyone has worked in their life - no grudges about it"

"Netting takes everything…lines only catch a little bit, nets catch tonnes every night – it's unsustainable"

"If you net and catch all the fish you destroy fish reserves. I prefer to pay more money for sustainable fishing - similar to pole fishing tuna. [It's] harder to destroy fishery one line at a time ... [there have been] dead Dugongs – indiscriminate. No set nets of any sort are good."

"We can't catch fish when they're here."

"[They] specifically target large schools of Grey Mackerel. It's not sustainable. The size and length of the nets says it all - so big, right on the tide lines exactly to catch fish. [Also] bycatch and a lot of it undersized as the nets don't discriminate. [It's a] waste to throw it overboard - must keep some through their license. But there's a lot of bycatch, and I believe no market."

"From a recreational point of view – flat out getting a quota and not even catching it! Most guys go out for a few fish, they're not filling their freezer…commercial fishers take, rape and pillage whatever they can get"

"[They] come in and catch all the legal-sized fish – only illegal and undersized fish (those that can get out of the net) are left for us"

"Depletes fish stocks by what they take and what they don't take – waste of other species…for each Grey Mackerel they gill net, there's 1 or 2 fish (any species) that drop to the bottom, dead"

"Fishing too close to shore, danger they're interfering with breeding of fish in the area"

"It's a breeding ground…you don't interrupt a breeding ground of anything!"

"Someone has to catch them [i.e. the fish]…commercial netters have just as much right to be there – they pay their fees…hard to make a distinction between 32 line trollers and 1 net boat"

"Wouldn't allow it; they're murdering the fishery, wiping it out; between Brisbane and Cairns are plenty of places to fish, but fishing is too good at Snapper Island - big shoal is too good for them [commercial netters] to resist"

Charter

"The method – although it's legal – takes out all fish in a spawning aggregation. They're not thinking of next year. [Net] fishers need to open their eyes – this is their fault. [It's] obvious the fish are no longer here"

"Allocation is not important; main problem is methods they're using that target spawning masses"

"[This is a] high tourism area – visitors don't want to see mass slaughter of any fish spawning aggregations"

Commercial line

"[They're] coming here and targeting Grey Mackerel schools saying they're targeting shark. [They] clean the fish out. No local commercial and recreational families can catch a fish and it's getting worse - upsetting everyone. Nothing to take kids for in the future...

"When we go with our lines we can't fish it out - we can't catch everything. The school regenerates every year and migrates through"

Related businesses

"[Problem is] the areas they're targeting and breeding areas. It's ok in the local area, but should have capped quota (i.e. 1 tonne). The quantity is too big currently"

"They can go further afield (out to sea). Closer in should be left for recreational fishers and locals"

"Port Douglas should be left for recreational fishers. Netting in any form (i.e estuaries, inshore fishing) is not sustainable. Should be no netting - it is not selective. Line fishing is more sustainable - 100% sustainable..."

Changes to Grey Mackerel fishing

Has Grey Mackerel fishing changed?

Fishing Effort

The majority of all recreational fishers (71% overall, slightly higher for tourist fishers in particular) stated the number of days they spent Grey Mackerel fishing in the previous 12 months had decreased from previous years (Figure 20), 83% of which specifically stated it had decreased 'a lot'. Charter operators were divided regarding whether the number of days they fished for Grey Mackerel had changed, as were commercial *line* fishers. Most commercial *net/line* fishers (67%) stated the number of Grey Mackerel fishing days had decreased (Figure 20).

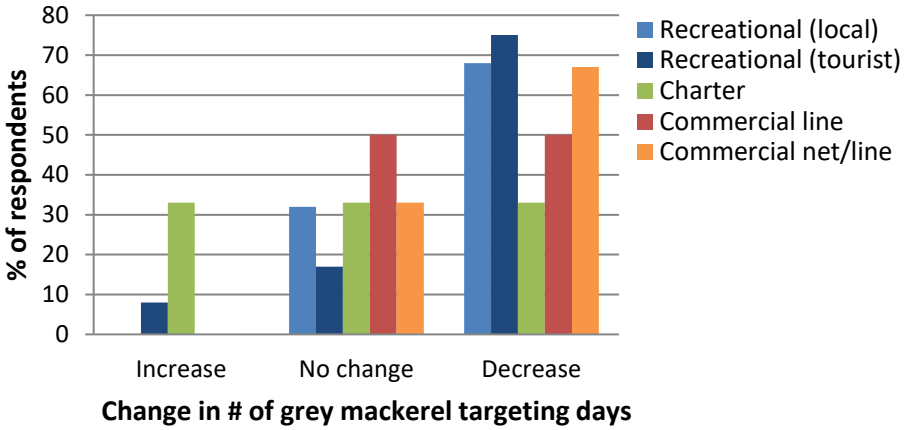


Figure 20 Reported changes in respondents' number of days spent fishing for Grey Mackerel in the past 12 months, compared to previous years.

Most *local* recreational fishing respondents (64%) and all commercial *line* fishing respondents quoted changes in fish numbers as the main reason why they fished more or less (Figure 21). For *tourist* recreational fishers the weather played a more important role. Some statements explaining recreational fishers' thoughts are provided in Box 9. Weather also played an important role for some commercial *line* fishers, as did issues with costs of fishing and commercial netting. Commercial *net/line* fishers stated conflict with locals was the reason they fished less for Grey Mackerel in the previous year (Figure 21).

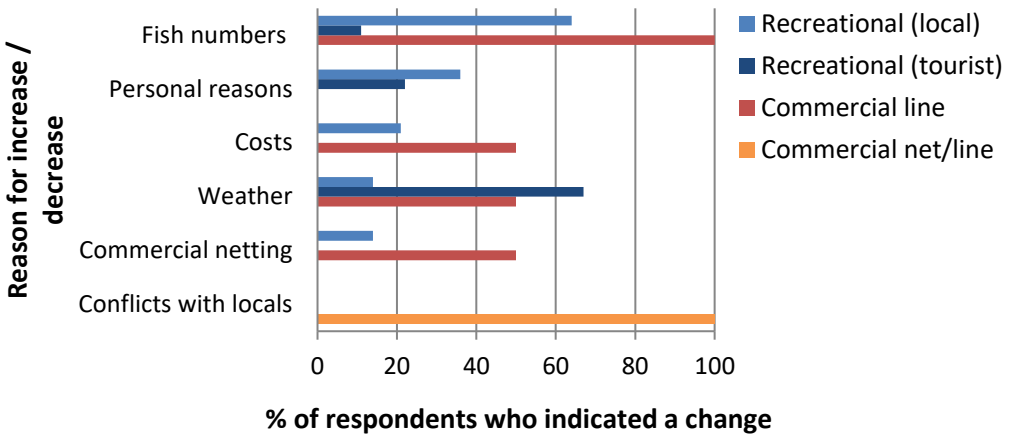


Figure 21 Coded reasons given by respondents from each sector regarding why the number of days they fished for Grey Mackerel had increased decreased in the previous year.
More than one response was allowed per respondent.

Box 9. Recreational fishers' comments regarding why the number of days they fished 12 months prior to the survey decreased compared to previous years.

"If things were healthy, I'd be out fishing more."
"Fish numbers have decreased significantly. Gillnetters come when the seas are too rough for recreational fishers – they're in first and by the time recreational guys get out, they're [i.e. the recreational fishers] lucky to get one. Possibility that they've cleaned the lot out."
"Previous year did not go at all – saw netters and went to reef instead"
"…you don't want to burn petrol looking for Grey Mackerel that isn't there."
"The weather – been windy for past 3 weeks, plus for first 6 weeks of our trip. We would go everyday for a few hours if the weather would allow us to."
"It's windy. Last year was the best for weather, but no legal-size fish. This year it's windy, but good for good fish".

Satisfaction

When asked if their satisfaction with Grey Mackerel fishing had changed from previous years, most (68%) *local* recreational fishers stated that their level of satisfaction had decreased over time – the majority of which (93%) stated it had decreased a lot (Figure 22). In contrast, most (70%) *tourist* recreational fishers stated that their satisfaction with Grey Mackerel fishing had increased over time, 71% of whom stated it had increased a lot. Half of all charter operators surveyed also stated that it had decreased a lot (Figure 22).

This trend varied with individual sectors. Most (87%) local recreational fishers identified decreased fish numbers as the main reason for their change in satisfaction followed by netting (47%); tourist recreational fishers cited the opposite, identifying increased fish numbers (86%), greater fish size (43%) and absence of commercial netting (29%) as the main reasons. All charter operators who stated that their satisfaction had decreased identified commercial netting as the main reason why, followed by decreased fish numbers (mentioned by 50% of charter fishers who stated their satisfaction had decreased) (see Box 10 for related comments).

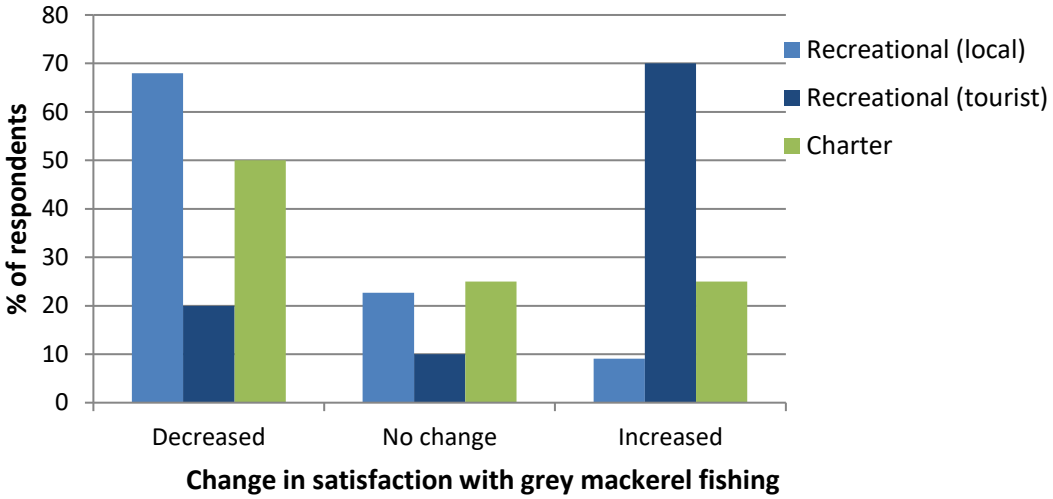


Figure 22 Change in satisfaction with Grey Mackerel fishing compared with previous years as reported by local and tourist recreational fishers and charter fishers in the Port Douglas region.

Box 10. Recreational and charter fisher comments regarding satisfaction with current Grey Mackerel fishing in the Port Douglas region

Recreational (local)

"Netters came in…noticed immediate collapse in stocks"

"(Fishing) better this year - netters not here this year - don't know why; but now more grey mack than there has been because they [netters] were stripping it bare - grey have rejuvenated; fish (are) bigger (115-120cm) - previously would only come back with 1 or 2 and usually smaller (the ones that get out of the nets)"

"[Decrease] in quantity of Grey Mackerel around. Up until netting there was a good quantity available for recreational and professional fishers who sustainably trolled. A few years ago it was satisfactory until the inshore netters came and started targeting Grey Mackerel at the breeding area around Snapper Island"

"This year fishing was very good – weather bad and netters can't come"

"There is nothing to catch and it's a costly exercise - i.e. cost of fuel to go out there and find there is nothing there because the stocks have been depleted; leaves one in a depressing state"

"Because of fish stocks netted inshore – taking Grey Mackerel…non-selective netting takes other species which school together…disappointed with government – consultation and meeting with no resolution"

Recreational (tourist)

"More and bigger fish this year - a lot bigger (115-120cm) and fat; getting average of 5 or 6 fish (per trip), 3 or 4 of those big"

"More good fish. No pro nets this year. Local pros troll here - have equal advantage as us"

"Better gear and luck - fishing is luck, bit of skill, but have to drag it past them – luck. 20% increase this year compared to last year - this year best year that I've had here"

Charter

"Because of netting – they're taking the lot…can't begrudge commercial line fishers"

"Over last 5 yrs it's decreased to nothing…method of netting – fish aggregations are all taken…"

"Concern is from broader point of view…so much is taken…sustainability is good for business and future people to fish…"

Catches

When recreational fishers were asked specifically if they're Grey Mackerel catches had changed in recent years, answers varied between individual sectors. Over three quarters (80%) of *local* recreational fishers stated that catches had decreased, most of which (64% of fishers) stated that catches had decreased a lot (Figure 23). *Tourist* recreational fishers were divided as to recent catch rates (46%) saying that Grey Mackerel catches had increased in recent years (30% stated that they had increased a lot), while 38% stated that they had decreased a lot. Charter operators who responded were divided as to the trends in Grey Mackerel catch rates in recent years, with half stating that there had been no change and the other half stating that catches had decreased a lot. Similar to most local recreational fishers, three quarters of commercial *line* fishers stated that Grey Mackerel catches had decreased a lot in recent years. Commercial *net/line* fishers either couldn't say (50%) or stated that there had been no change (50%) in Grey Mackerel catches in recent years (Figure 23).

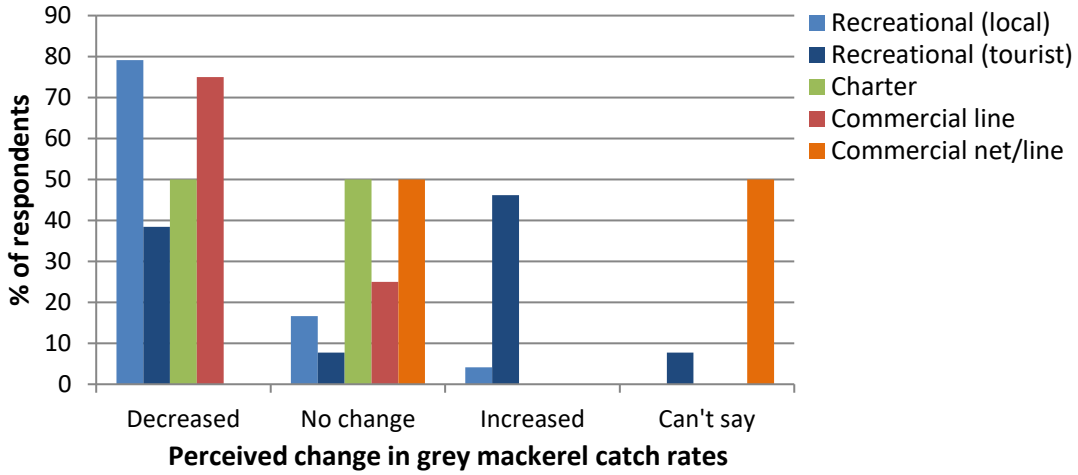


Figure 23 Perceived change in Grey Mackerel catch rates in recent years as reported by fishers fishing in the Port Douglas region.

All tourist recreational fishers and the majority (89%) of local recreational fishers listed "netting" as the main reason why catches had decreased in recent years (see Box 11 for related comments). Most (80%) tourist recreational fishers who believed catches had increased attributed it to the absence of netters. All commercial *line* fishers and charter fishers who stated that Grey Mackerel catches had decreased in recent years identified "netting" as the cause for the decrease in catch rates.

Box 11. Recreational fisher comments regarding why Grey Mackerel catches have decreased in recent years in the Port Douglas region

"Netting – can't prove it, but that's my opinion… [They] set right over the Grey Mackerel breeding ground – if that hasn't fished them out, it's frightened them out!"
"Mackay was a known Grey Mackerel breeding area – when discovered, netters depleted huge stocks and caused a "memory" in fish where they found the area unsafe and they avoided it…worried it could happen here"
"Before, could catch 20 fish easy. 20 fish now is like winning the lotto…netters dwindled stock and it needs to grow back"
"Because of netting…it is definitely nets causing this depletion..."

We asked fishers to rate this particular season (at the time of survey) of mackerel fishing and to compare it the previous few years and the previous decade. Only the recreational fishers provided enough responses to use these data, and hence they are the only sector shown here.

Most recreational fishers (56%) who responded stated that the current season (at the time of this survey) of Grey Mackerel fishing was 'good' (Figure 24); reasons for this varied with most respondents either citing the perceived absence of netters (40%) or the weather and atypical heavy wet season (40%) (see Box 12 for related comments).

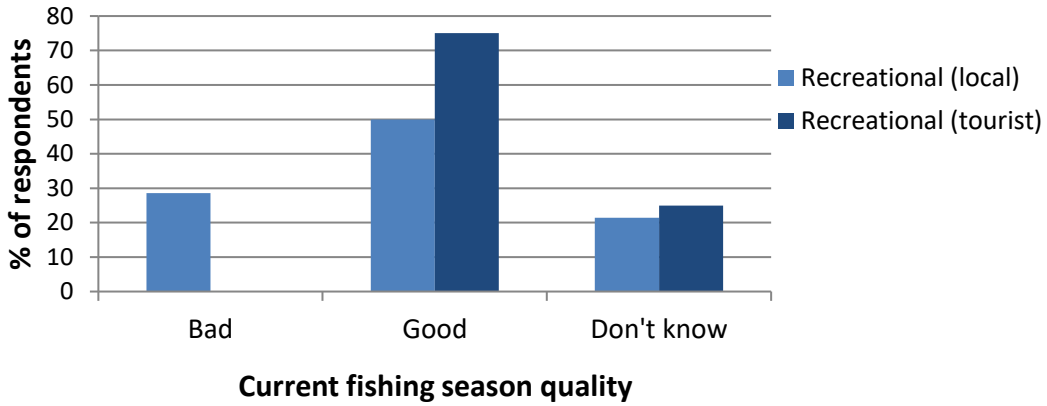


Figure 24 Perceived quality of Grey Mackerel fishing for the current season as reported by local and tourist recreational fishers in the Port Douglas region.

Box 12. Recreational fisher comments regarding the current season of Grey Mackerel fishing in the Port Douglas region

"Better season this year – few more than there has been (he hasn't been up here as much)…should be able to catch your 5 without much hassle – have this season"
"This year was good – good wet this year"
"Slightly/marginally better – because of absence of netters, who are having a better season down south"
"Pretty poor so far…weather is a big factor plus not a lot around…now we're lucky to get one for the whole trip – Spanish mackerel are up, but Grey Mackerel are low"
"Haven't gone – don't bother…heard from others that they're not getting numbers

Compared with previous years, most (58%) of all recreational fishers surveyed stated that this season of Grey Mackerel fishing was better, although this varied somewhat between sectors (Figure 25). As before, most (78%) respondents attributed this to the perceived absence of netters as well as the atypical weather (33%) (see Box 13 for related comments).

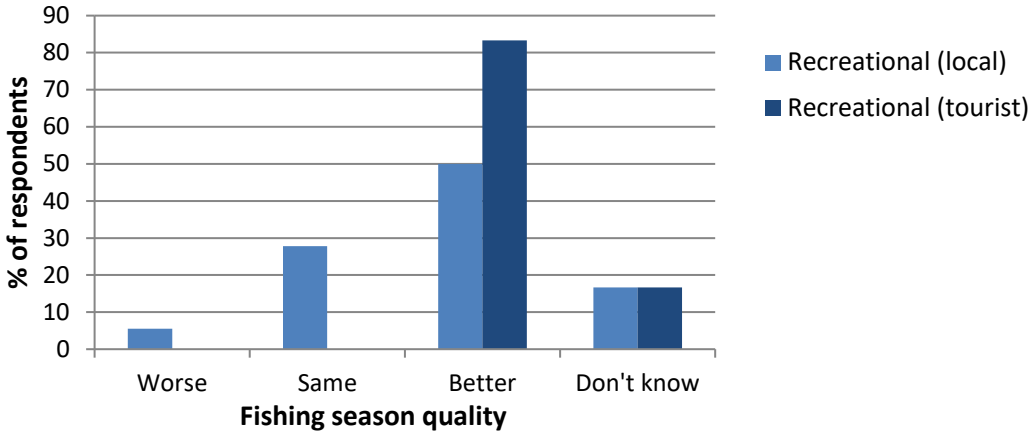


Figure 25 Perceived quality of Grey Mackerel fishing for the current season when compared with the previous few years as reported by local and tourist recreational fishers in the Port Douglas region.

Box 13. Recreational fisher comments regarding the current season of Grey Mackerel fishing in the Port Douglas region compared to previous years

"This year best year that I've had here – 20% increase this year compared to last year"
"Better this year – big fish and catching 3 or 4 each trip"
"Word of mouth (local recreational fishers) says better than last year so far"
"Fair, not as poor as previous years…can't account for it being a fair year – bad weather probably helped, keeps commercial fishers away and gives fish a break"
"Last 2 years were horrible…few years ago it was satisfactory until the inshore netters came and started targeting Grey Mackerel at the breeding area around Snapper Island"
"Caught one – still poor, but a few more this year than last year"
"Don't know, haven't bothered…haven't heard numbers are improving"

When comparing this season to the previous decade, the majority (90%) of all recreational fishers who responded stated that this season was worse (Figure 26). Nearly all (94%) respondents attributed this trend in decreased fishing quality to commercial netting in the Port Douglas area. Box 14 outlines multiple related comments when fishers were asked about historical trends. Some comments clearly outline that fishing was much better in previous decades. While many comments relate the decline in catches to netting, some comments suggest catches were declining prior to the commercial netting arising as an issue.

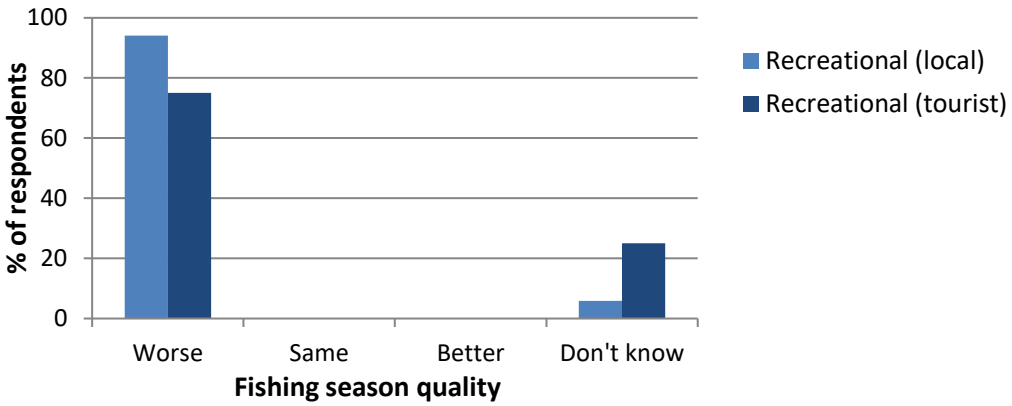


Figure 26 Perceived quality of Grey Mackerel fishing for the current season when compared with previous decades as reported by local and tourist recreational fishers in the Port Douglas region.

Box 14. Recreational fisher comments regarding the current season of Grey Mackerel fishing in the Port Douglas region compared to previous decades

"Dramatic decrease in the past 5 years…"
"Very, very poor…guaranteed to catch Grey Mackerel until 8 years ago – needed technology, but got bag limit…used to see schools few decades ago (on the sounder) – would see a solid surface (12m wide) with sharks following and we would go through them with set lines…was too many, too hard to handle!"
"Early 2000s felt you had a good chance of catching Grey Mackerel, but not towards the end of the decade"
"Better when I was a kid…father fished 20-30 Grey Mackerel in a few hours – a lot more then"
"Has thinned out a bit…there are less now…15 years ago I could see spawning aggregations out front"
"Used to have shoals of 200-300 metres of Grey Mackerel and you could work the edge…down by 90% -- shoals are gone…they got netted out…"
"Just stuck line in and caught Grey Mackerel immediately…used to be schools of big fish at Bell's reef (30-40 monsters at 15/20lbs each!), but don't see them anymore – been dwindling bit by bit…"
"Used to get a feed. Used to (over 10 years ago) get spawning schools in 70ft of water ... here was 60-70 recreational plus pro boats in the '70s and everyone was catching fish. Used to be several schools for a few days, but have not seen them last year or this year (not sure if that's due to currents or nets). Dramatic decrease in the past 5 years, marginal increase this year from last. When GBRMPA closed reef brought a lot of pros out of reef into areas they weren't before - they are entitled, but Grey Mackerel were ok here when they were line fished as you only catch those that want to feed"
"28 years ago, I came home with 400 pots of fish in 40 minutes and everyone else was catching lots. Lots of boats too. [Older commercial fishers] used to fish until they couldn't plane the boat then go home. Was always sustainable year after year whereas with netting you can notice a dramatic drop in numbers. But this (i.e. catching 5 Grey mackerel) hasn't happened for 5-6 years (in Cape Tribulation)"
"[Older recreational fisher] came here in the '70s and taught everyone how to catch Grey Mackerel using live herring - everyone was catching them. Line fishers have been here for decades catching Grey Mackerel, but fish always in same numbers - catch just as much at the end of the season as they did at the start (i.e. ~30-40 fish at start and ~20 at the end) - no one seemed to be able to fish it out. But when netters came they wiped it out within a few years"

"Used to see massive schools, hundreds and thousands of seagulls more than 10 years ago - by mid-morning you'd have your catch. Now you don't catch your bag limit. This year fishing from morning to 11am caught 5 fish which is a marked improvement. Used to catch your quota by 11am previously"
"My father would come home with good, strong catch - no bag limits then. He'd catch 25 fish – i.e. 1 person, 3 hours of fishing. Pre bag limits, ~6 years ago, average was 8-10 per person per trip. Just noticed gradual decline in fisheries stocks over the years..."
"Used to catch high teens to low 20's before bag limits, around 25-30 years ago. Used to be 20 boats out there, now you don't want to burn petrol looking for GMK that isn't there. Has been depleting for at least a decade if not longer"
"I previously commercially fished for mackerel (grey, Spanish, etc) by line, in the 1980's for a couple of years, but wasn't viable. I wasn't as good as the others catching them - 20-30 boats trolling around each other back then. Had to be careful not to get lines tangled! Problem was recreational guys were catching heaps too and selling them on the black market - made some people very unhappy, particularly the commercial guys"

Are stakeholders concerned about Grey Mackerel fishing in the Port Douglas area?

When asked specifically, 91% of all respondents stated that they were concerned about Grey Mackerel fishing in the Port Douglas region: this included most (93%) recreational fishing respondents, all charter fishers surveyed, all commercial *line* fishers, 75% of the commercial *net/line* fishers, and 90% of related business respondents.

How does it compare to other issues?

When asked how concerned they were about Grey Mackerel compared to other local fisheries issues, responses varied among individual sectors (see Figure 27): most (64%) *local* recreational fishers stated that they had the same level of concern whereas *tourist* recreational fishers were fairly evenly divided (40% more concerned; 30% same level of concern; 30% less concerned). Charter fishers were divided evenly between being a lot more concerned about Grey Mackerel fishing and having the same level of concern as for other fisheries issues. Commercial *line* fishers were more concerned about Grey Mackerel netting, while commercial *net/line* fishers were divided. Interestingly, most related business stakeholders had either the same level of concern (50%) about Grey Mackerel as they did about other fisheries issues in the region or were less concerned (38%).

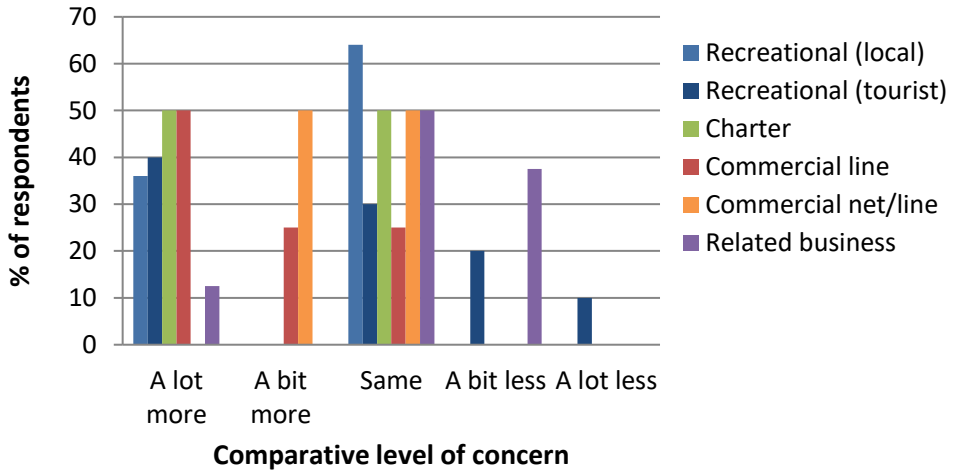


Figure 27 Level of concern about Grey Mackerel netting compared to other fisheries issues in the region.

What concerns fishers about Grey Mackerel netting?

While concerns about Grey Mackerel fishing expressed by recreational fishers were similar between individual sectors, the distribution varied between the two groups (Figure 28). The single greatest concern identified by *local* recreational fishers was sustainability, with 85% of respondents citing concerns that netting was an unsustainable method of fishing; non-selectivity of nets (63%) and the risk to species of conservation interest (SOCI) (33%) such as Dugong and Turtle were second and third, respectively. In contrast, the greatest concern identified by *tourist* recreational fishers was allocation of local stocks (43%), followed by issues of sustainability (36%) and concerns that nets may be interfering with local Grey Mackerel breeding grounds (29%).The main concern identified by all charter operators who responded was sustainability concerns and non-selectivity of nets followed by risk to SOCI (50%) and interference with a Grey Mackerel breeding ground (25%). Similar to local recreational fishers, the single greatest concern identified by commercial *line* fishers was sustainability, with 80% of respondents citing concerns that netting was an unsustainable method of fishing; non-selectivity of nets (60%) was the second greatest concern identified by respondents followed by the risk to species of conservation interest (SOCI) (40%) and allocation issues (40%). In contrast, the biggest concern reported by most (67%) commercial *net/line* fishers was access to the resource. A fisher also outlined concerns regarding license devaluation and negative public sentiment. For related businesses, concerns expressed were similar between business types sectors, the distribution varied between the three groups: All business types expressed some concern about sustainability with 100% of seafood retailers, 50% of caravan park respondents and 33% of bait and tackle shop respondents citing concerns that netting was an unsustainable method of fishing. See Figure 28 for coded concerns listed by all sectors, and Box 15 for examples of specific comments from fishers.

When asked if their customers ever mentioned their concerns about Grey Mackerel fishing to them, seafood retailers were evenly divided (33% sometimes, 33% rarely, 33% never).

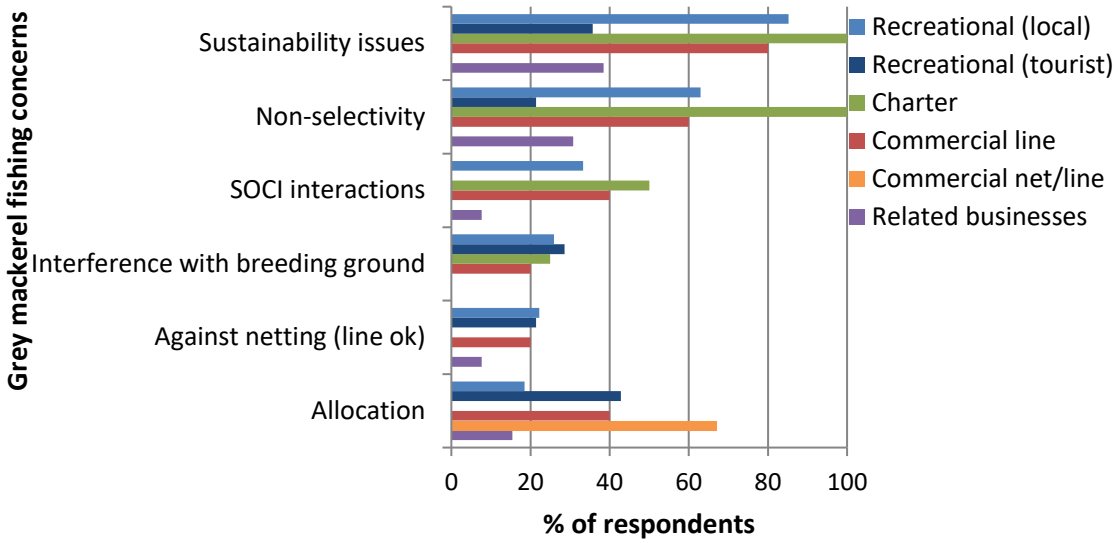


Figure 28 Distribution of Grey Mackerel fishing concerns as reported by respondents from all fishing sectors in the Port Douglas region.
Only concerns listed by >1 fisher are shown here. More than one coded response was allowed per respondent

Box 15. Fisher comments regarding concerns with current Grey Mackerel fishing in the Port Douglas region

Recreational

"Allocation - commercial fishers should be restricted to same methods as recreational fishers rather than netting. Not enough info regarding sustainability - i.e. whether or not it is sustainable"

"Sustainability. Been here all our lives; everyone would like to get a feed [but it's] been wrecked by a couple of ruthless netters. [They're] not local, they don't care. Another concern is Dugong bycatch - more damage from commercial netters than people realise ... Spanish mackerel are being caught in nets too"

"Fishing too close to shore, danger they're interfering with breeding of fish in the area"

"Sustainability - if allowed to continue as is, there won't be a fishery; I am sure that line fishing is and was sustainable"

"Bycatch - net does not discriminate between spotted/school mackerel and Grey Mackerel or Dugong/turtle and Grey Mackerel. Heard about Dugong/Turtle bycatch, but haven't seen it personally"

Charter

"Sustainability concerns, and bycatch – which is big. Main problem is methods they're using that target spawning masses"

Commercial fishers

"Sustainability – locals (including pros) who have supplied local markets are the ones who are trying to make it sustainable…these fellows coming in from out of town and ruining it"

"A lot of fish fall out of the net and rot on bottom – what a waste…"
"Pros (local, line) don't complain about rec fishers catching fish here, that's fine, but when local pros can't get enough to supply the market it's a problem"
"It is sustainable, management says it's sustainable…it's more a local issue…public emotion is a concern…"
"Concerned about losing ground area for all QLD license holders N1 or N2 and chipping away at fishery…we lose income because we lose area, then it devalues the license"

When did fishers start being concerned?

Fishers across all sectors who were concerned about Grey Mackerel fishing stated their concerns began around 2004-2006: For recreational fishers individual answers ranged from 1980 to 2007 (median of 2005); half of the responding charter operators stated that they started to become concerned in 2004 (range 2004 to 2006); commercial fishers became concerned anywhere from 1985 to 2006, with a median of 2004, and many related business respondents (44%) became concerned in 2005 (range from 2004-2010).

The individual catalysts for these concerns were similar for most fishers, with most local and tourist recreational fishers and commercial line fishers believing this was the point of the onset of commercial netting in the Port Douglas region (Figure 29). Most (50%) charter operators stated that a noticeable increase in commercial netting in the Port Douglas region was the main reason why they started to become concerned. In contrast, most (67%) commercial *net/line* fishers stated that conflict with other fishing sectors (commercial line fishers, recreational fishers) in the Port Douglas region was the main reason they started to become concerned. Related businesses primarily stated fish numbers had decreased and there was increased public awareness. See Figure 29 for the distribution of coded responses from all sectors and Box 16 for some more detailed comments.

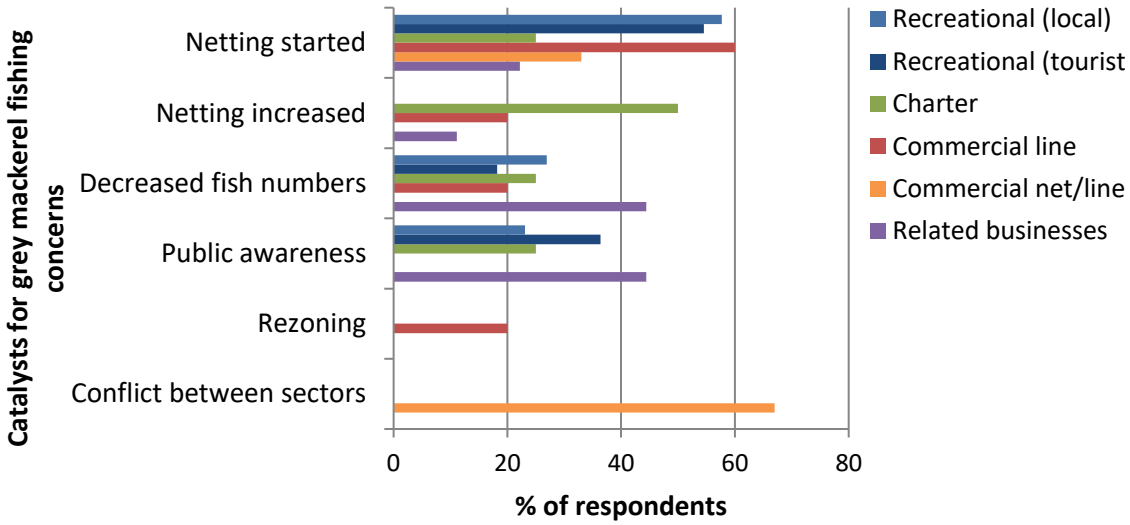


Figure 29 Reasons given by fishers in Port Douglas as to why they started to become concerned about Grey Mackerel fishing in the area.

Box 16. Fisher comments regarding why they started to become concerned with Grey Mackerel fishing in the Port Douglas region

Recreational:

"[I had been] hearing about netting up and down coast in 2004/05, but I was new to area and doing other activities. [It] struck home in 2006 when met with [a commercial fisher] and [was made aware of] a petition"

"[They] started having public meetings... I went to a few of them"

"Net boats came in the year before. I tolerated the 1st year and fishing was ok, but the next year it decreased and last year it was dreadful"

"First inshore netters arrived. Decline in fish was immediate. [A commercial fisher] immediately began a petition for DPI. Became a huge priority"

"Fish numbers dropped and then looked at what was going on out there, what was happening to fish stocks. Netters arrived and were there - linked netting to decline in fish stocks over the years"

Charter:

"More people netting and more often. Drastic change in fish numbers"

"[It was] talked about in the small boat [charter] industry"

Commercial line:

"When shark netters first came here; sorted it out for awhile – gentleman's agreement – but then they came back 4-5 years ago and started hammering the area..."

"Influx of net boats coming into the area…were there before in small numbers at night, but in 2006 there was a big increase with nets in the water 24 hours/day"
"Since the netters came the local stock levels have dropped…in 2006 things escalated due to more netters"
"Rezoning – coincided with closures of fishing zones along the coast…netters were pushed out of their area after the re-zoning and were forced up here…only up for a small amount of time and they have a legal right to fish these waters"

Commercial net/line:

"Amateurs tried to cut down your area and kick out the commercial guys (netters) from the region…entitled to fish by my license…proved it's sustainable…"
"Been ongoing issue forever. Conflict over Snapper Island since [commercial fishers] started [fishing there] decades ago"

Related businesses:

"Saw how few fish customers were catching…"
"Became more highlighted in media (i.e. local newspaper, radio, etc) and through rallies"
"They started cutting right in on beach…previously it was a "no go" and people didn't do it ("gentleman's agreement")"
"When netters first started…had business (fresh seafood/fish & chips) and was expecting fish, but there were no fish left…expecting Grey Mackerel to buy and none there"

Concerns for most respondents were based primarily on their own experience a combination of their own experience and information from other sources. Only a small proportion of recreational fishers stated their concerns were based on what they learned from other sources. Unlike the fishing sectors, however, most (56%) related business stakeholders stated that they had based their concerns on information received from other sources (Figure 30).

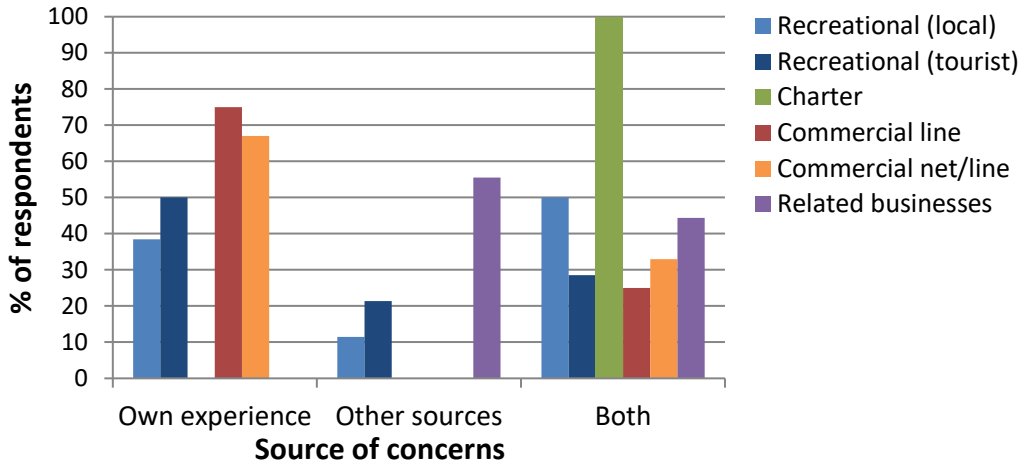


Figure 30 Source of Grey Mackerel fishing concerns as reported by fishers and related businesses in the Port Douglas region.

Seventy five percent of all fishing concerned respondents stated their concerns had not stopped them from fishing for Grey Mackerel: This included all tourist recreational fishers, over half (57%) of all local recreational fishing respondents, 75% of charter operators (one had stopped fishing for Grey Mackerel) and all commercial fishers.

Of the 43% of local recreational fishers who stated that their concerns had stopped them from fishing for Grey Mackerel identified decreased fish numbers (75%) and increased costs (i.e. fuel, bait) associated with extended trolling times needed to find Grey Mackerel (50%) as the main reasons (see Box 17 for related comments).

Most (78%) related business respondents stated that issues surrounding Grey Mackerel fishing had not affected their business (see box 18 for some specific comments). When asked if the amount of Grey Mackerel sold had changed in recent years, seafood retailers were evenly divided with 33% of respondents stating it had increased a little, 33% reporting no change and the rest stating it had decreased a lot.

Box 17. Recreational fisher comments regarding why they had stopped fishing for Grey Mackerel in the Port Douglas region

"[I stopped] for a while a few years ago…wasn't worth going – fish numbers so low…"

"Last time [I went] was 2 weeks ago…fuel costs are quite high and since reports are that there is nothing out there, I don't waste my time"
"Went 5 weeks ago and caught nothing – slowed me down because I know the fish aren't there"
"Don't have the time now…if you aren't going to catch anything, why bother? Waste of fuel, ice, bait and tackle"

Box 18. Related business comments regarding if issues surrounding Grey Mackerel have affected their businesses

"Don't think netting issue has stopped tourist fishers from coming"
"Not at this point, but there are people generally concerned ([e.g. saying] "Where is the mackerel?")"
"Could in the future…don't think tourist fishers would stop coming, but they DO catch mostly Grey Mackerel"
"Tourists come here for mackerel…if there is no mackerel, then it affects our business…they come, but they're despondent and their stays are shorter, spend less money anywhere in town"

Potential solutions to the Grey Mackerel issue

What are fisheries stakeholders' suggested solutions to the Grey Mackerel issue?

When asked what they thought was the solution to the Grey Mackerel issue they had outlined, the most prominent solution identified by the majority (60%) of all recreational fishers who responded was to have a "Net Exclusion Zone" for all commercial Grey Mackerel netting in the Port Douglas shire (Figure 31). Half of the charter fishing respondents suggested a "Net Exclusion Zone", and half suggested an end to netting altogether. Some also suggested adding a spawning closure for Grey Mackerel. Similar to recreational fishers, most (60%) commercial *line* fishers supported a "Net Exclusion Zone", whereas commercial *net/line* fishers were fairly divided between solutions. The majority (56%) of related business respondents suggested a "Net Exclusion Zone" as the best solution to the Grey Mackerel issue they had outlined. Another third suggested putting an end to netting altogether. See Figure 31 for the distribution of coded answers, and Box 19 for related comments from all sectors.

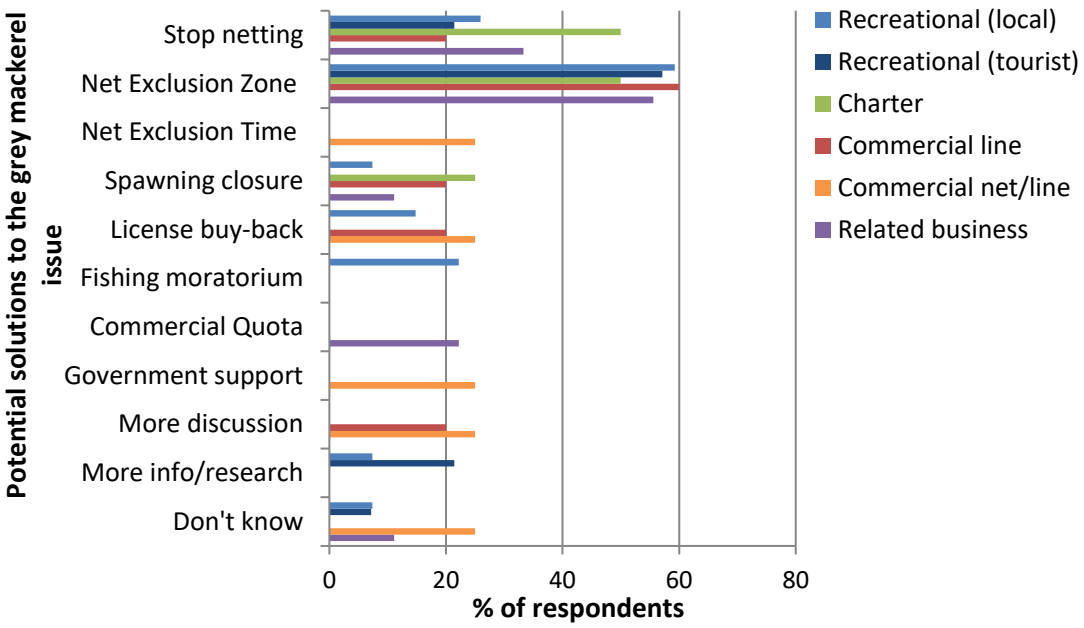


Figure 31 Potential solutions to the Grey Mackerel issue in the Port Douglas region as reported by fishers and related businesses.

Box 19. Respondents' comments regarding potential solutions to the Grey Mackerel issue in the Port Douglas region

Recreational:

"In this area, Grey Mackerel should be a line only species. In system as small as the Daintree where recreational and tourist fishery is so important, partially smooth and smooth waters of the Port Douglas area should be a net free area ("NFA"). People then say the commercial netters have to catch fish somewhere so we have fish to eat - I say "yes" but has to be sustainable; don't feed population by wiping out stocks, and currently we're depleting them"

"Complete ban of offshore netting from the area. Give Grey Mackerel a fair area to come in and breed without being harassed by 6/700m of net strung in front of them. [They're] catching them when they're most vulnerable. Catch with line – minor catch in comparison. They could come and line fish; no need to net especially with so many recreational fishers and tourists here"

"More research – form a validated, quantitative measure of recreational catch which is currently underestimated. Need information on the whole of fishery – rec, traditional, and commercial – for everything. Included in that we need to look at bait school dynamics; some of the bait that used to be here is not here now (food chain?). Regarding community issue: Everything here is based on qualitative observation – no science. Catches have dropped, but Grey Mackerel have natural fluctuation and cycle. Need good data on total catch for the whole fishery. Imbalance of what we know about fishery; don't know stock numbers or both sides of fishery"

"Recs should have at least a few kms out from shore because we don't go far out; they (netters) can fish out further"

"Push out yellow zone to 6 nautical miles (at least 3 or 4nm more than now) around Snapper Island then they can't net it, but can still line fish – rec and commercial fishers – and make good money by it"

"Take nets out or moratorium for a couple of years. Don't think limiting amateur catches any more would help – line fishing is proven sustainable – even pros could do it year after year. Might need 2-3 years to build stocks back up – people might have to live without it for awhile, but not a permanent closure. Would be worth buying back licenses"

"Need more information to be sure of correct solution. Precautionary principle in short term until we can be certain of what is going on..."

"They need to make a living and can come here anytime with handlines only to maintain the balance – I understand there are more overheads, need more catch and are forced into netting. They have my sympathies. Definitely don't ban commercial line fishing. If management plan put in place – buyback of netters or management area exclusion – I'm sure it'll recover, but it won't if they continue as is. If [there was] a moratorium on Grey Mackerel, that would be o.k. for 2 seasons then bag limit of 5 is plenty – if it allows for fish to increase – needs to be enforced"

"No more nets in inshore areas that recreational fishers use on a constant basis"

Charter:

"Black ban methods of netting... Nets = "wall of death". If any sort of commercial fishing continues on those species that form aggregations, need to go back to line fishing where knowledge and skill are required to catch fish"

"[In an] ideal world [I] would like to see ALL commercial fishing banned (line and netting included) – would be easier recreationally – wouldn't need to buy a fish. Old people who can't fish could get one off the local rocks..."

"Stop the netting in spawning aggregation areas..."

Commercial line:

"Stop the netting of spawning fish – permanent would be nice, but maybe a seasonal spawning closure (June to Sept/Nov)"
"Knock the net boats out and the problem disappears…lines can't fish them out – catch 1-2 then school gets spooked and disappears to come back another day"
"Keep shark netters and long netters out of the shire and let only local pros with history fish it, but lines only. Nothing against line pros, but netters come here and upset locals. Don't want to jeopardize someone's business – happy to buy them out just don't want them wrecking the area… get them away from here and go somewhere else!"
"Has to be give and take on both sides… (commercial netters) offered to cut their net size by half, but the Port Douglas ringleaders were against that…no compromise from the other side…commercial guys just waiting for the next shafting…"

Commercial net/line:

"If government or managers backed us – they need to say the issue is dealt with and leave it alone. Need someone to say they're doing what they are allowed to do"
"If shut down ... should have compensation or buyback. I want it to be sustainable and would stop if it's not. I haven't been shown or heard evidence of what's sustainable – work out solution from there and continue the fishery. Amateurs get a go on weekends and net boats can't fish then"
"Take out the hype and emotion and discuss it..."
"Can't say…people need us commercial guys to supply their fish – people up in the highlands, old people that can't/don't fish"

Related businesses:

"Stop all inshore netting – most critical and only thing to do…Grey Mackerel would be fine without nets…get rid of nets and everyone could go out and catch Grey Mackerel"

"Stop commercial netting! They're too close inshore – should go further to sea…they have the big boats as compared to the recreational fishers that have small boats"
"Need to rezone it – close inshore to commercial net fishers only…no one can do much damage with one hook, one line…"
"Don't know…if we are harvesting fish during their spawning period then we should stop netting – and they do appear to be spawning"
"Hard to strike a balance…commercial guys have to make a living, but perhaps some kind of quota would help? Perhaps leave Snapper Island for the recos? If you ban commercial guys it would be good for the recos, but no good for the fish & chip shops, etc… Need to find a way to share the catch"

How do fisheries stakeholders view co-management as a solution?

When stakeholder groups were asked if they were aware co-management had been trialled in the Port Douglas region as a potential solution to the Grey Mackerel issue they had outlined, responses varied between individual sectors (Figure 32). Most (75%) recreational *tourist* fishers were not aware of the co-management trials, while local recreational fishers and charter operators were fairly evenly divided. Most (89%) commercial fishing respondents stated that they were aware co-management had been trialled in the Port Douglas region. Related business stakeholders were similar to the *tourist* fishers, with most (80%) stating that they were not aware of the co-management trials (Figure 32).

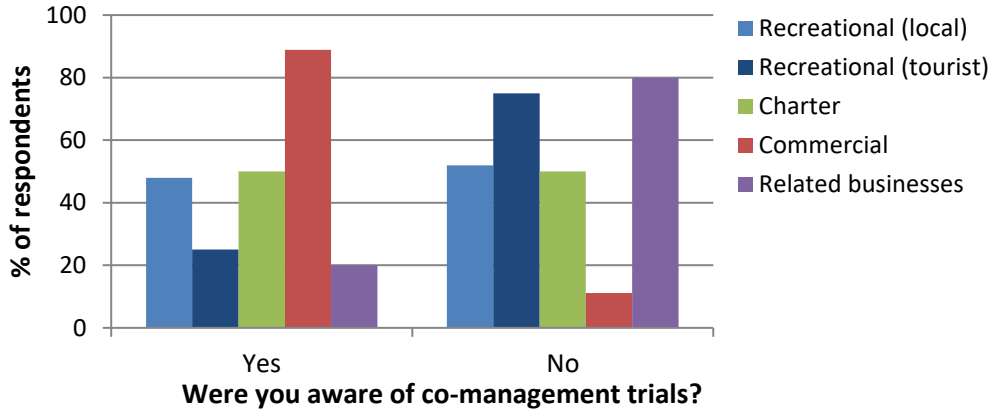


Figure 32 Awareness of co-management trials in the Port Douglas region as reported by various stakeholder groups.

All respondents who stated that they were aware co-management had been trialled in the Port Douglas region were then asked to define "co-management". Most considered co-management to some form of negotiation that involved multiple sectors, or a method to increase the role or voice of the community in government management. Figure 33 shows the distribution of coded responses, and Box 20 outlines some examples of more specific responses.

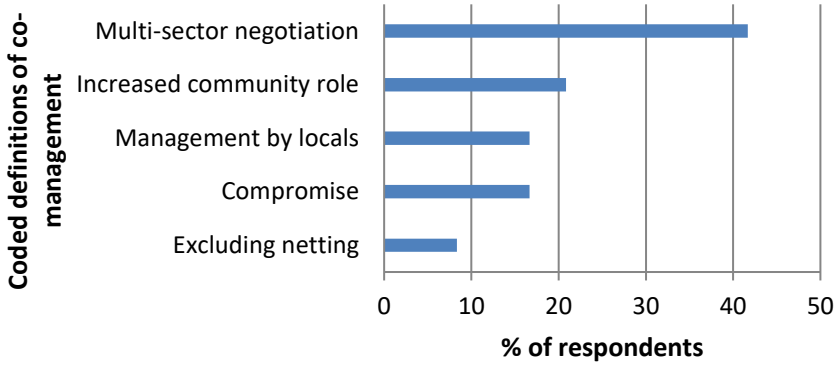


Figure 33 Definitions of co-management (coded) provided by fishing and related business respondents.

Box 20. Definitions of co-management as reported by stakeholder groups in the Port Douglas region

"Government agencies working with commercial and recreational fisheries to find a way to have a sustainable fishery for future generations"
"Professionals, amateurs, government working together to come out with reasonable outcome to suit everyone"

"Between people of the area - looking after own fisheries resources with help of others involved"

"Consists of a panel of concerned individuals on both sides of the issue, willing to talk about it and come up with a plan to conserve fisheries"
"Co-management is a system where a resource can be harvested to the benefit of the community – managed by people involved that understand it"
"Localised management structure rather than something managed from Brisbane"
"Management of fisheries by the authorities, giving greater significance to community views"
"Equal parties from all sides managing the resource - not just one mob. Equal opportunity"

For those that were aware of the co-management trials, we asked what they hoped co-management would achieve with regards to the Grey Mackerel issue they had outlined. Responses varied among stakeholder groups: Most recreational fishing, charter and commercial *line* fishers hoped it would stop netting or result in a net exclusion zone. Most commercial *net/line* fishers, however, hoped it would result in a compromise and reduce conflict (Figure 34). There were insufficient responses for related businesses to include here.

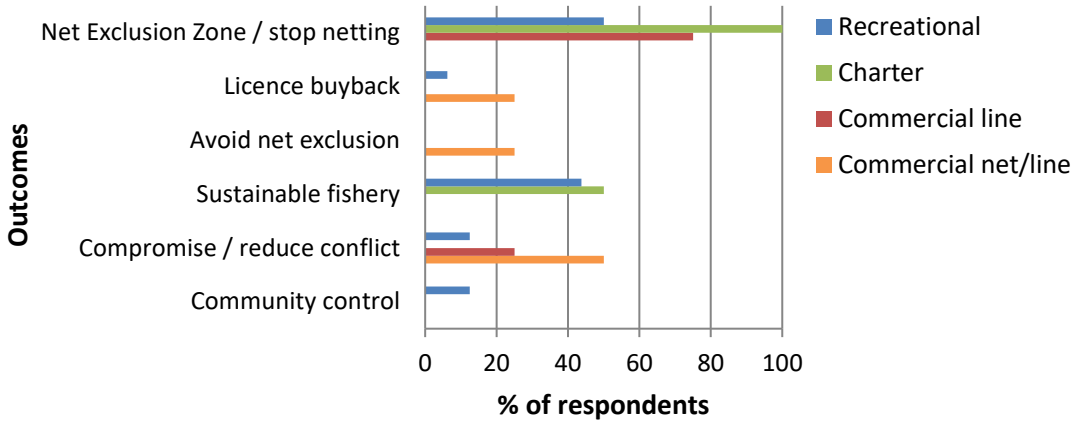


Figure 34 Potential outcomes of co-management trials in the Port Douglas region with regards to the Grey Mackerel issue as reported by recreational fishers.

Those respondents who stated that they were aware of co-management trials were also asked why they believed the trials had failed. Most recreational (47%) and commercial (57%) fishing respondents cited an unwillingness to compromise among stakeholder groups as the main reason (Figure 35) and many from each fishing sector believed that too much emotion and government mismanagement played a role in the failure of co-management trials in Port Douglas (see Box 21 for related comments).

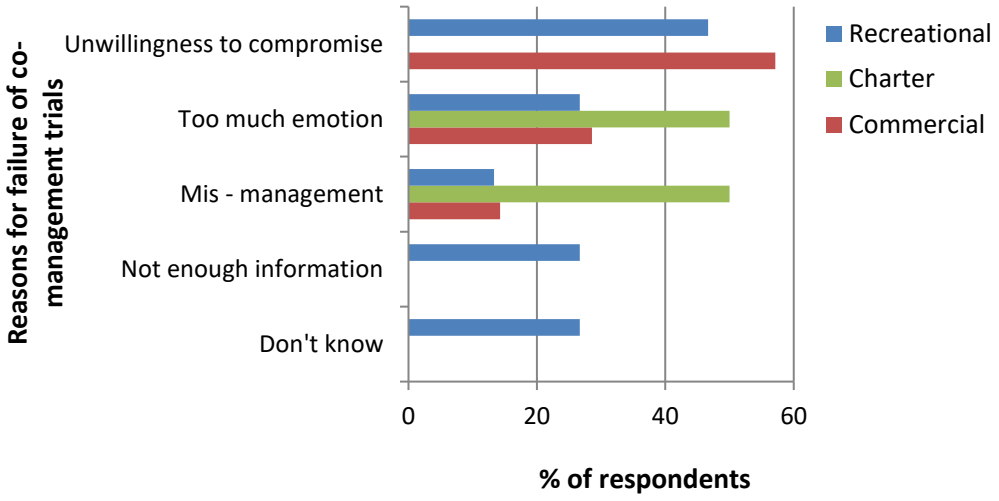


Figure 35 Reasons given for failure of co-management trials in the Port Douglas region as reported by various stakeholder groups.

Box 21. Fishing stakeholder comments regarding the failure of co-management trials in the Port Douglas region

"No one could get on. Locals didn't want to give anything, me included – don't want netting here at all"
"The two groups can't co-operate with each other – one side wants more than the other and isn't willing to compromise"
"Too much passion, not enough data – no one could validate what they were saying. Commercial fishers wouldn't give up something financially valuable to them and no willingness by recreational fishers to engage with commercial guys and negotiate."
"People walked out, no one can reach an agreement – everyone pushing their own agenda. A waste of time…"
"Relationships are broken down between commercial netters and community fishers – no trust…"
"Commercial logbooks showed that netting was sustainable – it's not. Decisions should be made with all information available – not just commercial netting logbooks, but also historic information that is given by people with a long history of Grey Mackerel fishing at Snapper Island"
"Adequate facilitation of community meeting may be a reason of failed co-management – people have best intentions, but they waffle on, not on point, and no solution is achieved…"
"Because of QLD government's greed and lack of common sense. It has to place more importance on recreational/tourism side of fishing rather than commercial…"
"GBRMPA never brought it in. They made promises for a management plan area which would stop netters from entering area, but failed to deliver."
"Mis-management from above again – lot of talk, but no action. Wasted time, energy and resources…"
"[Recreational and commercial line fishers] don't want [net fishers] there and they wouldn't negotiate for anything else."
"Inability to respect each other's opinion…or that [net fishing] is perfectly legal,otherwise [net fishers] would have been prosecuted"

Communication and trust

We asked stakeholders a number of questions to gain an understanding of their main sources of information, including within their sector, between sectors and with government agencies. This information is important for any future efforts to engage this community in practices such as co-management.

What are stakeholders' main sources of information on fisheries' issues?

Stakeholder groups in the Port Douglas region were asked to identify their main source of information regarding fisheries issues specifically. While most *local* recreational fishers received information in the public media, from other recreational fishers or from local commercial fishers, most *tourist* recreational fishers received information from other tourists or local community members (which may also include recreational fishers although this was not clear). Charter fishers received fisheries related information from other charter fishers, recreational fishers and from the Network for Sustainable Fishing (NSF). They also received information from DEEDI (via the internet) and the Queensland Boating and Fisheries Patrol (QBFP). Commercial fishers mostly received information from the QSIA or other commercial fishers, though some also listed recreational fishers and the media (see Figure 36).

Most fishers from all sectors chose their information sources because they were convenient (see Figure 37). Trust played a role for some fishers, particularly commercial fishers (56%).

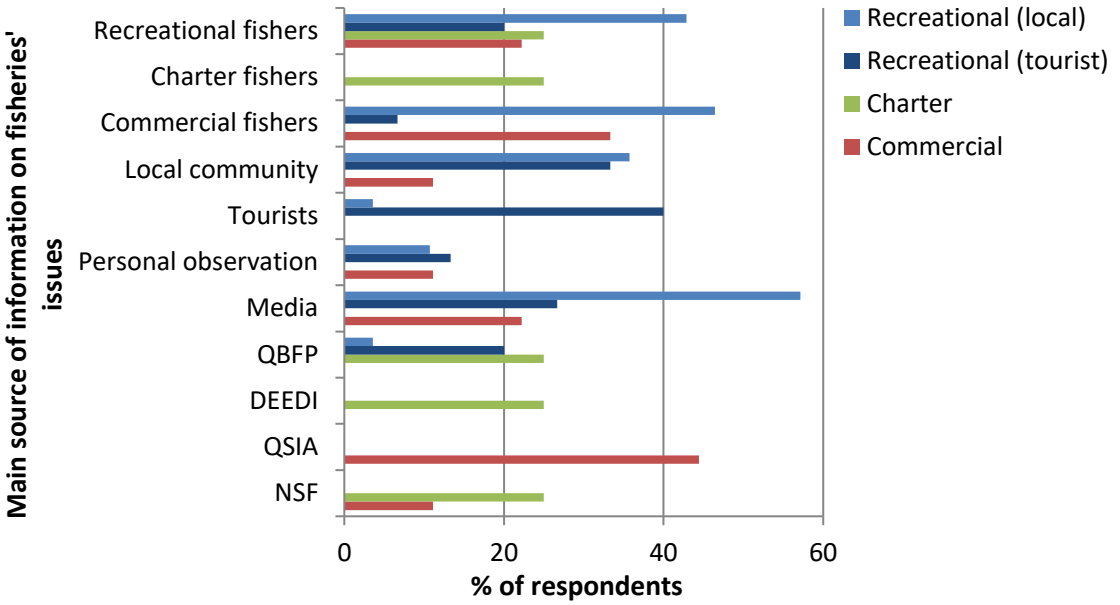


Figure 36 Main sources of information on fisheries issues for each fishing sector.

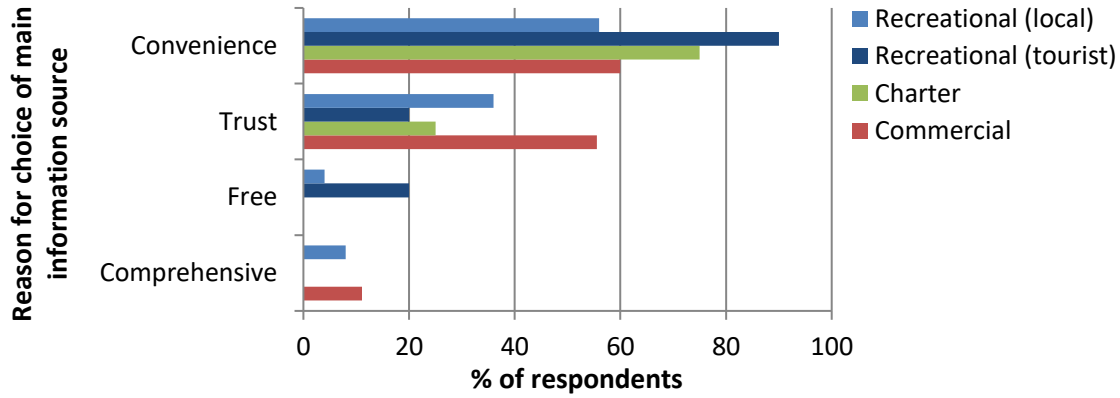


Figure 37 Reasons why fishers chose their main information sources regarding fisheries issues.

When asked how frequently they communicated with specific sectors or groups about fisheries related issues in the previous 12 months, most local and tourist recreational fishers communicated regularly (> 5 times) with other recreational fishers, but less regularly (1-5 times) or not at all with the other groups. Charter fishers spoke regularly with all groups, while most

commercial fishers communicated regularly with all groups except charter fishers (see Figure 38).

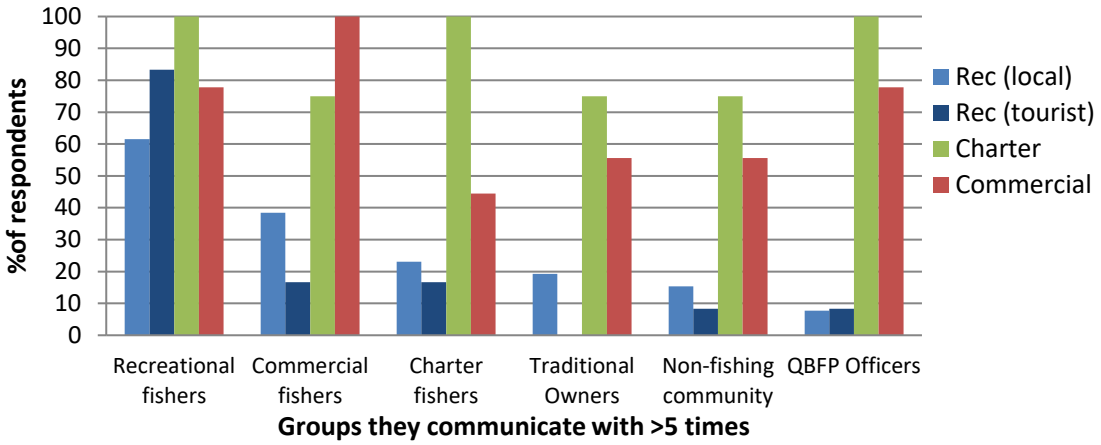
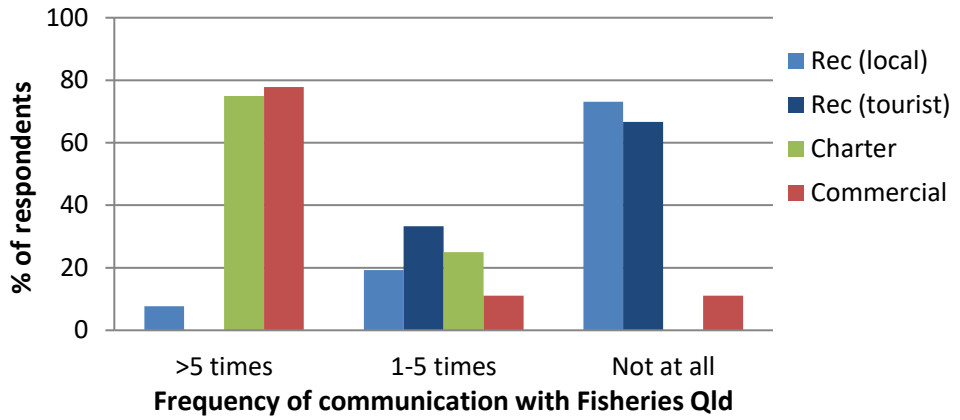


Figure 38 Groups which fishers regularly communicated with (>5 times) in the previous 12 months about fisheries related issues.

When asked how frequently they had spoken with management related staff – particularly Fisheries Queensland and GBRMPA – about fisheries related issues in the previous 12 months, most recreational fishers had not had any contact with either agency. Most charter fishers had frequent (>5 times) contact with Fisheries Queensland staff, but were divided in whether they had contact with GBRMPA staff. Most commercial fishers frequently communicated with Fisheries Queensland staff but not GBRMPA staff (see Figure 39).

a)



b)

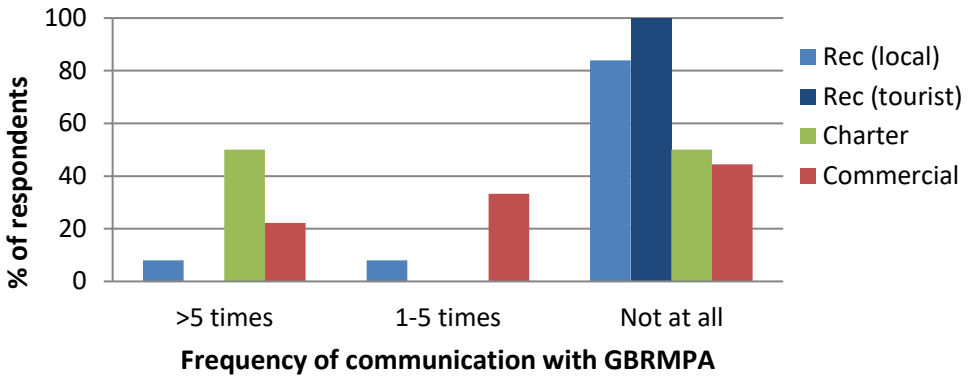


Figure 39 Frequency of communication in the previous 12 months with a) Fisheries Queensland; and b) GBRMPA staff members or liaison officers about fisheries related issues.

Other available data

Ideally, catch data for each fishing sector would be available to help clarify and verify the information found via oral histories. While some catch and effort data are collected at a state-wide level via Fisheries Queensland's Statewide Recreational Fishing Surveys (SWRFS) (Taylor et al. 2012), there are not enough data and hence precision to explore trends at a regional level. Further, given Grey Mackerel is not prominent in recreational catches throughout the state, catch data were too few to allow reliable estimates across the state.

For commercial fishing, there are catch data available via the Fisheries Queensland compulsory commercial logbook program. However, given confidentiality rules which specify that data provided by less than 5 boats in a given region cannot be provided, these data were not available on a year-by-year basis. Considering the above finding in the surveys that concerns about Grey Mackerel netting began between 2004-2006, with some suggestion that this related to the GBR Representative Areas Program (RAP), we were able to explore the relationship

between commercial net and commercial line fishers effort and catches between years prior to and following the introduction of the RAP (i.e. June 2004) by grouping years pre- and post-RAP.

Methods for analysing commercial catch data

The catch logbook data explored in these analyses included all effort and catch information for commercial net and line gear, providing 16 years pre-RAP and 6 years post-RAP. The year 2004 was excluded from all analyses, as the RAP was introduced mid-year (June). The spatial data considered included Port Douglas ($16^0$00' to $16^0$30'), Cairns ($16^0$30' to $17^0$00') and Innisfail ($17^0$00' to $17^0$30'). Although the focus area of this project was Port Douglas, both Cairns and Innisfail are included here in analyses as useful comparisons to add context.

The number of days Grey Mackerel were recorded in catches pre- and post-RAP was examined with t-tests for each combination of gear type and region. Full factorial analysis of variance was used to test the effects of gear type (line or net) and time (pre- and post- RAP) on landed catch (annual volume) as well as catch-per-unit-effort (annual measure of kgs/day) for each region. Data were explored for homogeneity of variance and logarithmic transformation applied where required. Significance of effects was determined at the $p = 0.05$ level and post hoc analyses (Fisher LSD) used to identify homogenous groups when significant effects were present.

Linear regression analysis was used to examine whether the catch or catch-per-unit-effort of commercial line fishers (dependent variable) was predicted by the catch or catch-per-unit-effort of commercial net fishers (independent variable). Prior to analysis, data was examined for homoscedasticity and logarithmic transformed where required. Significance of relationships was determined at the 0.05 level.

In order to respect the privacy that needs to be afforded to individual fisher's catch records, the analysis outputs do not contain any quantitative identifiers of catch volumes or catch-per-unit-effort. The interpretation of the trends and significance of the analyses are not compromised by this approach. The scaling of the analysis outputs have not been modified, so the magnitude of difference or lack of difference observed in the graphical outputs represents the true patterns in the data.

Results of commercial catch data analyses

The average number of days per year line fishers recorded Grey Mackerel catch decreased post-RAP in both Cairns and Innisfail, though the difference was not statistically testable due to a paucity of data particularly in years post-RAP. In Port Douglas, a non-significant 28% increase in days line fishers landed Grey Mackerel occurred post-RAP (0 8?). In contrast the average number of days per year net fishers recorded Grey Mackerel catch increased significantly post-RAP in all locations (table 8). Although all increases were remarkable, the increase in Port Douglas (276%) was less than those occurring in Cairns (671%) and Innisfail (376%).

Table 8 The average numbers of days per year Grey Mackerel was recorded in the catch of commercial line and net fishers between pre- and post-RAP periods – bold text denotes significant results.
* denotes too few data to test significance via t-tests.

Region	Sector	Pre RAP	Post RAP	Statistic
		(average # days)		
Port Douglas	Line	18	23	$t_{19} = 0.24$
Cairns	Line	5	0.3	*
Innisfail	Line	7	0.3	*
Port Douglas	Net	17	64	**$t_{17} = 0.016$**
Cairns	Net	21	162	**$t_{18} = 0.001$**
Innisfail	Net	17	81	**$t_{17} = 0.001$**

Significant interactive effects between gear and RAP on landed catch were present for each region (0). In the Port Douglas region, a significant increase in landed catch of Grey Mackerel by net fishers was made in years post-RAP compared with years pre-RAP, while catches landed by line fishers remained stable between both time periods (Figure 40a). This pattern was replicated in both the Cairns and Innisfail regions (Figure 40b and c), with significant increases in the annual catches by net fishers and stable annual catches by line fishers across the pre- to post-RAP time period.

Significant interactive effects between gear and RAP on CPUE were present for the Port Douglas region only (0), where a significant increase in annual catch-per-unit-effort of net fishers occurred between pre- and post-RAP periods (Figure 40d). While net fishers' catch-per-unit-effort increased, the catch-per-unit-effort of Port Douglas line fishers remained stable across the pre- to post-RAP time period (Figure 40d). No significant effects were present in the Cairns region (Figure 40e). In the Innisfail region, RAP had a significant effect on the catch-per-unit-effort of net fishers only (Figure 40f).

Regression analysis identified that only for the Innisfail region was catch volume of the commercial net fishery a good predictor of catch volume for commercial line fishers (0 10, Figure 41) with large net fisher catches predicting small line fisher catches and vice versa. Although this relationship was significant for catch data, it was not replicated in the catch-per-unit-effort data. In both Port Douglas and Cairns, the analysis demonstrated neither net fisher annual catch nor catch-per-unit-effort were suitable predictors of line fishers' annual catches or catch-per-unit-effort (0, Figure 41).

Table 9 ANOVA (full factorial) outputs from the exploration of the effects of gear (net or line) and RAP (pre- and post- times) on landed catch (CATCH) and catch-per-unit-effort (CPUE) in the Port Douglas, Cairns and Innisfail regions.
Significant effects are highlighted in bold.

Location	Data	Factors	Statistic	Significance
Port Douglas	CATCH	Gear	$F_{1,36} = 0.27$	0.60
		RAP	**$F_{1,36} = 19.73$**	**0.00**
		Gear*RAP	**$F_{1,36} = 15.89$**	**0.00**
Cairns	CATCH	**Gear**	**$F_{1,32} = 18.54$**	**0.00**
		RAP	$F_{1,32} = 1.41$	0.24
		Gear*RAP	**$F_{1,32} = 12.35$**	**0.00**
Innisfail	CATCH	**Gear**	**$F_{1,32} = 4.20$**	**0.04**
		RAP	$F_{1,32} = 3.94$	0.06
		Gear*RAP	**$F_{1,32} = 4.74$**	**0.04**
Port Douglas	CPUE	Gear	$F_{1,36} = 1.44$	0.24
		RAP	**$F_{1,36} = 5.58$**	**0.02**
		Gear*RAP	**$F_{1,36} = 5.45$**	**0.03**
Cairns	CPUE	Gear	$F_{1,32} = 0.70$	0.41
		RAP	$F_{1,32} = 0.50$	0.48
		Gear*RAP	$F_{1,32} = 2.71$	0.11
Innisfail	CPUE	Gear	$F_{1,36} = 0.05$	0.82
		RAP	**$F_{1,36} = 5.02$**	**0.03**
		Gear*RAP	$F_{1,36} = 2.21$	0.15

Table 10 Regression analysis outputs from the exploration of a dependent relationship between net and line fishers landed catch (CATCH) and catch-per-unit-effort (CPUE) in the Port Douglas, Cairns and Innisfail regions.

Data were log transformed to satisfy homoscedasticity. Significant effects are highlighted in bold.

Location	Data	Statistic	Significance
Port Douglas	CATCH	$F_{1,18} = 1.387$	0.25
	CPUE	$F_{1,18} = 0.050$	0.82
Cairns	CATCH	$F_{1,13} = 0.595$	0.45
	CPUE	$F_{1,13} = 0.733$	0.41
Innisfail	**CATCH**	**$F_{1,12} = 5.700$**	**0.03**
	CPUE	$F_{1,12} = 0.810$	0.38

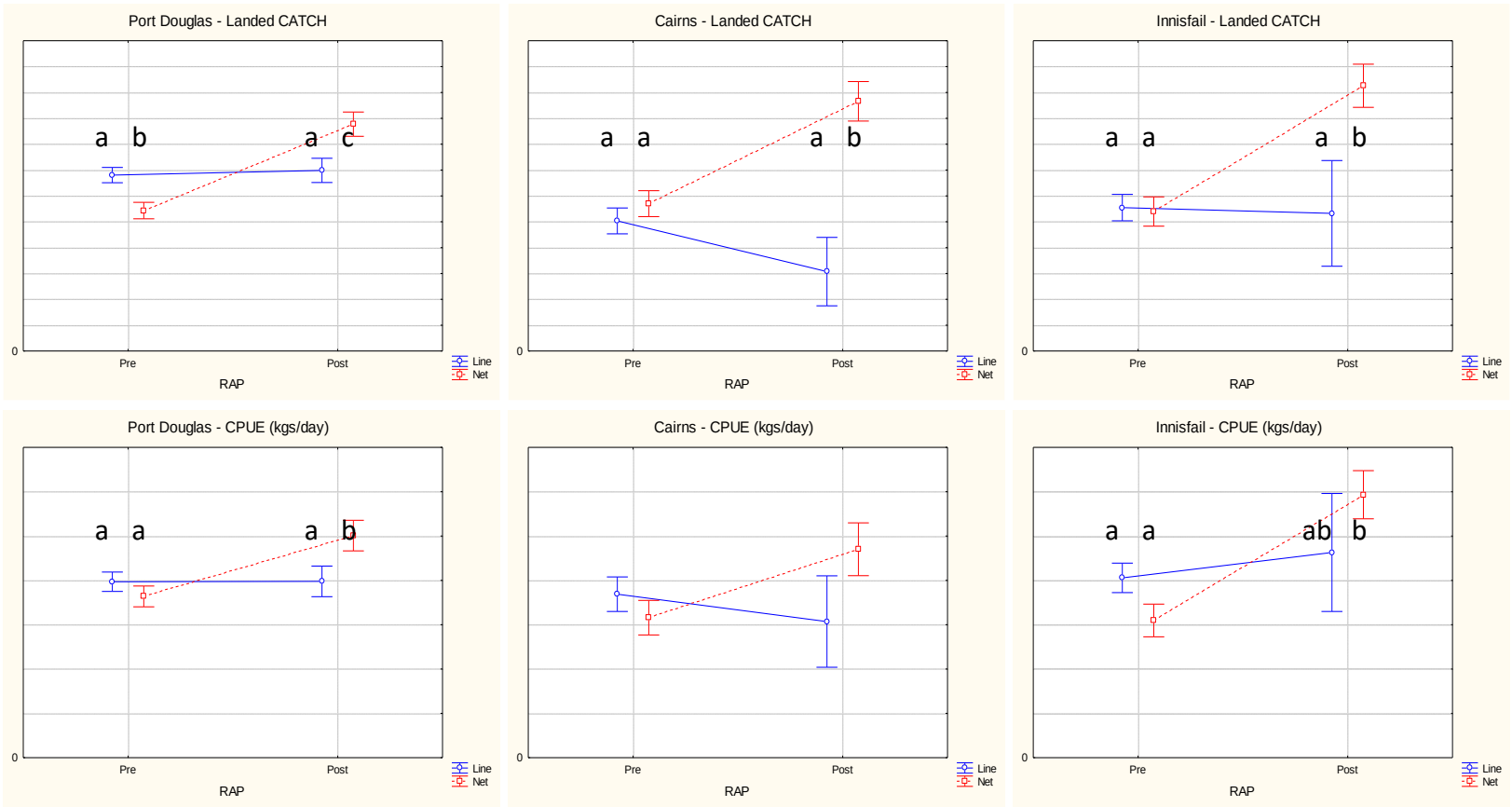


Figure 40 Mean (+/- standard error) of annual landed catch and annual catch-per-unit-effort (CPUE) of Grey Mackerel by commercial line (solid line) and commercial net (dashed) fishers. Where analysis of variance detected significant effects of gear and/or RAP, post hoc analyses of homogeneous groups identified similarities and differences (alphabetical grouping subscripts).

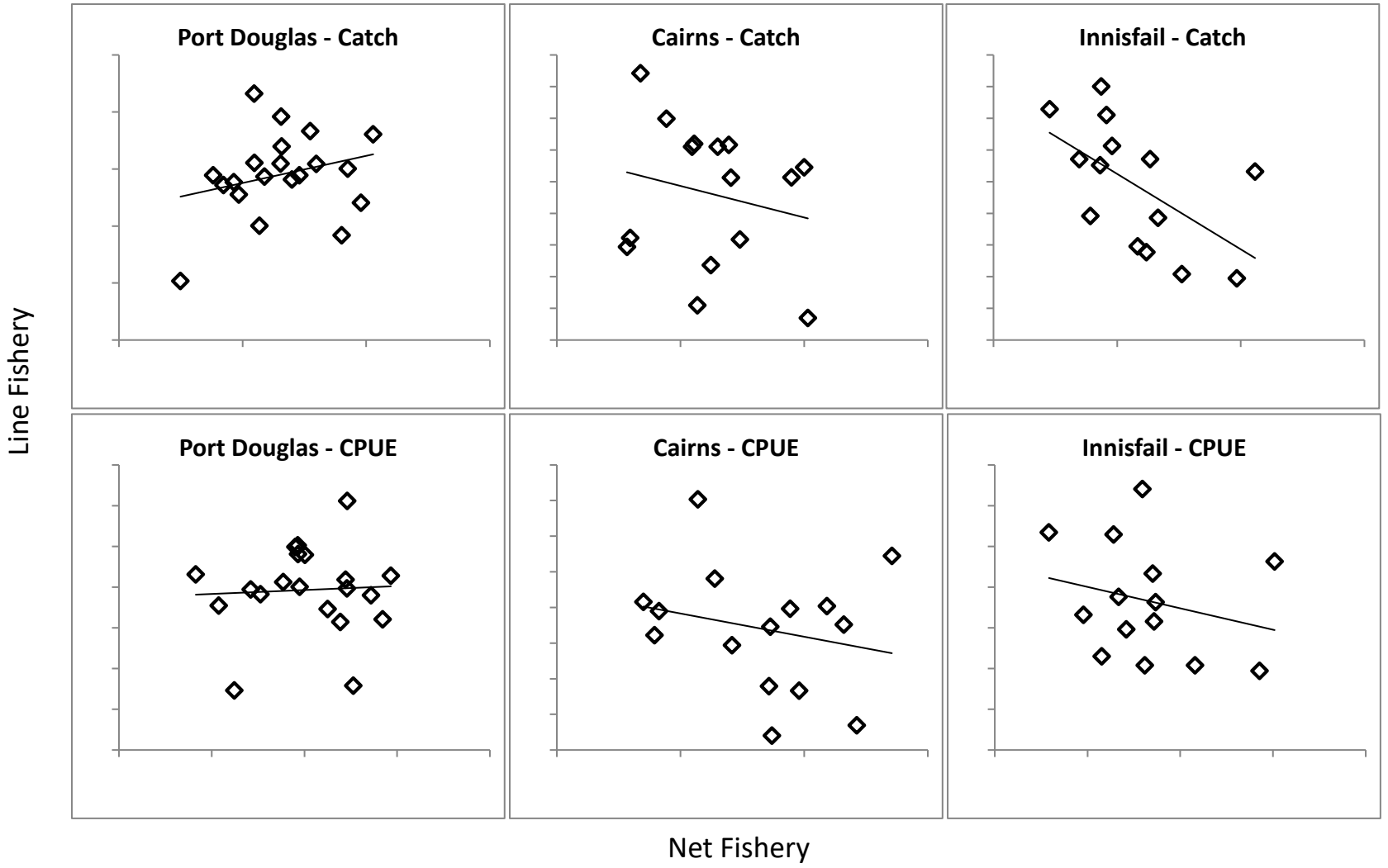

Port Douglas - Catch
Cairns - Catch
Innisfail - Catch
Port Douglas - CPUE
Cairns - CPUE
Innisfail - CPUE
Line Fishery
Net Fishery

Figure 41 Scatterplots and linear regression lines showing no significant influence of net fishers landed catch (CATCH) or catch-per-unit-effort (CPUE) on the coexisting line fishing sector (with the exception of Innisfail – Catch).
Data were transformed to satisfy the assumptions of homoscedasticity.

Discussion

Is Grey Mackerel fishing an issue of concern?

It is clear that there is significant angst among local fishers and related businesses about commercial net fishing for Grey Mackerel in the Port Douglas region, and that this angst can be defined as 'conflict' (i.e. "a process in which one party perceives that its interests are being opposed or negatively affected by another party" (Wall and Callister 1995, p4.)). For commercial line fishers in particular, Grey Mackerel netting was the most pressing fisheries issue in the region (other sectors primarily had the same level of concern about Grey Mackerel netting as other fisheries issues).

The issue did not stop most people from fishing for Grey Mackerel. However, most local fishers stated their satisfaction with fishing had decreased and they had reduced the number of days they spent fishing for Grey Mackerel. Local recreational and commercial line fishers believed their catches of Grey Mackerel had decreased in recent years, while charter fishers were divided. Those that had noticed a decrease consistently held commercial net fishing responsible.

Interestingly, when delving into more detail about historical changes, it appears many fishers found their Grey Mackerel fishing was better in the 'current' season (i.e. at the time of survey) than in recent years, but still worse than previous decades. This coincided with statements from commercial net/line fishers that they had decreased the number of days they fished for Grey Mackerel the year of the survey due to conflict with other sectors in previous years. Unfortunately the data to verify any change in effort or catch for the survey year was not available at the time of writing this report. However, given the trends found in previous years' commercial net and line logbook data, the relationship between net and line catches is questionable. This suggestion cannot be confirmed without data for the recreational sector.

It appears the angst surrounding commercial netting for Grey Mackerel began around 2004-2006 for most respondents: i.e. the time when local recreational and commercial line fishers believe is when commercial netting in the region began. Charter fishers, however, stated that commercial netting had been occurring in the region prior to those years but had increased at this point. The latter comment concurs in part with statements from commercial net fishers who stated they had been fishing for Grey Mackerel in the Port Douglas region for decades.

Some comments related this initiation or increase in Grey Mackerel netting in the region to the Great Barrier Reef rezoning (via the Representative Areas Program, RAP) which occurred in mid 2004 (Fernandes et al. 2005). When commercial catch data were explored for the Port Douglas and other nearby regions, it does appear that there was an increase in effort and associated catch in the region in the years post-RAP. The number of days Grey Mackerel were recorded as landed by net fishers increased significantly in all three tested regions – Port Douglas, Cairns and Innisfail – from pre-RAP to post-RAP years. Interestingly, and in contrast to line fishers' suggestions that stocks were declining, increases in landed catch in Port Douglas (and Innisfail)

were the result of the combined effect of increased days Grey Mackerel were landed as well as significant increases in catch-per-unit-effort (CPUE) of Grey Mackerel in the post-RAP period.

Given the increase in CPUE for the commercial fishery in the region, perceptions of sustainability and stock declines may be questionable. It is possible that the perceived declines in recreational, charter and commercial line harvest were due to allocation of the available stock – i.e. commercial net fishers were taking a greater share of the stock, at the cost to the recreational, charter and commercial line fishers. However, according to the commercial logbook data, the increased presence and catch of commercial net fishers particularly in the Port Douglas region did not result in decreased landings nor catch rates for commercial line fishers. It is unfortunate that there are not catch data available for the recreational sector to verify reported declines in catches since the increase in net fishing effort: without such data it is unknown if declines in recreational catches are real or perceived.

Many of the stories provided by recreational fishers who had been in the area for multiple generations strongly suggest that current fishing for Grey Mackerel is substantially worse than previous decades. Many of the comments relate the decline in catches to the instigation of commercial netting in the region: e.g. “As soon as the nets came, they took the lot. I've been fishing there for 10+ years and the Grey Mackerel went off when the netters came in”.

However, some of the stories suggest that the decline in catches may have been occurring over a longer time period than when the issue surrounding netting first became apparent. For example, one long-term resident of the region stated “it has been depleting for at least a decade if not longer; [we] used to catch high teens to low 20's before bag limits, around 25-30 years ago”. Perhaps some consideration should be given to possible increases in technology therefore increasing the catchability and “effort” on the species– E.g. “Fishing pressure has increased across the board – recreational and commercial – especially increase in technology for recs, plus the number of people in this area. All inshore species are in easy reach of tinnies here”. Further, environmental changes were suggested by some respondents, e.g. “[The] habitat is also degraded – housing development, barra[mundi] farm on acid sulphate soils... Used to be acres of baitfish and tuna (around [19]98), but don't see it now. Bait and birds not what they used to be. Something going on with bait schools...”. Again, these questions cannot be definitively resolved without historic catch data for both the recreational and commercial sectors.

How important is Grey Mackerel?

An important element to consider in the context of conflict over shared fish stocks is how important the focus species is within the region to each group. All surveyed fishers were very attached to the Port Douglas region, having lived or visited and fished there for many years. Recreational fishers surveyed rated fishing as their most important recreational activity, and fished on average almost twice a month. Charter fishers and commercial line and net fishers had a high dependence on the inshore fishery in the region for their income.

Most respondents from all sectors had caught or targeted Grey Mackerel prior to the surveys. All commercial fishers considered Grey Mackerel as very important to their sector, and also to seafood consumers. Both commercial line fishers and net/line fishers who actively fish for Grey Mackerel relied on their Grey Mackerel catch specifically from the Port Douglas region for approximately a quarter of their fishing income in the year prior to the survey – i.e. a significant proportion of their fishing income. Many commercial net/line fishers also caught Grey Mackerel in other regions, further adding to their reliance on this species, and interestingly more than twice the proportion of commercial net/line fishers stated that Grey Mackerel was their most important harvested species as compared to commercial line fishers.

Recreational fishers considered Grey Mackerel as important to their sector, and fished for Grey Mackerel between a quarter (for local fishers) and 45% (for tourists) of their fishing days in the previous 12 months – given the seasonality of this species, this proportion of fishing days can be considered high. However, the majority of recreational fishers considered Grey Mackerel to be only one of many species they targeted, and not the most important. Interestingly, while local charter fishers had a high dependence on the inshore fishery for their income, their dependence on Grey Mackerel fishing was low, spending only 6% of the previous year's fishing days targeting Grey Mackerel. The importance of Grey Mackerel specifically for related businesses was unclear, though it didn't appear high and they appeared largely unaffected by the issue. For example, one caravan park owner stated "*The majority (of tourists) come to catch whatever they can catch*".

In terms of consumption, only commercial fishers considered Grey Mackerel as one of their preferred species to eat. Individual fishers from all sectors did consume Grey Mackerel, but recreational and charter fishers did not rank it as one their preferred species. When they did consume it, they had caught it themselves. The importance of Port Douglas caught Grey Mackerel to local consumers is unclear: It appears most commercial caught product was sold in Cairns, 70km to the south of Port Douglas, although where it was sold from there is unknown. Some local seafood retailers did sell Grey Mackerel to consumers, generally as a "fish and chip" product, although they marketed it as "mackerel". Some of this product came from outside of the Port Douglas region.

What are the solutions to this issue?

Most recreational, charter and commercial line fishers and related businesses strongly disapproved of commercial netting and were concerned about the sustainability and non-selectivity of commercial net fishing. Some were also concerned about the ability of nets to target what they believed were "breeding" aggregations of Grey Mackerel. Not surprisingly, then, most of these respondents believed the main solution to this issue is to implement a net exclusion zone in the Port Douglas region. The exact boundaries of this suggested zone differed slightly, but the sentiment was the same: provide an area within the Port Douglas region where fishing occurred by line only, with no nets allowed. Commercial net/line fishing respondents suggested the government implement a net buy-back if the issue was ongoing in the region, believing if they had to be excluded they should be appropriately compensated. Alternatively,

they suggested the government should support the industry in terms of providing information to the public about the industry's sustainability and operations, to debunk what they see as 'myths' surrounding their industry, potentially providing an opportunity for informed discussion and debate.

Conflict over fish resources shared between two or more sectors is very common in developed countries, including Australia (Kearney 2002; Ebbin 2004; McPhee and Hundloe 2004; Arlinghaus 2005). Such conflict is particularly enhanced when both sectors target the same species (Arlinghaus 2005), as is the case in this situation. It many cases, one or both sectors blame the other for reduced catches, and commonly request the exclusion of the competing sector (Kearney 2002; Arlinghaus 2005; Tobin and Sutton 2011). However, complete exclusion of a sector, while removing conflict in the immediate area, is not an amicable solution for all parties involved – it obviously comes at a significant direct social and economic cost to the excluded sector (see Smith et al. 2003 for an outline of social impacts of the Florida net ban, for example). Exclusion may remove the 'problem' from the focal area in the immediate term; however, it does not solve the issue at a larger spatial or temporal scale and may set a precedent for surrounding areas to follow the same suit. For example, in New South Wales, ongoing, long-term conflict between recreational and commercial fishers over shared stocks in specific areas was 'resolved' by the exclusion of commercial fishing from 29 lakes in 10 regions in 2002. The new Recreational Fishing Havens created resulted in the direct loss of 426 commercial fishing jobs in the state, despite what Momtaz and Gladstone (2008) describe as a lack of evidence of the impact of commercial fishing on recreational fishing catches. Significant costs such as these need to be considered carefully in light of what benefits may be provided to offset them.

Also common in issues of conflict surrounding shared resources is the notion that an 'undesirable' activity is acceptable in other areas, but 'not in my backyard'- i.e. 'NIMBY' (see Devine-Wright 2009 for a discussion on NIMBYism). Many respondents supported commercial net fishing in general, however they preferred it to occur in areas outside of their immediate local region – i.e. in other regions or "out to sea". NIMBYism has been shown in multiple other studies: For example, Suman et al (1999) demonstrated how stakeholders supported the implementation of marine reserves somewhere in the Florida Keys, but not in their vicinity. Such situations are common where residents want to protect their 'place' from what they perceive as negative change. This 'place-protection' is particularly evident where individuals have strong place attachment – i.e. strongly attached individuals take an interest in what is happening in their region, and talk about and potentially take action against unwanted forms of change (Devine-Wright 2009). In this particular instance, long-term Port Douglas region line fishers (residents and tourists) see net fishing as a relatively new change that threatens the values they hold for their place – i.e. quality fishing for Grey Mackerel – and this has manifested into discussion and action to remove that threat. Interestingly, research suggests that the Grey Mackerel stock found seasonally in the Port Douglas region extends significantly further than the suggested exclusion area (Welch et al. 2009). Line fishers and related businesses are

concerned about stock sustainability, yet they are not concerned about fishing outside of their region, highlighting a clear case of place protection or NIMBYism.

Co-management as a solution

Most commercial fishers and approximately half of the recreational and charter fishers surveyed were aware of the co-management trial in the Port Douglas region. Many also correctly identified co-management as an opportunity for multi-sector negotiation, which fits within how co-management is defined in this study (Fisheries Research and Development Corporation 2008). Commercial net/line fishers had hoped co-management would allow a compromise to be found, which would reduce the current conflict between sectors. However, with line fishers in all sectors hoping primarily for exclusion of commercial net fishing from the region, they themselves realised that co-management was not possible due to the unwillingness of line fishers to compromise. The aim of the co-management trial in the region was to try to find a solution to the ongoing conflict over Grey Mackerel through compromise and negotiation. Without the ability to compromise or negotiate between each of the sectors, co-management became impossible in this instance. Development of co-management situations requires the development of trust, relationships and social networks within and between stakeholders at various levels (Natcher et al. 2005; Berkes 2009; de Vos and van Tatenhove 2011). While further analysis is required to confirm it, in the Port Douglas case study trust and effective networks between line fishers and commercial net fishers appear to be lacking.

Some fishers did feel that perhaps progress towards co-management could be made if more information were available: for example comparable recreational catch and effort data, information about the sustainability of commercial fishing for Grey Mackerel, etc. Respondents' key information sources related to fisheries, however, were dominated by public media and inter-sectoral communication, rather than more formal information sources (e.g. management agencies or scientific publications). Commercial and charter fishers appeared to also have regular connection with Fisheries Queensland (but not GBRMPA), which shows some potential for effective communication and information flow between fishers and managers.

Where to from here?

It is clear that co-management is not currently the appropriate solution to conflict between line and net fishers over shared Grey Mackerel stocks in the Port Douglas region. Without the ability of all sectors to find a compromised solution amongst themselves. \. This decision may be to: a) retain the status quo, b) remove commercial net fishing from the region, or c) attempt to resolve the conflict by improving the availability of, and trust in objective information related to the cause of the conflict, and encouraging dialogue to build respect between line and net fishing sectors.

a) Retaining the status quo does not resolve the conflict in the region. Line fishers will continue to be concerned about commercial net fishing in the region while they believe it affects their catch, is unsustainable, is non-selective, and targeting breeding aggregations. Conflict can have significant negative social effects for those involved, and

if left unresolved, it has the tendency to escalate (Wall and Callister 1995; Yasmi et al. 2006). Therefore, some action is required.

b) If commercial net fishing were to be removed from the region, serious consideration needs to be given to the potential flow-on effects of such action.

   i. Removing net fishing from this region may simply move the issue to another coastal township. Within this very case study there is some suggestion that the conflict in the region increased following the introduction of the Representative Areas Program: many fishers perceived this as the cause of an increase in net fishing effort in their region as fishers were excluded from fishing grounds closer to Cairns (although the data suggest there was an increase in effort across multiple regions, the perception still remains). Given their reliance on Grey Mackerel in the Port Douglas for a quarter of their fishing income, excluded net fishers will need to replace this harvest from another region.

   ii. Also, while removing commercial net fishing from Port Douglas may deescalate the conflict in the immediate region, it has the potential to set a precedent for other regions along the coast. The costs and benefits of any change in resource allocation need to be considered and measured carefully.

   Further, given the Grey Mackerel stock of interest extends beyond the Port Douglas region, removing effort from one coastal community within the stock's bounds may not reduce overall harvest.

c) Conflict is very difficult to resolve, but that does not mean resolution should not be attempted, or that it should not at least be managed. Conflict can be 'resolved' by the involved sectors themselves through avoidance or coercion, a third party may be involved to help the sectors through mediation, or it may be handed to a third party for arbitration (FAO 2000). However, the process most likely to result in long-term resolution is negotiation (FAO 2000), with or without a third party. In this instance, it is likely a third party is required, as it appears the involved sectors are unable to resolve the conflict amicably on their own (Wall and Callister 1995).

   i. The first step in any conflict resolution is to address the cause the conflict (Jacob and Schreyer 1980). In this case study it has been clearly demonstrated that contrasting perceptions are the root of the cause – line fishers believe that commercial net fishing negatively impacts line catches of Grey Mackerel, and commercial net fishers believe that it does not; and the parties differ in their perception regarding whether commercial net fishing is sustainable for targeted Grey Mackerel and bycatch species.

   ii. What is needed now is objective information to support or refute those perceptions. For example, information about net fishing sustainability for target and bycatch species, including within small areas, needs to be outlined, and information

regarding recreational catch and effort is required to determine whether line catches are being affected by net catch.

iii. Simply having that information will not be enough, however; the information needs to be trusted. For example, information regarding commercial Grey Mackerel catch and harvest is available, but it is not well accepted. Also, while line fishers are concerned about what they perceive as net fishing of "breeding" populations, Fisheries Queensland researchers found that Grey Mackerel were not in spawning condition (David Welch, unpublished data) at the time of year that they inhabit the Port Douglas region. This information was provided to the community but, again, this information was not well accepted. Some fishers are also concerned about the non-selectivity of commercial nets. Factual, objective information about net selectivity is available and indicates the commercial net fisheries throughout Queensland have very low levels of bycatch and are in fact very selective in harvesting targeted species (Halliday et al. 2001).

   The barriers to acceptance of these data should be explored: is there a lack of trust of information held by Fisheries Queensland? How can this be overcome? Perhaps there is potential for some fisheries independent data assessing stock status. Perhaps on-board observers could provide information to other fishing sectors, or representatives from other sectors could accompany the commercial net fishers onboard to witness the operations for themselves and report back to their sector. Managers, researchers, and stakeholder groups need to work in partnership to find ways to best disseminate information in a way that will increase trust in the information (Aslin and Byron 2003; Tobin 2010).

iv. Once the background information relating to the conflict is understood and accepted, attempts need to be made to build relationships and trust between sectors. Individuals and groups need to think about the conflict from their own and others' position (Wall and Callister 1995), and to communicate and discuss issues from each of their perspectives (Murshed-e-Jahan et al. 2009). It Is well recognised that effective communication and participation can improve relationships, increase trust, and reduce conflict (Redpath et al. 2013). Communication may also lead to stakeholders finding common goals and a potential cooperative approach (Schusler et al. 2003). They may find they each have the best interests of the resource in mind and work together to mitigate potentially greater threats to their shared resource (Henry 1984; Kearney 2002). The most appropriate methods to improve dialogue and communication need further exploration.

Conflict over shared fish stocks is not an easy issue to resolve. However, if improved trust and dialogue between sectors can be achieved, perhaps co-management can be revisited in the Port Douglas region. Co-management may not necessarily reduce incidences of conflict in all cases, but by including all stakeholders in decision making and discussion it can change to nature of the conflict and provide opportunities for resolution (Ebbin 2004). For the moment, though, further discussions are required about the best way forward for the Port Douglas region.

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Appendix 1 Oral history survey: Initial form for all respondents.
PORT DOUGLAS COMMUNITY SURVEY

ID #: _____ Date: _____ Time start: _____

BACKGROUND

First we'd like to know a bit about you and your role in the Port Douglas and fishing community

1. a) Are you currently a resident of the Port Douglas region?

   Yes *(answer b then go to next q)*

   No

   b) Home town / suburb / _____ Post code _____

   c) What is your link to Port Douglas?

   1 Work (including coastal waters): *As, for how long* _____

   _____

   2 Tourist: *How many years* _____

   3 Ex-resident: *How many years ago* _____

2. How long have you lived in the Port Douglas region? _____ years

FISHERIES

We are here to talk about fisheries issues in the local area. Before we get further into the survey, I'd like to know:

3. What do you see as the MOST pressing fisheries issue in the Port Douglas region?

4. a) What sector(s) do you consider yourself as belonging to?

   1 Recreational fisher
   2 Commercial fisher
   3 Charter fisher
   4 Traditional owner
   5 Fishing tourist
   6 Fishing related business operator (e.g. tackle/seafood retail)
   7 Tourism business operator (e.g. caravan park owner)
   9 Other _____

b) What is your PRIMARY sector? _____ - *to appropriate survey*

Appendix 2 Oral history survey for RECREATIONAL fishers.

A) LOCAL RECREATIONAL FISHERS

RECREATIONAL FISHING

First we'd like to know a bit about you and your role in the Port Douglas and fishing community

5. How long have you been fishing recreationally? _____ years
6. How many days in total did you go fishing in the past 12 months? _____
7. Compared to other outdoor activities that you participate in (like golf, tennis, camping, etc.), would you say fishing is:

    1 Your most important activity
    2 Your second most important activity
    3 Your third most important activity
    4 Only one of many activities

8. Charter q

9. Are you a member of:

    a fishing club? Y / N
    Sunfish? Y / N
    Ecofishers? Y / N
    Other relevant club / organisation? _____

10. Charter/commercial q
11. Charter/commercial q

12. a) Do you catch (or have you ever tried to catch) Grey Mackerel?

    No – *to next q*

    Yes

    b) Compared to other species, would you say GREY MACKEREL is:

    1 Your most preferred target species
    2 Your second most preferred target species
    3 Your third most preferred target species
    4 Only one of many target species

    c) How long have you been targeting Grey Mackerel in this area? _____ years

d) How many days did you target Grey Mackerel in the past 12 months?

_____ days

e) Has this changed from previous years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

m) **WHY?**

f) How satisfied are you with your Grey Mackerel fishing currently?

1 Very satisfied
2 Satisfied
3 Neither satisfied nor dissatisfied
4 Dissatisfied
5 Very dissatisfied

g) Has your satisfaction with Grey Mackerel fishing changed from previous years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

h) Why increased / decreased?

i) If you personally caught **3** Grey Mackerel in a trip, how would you consider the fishing quality on a 1-5 scale?

1 Very low quality
2 Low quality
3 Neither low nor high
4 High quality
5 Very high quality

j) ***If answered 1 or 2:*** How many MORE Grey Mackerel would you need to catch before you considered the fishing quality to be HIGH? _____

If answered 3 or 4: How many FEWER Grey Mackerel would you need to catch before you considered the fishing quality to be LOW? _____

k) Do you think your catches of Grey Mackerel have changed in recent years?

1 Increased a lot
2 Increased a little
3 No change

4 Decreased a little
5 Decreased a lot

l) Why?

n) HOW was this season of Grey Mackerel fishing?

o) HOW does this season of Grey Mackerel fishing compare to the last few years?

p) HOW do the last few years of Grey Mackerel fishing compare to previous decade(s) (*if fishing here that long*)?

13. How important do you think Grey Mackerel fishing in Port Douglas is to:	**Not at all important**	**Of minor importance**	**Of moderate importance**	**Very important**	**Can't say**
a) Local recreational fishers	**1**	**2**	**3**	**4**	**5**
b) Commercial fishers	**1**	**2**	**3**	**4**	**5**
c) Local seafood consumers (to purchase)	**1**	**2**	**3**	**4**	**5**
d) Tourist recreational fishers	**1**	**2**	**3**	**4**	**5**
e) Traditional owners	**1**	**2**	**3**	**4**	**5**

14. a) Are you aware there is commercial netting for Grey Mackerel in the Port Douglas area?
No – *to next q*

Yes

b) Have you personally witnessed the commercial netters operating, or heard about it from others? *(can be both)*

Personal experience

Heard from others – c) Who? (*e.g. other recreational fishers*, *tackle shop, newspaper, etc*)

_____

d) What is your level of approval of commercial Grey Mackerel netting in the Port Douglas area?

1 Strongly approve
2 Approve
3 Neither approve nor disapprove
4 Disapprove
5 Strongly disapprove

e) In what way do you approve/disapprove?

15. a) Are you concerned about Grey Mackerel fishing in the area?

No - *to next q*

Yes

b) How concerned are you about Grey Mackerel fishing compared to other local fisheries issues (Q3)?

1 A lot more concerned about Grey Mackerel than any other issue
2 A bit more concerned
3 Same level of concern
4 A bit less concerned
5 A lot less concerned about Grey Mackerel than other issues
NA Listed Grey Mackerel as sole most pressing issue in Q3

c) Please explain your concerns about Grey Mackerel fishing (*what sort of concerns do you have? E.g. sustainability, bycatch, allocation, etc)*

d) In what YEAR did you first start to become concerned about Grey Mackerel fishing?

_____

e) What changed at that point to make you concerned?

f) Is your concern based on your own experience or from other sources (*e.g. other community members, newspaper, etc. Be as specific as possible. Can be both*)?

Own experience / witness

Other:

g) Have your concerns stopped you from fishing for Grey Mackerel?

N/A – never did fish for them

No

Yes – when was last time you fished for Grey Mackerel? _____

h) What do you think is the solution to the Grey Mackerel issue you've outlined?

SEAFOOD CONSUMPTION

16. What is your MOST preferred fresh seafood species to eat?

_____

17. a) Have you eaten MACKEREL in the past 12 months?

Don't know – *to next q*
No – *to next q*
Yes

b) Where did you last get it from?

1 Self-caught
2 Caught by friends/ family
3 From a supermarket
4 From a local seafood store
5 From a restaurant
6 From a fish and chip shop
97 OTHER _____
98 CAN'T SAY

c) Do you know if *any* of the mackerel you consumed in the past 12 months was GREY mackerel?

Can't be sure
Yes it was, at least once
No it was not – *to next q*

d) Compared to other fresh seafood species you eat, would you say GREY MACKEREL is:

1 Your most preferred species
2 Your second most preferred species
3 Your third most preferred species
4 Only one of many species

COMMUNICATION

Now we'd like to know a little more about communication about fisheries issues for you and your community, so communication can be improved in the future.

18. a) What is your MAIN source of information about fisheries-related issues (*Can be a group / organisation / sector / individual – please list sector for individuals*),

    b) Why do you choose this source? *(e.g. trust, accessibility, etc)*

19. Specifically, please list the **5 key people** in your community you talk to about fisheries related issues and indicate how much they influence your opinion about issues.

Name	**Sector**	**Level of influence** Not at all - Very high; DK				
1.		1	2	3	4	DK
2.		1	2	3	4	DK
3.		1	2	3	4	DK
4.		1	2	3	4	DK
5.		1	2	3	4	DK

20. How often have you communicated with the following groups within your community about **fisheries issues** in the past 12 months?

Recreational fishers	Never / 1-5 times / >5 times
Commercial fishers	Never / 1-5 times / >5 times
Charter operators	Never / 1-5 times / >5 times
Indigenous community members	Never / 1-5 times / >5 times
Non-fishing community members	Never / 1-5 times / >5 times
QBFP officers	Never / 1-5 times / >5 times

21. a) Are there any groups you wish you had better communication with?

    b) Why?

22. a) Are there any groups you do NOT wish to have a connection with?

    b) Why?

23. a) Over the last 12 months, how many times did you speak to Fisheries Queensland (not the QBFP) **about fisheries-related issues**?

    1 More than 10 times
    2 5-10 times
    3 2-5 times
    4 Once
    5 Not at all

b) Over the last 12 months, how many times did you speak to the QBFP **about fisheries-related issues**?

    1 More than 10 times
    2 5-10 times
    3 2-5 times
    4 Once
    5 Not at all

24. Over the last 12 months, how many times did you speak to a GBRMPA staff member or Liaison officer about fisheries-related issues?

    1 More than 10 times
    2 5-10 times
    3 2-5 times
    4 Once
    5 Not at all

25. How much do you trust Fisheries Queensland to manage your LOCAL fisheries resources sustainably?

    1 Not at all trustworthy
    2 Slightly trustworthy
    3 Moderately trustworthy
    4 Highly trustworthy
    5 Can't say

CO-MANAGEMENT

26. a) Before we met today, were you aware there was a project in Port Douglas trialling co-management of local fisheries resources?

    No – *to next q*

    Yes b) What do you think co-management is? How would you define it?

    c) What did you hope it would achieve in Port Douglas?

d) Why do you think it failed here?

DEMOGRAPHICS

If you don't mind we'd like to collect a few details about yourself so we get a good demographic picture and coverage of the community.

27. Would you mind telling me your approximate age?

1 15-19
2 20-29
3 30-39
4 40-49
5 50-59
6 60-64
7 65 years or over

28. What is the highest level of education you have completed?

1 Year 10 or less
2 Year 11
3 Year 12/Tech
4 University (Currently studying / completed)

29. Do you mind if I ask your approximate annual household income before taxes?

1 Under $50,000
2 $50,000 to $99,999
3 $100,000 to $149,999
4 $150,000 to $199,999
5 $200,000 to $249,999
6 $250,000 to $299,999
7 $300,000 or more
98 Prefer not to answer

30. Gender *(don't ask!)*

1 Male
2 Female

CONTACT

Fisheries Queensland have offered to send information they have about Grey Mackerel to anyone who would like to know more. Would you like them to send you something?

No

Yes – *Any specific question?*_____ _____

Contact details (e-mail preferred) _____

Would you like to be on the F&F mailing list too? Y / N

Anything else to add?

Appendix 3 Oral history survey for Charter operators

CHARTER FISHING

First we'd like to know a bit about you and your fishing business

5. How long have you been charter fishing in Port Douglas? _____ years
6. How many days in total did you go charter fishing in the past 12 months? _____
7. a) Is chartering the sole-source of your individual income?

   Yes

   No – b) What percentage of your individual income comes from chartering? _____ %
8. What percentage of your household income comes from chartering? _____ %
9. Are you a member of:

   a fishing club? Y / N

   Sunfish? Y / N

   Ecofishers? Y / N

   Other relevant club / organisation? _____
10. For your charter business, which may consist of one or more operations, please tell me what percentage of your income for the last 12 months came from:

    Inshore finfish fishing (in creeks, bays, estuaries; for inshore species

    such as barramundi, bream, lesser mackerels (i.e. not Spanish mackerel), etc) _____%
11. How many clients do you take on a typical INSHORE fishing trip? _____
12. a) Do you catch /target GREY MACKEREL?

    No – *to next q*

    Yes

    b) How long have you been catching/ targeting Grey Mackerel in this area?
    _____ years

    c) How many days did you *target* Grey Mackerel in the past 12 months?

    _____ days

    d) Has the number of days you spent charter fishing for Grey Mackerel changed from previous years?

    1 Increased a lot
    2 Increased a little
    3 No change
    4 Decreased a little

5 Decreased a lot

l) **WHY?**

e) How satisfied are you with your Grey Mackerel charter fishing currently?

1 Very satisfied
2 Satisfied
3 Neither satisfied nor dissatisfied
4 Dissatisfied
5 Very dissatisfied

f) Has your satisfaction with Grey Mackerel fishing changed from previous years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

g) Why increased / decreased?

h) If each of your clients caught **3** Grey Mackerel in a trip, how would you consider the fishing quality on a 1-5 scale?

1 Very low quality
2 Low quality
3 Neither low nor high
4 High quality
5 Very high quality

i) ***If answered 1 or 2:*** How many MORE Grey Mackerel would each client need to catch before you considered the fishing quality to be HIGH? _____

If answered 3 or 4: How many FEWER Grey Mackerel would each client need to catch before you considered the fishing quality to be LOW? _____

j) Do you think your catches of Grey Mackerel have changed in recent years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

k) Why?

n) HOW was this season of Grey Mackerel fishing?

o) HOW does this season of Grey Mackerel fishing compare to the last few years?

p) HOW do the last few years of Grey Mackerel fishing compare to previous decade(s) (*if fishing here that long*)?

13. How important do you think Grey Mackerel fishing in Port Douglas is to:	**Not at all important**	**Of minor importance**	**Of moderate importance**	**Very important**	**Can't say**
a) Local recreational fishers	**1**	**2**	**3**	**4**	**5**
b) Commercial fishers	**1**	**2**	**3**	**4**	**5**
c) Local seafood consumers (to purchase)	**1**	**2**	**3**	**4**	**5**
d) Tourist recreational fishers	**1**	**2**	**3**	**4**	**5**
e) Traditional owners	**1**	**2**	**3**	**4**	**5**

14. a) Are you aware there is commercial netting for Grey Mackerel in the Port Douglas area?

No – *to next q*

Yes

b) Have you personally witnessed the commercial netters operating, or heard about it from others? *(can be both)*

Personal experience

Heard from others – c) Who? (*e.g. other recreational / charter fishers, tackle shop, newspaper, etc*)

_____

d) What is your level of approval of commercial Grey Mackerel netting in the Port Douglas area?

1 Strongly approve
2 Approve
3 Neither approve nor disapprove
4 Disapprove
5 Strongly disapprove

e) In what way do you approve/disapprove?

15. a) Are you concerned about Grey Mackerel fishing in the area?

No - *to next q*

Yes

b) How concerned are you about Grey Mackerel fishing compared to other local fisheries issues (Q3)?

1 A lot more concerned about Grey Mackerel than any other issue
2 A bit more concerned
3 Same level of concern
4 A bit less concerned
5 A lot less concerned about Grey Mackerel than other issues
NA Listed Grey Mackerel as sole most pressing issue in Q3

c) Please explain your concerns about Grey Mackerel fishing (*what sort of concerns do you have? E.g. sustainability, bycatch, allocation, etc)*

d) In what YEAR did you first start to become concerned about Grey Mackerel fishing?

_____

e) What changed at that point to make you concerned?

f) Is your concern based on your own experience or from other sources (*e.g. other community members, newspaper, etc. Be as specific as possible. Can be both*)?

Own experience / witness

Other:

g) Have your concerns stopped you from charter fishing for Grey Mackerel?

N/A – never did fish for them

No

Yes – when was last time you fished for Grey Mackerel? _____

h) What do you think is the solution to the Grey Mackerel issue you've outlined?

SEAFOOD CONSUMPTION

16. What is your MOST preferred fresh seafood species to eat?

_____

17. a) Have you eaten MACKEREL in the past 12 months?

Don't know – *to next q*

No – *to next q*

Yes

b) Where did you last get it from?

1 Self-caught
2 Caught by friends/ family
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4 From a local seafood store
5 From a restaurant
6 From a fish and chip shop
97 OTHER _____
98 CAN'T SAY

c) Do you know if *any* of the mackerel you consumed in the past 12 months was GREY mackerel?

Can't be sure

Yes it was, at least once

No it was not – *to next q*

d) Compared to other fresh seafood species you eat, would you say GREY MACKEREL is:

1 Your most preferred species
2 Your second most preferred species
3 Your third most preferred species
4 Only one of many species

COMMUNICATION

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19. Specifically, please list the **5 key people** in your community you talk to about fisheries related issues and indicate how much they influence your opinion about issues.

Name	**Sector**	**Level of influence** Not at all - Very high; DK				
1.		1	2	3	4	DK
2.		1	2	3	4	DK
3.		1	2	3	4	DK
4.		1	2	3	4	DK
5.		1	2	3	4	DK

20. How often have you communicated with the following groups within your community about **fisheries issues** in the past 12 months?

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QBFP officers	Never / 1-5 times / >5 times

21. a) Are there any groups you wish you had better communication with?

    b) Why?

22. a) Are there any groups you do NOT wish to have a connection with?

    b) Why?

23. a) Over the last 12 months, how many times did you speak to Fisheries Queensland (not the QBFP) **about fisheries-related issues**?

    1 More than 10 times
    2 5-10 times
    3 2-5 times
    4 Once
    5 Not at all

    b) Over the last 12 months, how many times did you speak to the QBFP **about fisheries-related issues**?

    1 More than 10 times
    2 5-10 times
    3 2-5 times
    4 Once
    5 Not at all

24. Over the last 12 months, how many times did you speak to a GBRMPA staff member or Liaison officer **about fisheries-related issues**?

    1 More than 10 times
    2 5-10 times
    3 2-5 times
    4 Once

5 Not at all

25. How much do you trust Fisheries Queensland to manage your LOCAL fisheries resources sustainably?

1 Not at all trustworthy
2 Slightly trustworthy
3 Moderately trustworthy
4 Highly trustworthy
5 Can't say

CO-MANAGEMENT

26. a) Before we met today, were you aware there was a project in Port Douglas trialling co-management of local fisheries resources?

No – *to next q*

Yes b) What do you think co-management is? How would you define it?

c) What did you hope it would achieve in Port Douglas?

d) Why do you think it failed here?

DEMOGRAPHICS

If you don't mind we'd like to collect a few details about yourself so we get a good demographic picture and coverage of the community.

27. Would you mind telling me your approximate age?

1 15-19
2 20-29
3 30-39
4 40-49
5 50-59
6 60-64
7 65 years or over

28. What is the highest level of education you have completed?

1 Year 10 or less
2 Year 11
3 Year 12/Tech
4 University (Currently studying / completed)

29. Do you mind if I ask your approximate annual household income before taxes?

1 Under $50,000
2 $50,000 to $99,999
3 $100,000 to $149,999
4 $150,000 to $199,999
5 $200,000 to $249,999
6 $250,000 to $299,999
7 $300,000 or more
98 Prefer not to answer

30. Gender *(don't ask!)*

1 Male
2 Female

CONTACT

Fisheries Queensland have offered to send information they have about Grey Mackerel to anyone who would like to know more. Would you like them to send you something?

No

Yes – *Any specific question?*_____ _____

Contact details (e-mail preferred) _____

Would you like to be on the F&F mailing list too? Y / N

Anything else to add?

Appendix 4 Oral history survey for COMMERCIAL fishers.

COMMERCIAL FISHING

First we'd like to know a bit about you and your role in the Port Douglas and fishing community

5. How long have you been fishing commercially in Port Douglas? _____ years
6. Are you the

1 Owner-operator
2 License Owner (non-operator)
3 Contract skipper
4 Lessee
5 Other _____

7. a) Is commercial fishing the sole-source of your individual income?

1 Yes
2 No –

b) If No, what % of your individual income comes from commercial fishing? _____ %

8. What percentage of your household income comes from commercial fishing? ____ %
9. Are you a member of:

QSIA? Y / N

Other relevant club / organisation? _____

10. a) For your commercial fishing business, which may consist of one or more operations, please tell me what percentage of your income for the last 12 months came from:

% of income

Inshore fishing (including bays, creeks and estuaries) _____

11. Charter q
12. a) Do you catch (or have you ever tried to catch) Grey Mackerel?

No – *to next q*

Yes

b) How (methods)?

1 Line only
2 Set net only
3 Line and net

c) Compared to other species, would you say GREY MACKEREL is:

1 Your most important harvested species
2 Your second most important harvested species

3 Your third most important harvested species
4 Only one of many harvested species

d) What proportion of your fishing income in the past 12 months came from selling Grey Mackerel? _____%

e) Where do you sell your Grey Mackerel product?

f) What proportion is sold in the Port Douglas region? _____

g) How long have you been catching Grey Mackerel in the Port Douglas region? _____ years

h) What proportion of your Grey Mackerel catch in the past 12 months was from the Port Douglas region? _____

i) How many days did you target Grey Mackerel (anywhere) in the past 12 months? _____ days

j) What proportion of that was in the Port Douglas region? _____

k) Have the number of days you target Grey Mackerel in the Port Douglas region changed in recent years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

l) Why?

m) Do you think your catches of Grey Mackerel have changed in recent years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

n) Why?

o) HOW was this season of Grey Mackerel fishing?

p) HOW does this season of Grey Mackerel fishing compare to the last few years?

q) HOW do the last few years of Grey Mackerel fishing compare to previous decade(s) (*if fishing here that long*)?

13. How important do you think Grey Mackerel fishing in Port Douglas is to:	Not at all important	Of minor importance	Of moderate importance	Very important	Can't say
a) Local recreational fishers	**1**	**2**	**3**	**4**	**5**
b) Commercial fishers	**1**	**2**	**3**	**4**	**5**
c) Local seafood consumers (to purchase)	**1**	**2**	**3**	**4**	**5**
d) Tourist recreational fishers	**1**	**2**	**3**	**4**	**5**
e) Traditional owners	**1**	**2**	**3**	**4**	**5**

*14. For **LINE ONLY** fishers*

a) Are you aware there is commercial netting for Grey Mackerel in the Port Douglas area?

No – *to next q*

Yes

b) Have you personally witnessed the commercial netters operating, or heard about it from others? *(can be both)*

Personal experience

Heard from others – c) Who? (*e.g. other fishers*, *newspaper, etc*)

_____

d) What is your level of approval of commercial Grey Mackerel netting in the Port Douglas area?

1 Strongly approve
2 Approve
3 Neither approve nor disapprove
4 Disapprove
5 Strongly disapprove

e) In what way do you approve/disapprove?

15. a) Are you concerned about Grey Mackerel fishing in the Port Douglas area?

No - *to next q*

Yes

b) How concerned are you about Grey Mackerel fishing compared to other local fisheries issues (Q3)?

1 A lot more concerned about Grey Mackerel than any other issue
2 A bit more concerned
3 Same level of concern
4 A bit less concerned
5 A lot less concerned about Grey Mackerel than other issues
NA Listed Grey Mackerel as sole most pressing issue in Q3

c) Please explain your concerns about Grey Mackerel fishing (*what sort of concerns do you have? E.g. sustainability, bycatch, allocation, etc)*

d) In what YEAR did you first start to become concerned about Grey Mackerel fishing?

_____

e) What changed at that point to make you concerned?

f) Is your concern based on your own experience or from other sources (*e.g. other community members, newspaper, etc. Be as specific as possible. Can be both*)?

Own experience / witness

Other:

g) Have your concerns stopped you from fishing for Grey Mackerel?

N/A – never did fish for them
No
Yes – when was last time you fished for Grey Mackerel? _____

h) What do you think is the solution to the Grey Mackerel issue you've outlined?

SEAFOOD CONSUMPTION

16. What is your MOST preferred fresh seafood species to eat?

_____

17. a) Have you eaten MACKEREL in the past 12 months?

Don't know – *to next q*

No – *to next q*
Yes

b) Where did you last get it from?

1 Self-caught
2 Caught by friends/ family
3 From a supermarket
4 From a local seafood store
5 From a restaurant
6 From a fish and chip shop
97 OTHER _____
98 CAN'T SAY

c) Do you know if *any* of the mackerel you consumed in the past 12 months was GREY mackerel?

Can't be sure
Yes it was, at least once
No it was not – *to next q*

d) Compared to other fresh seafood species you eat, would you say GREY MACKEREL is:

1 Your most preferred species
2 Your second most preferred species
3 Your third most preferred species
4 Only one of many species

COMMUNICATION

Now we'd like to know a little more about communication about fisheries issues for you and your community, so communication can be improved in the future.

18. a) What is your MAIN source of information about fisheries-related issues (*Can be a group / organisation / sector / individual – please list sector for individuals*),

b) Why do you choose this source? *(e.g. trust, accessibility, etc)*

19. Specifically, please list the **5 key people** in your community you talk to about fisheries related issues and indicate how much they influence your opinion about issues.

Name	**Sector**	**Level of influence** Not at all - Very high; DK				
1.		1	2	3	4	DK
2.		1	2	3	4	DK
		1	2	3	4	DK

3.					
4.	1	2	3	4	DK
5.	1	2	3	4	DK

20. How often have you communicated with the following groups within your community about **fisheries issues** in the past 12 months?

Recreational fishers	Never / 1-5 times / >5 times
Commercial fishers	Never / 1-5 times / >5 times
Charter operators	Never / 1-5 times / >5 times
Indigenous community members	Never / 1-5 times / >5 times
Non-fishing community members	Never / 1-5 times / >5 times
QBFP officers	Never / 1-5 times / >5 times

21. a) Are there any groups you wish you had better communication with?

    b) Why?

22. a) Are there any groups you do NOT wish to have a connection with?

    b) Why?

23. a) Over the last 12 months, how many times did you speak to Fisheries Queensland (not the QBFP) **about fisheries-related issues**?

    1 More than 10 times
    2 5-10 times
    3 2-5 times
    4 Once
    5 Not at all

b) Over the last 12 months, how many times did you speak to the QBFP **about fisheries-related issues**?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once

5 Not at all

24. Over the last 12 months, how many times did you speak to a GBRMPA staff member or Liaison officer **about fisheries-related issues**?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once
5 Not at all

25. How much do you trust Fisheries Queensland to manage your LOCAL fisheries resources sustainably?

1 Not at all trustworthy
2 Slightly trustworthy
3 Moderately trustworthy
4 Highly trustworthy
5 Can't say

CO-MANAGEMENT

26. a) Were you aware there was a project in Port Douglas trialling co-management of local fisheries resources?

No – *to next q*

Yes b) What do you think co-management is? How would you define it?

c) What did you hope it would achieve in Port Douglas?

d) Why do you think it failed here?

DEMOGRAPHICS

If you don't mind we'd like to collect a few details about yourself so we get a good demographic picture and coverage of the community.

27. Would you mind telling me your approximate age?

1 15-19
2 20-29
3 30-39
4 40-49
5 50-59
6 60-64
7 65 years or over

28. What is the highest level of education you have completed?

1 Year 10 or less
2 Year 11
3 Year 12/Tech
4 University (Currently studying / completed)

29. Do you mind if I ask your approximate annual household income before taxes?

1 Under $50,000
2 $50,000 to $99,999

3 $100,000 to $149,999
4 $150,000 to $199,999
5 $200,000 to $249,999
6 $250,000 to $299,999
7 $300,000 or more
98 Prefer not to answer

30. Gender *(don't ask!)*
1 Male
2 Female

CONTACT

Fisheries Queensland have offered to send information they have about to anyone who would like to know more. Would you like them to send you something?

No

Yes – *Any specific question?*_____ _____

Contact details (e-mail preferred) _____

Would you like to be on the F&F mailing list too? Y / N

Anything else to add?

Appendix 5 Oral history survey for related BUSINESS OWNERS.

A) CARAVAN PARK MANAGERS

FISHING RELATED BUSINESSES – CARAVAN PARK / SIMILAR

First we'd like to know a bit about you and your role in the Port Douglas and fishing community

5. a) How long has your business been operating in Port Douglas? _____ years

b) How long have you been involved with this business? _____ years

6. Are you the:

1 Business owner
2 Manager
3 Other _____

8. What percentage of your household income comes from this business? _____ %

9. Are you a member of any clubs/organisations in your community?

Yes – _____
No

12. a) Do your tourists catch (or have you ever tried to catch) grey mackerel?

No – *to next q*
Yes

b) Do any of your tourists come *specifically* to catch grey mackerel each year?

Yes – what proportion? _____
No

c) Regarding GREY MACKEREL, would you say:

1 All/Most of your tourists target them during the season
2 Some of your tourists target them during the season
3 Very few of your tourists target them during the season
4 None of your tourists target them during the season

d) How long have tourists been coming to this area to catch Grey Mackerel?
_____ years

e) Do you think the Grey Mackerel catches for individual tourists have changed in recent years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

f) Why?

13. How important do you think Grey Mackerel fishing in Port Douglas is to:	Not at all important	Of minor importance	Of moderate importance	Very important	Can't say
a) Local recreational fishers	**1**	**2**	**3**	**4**	**5**
b) Commercial fishers	**1**	**2**	**3**	**4**	**5**
c) Local seafood consumers (to purchase)	**1**	**2**	**3**	**4**	**5**
d) Tourist recreational fishers	**1**	**2**	**3**	**4**	**5**
e) Traditional owners	**1**	**2**	**3**	**4**	**5**

14. a) Are you aware there is commercial netting for Grey Mackerel in the Port Douglas area?

No – *to next q*
Yes

b) Have you personally witnessed the commercial netters operating, or heard about it from others? *(can be both)*

Personal experience
Heard from others – c) Who? (*e.g. recreational fishers*, *tackle shop, newspaper, etc*)

_____

d) What is your level of approval of commercial Grey Mackerel netting in the Port Douglas area?

1 Strongly approve
2 Approve
3 Neither approve nor disapprove
4 Disapprove
5 Strongly disapprove

e) In what way do you approve/disapprove?

15. a) Are you concerned about Grey Mackerel fishing in the Port Douglas area?

No - *to next q*
Yes

b) How concerned are you about Grey Mackerel fishing compared to other local fisheries issues (Q3)?

1 A lot more concerned about Grey Mackerel than any other issue
2 A bit more concerned
3 Same level of concern
4 A bit less concerned
5 A lot less concerned about Grey Mackerel than other issues
NA Listed Grey Mackerel as sole most pressing issue in Q3

c) Please explain your concerns about Grey Mackerel fishing (*what sort of concerns do you have? E.g. sustainability, bycatch, allocation, effect on business, etc)*

d) In what YEAR did you first start to become concerned about Grey Mackerel fishing?

_____

e) What changed at that point to make you concerned?

f) Is your concern based on your own experience or from other sources (*e.g. other community members, newspaper, etc. Be as specific as possible. Can be both*))?

Own experience / witness

Other:

g) Do you issues surrounding Grey Mackerel fishing have affected your business?

No
Yes – how? _____

_____

h) What do you think is the solution to the Grey Mackerel issue you've outlined?

COMMUNICATION

Now we'd like to know a little more about communication about fisheries issues for you and your community, so communication can be improved in the future.

18. a) What is your MAIN source of information about fisheries-related issues (*Can be a group / organisation / sector / individual – please list sector for individuals*),

b) Why do you choose this source? *(e.g. trust, accessibility, etc)*

19. Specifically, please list the **5 key people** in your community you talk to about fisheries related issues and indicate how much they influence your opinion about issues.

Name	**Sector**	**Level of influence** Not at all - Very high; DK				
1.		1	2	3	4	DK
2.		1	2	3	4	DK
3.		1	2	3	4	DK
4.		1	2	3	4	DK
5.		1	2	3	4	DK

20. How often have you communicated with the following groups within your community **about fisheries issues** in the past 12 months?

Recreational fishers	Never / 1-5 times / >5 times
Commercial fishers	Never / 1-5 times / >5 times
Charter operators	Never / 1-5 times / >5 times
Indigenous community members	Never / 1-5 times / >5 times
Non-fishing community members	Never / 1-5 times / >5 times
QBFP officers	Never / 1-5 times / >5 times

21. a) Are there any groups you wish you had better communication with?

b) Why?

22. a) Are there any groups you do NOT wish to have a connection with?

b) Why?

23. a) Over the last 12 months, how many times did you speak to Fisheries Queensland (not the QBFP) **about fisheries-related issues**?

1 More than 10 times
2 5-10 times

3 2-5 times
4 Once
5 Not at all

b) Over the last 12 months, how many times did you speak to the QBFP **about fisheries-related issues**?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once
5 Not at all

24. Over the last 12 months, how many times did you speak to a GBRMPA staff member or Liaison officer **about fisheries-related issues**?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once
5 Not at all

25. How much do you trust Fisheries Queensland to manage your LOCAL fisheries resources sustainably?

1 Not at all trustworthy
2 Slightly trustworthy
3 Moderately trustworthy
4 Highly trustworthy
5 Can't say

CO-MANAGEMENT

26. a) Before we met today, were you aware there was a project in Port Douglas trialling co-management of local fisheries resources?

No – *to next q*
Yes b) What do you think co-management is? How would you define it?

c) What did you hope it would achieve in Port Douglas?

d) Why do you think it failed here?

DEMOGRAPHICS

If you don't mind we'd like to collect a few details about yourself so we get a good demographic picture and coverage of the community.

27. Would you mind telling me your approximate age?

1 15-19
2 20-29
3 30-39
4 40-49
5 50-59
6 60-64
7 65 years or over

28. What is the highest level of education you have completed?

1 Year 10 or less
2 Year 11
3 Year 12/Tech
4 University (Currently studying / completed)

29. Do you mind if I ask your approximate annual household income before taxes?

1 Under $50,000
2 $50,000 to $99,999
3 $100,000 to $149,999
4 $150,000 to $199,999
5 $200,000 to $249,999
6 $250,000 to $299,999
7 $300,000 or more
98 Prefer not to answer

30. Gender *(don't ask!)*

1 Male
2 Female

CONTACT

Fisheries Queensland have offered to send information they have about Grey Mackerel to anyone who would like to know more. Would you like them to send you something?

No

Yes – *Any specific question?*_____

Contact details (e-mail preferred) _____

Would you like to be on the F&F mailing list too? Y / N

Anything else to add?

B) BAIT AND TACKLE SHOP MANAGERS

FISHING RELATED BUSINESSES – BAIT AND TACKLE / SIMILAR

First we'd like to know a bit about you and your role in the Port Douglas and fishing community

5. a) How long has your business been operating in Port Douglas? _____ years

b) How long have you been involved with this business? _____ years

6. Are you the:

1 Business owner
2 Manager
3 Other _____

8. What percentage of your household income comes from this business? _____ %

9. Are you a member of any clubs/organisations in your community?

Yes – _____

No

12. a) Regarding GREY MACKEREL, would you say:

1 Most/All of your customers target them during the season
2 Some of your customers target them during the season
3 Very few of your customers target them during the season
4 None of your customers target them during the season

b) Do you think the Grey Mackerel catches for local recreational fishers have changed in recent years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

c) Why?

13. How important do you think Grey Mackerel fishing in Port Douglas is to:	Not at all important	Of minor importance	Of moderate importance	Very important	Can't say
a) Local recreational fishers	1	2	3	4	5
b) Commercial fishers	1	2	3	4	5
c) Local seafood consumers (to purchase)	1	2	3	4	5

d) Tourist recreational fishers	**1**	**2**	**3**	**4**	**5**
e) Traditional owners	**1**	**2**	**3**	**4**	**5**

14. a) Are you aware there is commercial netting for Grey Mackerel in the Port Douglas area?

No – *to next q*

Yes

b) Have you personally witnessed the commercial netters operating, or heard about it from others? *(can be both)*

Personal experience

Heard from others – c) Who? (*e.g. recreational fishers*, *tackle shop, newspaper, etc*)

_____

d) What is your level of approval of commercial Grey Mackerel netting in the Port Douglas area?

1 Strongly approve
2 Approve
3 Neither approve nor disapprove
4 Disapprove
5 Strongly disapprove

e) In what way do you approve/disapprove?

15. a) Are you concerned about Grey Mackerel fishing in the Port Douglas area?

No - *to next q*

Yes

b) How concerned are you about Grey Mackerel fishing compared to other local fisheries issues (Q3)?

1 A lot more concerned about Grey Mackerel than any other issue
2 A bit more concerned
3 Same level of concern
4 A bit less concerned
5 A lot less concerned about Grey Mackerel than other issues
NA Listed Grey Mackerel as sole most pressing issue in Q3

c) Please explain your concerns about Grey Mackerel fishing (*what sort of concerns do you have? E.g. sustainability, bycatch, allocation, effect on business, etc)*

d) In what YEAR did you first start to become concerned about Grey Mackerel fishing?

_____

e) What changed at that point to make you concerned?

f) Is your concern based on your own experience or from other sources (*e.g. other community members, newspaper, etc. Be as specific as possible. Can be both*)?

Own experience / witness

Other:

g) Do you issues surrounding Grey Mackerel fishing have affected your business?

No

Yes – how? _____

_____

h) What do you think is the solution to the Grey Mackerel issue you've outlined?

COMMUNICATION

Now we'd like to know a little more about communication about fisheries issues for you and your community, so communication can be improved in the future.

18. a) What is your MAIN source of information about fisheries-related issues (*Can be a group / organisation / sector / individual – please list sector for individuals*),

b) Why do you choose this source? *(e.g. trust, accessibility, etc)*

19. Specifically, please list the **5 key people** in your community you talk to about fisheries related issues and indicate how much they influence your opinion about issues.

Name	**Sector**	**Level of influence** Not at all - Very high; DK				
1.		1	2	3	4	DK
2.		1	2	3	4	DK
3.		1	2	3	4	DK
4.		1	2	3	4	DK
		1	2	3	4	DK

5.

20. How often have you communicated with the following groups within your community **about fisheries issues** in the past 12 months?

Recreational fishers	Never / 1-5 times / >5 times
Commercial fishers	Never / 1-5 times / >5 times
Charter operators	Never / 1-5 times / >5 times
Indigenous community members	Never / 1-5 times / >5 times
Non-fishing community members	Never / 1-5 times / >5 times
QBFP officers	Never / 1-5 times / >5 times

21. a) Are there any groups you wish you had better communication with?

b) Why?

22. a) Are there any groups you do NOT wish to have a connection with?

b) Why?

23. a) Over the last 12 months, how many times did you speak to Fisheries Queensland (not the QBFP) **about fisheries-related issues**?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once
5 Not at all

b) Over the last 12 months, how many times did you speak to the QBFP **about fisheries-related issues**?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once
5 Not at all

24. Over the last 12 months, how many times did you speak to a GBRMPA staff member or Liaison officer **about fisheries-related** issues?

1 More than 10 times
2 5-10 times

3 2-5 times
4 Once
5 Not at all

25. How much do you trust Fisheries Queensland to manage your LOCAL fisheries resources sustainably?

1 Not at all trustworthy
2 Slightly trustworthy
3 Moderately trustworthy
4 Highly trustworthy
5 Can't say

CO-MANAGEMENT

26. a) Were you aware there was a project in Port Douglas trialling co-management of local fisheries resources?

No – *to next q*

Yes b) What do you think co-management is? How would you define it?

c) What did you hope it would achieve in Port Douglas?

d) Why do you think it failed here?

DEMOGRAPHICS

If you don't mind we'd like to collect a few details about yourself so we get a good demographic picture and coverage of the community.

27. Would you mind telling me your approximate age?

1 15-19
2 20-29
3 30-39
4 40-49
5 50-59
6 60-64
7 65 years or over

28. What is the highest level of education you have completed?

1 Year 10 or less
2 Year 11
3 Year 12/Tech
4 University (Currently studying / completed)

29. Do you mind if I ask your approximate annual household income before taxes?

1 Under $50,000

2 $50,000 to $99,999
3 $100,000 to $149,999
4 $150,000 to $199,999
5 $200,000 to $249,999
6 $250,000 to $299,999
7 $300,000 or more
98 Prefer not to answer

30. Gender *(don't ask!)*

1 Male
2 Female

CONTACT

Fisheries Queensland have offered to send information they have about Grey Mackerel to anyone who would like to know more. Would you like them to send you something?

No

Yes – *Any specific question?*_____ _____

Contact details (e-mail preferred) _____

Would you like to be on the F&F mailing list too? Y / N

Anything else to add?

C) SEAFOOD RETAIL MANAGERS

FISHING RELATED BUSINESSES – SEAFOOD RETAIL / SIMILAR

First we'd like to know a bit about you and your role in the Port Douglas and fishing community

5. a) How long has your business been operating in Port Douglas? _____ years

b) How long have you been involved with this business? _____ years

6. Are you the:

1 Business owner
2 Manager
3 Other _____

8. What percentage of your household income comes from this business? _____ %

9. Are you a member of any clubs/organisations in your community?

Yes – _____

No

12. a) Do you sell Grey Mackerel in the local area?

No – Why? _____

Yes

b) Do you sell it specifically as GREY mackerel, or as MACKEREL?

_____

c) Where do you source your Grey Mackerel from?

d) If local, do you advertise it as locally caught? Always / Sometimes / No

e) Compared to other species, how much demand is there for GREY MACKEREL?

1 It is in high demand during the season
2 It is in medium demand during the season
3 It is in low demand during the season
4 No-one specifically asks for it

f) Has the amount of Grey Mackerel you sell changed in recent years?

1 Increased a lot
2 Increased a little
3 No change
4 Decreased a little
5 Decreased a lot

g) Why?

13. How important do you think Grey Mackerel fishing in Port Douglas is to:	Not at all important	Of minor importance	Of moderate importance	Very important	Can't say
a) Local recreational fishers	**1**	**2**	**3**	**4**	**5**
b) Commercial fishers	**1**	**2**	**3**	**4**	**5**
c) Local seafood consumers (to purchase)	**1**	**2**	**3**	**4**	**5**
d) Tourist recreational fishers	**1**	**2**	**3**	**4**	**5**
e) Traditional owners	**1**	**2**	**3**	**4**	**5**

14. a) Are you aware there is commercial netting for Grey Mackerel in the Port Douglas area?

No – *to next q*

Yes

b) Do you buy fish from commercial netters operating in Port Douglas?

Yes / No

c) What is your level of approval of commercial Grey Mackerel netting in the Port Douglas area?

1 Strongly approve
2 Approve
3 Neither approve nor disapprove
4 Disapprove
5 Strongly disapprove

d) In what way do you approve/disapprove?

15. a) Are you concerned about Grey Mackerel fishing in the Port Douglas area?

No - *to next q*

Yes

b) How concerned are you about Grey Mackerel fishing compared to other local fisheries issues (Q3)?

1 A lot more concerned about Grey Mackerel than any other issue
2 A bit more concerned
3 Same level of concern

4 A bit less concerned

5 A lot less concerned about Grey Mackerel than other issues

NA Listed Grey Mackerel as sole most pressing issue in Q3

c) Please explain your concerns about Grey Mackerel fishing (*what sort of concerns do you have? E.g. sustainability, bycatch, allocation, effect on business, etc)*

d) In what YEAR did you first start to become concerned about Grey Mackerel fishing? _____

e) What changed at that point to make you concerned?

f) Is your concern based on your own experience or from other sources (*e.g. other community members, newspaper, etc. Be as specific as possible. Can be both*)?

Own experience / witness

Other:

g) How often do your customers mention their concerns about Grey Mackerel fishing to you?

1 Very regularly / often
2 Sometimes
3 Rarely
4 Never

h) Do you think issues surrounding Grey Mackerel have affected your customer numbers/ business?

No

Yes – to what extent? _____

h) What do you think is the solution to the Grey Mackerel issue you've outlined?

COMMUNICATION

Now we'd like to know a little more about communication about fisheries issues for you and your community, so communication can be improved in the future.

18. a) What is your MAIN source of information about fisheries-related issues (*Can be a group / organisation / sector / individual – please list sector for individuals*),

b) Why do you choose this source? *(e.g. trust, accessibility, etc)*

19. Specifically, please list the **5 key people** in your community you talk to about fisheries related issues and indicate how much they influence your opinion about issues.

Name	**Sector**	**Level of influence** Not at all - Very high; DK				
1.		1	2	3	4	DK
2.		1	2	3	4	DK
3.		1	2	3	4	DK
4.		1	2	3	4	DK
5.		1	2	3	4	DK

20. How often have you communicated with the following groups within your community **about fisheries issues** in the past 12 months?

Recreational fishers	Never / 1-5 times / >5 times
Commercial fishers	Never / 1-5 times / >5 times
Charter operators	Never / 1-5 times / >5 times
Indigenous community members	Never / 1-5 times / >5 times
Non-fishing community members	Never / 1-5 times / >5 times
QBFP officers	Never / 1-5 times / >5 times

21. a) Are there any groups you wish you had better communication with?

b) Why?

22. a) Are there any groups you do NOT wish to have a connection with?

b) Why?

23. a) Over the last 12 months, how many times did you speak to Fisheries Queensland (not the QBFP) **about fisheries-related issues**?

1 More than 10 times

2 5-10 times
3 2-5 times
4 Once
5 Not at all

b) Over the last 12 months, how many times did you speak to the QBFP **about fisheries-related issues**?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once
5 Not at all

24. Over the last 12 months, how many times did you speak to a GBRMPA staff member or Liaison officer about fisheries-related issues?

1 More than 10 times
2 5-10 times
3 2-5 times
4 Once
5 Not at all

25. How much do you trust Fisheries Queensland to manage your LOCAL fisheries resources sustainably?

1 Not at all trustworthy
2 Slightly trustworthy
3 Moderately trustworthy
4 Highly trustworthy
5 Can't say

CO-MANAGEMENT

26. a) Before we met today, were you aware there was a project in Port Douglas trialling co-management of local fisheries resources?

No – *to next q*
Yes b) What do you think co-management is? How would you define it?

c) What did you hope it would achieve in Port Douglas?

d) Why do you think it failed here?

DEMOGRAPHICS

If you don't mind we'd like to collect a few details about yourself so we get a good demographic picture and coverage of the community.

27. Would you mind telling me your approximate age?

1 15-19
2 20-29

3 30-39
4 40-49
5 50-59
6 60-64
7 65 years or over

28. What is the highest level of education you have completed?

1 Year 10 or less
2 Year 11
3 Year 12/Tech
4 University (Currently studying / completed)

29. Do you mind if I ask your approximate annual household income before taxes?

1 Under $50,000
2 $50,000 to $99,999
3 $100,000 to $149,999
4 $150,000 to $199,999
5 $200,000 to $249,999
6 $250,000 to $299,999
7 $300,000 or more
98 Prefer not to answer

30. Gender *(don't ask!)*

1 Male
2 Female

CONTACT

Fisheries Queensland have offered to send information they have about Grey Mackerel to anyone who would like to know more. Would you like them to send you something?

No

Yes – *Any specific question?*_____ _____

Contact details (e-mail preferred) _____

Would you like to be on the F&F mailing list too? Y / N

Anything else to add?

Appendix 6 Oral history survey for TRADITIONAL OWNERS

TRADITIONAL OWNERS

This will be more of a conversation rather than strict survey questions, but we have general topics we'd like to cover if possible (ignore question numbers – they are for data entry to fit with other sectors)

12. a) Do you catch (or have you ever tried to catch) Grey Mackerel?

b) How do you catch them?

13. How important is Grey Mackerel to you as a customary species? Does it have historic significance?

12. Have you noticed any changes in Grey Mackerel in the area (in recent years / previous decades)? Do you know why?

14. Are you aware there is offshore commercial netting for Grey Mackerel in the Port Douglas area? How do you feel about it?

15. Are you concerned about Grey Mackerel netting in the area?

Please explain – what are your concerns, when did you first become concerned, what are the solutions?

COMMUNICATION

Now we'd like to know a little more about communication about fisheries issues for you and your community.

18. Where do you get your information about fisheries / sea country related issues? Why from that source?

20. How often have you communicated with the following groups within your community about fisheries issues in the past 12 months?

Indigenous community members	Never / 1-5 times / >5 times
Recreational fishers	Never / 1-5 times / >5 times
Commercial fishers	Never / 1-5 times / >5 times
Charter operators	Never / 1-5 times / >5 times
Non-fishing community members	Never / 1-5 times / >5 times

QBFP officers Never / 1-5 times / >5 times

21. Are there any groups you wish you had better communication with and why?

22. Are there any groups you do NOT wish to have a connection with and why?

25. Do you trust Fisheries Queensland to manage your LOCAL fisheries resources sustainably?

CO-MANAGEMENT

26. a) Were you aware there was a project in Port Douglas trialling co-management of local fisheries resources?

No – *to next q*

Yes b) What do you think co-management is? How would you define it?

c) What did you hope it would achieve in Port Douglas?

d) Why do you think it failed here?

CONTACT

Fisheries Queensland have offered to send information they have about Grey Mackerel to anyone who would like to know more. Would you like them to send you something?

No

Yes – *Any specific question?*_____ _____

Contact details (e-mail preferred) _____

Would you like to be on the F&F mailing list too? Y / N

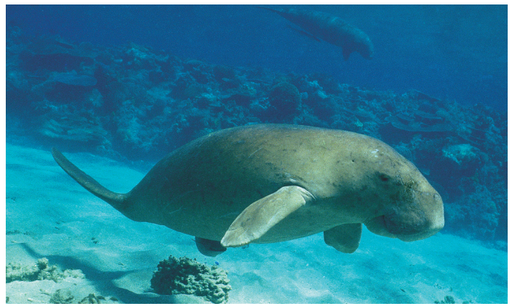
Anything else to add?

Appendix 2. Zoning map and information sheet: “For commercial net fishermen about netting changes in Bowling Green Bay Species Conservation (Dugong Protection) Special Management Area”

Australian Government
Great Barrier Reef Marine Park Authority

INFORMATION SHEET

For commercial net fishermen about netting changes in Bowling Green Bay Species Conservation (Dugong Protection) Special Management Area



Overview

Amendments to *Great Barrier Reef Marine Park Regulations 1983* were introduced in December 2011 to provide increased protection to dugong in a defined area of the Great Barrier Reef Marine Park. The amendments are one step to address concerns about the level of dugong mortalities in the Bowling Green Bay area.

The rule changes further restrict commercial net fishing within the existing Species Conservation (Dugong Protection) Special Management Area, known as a Dugong Protection Area.

The changes were largely developed through the initiative of local fishers as part of the Burdekin Regional Management Project, to reduce the risk of incidental catch of dugong in commercial mesh nets. The Burdekin Regional Management Project seeks outcomes that work for the local community and the marine resources they depend on. It is a strong stewardship initiative that is about local people being involved in and influencing important decisions that impact on a range of marine resource management concerns.

What are the new netting arrangements?

The amendments change the rules for net fishing within part of Bowling Green Bay to reduce the risk of dugong mortalities. The map shows the two defined areas where the rule changes apply. The restrictions on net fishing are:

- In the 'No Netting Area', no netting activities (other than bait netting) are allowed.
- In the 'Restricted Netting Area', larger dimension nets are prohibited, but limited lower-risk netting activities are allowed. A summary of the rules are outlined over the page.

Fishers need to be aware of the specific rules that apply to netting in the area.

The precise boundary descriptions and provisions for netting in the area are described in the *Great Barrier Reef Marine Park Regulations 1983* and maps have been provided to all relevant licence holders. Existing Great Barrier Reef Marine Park zoning and other fishing rules still apply.

Why have there been changes?

These changes have been initiated and developed in consultation with local fishers who recognised the need to increase protection to dugong following recent unsustainable levels of dugong mortalities in the area:

- Since July 2010 at least seven dugong mortalities have been reported in Bowling Green Bay (three confirmed, four unconfirmed). These mortalities are understood to be associated with incidental capture in fishing nets.
- These incidents raise concerns as the mortality of dugong from all human-related causes for the whole urban coast of the Great Barrier Reef (from Cooktown south) should be reduced to as close to zero as possible. This is so dugong populations can recover and where possible allow for future sustainable traditional use.
- The Queensland dugong population is currently under additional pressures due to extreme weather impacts on their critical seagrass habitats and food resources.

The Queensland Seafood Industry Association and fishing representatives in the Burdekin region support these measures. They are designed to address the netting practices that led to the dugong deaths and to minimise disruption for businesses so that they can continue fishing operations and supply a range of seafood products to markets.

What does this mean for net fishermen?

Commercial net fishermen need to make sure they are familiar with the rules, and ensure they aren't illegally fishing within Bowling Green Bay. It is important you know where you are, and what the rules are for that area, otherwise you could risk getting a fine for illegal fishing.

Netting rules for other areas within Bowling Green Bay remain unchanged. The rules for other activities, including recreational fishing and other forms of commercial fishing, also remain unchanged.

For more information

http://www.gbrmpa.gov.au/about-the-reef/how-the-reefs-managed/fisheries-in-the-marine-park/east-coast-inshore-finfish

Details of the new netting arrangements

No Netting Area within Bowling Green Bay

The area bounded by a line commencing at 19° 23.282' S, 147° 15.684' E then running progressively:

1. east along the parallel to its intersection with longitude 147° 23.581' E
2. south along the meridian to its intersection with latitude 19° 23.985' S
3. west along the parallel to its intersection with longitude 147°15.684' E
4. north along the meridian to the point of commencement.

The following rule applies to net fishing (other than bait netting) in the No Netting Area

(1) Commercial net fishing is prohibited in the No Netting Area within Bowling Green Bay.

Restricted Netting Area within Bowling Green Bay

The area bounded by a line commencing at 19° 23.985' S, 147° 15.684' E then running progressively:

1. east along the parallel to its intersection with longitude 147° 23.581' E
2. south along the meridian to its intersection with the mainland coastline at mean low water (at or about 19° 25.119' S, 147° 23.581' E)
3. along the mainland coastline at mean low water to its intersection with the meridian 147° 15.684' E (at or about 19° 25.673' S, 147° 15.684' E)
4. north along the meridian to the point of commencement.

The following rules apply to commercial net fishing (other than bait netting) in the Restricted Netting Area

(1) The only nets that may be used in the Restricted Netting Area are:

(i) up to three set mesh nets with each net:
   a. up to 120 metres long
   b. with mesh size of at least 100 mm but no more than 215 mm
   c. weighed down only with continuous lead core rope (6-8mm diameter) along the full length of the bottom of the mesh net, and
   d. for nets with mesh size of 150 mm to 215 mm, the drop must be no more than 16 meshes.

(ii) a mesh net up to 120 metres long with:
   a. mesh size of at least 50mm but no more than 115 mm, and
   b. weighed down only with continuous lead core rope (6-8mm diameter) along the full length of the bottom of the mesh net.

(2) For a net used under (1)(i):
   a. the entire net must be in nearshore waters while it is being used
   b. the distance between the first and last net must be no more than 1km
   c. the nets must be no more than 800 m apart, and
   d. any person using the nets must be between the first and the last net; and no more than 800m from any of the nets.

(3) For a net used under (1)(ii) a person using the net must remain on a boat floating on the water within 100m of the net unless the person is setting or retrieving the net.

(4) A net that is neither fixed nor hauled must not be used.

The information above is provided as a summary. It is not a precise statement of law and should not be relied on as a complete or accurate representation of the legislative requirements that apply to netting operations in the area. Users should refer to the *Great Barrier Reef Marine Park Regulations 1983* for the precise boundary descriptions and provisions for netting in the area, and familiarise themselves with all legal requirements relevant to their particular activities before entering or using the Great Barrier Reef Marine Park.

C2172

AREAS WHERE RULE CHANGES APPLY WITHIN THE BOWLING GREEN BAY SPECIES CONSERVATION (Dugong Protection) SPECIAL MANAGEMENT AREA

(providing various levels of protection)

Australian Government
Great Barrier Reef Marine Park Authority

Legend

- Restricted Area coordinate
- No netting (other than bait netting) area within Bowling Green Bay Species Conservation (Dugong Protection) SMA
- Restricted netting area within Bowling Green Bay Species Conservation (Dugong Protection) SMA
- Great Barrier Reef Marine Park boundary
- Bommie / Rock
- Indicative Reef boundary
- Population centres (symbolised)
- Population centres (to scale)
- Road
- River
- Mangrove
- Backshore
- National Park / Conservation Tenure
- Mainland and Islands

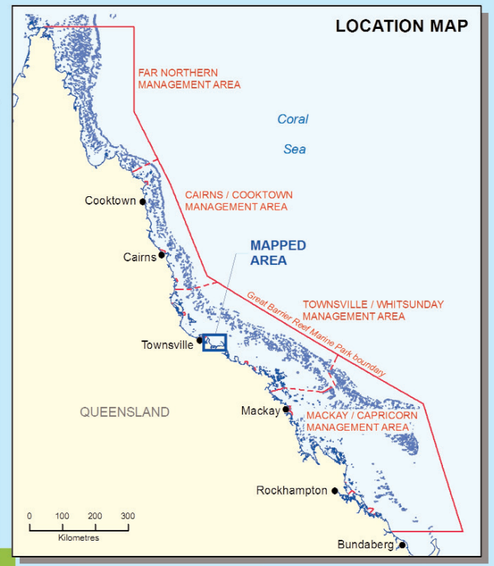
Special Management Areas

- Restricted Access Area boundary
- Species Conservation (Dugong Protection) boundary

Zoning

- General Use
- Habitat Protection
- Conservation Park
- Buffer
- Scientific Research
- Scientific Research *(closed to public access)*
- Marine National Park
- Preservation

LOCATION MAP



Cape Cleveland
Four Foot Rock
Twenty Foot Rock
Cleveland Bay
Bare Islet
AIMS
Cocoa Ck
Crocodile Creek
Alligator Creek
BOWLING GREEN BAY NATIONAL PARK
Nome
Cungulla
Giru
Haughton River
Barramundi Creek
Combe Creek
Barratta Creek
Bowling Green Bay
Cape Bowling Green
Sand Island
Alva
Ayr

Areas where new provisions apply:
Species Conservation (Dugong Protection) Restricted Areas coincident with boundary of GBRMP HP-19-5171 zone

19° 23.282' S
147° 15.684' E

19° 23.282' S
147° 23.581' E

No netting (other than bait netting) area

19° 23.985' S
147° 15.684' E

19° 23.985' S
147° 23.581' E

Restricted netting area

19° 25.119' S
147° 23.581' E

19° 25.673' S
147° 15.684' E

No netting (other than bait netting) area within Bowling Green Bay Species Conservation (Dugong Protection) SMA

The area bounded by a line commencing at 19° 23.282' S, 147° 15.684' E then running progressively:

1. east along the parallel to its intersection with longitude 147° 23.581' E
2. south along the meridian to its intersection with latitude 19° 23.985' S
3. west along the parallel to its intersection with longitude 147°15.684' E
4. north along the meridian to the point of commencement

Restricted netting area within Bowling Green Bay Species Conservation (Dugong Protection) SMA

The area bounded by a line commencing at 19° 23.985' S, 147° 15.684' E then running progressively:

1. east along the parallel to its intersection with longitude 147° 23.581' E
2. south along the meridian to its intersection with the mainland coastline at mean low water (at or about 19° 25.119' S, 147° 23.581' E)
3. along the mainland coastline at mean low water to its intersection with the meridian 147° 15.684' E (at or about 19° 25.673' S, 147° 15.684' E)
4. north along the meridian to the point of commencement

N

0 5 10
Kilometres

Map Projection: Unprojected Geographic
Horizontal Datum: Geocentric Datum of Australia 1994
SDC110411 14 November 2011

Appendix 3. Consultation paper: “Fishing in the Burdekin community: your view”

Department of **Employment, Economic Development and Innovation**
Fisheries Queensland

Fishing in the Burdekin community: your view

Are you interested in how fisheries are being managed in the Burdekin? If so, you are invited to provide feedback on proposed changes to fishing in this area.

Proposed changes to commercial netting closures within the region have been driven by the community. The proposals have been developed by government and the Burdekin Regional Fisheries Management Committee. Fisheries Queensland is conducting this consultation on behalf of the committee.

These proposed changes are the first step in co-managing the area's fisheries on a regional basis. The changes will benefit the recreational and commercial fishing sectors, and support the environment in terms of dugong protection.

As a member of the Burdekin community, you are invited to comment on proposed changes to commercial netting closures within the region.

What is regional co-management?

For some time, coastal communities have argued that certain general fishing rules do not suit their region.

To address this, Fisheries Queensland has been considering options for managing Queensland's fisheries through regional co-management.

Through co-management, the responsibilities and obligations for sustainable fisheries management are negotiated, shared and delegated between the government, fishers and other interest groups and stakeholders.

This approach recognises that local people have a greater interest in protecting and fairly allocating the resources in their region.

Regional co-management in the Burdekin

The Burdekin Regional Fisheries Management Committee was formed to consider regional fisheries issues. The committee includes recreational fishers, commercial fishers, fish shop owners and government (including local government).

The committee considers fishing issues in the region and provides solutions that ensure a fair and equitable outcome for recreational and commercial fishers and the environment.

The four main issues currently being considered by the committee are:

1. amending, reducing or introducing commercial netting closures
2. adopting best practice commercial netting to minimise the impact on protected species and address ongoing issues with recreational fishers
3. amending marine park arrangements regarding yellow zones
4. implementing an education program for recreational fishers on appropriate fishing practices in the Burdekin region.

This consultation paper deals with the first issue—amending, reducing or introducing commercial netting closures.

Queensland Government

Affix stamp here

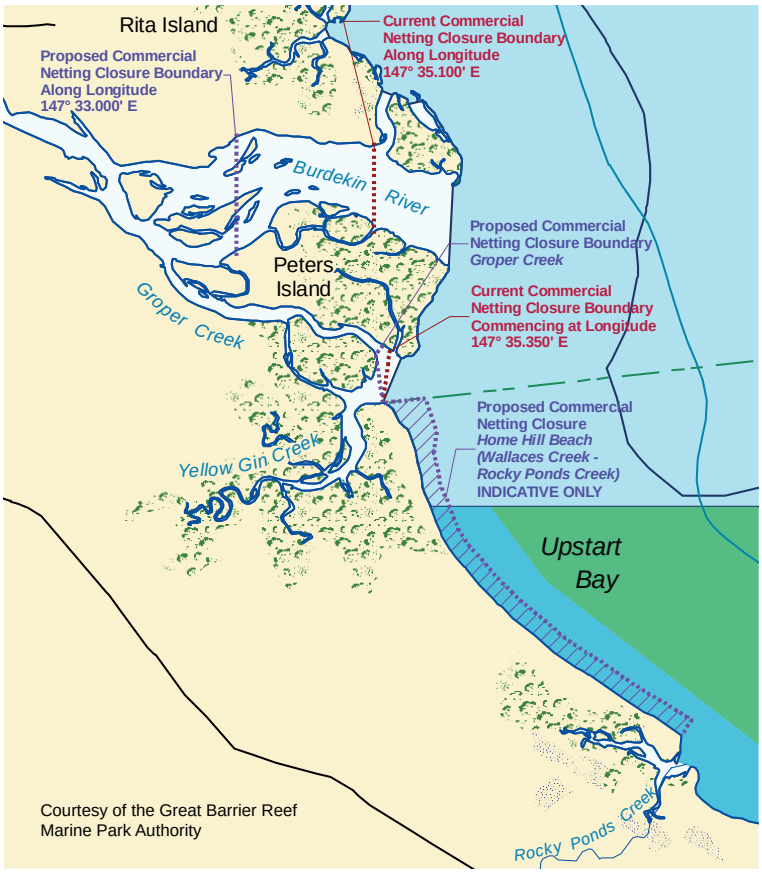
Burdekin regional management

Fisheries Queensland

Department of Employment, Economic Development and Innovation

GPO Box 46

Brisbane Qld 4001



Proposed changes to netting closures

Commercial netting occurs in the lower stretches of the Burdekin River. Species targeted include barramundi, blue salmon, king salmon, diamondscale mullet and shark.

Commercial netting also occurs on the foreshores of Home Hill Beach, targeting the same species and occasionally bream, whiting and flathead when in season.

The proposal is to close Home Hill Beach to commercial netting, but compensate by extending the commercial netting area in the Burdekin River.

The proposed commercial netting area of the Burdekin River is only lightly fished by recreational fishers. In contrast, Home Hill Beach (a stretch of foreshore from Sugarloaf Point to Rocky Ponde Creek) is heavily fished by recreational fishers, particularly around the Wungunga township and the huts.

Dugong are often found in this region and could get caught in nets.

These proposed changes would achieve the following benefits for the community:

- **Recreational fishers** will enjoy net-free fishing in a popular recreational fishing area.
- **Commercial fishers** will be able to supply a range of fish species to local markets and avoid conflict with recreational fishers.
- **Dugongs** will have greater protection.

More information

For more information, call **13 25 23** or visit **www.fisheries.qld.gov.au**

Response form

Do you agree or disagree with the proposed changes to netting outlined in this document?

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

Please specify which fishing sector you are from:

☐ Recreational ☐ Commercial ☐ Charter ☐ Other

Why do you agree or disagree with the proposed changes?

.....

.....

.....

.....

.....

.....

.....

.....

Public meeting:

Venue: Ayr Catholic Parish Hall
Edwards Street, Ayr

Date: Friday 18 March 2011
Time: 7 pm

Mail:

Burdekin regional management
Fisheries Queensland
Department of Employment,
Economic Development and Innovation
GPO Box 46
Brisbane Qld 4001

Fax: (07) 3229 8146
Email: kirsty.howard@deedi.qld.gov.au

Your comments can be submitted in person at the public meeting in Ayr, or by post, fax or email.

Please submit your comments by 5 pm, Monday 4 April 2011.

CS0003 03/11