Trends and transitions observed in an iconic recreational fishery across 140 years

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Historical ecology

Abstract

Recreational fishing has taken place for centuries and is a globally popular activity, yet a lack of monitoring data means historical trends in recreational fisheries are often little understood compared to their commercial counterparts. We examined archival sources and conducted fisher interviews to examine changes in the Queensland recreational snapper (Chrysophrys auratus) fishery throughout its documented history. We extracted data spanning the past 140 years on technological innovations, catch rate trends, and social and regulatory change. Technological innovations were evident throughout the history of the recreational fishery. During the 1960s, 1990s and 2000s, several periods of rapid technological transition occurred, where a technology was adopted by > 50% of recreational fishers within 10 years of its introduction. Since the 1960s, the timing and rate of adoption of fish-finding technology by recreational fishers has kept pace with the commercial sector. These technological advances have profoundly increased recreational targeting ability, but despite these advances, recalled recreational catch rate trends demonstrated significant declines over the course of the 20th century. While minimum size limits have been imposed on the snapper fishery for over a century, in contrast, the introduction of recreational in-possession limits only commenced in the 1990s. At this time, the beginnings of a societal transition was also observed, where longstanding ‘take-all’ attitudes towards fishing began to be replaced by a more conservation-minded ethic. This shift was driven in part by the changing regulatory landscape, as well as wider attitudinal change influenced by the media and shifting societal norms, although whether this led to a reduction in total recreational catch remains unclear due to a lack of fishery-wide monitoring data and the open access nature of the recreational fishery. This study demonstrates that in the absence of systematic data collection, archival sources and fisher interviews can contribute an interdisciplinary knowledge base for understanding and interpreting historical fishery trends.

1. Introduction

Fishing is one of the longest and most pervasive of human influences upon marine ecosystems (Jackson et al., 2001). Recreational fishing activities, in particular, remain under-examined (McPhee et al., 2002; Beaudreau and Whitney, 2016). Until recently, monitoring efforts largely focused upon commercial fisheries, with recreational fisheries assumed to have a far lower ecological footprint than the commercial sector (Post et al., 2002; McClenachan, 2013). However, we now know that recreational fisheries comprise a significant percentage of global fish harvest (Cooke and Cowx, 2004), with recreational fish harvest exceeding that of the commercial sector in some inshore regions (Coleman et al., 2004; Idhe et al., 2011). Recreational fisheries are also recognised as economically, socially and culturally significant, for example, they contribute to regional economies and provide social opportunities (Peirson et al., 2001). Some recreational fisheries have existed as long as, or longer than, their commercial counterparts (Dayton and MacCall, 1992).

To combat a lack of formal data collection, researchers have turned to previously neglected sources to understand recreational fishery trends through time. Recreational catch rate trends have been extracted from fishing club records, diaries, logbooks and newspaper articles (e.g., Dayton and MacCall, 1992; Campbell et al., 2003; Parsons et al., 2009; Thurstan et al., 2016b), while size trends in landed fish have been examined using magazines and photographs (Young et al., 2014; McClenachan, 2009). However, despite an increasing number of studies, we continue to lack a basic knowledge of long-term catch or size trends in most recreational fisheries.

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In addition to a lack of understanding of fishery trends, our understanding of how social and technological shifts have influenced recreational fishing practices, and consequently catch and size trends, remains limited (Young et al., 2015; Frawley, 2015). In particular, we know little about the magnitude, timing and rate of technological change in many recreational fisheries. In commercial fisheries, technological advances have been shown to occur gradually, otherwise known as ‘technological creep’. These gradual changes are often interspersed with periods of rapid change, where the adoption of a new technology has a profound effect on fishers’ ability to catch fish, for example, the introduction of the bottom trawl (Garstang, 1900; Engelhard et al., 2008; Kerby et al., 2012). Other changes, such as societal shifts or the introduction of legislation that restricts landings of a particular species, may also effect a rapid change in fishers’ targeting behaviour. Identifying these ‘transition’ periods, where rapid changes in fishing ability or fishing behaviour occurred, and their drivers, provides an enhanced, holistic understanding of change in recreational fisheries, including the interpretation of catch or size trends (McClenachan, 2013).

In this study we use archival and fisher knowledge-derived data to identify fishery catch trends, technological, regulatory and societal transitions in a recreational fishery over the course of its documented history. Snapper (Chrysophrys auratus, also known as Pagrus auratus) occurs throughout the Indo-Pacific and supports significant commercial and recreational fisheries throughout Australia and New Zealand (Allen et al., 2006). In Queensland, Australia (Fig. 1), despite there being no formal records of the recreational fishery until the late 20th century, reports of chartered recreational fishing trips occur in popular media from the 1870s onwards (Thurstan et al., 2016b). We use these sources to quantify changes in catch rates, the impact of new technology on fishers’ targeting ability, and identify shifts in fishers’ attitudes towards fishing. We examine these changes, their timing and drivers over the documented period of the recreational fishery, a total of 140 years. Where data exist, we examine both recreational and commercial fishing sectors to compare how recreational fishery trends have changed in relation to the commercial sector.

The global significance of recreational fisheries contrasts with our lack of understanding of the ecological, human and policy dimensions of these fisheries. However, despite a lack of formal data collection we demonstrate that, due to the enduring community interest in recreational fishing and the ensuing records of popular and personal accounts of recreational fishing activities, alternative data sources exist that enable us to examine long-term changes in these systems over time. Our interdisciplinary approach can thus be replicated for any species that has a history of being targeted, and written about, by recreational fishers.
2. Methods

2.1. The contemporary Queensland fishery

In Queensland, snapper is managed as part of the mixed species Rocky Reef Fin Fish Fishery, which targets a range of line-caught species in rocky reef environments from 10 to 200 m depth (Allen et al., 2006). Within this fishery, snapper, pearl perch (Glaucosoma scapulare), teraglin (Atractoscion aequidens) cobia (Rachycentron canadum) and a range of other pelagic and demersal species are caught by both commercial and recreational fishers. Snapper landings dominate the commercial fishery (comprising 47.5% by weight in 2016), with pearl perch the second most abundant species by weight (14.4% by weight in 2016; Department of Agriculture and Fisheries, 2017a). Within this fishery, snapper is also the most frequently caught species by recreational fishers, but pearl perch, cobia and other rocky reef species are also commonly targeted by recreational fishers (Department of Agriculture and Fisheries, 2017b).

A charter fishery also exists, where vessels are operated by professional skipper but carry recreational fishers as passengers and operate under recreational limits (Allen et al., 2006). In line with the commercial and recreational sectors, snapper are targeted by this sector as part of the mixed rocky reef fishery and are caught by hook and line. All sectors are regulated by gear and size restrictions (Table 1), while recreational fishers are subject to in-possession limits and commercial fishers operate under a limited entry license system. Prior to 1990, recreational fishers were permitted to sell their catch, while the only management enacted across all sectors was a minimum landing size of 25 cm (Allen et al., 2006). Recreational sale of fish was halted in 1990, and the first recreational in-possession limits enacted in 1993 (Table 1; Allen et al., 2006). Due to differing management histories we separate analyses of the three sectors, but discuss the charter sector in the context of it being a recreational fishing platform.

Snapper occur as far north as the sub-tropical waters of the southern Great Barrier Reef (latitude 20.4°S), although the majority of the commercial catch is taken south of Bundaberg (Fig. 1). Commercial landings into Queensland totalled 661 in 2016 (Department of Agriculture and Fisheries, 2017a). Recreational landings are estimated to be 2–3 times greater than the commercial fishery, although only fragmented data exist (Department of Employment, Economic Development and Innovation, 2011). In 2009 a report into the status of the Queensland snapper fishery concluded that the stock was overfished, raising concerns for its sustainability (Campbell et al., 2009).

2.2. Data sources

2.2.1. Archival data

We gathered historical articles on snapper fishing (1871–1955) via searches of digitised newspaper articles available from the Trove database held at the National Library of Australia (2016). We sourced more recent records from digital archives available from the State Library of Queensland (2016), including ProQuest (2004–2015) and ABC news (2008–2015). Online archives of Fishing Monthly, a fishing magazine, were also searched (2007–2015). We searched digital articles using a combination of terms, including ‘snapper fishing’, ‘snapper expedition’, and ‘schnapper’ and ‘squire’, which were both popular names for snapper during the late 19th and early 20th centuries. Few newspaper articles are digitally archived after 1955 and prior to 2004, hence we manually searched two newspapers during this interval; the Courier Mail and the Gold Coast Bulletin. One year out of every five was sub-sampled and searched for information on snapper fishing. Additional information was sourced from the Queensland Historical Society and state government records, including annual reports from the Queensland Fish Board, Marine Department, Department of Harbours and Marine (1882–1978) and the Department of Agriculture and Fisheries (2000–2014). We recorded information on fishing trips including numbers of fish caught, numbers of fishers and hours fished, vessel information including engine power, length, depth fished and fishing ground names. Descriptive information on the snapper fishery was also recorded.

2.2.2. Fisher interviews

We undertook interviews with recreational, charter and commercial fishers along the Queensland coast, from November 2013 to February 2015, to gather observations of change during the period of time they had targeted snapper. Interview locations ranged from the snapper’s most northerly Queensland distribution to the New South Wales border (Fig. 1). We initially identified fishers by searching recreational fishing articles, charter fishing websites, and local fish shop or tackle businesses, after which we used snowball sampling, a process where interviewees identify potential candidates for future interview. We restricted our sampling to long-term fishers (10 years or more of fishing experience) who stated that they regularly (now or in the past) targeted snapper. We interviewed fishers individually using a semi-structured questionnaire.

Interview questions focused on individuals’ past and present fishing activities. We asked interviewees to describe changes in vessel length, engine power and what year these had occurred, and what year they adopted new technologies. They were asked to estimate typical distances they travelled to fishing grounds and typical depths they fished at during the beginning and most recently in their career. They were asked to recall recent ‘good’, ‘typical’ and ‘poor’ catches of snapper, how many hours they would fish and number of people fishing for these catches (Sáenz-Arroyo et al., 2005; Daw et al., 2011; O’Donnell et al., 2012). We then asked each interviewee the same questions about their early experiences of snapper fishing, and asked them to recall their ‘best’ catch during their fishing career. We also asked what technology had impacted their fishing activities the most and in what way, if any management actions changed their experience of fishing, and any behavioural or attitudinal changes they had witnessed or experienced during their period fishing. These open questions were used for the qualitative component of this study.

In addition to the above questions, we conducted a follow up interview with fifteen of the interviewed recreational fishers, where we asked them to quantify the impact of specific fishing technologies on their fishing activities: for example, by comparing the number of fishing spots they access today compared with the number prior to the technology in question, or by the time saved by using their technology to travel to fishing grounds.

2.3. Data analysis

2.3.1. Qualitative data

We used a conventional content analysis approach to qualitatively analyse the descriptive data transcribed from archival documents and...
fishing activities. We sourced a total of 331 articles on snapper fishing trips for the years spanning 1871–1954, and 98 articles from 2004 to 2015. No articles were found from the manual searches of sources from 1956 to 2003. Historical articles predominately recorded the activities of charter fishing vessels, while the contemporary articles mainly focused on recreational and charter fishing activities. Of the 107 snapper fishermen we interviewed, 48 (45%) predominately classed themselves as recreational fishermen, 18 (17%) as charter and 41 (38%) as predominately commercial fishermen. Interviewees’ observations of the fishery spanned the years 1945–2013. The following broad categories were developed from content analysis of the open-ended responses and qualitative text from archival sources: fishing technology and technological innovation, regulation and responses to regulatory change, changing attitudes towards fishing, and trends in snapper abundance or catch. Each of these categories are described in detail below.

3.1. Fishing technology and technological innovation

The charter fishery was the predominant sector to target snapper prior to World War I, and was the most frequently recorded of the sectors in the historical articles devoted to snapper fishing (87% of articles). Charter fishing trips targeting snapper were documented in Queensland popular media from the 1870s onwards. While other fish species were caught as part of this mixed line fishery, trips were almost always labelled as ‘schnapper trips’, targeting the ‘schnapper grounds’, with snapper being the predominant species caught (Marine Department Report, 1898). During this period steam-powered tug vessels came into use (Jordan, 1959) and these vessels were advertised for charter to groups of recreational fishermen (Marine Department Report, 1898). Although quantitative data on the vessels are limited, preventing statistical trend analysis, available data demonstrates that these vessels could be > 20 m in length with engines up to 200 hp (Fig. 1a, b), holding upwards of 20 fishers. During the pre-World War I period fishing grounds inside and to the north and south of Moreton Bay were targeted, with vessels sometimes travelling more than 40 km from port and fishing from 15 to 70 m depth (Fig. 2c, d).

After the First World War, steam vessels began to fall out of use and be replaced by smaller motorboats (Marine Department Report, 1924; Figs. 2a and A1a). After the Second World War the commercial snapper fishery expanded and recreational fishers increasingly owned personal vessels. Only recreational motor vessels have significantly increased in length since the Second World War, although all sectors significantly increased their engine power during this time (Figs. 2a,b and A1a, b, Table A1). During this same period, the recreational and commercial sectors significantly increased their distance fished from port, while all sectors increased the depth at which they target schnapper (Figs. 2c, d, and A1c, d, Table A1).

The post-war period saw the advent of fish-finding technologies such as paper echo-sounders, as well as the introduction of monofilament lines and fibreglass boats (Table A2). By 1970, paper echo-sounders were being used by > 60% of fishers interviewed and active during that period. Geographical positioning systems (GPS) were rapidly adopted by fishers from all sectors from the late-1980s, with 50% of recreational and commercial fishers using GPS by 1993. By 2013, > 90% of fishers across all sectors used GPS (Figs. 2e, f and A1e). Improvements and diversification in line and lure technology have also occurred throughout the last decade. In the year 2000, < 20% of recreational fishers used soft plastic lures or braid line, but by 2013 63% used soft plastics, and 80% used braid line, either in addition to or in place of monofilament (Fig. 2e). A similar pattern of adoption was observed in the charter sector (Fig. A1e). No fishers in our sample used 4-stroke outboard motors in 1990, but 50% of recreational, charter and commercial fishers with outboard motors were using these by 2006, 2005 and 2008, respectively. By 2013, 85% of recreational, 89% of charter and 90% of commercial fishers using outboard motors had installed a 4-stroke engine (Fig. 2f).

Fishers qualitatively described how these technologies altered their snapper targeting ability, which included improved hook-up rates, being able to preferentially target larger snapper, finding known spots more quickly, and an increased ability to find and exploit fishing grounds further from port or in greater depths (Tables 2 and A2). Ten recreational fishers quantified the impact of GPS on their fishing activities. Responses varied from individual fishers being able to find no more than 2% of currently used grounds without GPS, to being able to find all their grounds without GPS, but on average, fishers stated they would be able to find no more than 35% (SD = 31.6%) of their currently used fishing spots without GPS. GPS had less of an effect on travel time to fishing grounds, with post-GPS travel perceived to take 14% (SD = 16.3%) less time on average. Fewer fishers had commenced fishing prior to the introduction of echo sounders, with just seven recreational fishers quantifying the number of grounds they would be able to find without echo sounder technology. On average, these fishers stated that they would be able to find no more than 7% (SD = 4.2%) of grounds they fished today without an echo sounder. Fishers also stated that some technologies were adopted in response to societal shifts or regulatory change. For example, fishers reported that artificial lures such as soft plastics were suited to catch and release practises, and
enabled fishers to preferentially target larger snapper (Table A2). Braid was considered by some fishers to be better for deep-water fishing as bites could be felt more easily compared to monofilament line (although this experience was not endorsed by all fishers; Table A2).

### 3.2. Regulation and responses to regulatory change

A minimum length for landed snapper was introduced under the Fish and Oyster Act of 1914 (Qld). Prior to and during this period several well-known recreational fishers of the time voiced their support in popular media for the implementation of minimum length legislation (Table A2). This was driven by concerns that snapper and other fish species were in decline as a result of young fish being destroyed by net and line fishing in inshore waters. There were no data on how well this regulation or subsequent size-regulations were received by the recreational community or to what extent they were enforced until the mid-1990s (Ferrell and Sumpton, 1998). At this time the retention of undersized snapper in southeast Queensland was found to be high (75% of snapper caught from inshore areas). However, more recent work (Fraser et al. unpublished) indicates that compliance with minimum size limits has improved since then. When questioned, 17% of interviewed recreational fishers responded positively towards contemporary minimum size legislation, with 76% neutral in tone.

Prior to 1989 there were no restrictions on the number of fish recreational fishers could land, nor were there restrictions on what could be done with these fish. Consequently, many recreational fishers would sell their fish to recover the cost of fuel and vessel maintenance (Craik, 1990). When this practise occurred on charter vessels, commercial quantities of fish could be caught (Tables 2 and A2). Sources from the pre-War years state that excess fish from charter vessels would either be given away or sold. Few pre-War commercial fishers had the vessels and capital required to access the offshore snapper grounds, and hence were consigned to targeting inshore fisheries. These species were not as popular with the public and hence large numbers of charter-caught snapper and other ’deep water’ species arriving in the markets would compete with commercially-caught fish (Marine Department Report, 1905). During the pre-War years the vast majority of the snapper sold was likely to have been sourced from the recreational and charter sectors (Marine Department Report, 1905). After World War II the commercial fishery expanded, but recreational catches still made up a significant, although unknown, proportion of the total landings of snapper.

In-possession limits were first introduced to the recreational and charter sectors in 1993. Data on recreational fishers’ responses to the introduction of this first in-possession limit are scarce, but 18% of interviewees stated that negative views were initially held towards the 30 in-possession limit, but that these reduced as time passed (Table A2). When asked about contemporary in-possession limits, 37% and 42% of contemporary recreational fishers’ responses were supportive or neutral in tone, respectively, while the 21% who felt negatively towards this regulation stated that they were not against in-possession limits in principle, but only the most recent and most restrictive in-possession limit enacted in 2011 (Table 1).

While in-possession and minimum landing size regulations are largely observed neutrally or accepted by the recreational sector today, proposals to introduce a compulsory recreational fishing license in 2011 were ultimately halted due to pressure from the recreational sector (Tables 2 and A2). Similarly, a 6-week ban on recreational and
commercial landings of snapper was enacted in 2011 but was not repeated due to pressure from all sectors. The polarisation of feelings towards these regulations was repeated due to pressure from all sectors. The schedule of the legal minimum lengths of fish is as follows [...] square, 10m... The fact remains that [...] the snapper, is rarely in the market, and that its familiarity to some consumers is due rather to the efforts of amateur parties... The Queensland Mariner 6 Nov 1894.

Twenty years ago or more snapper parties [...] caught many large fish of that species [...]. Since then big snapper have been few and far between. The Queensland Mariner 21 Jan 1932.

I believe we are in the midst of the best snapper fishing season for years east of the South Passage Bar [...]. On charter trips in August we had very little trouble catching our bag limit of five fish per angler... Fishing Monthly Sept 2005.

Perceptions of fishing changed in the mid-1980s; in the 1970s and 80s people would fish for the 30 bag limit because they could get away with selling the fish, now most want to preserve stocks. The media also altered and came rounded much more to catch and release, or only taking what you need. Charter fisher.

Gung-ho attitudes have changed in the last 5 years, but those people are just getting their own boats. Charter fisher.

I have no doubt snapper are overfished; you have to travel further and further to get good quality and quantity. Commercial fisher.

Table 2
Major themes derived from archival and interview data, with examples of quotes from media and fisher interviews. Extended version in Appendix: Table A2.

<table>
<thead>
<tr>
<th>Archival popular media</th>
<th>Contemporary popular media</th>
<th>Fisher interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology and skill</td>
<td>A bit of barley and a floating bait seem to have been the key to the bigger fish. Fishing Monthly Sept 2007.</td>
<td>When GPS was combined with good quality echo sounders that allowed us to accurately identify the little reefs. Recreational fisher.</td>
</tr>
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<td></td>
<td>The growing trend of bouncing soft plastics around rubble and other structure when chasing snapper is gaining momentum. Fishing Monthly Sept 2008.</td>
<td>The introduction of braid was a massive change, it increased efficiency and hook-up rates. Recreational fisher.</td>
</tr>
<tr>
<td></td>
<td>Changing your techniques to literally trick the fish into biting your lures or bait is essential. Gold Coast Bulletin 24 Sept 2010.</td>
<td>Certain techniques allow us to catch our fish faster than when we were bait fishing. Recreational fisher.</td>
</tr>
<tr>
<td>Regulations and response</td>
<td>A controversial plan to charge recreational fishermen $90 to catch snapper has been scrapped [...]. It was a small victory for outraged commercial and recreational fishermen who campaigned against a six-week ban on snapper fishing amid fears it could become a yearly shutdown. Gold Coast Bulletin 9 Mar 2011.</td>
<td>When the 30 bag limit came in people said it was too restrictive, but it was a good thing. The 5 bag limit was sensible but 4 is too restrictive. Charter fisher.</td>
</tr>
<tr>
<td></td>
<td>Over the past few years, the Queensland Government and Fisheries Department has been correcting the bag and size limits on certain species that would, in turn, change the fish population forever [...]. The introduction of fishing shows and fishing personalities such as Rex Hunt, the fish kissing and, more importantly, the message of catch and release on Hunt's program in the 1990s have had replaceable benefits. Nowadays, catch and release is widely practised... Gold Coast Bulletin 28 Oct 2006.</td>
<td>Size limits have affected catches but they will be good in the long run, we were virtually wiping them out before. Commercial fisher.</td>
</tr>
<tr>
<td>Changing attitudes</td>
<td>I believe we are in the midst of the best snapper fishing season for years east of the South Passage Bar [...]. On charter trips in August we had very little trouble catching our bag limit of five fish per angler... Fishing Monthly Sept 2005.</td>
<td>Perceptions of fishing changed in the mid-1980s; in the 1970s and 80s people would fish for the 30 bag limit because they could get away with selling the fish, now most want to preserve stocks. The media also altered and came rounded much more to catch and release, or only taking what you need. Charter fisher.</td>
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<td></td>
<td>&quot;I have been snapper fishing for the past 30 years and I’m catching just as much fish now as I did 30 years go.&quot; Gold Coast Bulletin 16 Feb 2011.</td>
<td>Gang-ho attitudes have changed in the last 5 years, but those people are just getting their own boats. Charter fisher.</td>
</tr>
<tr>
<td>Abundance or catch trends</td>
<td>The average take is rarely less than a couple of hundred fish per steamer, but occasionally a steamer returns with a catch running into four figures. Marine Department Report (1905).</td>
<td>Snapper have declined but they are not in serious trouble: there is a difference between decreased and destroyed; it is still a good fishery. Commercial fisher.</td>
</tr>
<tr>
<td></td>
<td>Twenty years ago or more snapper parties [...] caught many large fish of that species [...]. Since then big snapper have been few and far between. The Queensland Mariner 21 Jan 1932.</td>
<td>The snapper grounds further south have been flogged. Commercial fisher.</td>
</tr>
<tr>
<td></td>
<td>&quot;I have been snapper fishing for the past 30 years and I’m catching just as much fish now as I did 30 years go.&quot; Gold Coast Bulletin 16 Feb 2011.</td>
<td>I’ve no doubt snapper are overfished; you have to travel further and further to get good quality and quantity. Commercial fisher.</td>
</tr>
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</table>

3.3. Changing attitudes towards fishing

From its commencement in the 1870s, recreational snapper fishing was described as a sport, with the aim to catch as many individual snapper as possible (Tables 2 and A2). Early media articles described the activity as ‘more slaughter than sport’ (Tables 2 and A2). From 1871 to 1919, numbers of snapper reported landed by steam vessels averaged 255 snapper vessel⁻¹ (n trips = 67), with > 1000 snapper (plus other species) reported on three occasions. The vast majority (92%) of historical media articles reported on individual fishing trips, with ‘good’ trips considered as those which had caught the most fish. The aim of fishing to catch as many fish as possible persisted throughout the historical time series (1871–1955), most likely fuelled by the element of competition and the ready saleability of snapper and other rocky reef fish such as pearl perch (Marine Department Report, 1905). Of the contemporary media articles sourced, 51% spoke about recent recreational or charter fishing trips where snapper were caught. However, unlike historical media, only 5% of all articles provided details on the number of fish caught, more commonly referring qualitatively to the success of or conditions experienced during the fishing trip.

Of the recreational and charter fishers interviewed, 44% mentioned how attitudes towards snapper fishing had changed during their lifetimes (Tables 2 and A2). All stated that, with a few exceptions, the vast majority of recreational fishers had become more conservation-minded from the 1990s onwards. Half of these respondents stated that the introduction of bag limits was, at least partially, responsible for a shift in recreational fishers’ attitudes away from catching large numbers of fish. Fishers also attributed this change to the abolition of recreational selling of fish and the rise in popularity of catch and release fishing during the 1990s (Table A2).

3.4. Reported trends in catch rate and abundance

Catch rate trends were collated from fisher interviews and historical media. Charter catch rates recorded from historical media articles (1871–1939) remained stable over time (Thurstan et al., 2016b). However, post-war catch rate trends recalled by recreational fishers demonstrated significant declines (Fig. 3, Table A1). Conversely, the commercial sector’s recalled catch rates demonstrated stable trends, with the exception of ‘good’ catch, which significantly declined with time (Fig. 3; Table A1). Recent charter catch rate trends showed different patterns over a shorter period of time: ‘best’ charter catch rates...
significantly increased with time, 'good' catch rate trends were stable, while 'typical' catch rates decreased with time.

In early media, snapper were considered highly abundant, although a small percentage (3%) of articles from 1913 onwards expressed concern about declining abundance of snapper. These were usually voiced by recreational fishers who were concerned about large numbers of undersized snapper being caught and killed by line and net fishers.

Snapper abundance was referred to in 26% of contemporary media articles, mostly in articles discussing the outcomes of the 2009 snapper stock assessment. The content of these articles reflected the polarised views emanating from the assessment, with fishers either decrying the decline in snapper or stating that snapper abundance had not changed over their experience (Table A2). When interviewed, 65% of recreational fishers, 71% commercial and 55% of charter fishers stated they had witnessed a decrease in snapper abundance over their lifetimes.

4. Discussion

A lack of data reduces our ability to unravel ecological and social changes in marine fisheries, yet an understanding of both are required.
for effective marine resource management (Lunt et al., 2013). Despite their social and ecological significance, our understanding of change in recreational fisheries is particularly limited. Using historical and contemporary popular media sources alongside fisher knowledge data, this research revealed technological, regulatory, societal, and catch rate trends in the Queensland recreational snapper fishery over the course of its documented history.

4.1. Observed transitions in the snapper fishery

Several transitional periods relating to the introduction of new fishing technologies or fishing gear were observed, in which technologies that fishers claimed significantly impacted their targeting behaviour or catch rates were rapidly adopted. The technologies that fishers observed to have the maximum impact on their fishing activities were echo-sounders, GPS, new motor, line and lure technologies. These technologies were adopted by the majority (i.e., > 50%) of fishers interviewed and active during the 1960s, 1990s and 2000s, respectively, having first been used less than 10 years prior. It is well known by fishery scientists that technological innovations improve fishers’ ability to catch fish, but quantifying this impact is difficult. Our study demonstrated that snapper fishers’ perceptions of the impact of new technologies on their fishing abilities varied widely, but that the introduction of echo-sounders and GPS were perceived to have the greatest impact upon their targeting opportunities, mainly by increasing the number of known fishing spots. The latest transition, documented during the mid-2000s, occurred in the recreational and charter fisheries and acted to increase targeting opportunities by diversifying the methods used to catch snapper. While this may result in specialisation among fishers in these sectors, it also enables fishers to target snapper in conditions that previously may have been less conducive to successful fishing (Table A2). Fishers were often unable to quantify how their catch or catch rates had changed as a result of fishing technologies, with interviewees stating that these difficulties were due to their inability to account for the confounding influences of legislation and/or behavioural shifts that altered fishing behaviour.

The timing, rate of uptake and impact of key technologies has previously been documented for commercial fisheries (e.g., Engelhardt et al., 2008; Robins et al., 1998; Marriott et al., 2011), but rarely for the recreational sector. With the exception of the last recorded transition (the diversification of line and lure technologies), adoption of fishing gear in the recreational and charter sectors commenced and increased at a similar rate as the commercial sector. While fishing skills were likely to differ between recreational and commercial fishers, these observed patterns in technological uptake suggest that the recreational sector’s ability to locate and target snapper has kept pace with the commercial sector.

Fisher knowledge interviews enabled the rate and timing of technological transitions to be uncovered during the post-war period, but earlier transitional periods are also likely to have occurred. However, these are beyond living memory and thus the rate of uptake of specific technologies and their impact upon the fishery is harder to detect using archival sources alone. The impact of the introduction of outboard motors, fibreglass boats, and monofilament line on the fishery during the 1950s was mentioned by interviewees, but by < 5 individuals (Table A2). As this period is already beyond the living memory of most, the rate of adoption could not be quantified. Archival sources published during the pre-War period also describe early improvements in line fishing technology and the introduction of steam power and motorboats (Table A2), but similarly, the rate of adoption of these technologies could not be quantified.

Media reporting and fisher interviews also points to a social transition occurring during the 1990s, when it became less socially acceptable to land large numbers of fish. The available evidence, from archival and interviewee sources, suggests that the banning of the recreational sale of fish, the implementation of in-possession limits, together with the rise in popularity of catch and release fishing and the push by media celebrities to release unwanted fish (Frawley, 2015), placed increasing emphasis on catching quality over quantity (Table A2). This consequently modified peoples’ attitudes towards what they deemed an acceptable harvest of fish. Here, new technologies played a role in allowing fishers to diversify their fishing methods (e.g., the use of soft plastics for catch and release; Table A2), thus facilitating changes in fishing behaviour.

4.2. Comparisons among fishing sectors

We were able to compare technological trends among the three sectors. By and large, all sectors demonstrated significant increases in vessel length, engine power, depth and distance fished from port. However, fishers from all sectors exhibited diversity in terms of individual choice. In 2013 some recreational fishers still reported fishing as close as 3 miles from port, with the maximum distance from port reported as 80 miles. This diversity likely reflects variable motivations for fishing and individual preferences. For example, recreational fishers stated that they moved further away to either avoid other fishers, to explore, or because they perceived snapper abundance to be higher further away from the main ports and shore. Conversely, some recreational fishers fished close to home to reduce the cost of their fishing trip, or because they simply enjoyed fishing in sheltered waters (Table A2).

Recreational fishers overwhelmingly experienced declines in their catch rates of snapper, while other sectors’ experiences were more mixed. Charter fishers experienced increases in their best catch rates over time, which, given declines in the best catch rates of commercial and recreational fishers, may reflect shifts to alternative fishing grounds, or a preference by professional skippers for recalling recent over past experiences. Stable catch rates may reflect greater skill or knowledge among charter and commercial fishers compared to recreational fishers, increased search effort for new fishing grounds, or an unwillingness by these sectors to communicate observed declines to researchers. Alternatively, reports of recreational declines may be the result of increasingly restrictive regulations (including the halting of recreational selling of fish, or introduction of in-possession limits), declines in snapper abundance in popular fishing grounds frequented by recreational fishers, or population declines more broadly, a function of changing attitudes over time, or because of other changes undocumented by this study. What we can conclude is that, over the course of the 20th century, the majority of interviewed recreational fishers perceived diminishing returns in the rate at which they caught snapper. These declines occurred despite technological innovations and targeting of snapper and other rocky reef species further away from home ports and in deeper waters.

4.3. Use of non-traditional sources in informing recreational fishery trends

Formal data collection on the Queensland recreational snapper fishery did not commence until the last decade of the 20th century. However, archival and fisher knowledge sources enable us to explore trends in recreational fishing technology, catch rates and changing fisher motivations commencing over a century prior to this. We know from archival sources that recreational fishers were some of the first people to regularly exploit snapper and other rocky reef fin fish species in Queensland’s offshore waters. We also know that, prior to regulation of the recreational sector, recreational fishers commonly acted in a commercial capacity and were responsible for a considerable proportion of the snapper and other rocky reef species available in the markets. Despite increasingly restrictive regulations, the recreational sector today lands the majority of snapper in Queensland (Campbell et al., 2009), yet our knowledge of recreational fishing trends remains far more limited than the commercial fishery. Archival and fisher knowledge sources provide evidence of technological creep since the
commencement of the fishery 140 years ago, interspersed with periods of rapid technological advancement. Both archival and fisher interviews demonstrate that the introduction of new technologies profoundly increased fishers’ ability to target snapper over time. However, this was countered in the last two decades by a shift away from an emphasis on recreationally catching large quantities of snapper. This shift coincided with the implementation of a ban on the recreational sale of fish, in-possession limits and increased media coverage of catch and release fishing. However, as recalled catch rate trends were variable among individual fishers, and because individuals had fished for different lengths of time it was impossible to pinpoint a specific period when declines in catch rates commenced. This meant we were unable to determine whether declining catch rates drove the observed attitudinal shift or vice versa. It is possible that pre-1990, declining catch rate trends were masked by technological advances, but after 1990 increasingly restrictive regulations and the increased emphasis on catch and release altered fishers’ behaviour, contributing to observed declines in catch rate trends. Alternatively, it is possible that declining returns have played a role in altering attitudes towards fishing, but additional social and catch trend data are required to unravel this.

Archival sources contain a wealth of information on recreational snapper fishing activities over the past 140 years. However, these tended to be focused upon individual fishing trips, rarely providing quantitative information at the state fishery level. For example, trends in total numbers of recreational vessels, total catch, and evidence of ecological impact are limited in the popular media. Furthermore, popular media focused upon real-time reporting. The majority of articles focused upon recent catches and short-term (i.e., seasonal or annual) change. Long-term declines were rarely discussed, although occasional articles raised concerns in this context, or provided comments on long-term perspectives.

Our fisher interview sampling methodology does not provide a representative sample of fishers, meaning that we cannot use this source to make inferences about total catch trends or the impacts of fishing power increases on catch rate. It may be that further examination of these sources alongside available government data will enable suitable proxies of change to be generated at the fishery scale. This is particularly important if the impact of technological advances, attitudinal change and regulations on the fishery are to be quantified. While fishers often stated in interviews that in-possession limits, changing attitudes and catch and release techniques have benefited the fishery, any potential conservation gains resulting from these changes need to be contrasted with the impact that increased numbers of recreational fishers and improved access to the fishery resource will have at the fishery scale. For example, increases in fishing power together with lure and line diversification mean that fishers today are able to target snapper in environmental conditions and locations that historically would not have been conducive to snapper fishing.

The accuracy of popular media and fisher knowledge sources also continues to be questioned, and without independent data that provide information at similar spatial and temporal scales it is difficult to assess the level of uncertainty or bias contained within these sources, including how biases change with time. Popular media articles potentially suffer from reporting bias towards high or extraordinary catches, while fisher interviews may elicit biased responses for various reasons, such as an inability to accurately recall catches or concern over the perceived use of their information. A previous study explored the level of bias in catch rates portrayed by media sources, and suggested that, historically at least, reporting bias was minimal (Thurstan et al., 2016b). Another study demonstrated no major change in the accuracy of fishers’ recalled good and poor catch rates over time (Thurstan et al., 2016a). Therefore, we do not anticipate that biases will have altered significantly over time, but we do acknowledge that the level of bias will differ among sources. For these reasons, we did not directly compare quantitative data derived from popular media sources with data derived from fisher interviews.

4.4. How these findings could inform management

In many countries recreational fish harvest levels are significant, yet the social and economic contributions of recreational fisheries, as well as the potential ecological issues resulting from high recreational harvest, are commonly overlooked because of a lack of monitoring data (Coleman et al., 2004; Idhe et al., 2011). Within the Queensland Rocky Reef Fin Fish Fishery the high level of recreational snapper harvest compared to the commercial sector is recognised, yet data on the recreational sector only became available from the late 1990s onwards, and remains limited today. Our findings demonstrate that recreational snapper harvest has a far longer history that spans at least 140 years in length. Furthermore, we demonstrate that there are been marked shifts in technological capacity of the recreational sector over the decades, at a level comparable to the commercial sector, as well as significant changes in recreational fishers’ behaviour and catch rate trends.

The incorporation of historical data into contemporary management frameworks is not without its challenges, yet the consideration of the historical data presented here may inform management of the snapper fishery in a number of ways. The most recent stock assessment of snapper (Campbell et al., 2009) assumed the start of significant fishing activities just after World War II, when annual landings data began to be collated. Our sources suggest that significant fishing activity, enough to provide a marketable supply of snapper for at least part of the year, occurred from the beginning of the 20th century if not before. Knowing when significant levels of fishing began is highly relevant for informing fishery model inputs. Moreover, the large number of popular articles describing snapper catches and the vessels involved sometimes enable annual landings to be estimated for this pre-War period, again informing model inputs for a period of time when no other known data exist. Time series of catch rates for the early years of the fishery, which often comprise detailed information on individual trips, including fishing locations and vessel identifiers, can also be incorporated into models, potentially as a proxy of abundance (e.g., Thurstan et al., 2016b).

Fisher interviews also provide information for fishery assessment: data on the year of introduction of specific fishing technologies, their rate of uptake and the impact of these technologies on fishing efficiency can contribute to catch standardisation, thus helping to minimise the confounding effects of increased fishing power on abundance estimates (e.g., O’Neill and Leigh, 2006). Likewise, uncovering information on the spatial dynamics within the fishery may also help to reduce the confounding effects of spatial expansion within fishery models. Historical data can also contribute to informing broader marine resource management goals. Greater engagement of stakeholders in fishery management advice is beneficial for both scientists and stakeholders (Sampedro et al., 2017). Historical perspectives are often of great interest to industry stakeholders, and hence this is one avenue that may facilitate increased engagement in management processes. Finally, an understanding of the drivers of resource use, stakeholder perceptions and changes over time may also help inform managers of common concerns held by stakeholders, and thus aid understanding of the likely level of support for particular management actions.

5. Conclusions

In this study we examined technological, social and catch rate trends of a recreational fishery throughout its documented history. During the 19th century snapper was arguably one of the most talked about fish in Queensland popular media. In the 21st century media the fishery and its management continues to be discussed, often animately. The long history of this fishery and the archival documents that exist allowed us to examine both popular media, a source that is rarely considered by natural resource managers and scientists, and fisher knowledge, an underused source of data on fisheries and fishing practices, to unravel multi-decadal fishery trends. While data gaps remain,
these sources contribute towards a fuller understanding of recreational fishery trends and changing fisher motivations. The importance of an interdisciplinary knowledge base for fisheries management is increasingly recognised (Arlinghaus et al., 2016) and this study highlights that non-traditional data sources can contribute to this goal.

Acknowledgements

We gratefully acknowledge the fishers who gave their time and expertise to take part in this research, and two anonymous reviewers who greatly improved the manuscript. RT, SB and JP were supported by the ARC Centre of Excellence for Coral Reef Studies. Fieldwork costs were supported by the University of Queensland’s New Staff Start-Up Fund, awarded to RT, and the Fisheries Research Development Corporation (FRDC) on behalf of the Australian Government, report 2013–018 “Using commercial and recreational fisher knowledge to reconstruct historical catch rates for Queensland Snapper (Chrysophrys auratus), Spanish Mackerel (Scomberomorus commerson) and Coral Trout (Plectropomus spp.): Long-term data for incorporation into future stock assessments”.

Appendix A

![Fig. A1. Technological changes reported in popular media and by charter fishers. A) Length of fishing vessel (archival, n = 37; charter, n = 73). B) Engine power of main engine (archival, n = 28; charter, n = 75). C) Typical depth fished, or reported depths from archival data (archival, n = 17; charter, n = 35). D) Typical distance fished from port (archival, n = 130; charter, n = 32). E) Percentage of interviewed charter fishers active in the fishery each year that used the named technology. (A–D) Red squares denote charter fishers’ responses, filled circles denote information sourced from archival data. (E) Black line = GPS, short dashed black line = digital monochrome echo sounder, long dashed black line = digital colour echo sounder, long dashed red line = paper echo sounder, blue line = 4-stroke outboard engine, red line = soft plastics, green line = braid line. For mixed model outputs (A–D) see Table A1. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).](image)

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Table A1 (continued)

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Table A2

Major themes derived from archival and interview data, with quotes from media and fisher interviews. Extended version of Table 2 in main text.

Archival popular media | Contemporary popular media | Fisher interviews
---|---|---
Technology and skill
It is true (snapper fishing) requires little piscatorial science or skill, but it is exciting... The Brisbane Courier 22 May 1879.

...An iron paddle wheel vessel of 203 tons gross [...], 99 nominal horse power, length of 125 ft., breadth 21 ft. 1 in., and depth 10 ft. 4 in. Brisbane Courier 3 Oct 1903.

Fish are either more "educated" or not so plentiful as they were 20 years ago, and now the finer tackle is more successful than ever. Daily Standard 17 May 1918.

...Line, thirty fathoms long if it is to be of any service, about the thickness of a lead pencil, and weighted with 3 egg-shaped pieces of lead, each a pound in weight, and so borer that the line will run freely through it. The hook is a trifle, but not much, smaller than a young meat-hook [...]. The bait is a lump of fish or meat the size of a walnut [...]. The Brisbane Courier 16 Jan 1877.

The dangerous nature of the ocean bed at Flat Rock renders it impossible to anchor near the fishing ground, the Kate, as fast as she is brought near the desired spots, drifts back again [...], do your best in 10 minutes, for no longer can we remain in such dangerous neighborhood [...]. Our fishing lasts not more than two hours, and a large portion of that time is occupied in steaming [...]. The Brisbane Courier 16 Jan 1877.

I have always found having the lead about a foot from the end of the line, with a trail hook, the best plan in fishing for schnapper. The Brisbane Courier 12 April 1879.

The bait of baits is mullet, and a truly good bait it is. The Queensland 4 Sept 1886.

...by 5 o'clock [we] were well off South Passage waiting for dawn to pick up the rock and our proper fishing ground. The Queenslander 4 Sept 1886.

Previous to fishing on the Southport reef, the Tarshaw put in a couple of hours on the newly-found grounds on the ocean side of the sandhills near Lucinda Bay. The Brisbane Courier 26 Jul 1898.

Arrangements had been made for a pilot [to help find] the best fishing grounds [...]. In this case the grounds south of Cape Moreton will be prospected. The Brisbane Courier 14 Jul 1904.

A bit of burley and a floating bait seem to have been the key to the bigger fish. Fishing Monthly Sept 2007.

The growing trend of bouncing soft plastics around rubble and other structure when chasing snapper is gaining momentum. Fishing Monthly Sept 2008.

Changing your techniques to literally trick the fish into biting your lures or baits is essential. Gold Coast Bulletin 24 Sept 2010.

The most successful snapper anglers are very keen on burley. Fishing Monthly Feb 2008.

Soft plastics, octa jigs and pilchards are all effective, but to specifically target big nobbies over 8 kg nothing beats small lures or bigger dead baits such as mullet, especially if you can get a bit of burley into the feeding zone as well. The 36 fathom line is a massive line of reef, so look for high pinnae concluded by flat staff for the best results. Early morning and late afternoon are usually the best time to fish, and there is often a frantic bire just on dish, especially when quality fish are around. Fishing Monthly Aug 2011.

When GPS was combined with good quality echo sounders that allowed us to accurately identify the little reefs. Recreational fisher interview.

The introduction of braid was a massive change, it increased efficiency and hook-up rates. Recreational fisher interview.

Certain techniques allow us to catch our fish faster than when we were bait fishing. Recreational fisher interview.

Outboards and fibreglass boats provided access to the offshore fishery. Recreational fisher interview.

GPS gave a significant and immediate improvement; the dusd got good. Recreational fisher interview.

Sounders expanded the fishing grounds extensively. Recreational fisher interview.

Everyone is using lures now, which are better for catch and release. Recreational fisher interview.

Plastics target the big fish, so does live bait, so they help with the size limits. Commercial fisher interview.

Prior to GPS you stayed within sight of land, now you travel further. Commercial fisher interview.

Back then the snapper grounds were common property, everyone went to more or less the same grounds. Recreational fisher interview.

GPS was really the killer, you didn't have to worry about marks. Then the tackle stores giving out GPS marks really knocked the fishery. Recreational fisher interview.

Communication and safety increased in the 1990s. Recreational fisher interview.

In the mid-2000s cheap efficient 4 stoke outboards transformed recreational fishing. Recreational fisher interview.

(continued on next page)
Regulations and response

By the standard weight recognised by the [Amateur Fishermen’s] association, schnapper or squire are not allowed to be taken under 16 ounces. The Brisbane Courier 13 Aug 1909.

The schedule of the legal minimum lengths of fish is as follows [n/a] squire, 10 in... The Telegraph, 24 Apr 1936.

A scheme for bringing fresh schnapper into the Brisbane market has been matured by the Aquarium Company. The steamer Woolwich will leave the City Wharf this evening, and on each succeeding Tuesday and Thursday evening, for the schnapper grounds, and will return to town the following morning in time for an auction of the fish at 9 o’clock. A limited number of passengers will be taken to enjoy the sport, and it is expected that they will have about six hours on the fishing ground. The Brisbane Courier 8 May 1890.

The Otter brought about 900 fish, and a large basketful, including besides the schnapper, a small groper and a king fish, was sent off on a dray to the General Hospital. The Brisbane Courier 13 Jun 1887.

The fact remains that the very best of our food fishes, the schnapper, is rarely in the market, and that its familiarity to some consumers is due rather to the efforts of amateur parties than the enterprise of persons engaged in the fishing industry. The Brisbane Courier 6 Nov 1894.

A controversial plan to charge recreational fishermen $90 to catch snapper has been scrapped [n/a]. It was a small victory for outraged commercial and recreational fishermen who campaigned against a six-week ban on snapper fishing amid fears it could become a yearly shutdown. The move to restore depleted fish stocks of snapper, pearl perch and terebin has received a stormy reception on the Gold Coast where about 160 commercial and recreational fishermen and marine industry stakeholders last month held an angry meeting in protest. Gold Coast Bulletin 9 Mar 2011.

Unfortunately we lost a lot of prime snapper country around Henderson Rock when the green zones were implemented a few years ago, but there is still a lot of ground north of the green zone, running right up to Cape Moreton. Fishing Monthly Sept 2011.

Dangerously low stocks of snapper have prompted the Queensland State Government to announce a six-week ban for next year [n/a]. The six-week ban on snapper will apply to both commercial and recreational fishermen and will be in force between February 15 and March 31. Gympie Times 15 Dec 2010.

On the most recent charters we’ve had little trouble reaching our limit and most days we’ve left them chewing. However, apparently this shouldn’t be happening according to the science the fisheries are throwing at us in their push for lengthy closures of our rocky reef species. Nevertheless, despite the recent captures some fisheries management are interpreting the so-called science the way they want; often in a detrimental way to rec and commercial fishos. By the stocks of snapper at present the fishery is nowhere near as bad as they’re making out. Let’s hope they don’t make any hasty decisions to keep Anna Bligh’s Green friends happy! Fishing Monthly Nov 2010.

When the 30 bag limit came in people said it was too restrictive, but it was a good thing. The 5 bag limit was sensible but 4 is too restrictive. Charter fisher interview.

Size limits have affected catches but they will be good in the long run, we were virtually wiping them out before.

Commercial fisher interview.

Bag limits altered the way you fish, as you had to diversify your catch. Recreational fisher interview.

If the government had thought of the 4 or 5 bag limit 20 years ago, we wouldn’t even be talking about this now, there wouldn’t be a problem. Recreational fisher interview.

Management needs to be more regionalised, not a blanket rule. Recreational fisher interview.

Size limits made a massive difference in the bay, people stopped fishing because many squire are below the limit.

Commercial fisher interview.

Until restrictions were put in place, everyone would fish for as many snapper as they could. There was no thought for conservation, we would give the fish away, not sell it to the Fish Board. Recreational fisher interview.

Soft plastics were the big game changer, we were putting 10 snapper in the boat in 35 minutes between 2 people when they first came out. Recreational fisher interview.

Braid is one of the biggest changes in my fishing time.

Recreational fisher interview.

The 1950s was the era of equipment development. We got nylon lines [...], outboard fibreglass boats... This led to an exponential increase in the numbers of boats. Recreational fisher interview.

You couldn’t go to the far-out reefs until you got a [paper] sounder. Commercial fisher interview.

Braid gives the passengers a better chance in the deep water to feel the bites, you get a slightly better hook up rate.

Charter fisher interview.

Charter boats have to increasingly fish secret places when no one is around. They are not getting the same numbers or sizes on the old reef systems, but instead you need to work around the trigger periods. So people with the knowledge can still catch the fish, but others can’t. Recreational fisher interview.

We’re fishing deeper waters and trying to find grounds that haven’t been touched. Recreational fisher interview.

The deeper waters are the last area that snapper are safe. Charter fisher interview.

(continued on next page)
Changing attitudes

It is scarcely sport, it is next door to slaughter […], there are piles and strings of fish decorating the ship fore and aft…

The Queenslander 16 Jun 1877.

A few of Brisbane’s peaceable citizens who were bent on schnapper slaughter… The Brisbane Courier 14 Jun 1887.

Our fishermen are only just beginning to realise what splendid sport of its kind our waters afford. The Brisbane Courier 22 May 1879.

Deep-fishing as a sport should not be lost sight of. It has become a very popular pastime, as many as ten or twelve steamers, with large parties on board, engaging in it each weekend. Marine Department Report, 1905.

…the fish were there in hundreds. On all sides they came, in twos, in threes, in singles, all schnapper […]; the fishermen were crazy with delight and enthusiasm. Welsby, 1905.

In reading the "Courier" a letter from an angler caught my eye. He is in a great fuss about the number of squire killed by the numerous boat crews who leave Brisbane for a cruise round the Bay. Now, by the tone of his letter, he would like to stop the little sport available […]. His wail is that the number of squire caught by the aforesaid crews would empty the ocean, and schnapper would be a thing of the past. His knowledge is very limited when he writes so. If thousands were fishing and catching nothing but squire it would be like a drop in a bucket – they never would be missed. The Bay is teeming with them, and not a day passes but scores are born to fill up any gap. The Brisbane Courier 9 Jun 1909.

There is one matter I would like to bring before the members [of the Amateur Fisherman’s Association], and also before the fishing sporting fraternity of Moreton Bay. My notice has been drawn to a par in one of the daily papers to the effect that a large haul of squire had been taken off Mad Island […]. Apparently those who made the haul have little respect for sport, even for the present or the future, as the catch consisted of very small squire, by far the greater majority being under one pound in weight. The Brisbane Courier 13 Aug 1909.

The taking of undersized fish from the Bay waters and estuaries is causing considerable anxiety amongst the more thoughtful local fishermen […]. There can be no doubt that the continual destruction of undersized fish now will have a very drastic effect on the fish population in the future. The angler should realise that the law is there not to place petty restrictions upon him but to safeguard his interests for the future. Therefore, when an undersized fish is caught, take the broad outlook and throw it back. It is a case where all can help. The Telegraph, 24 Apr 1936.

Over the past few years, the Queensland Government and Fisheries Department has been correcting the bag and size limits on certain species that would, in turn, change the fish population forever […]. The introduction of fishing shows and fishing personalities such as Rex Hunt, the fish kissing and, more importantly, the message of catch and release on Hunt’s program in the 1990s have had irreplaceable benefits.

Nowadays, catch and release is widely practised and I take my hat off to Rexy Boy - the man, in my view, who changed fishing forever. Gold Coast Bulletin 28 Oct 2006.

Snapper are one of those fish that anyone who has picked up a fishing rod dream about catching. Fishing Monthly Jul 2010.

While recent numbers of snapper can be caught year-round, the cooler months see heightened activity with larger breeding fish entering the bay from offshore grounds. This period also sees large numbers of juvenile snapper and anglers often have to wade through numerous small fish before hooking that trophy specimen. These smaller fish must be treated respectfully and released carefully as they are likely to grow into that trophy knobby in years to come. Fishing Monthly Jul 2012.

During the next couple of months as the water cools, there should be top class snapper fishing just east of the South Passage Bar. But with a bag limit of 4, you’ll want to target quality fish and floatlining is the only way to go. Fishing Monthly Jul 2015.

Generally they are caught at 2–4 kg or so with standout specimens pushing 10 kg […]. At that size they would be a good catch and release candidate. Fishing Monthly Feb 2008.


Perceptions of fishing changed in the mid-1980s; in the 1970s and 80s people would fish for the 30 bag limit because they could get away with selling the fish, now most want to preserve stocks. The media also altered and came round much more to catch and release, or only taking what you need. Charter fisher interview.

Gung-ho attitudes have changed in the last 5 years, but those people are just getting their own boats. Charter fisher interview.

When the 30 bag limit came in there was an outcry, but it modified the behaviour of a minority who could catch the most. Recreational fisher interview.

Attitudes have changed from 30 years ago, today 10-15% of people are out there to smash the bag limit, 30 years ago it was 99%. Recreational fisher interview.

Attitudes changed in the early 1990s, we’re seeing a lot more catch and release now. Recreational fisher interview.

Fishers will highgrade once they reach their bag limit. Commercial fisher interview.

Until restrictions were put in place, everyone would fish for as many snaiper as they could. There was no thought for conservation, we would give the fish away, not sell it to the fish board. Recreational fisher interview.

I’ll often sneak off the patch of fish if customers are catching too many. Charter fisher interview.

If all punters get their bag limits that equals 40 fish, that’s too many fish. There was an attitude change beginning about 20 years ago, when catch and release came in. Now, we let the big fish go unless we’re going to eat them. Charter fisher interview.

The perception of ‘kill kill kill’ changed with the introduction of the 30 bag limit. Now most people are fishing for the right reasons, the culture has changed. Recreational fisher interview.

I began targeting larger fish as the bag and size limits came in. Recreational fisher interview.

Before the bag limit people went out and killed hundreds. Recreational fisher interview.

Section 35 was probably good for the boating and tackle industry, but it was really bad for the fish. There was a different mentality then. Recreational fisher interview.

(continued on next page)
Abundance or catch trends

The average take is rarely less than a couple of hundred fish per steamer, but occasionally a steamer returns with a catch running into four figures. Marine Department Report, 1905.

Twenty years ago or more snapper parties [...] caught many large fish of that species [...] Since then big snapper have been few and far between. The Queenslander 21 Jan 1932.

I am able to account for, say, 25,000 fish so landed from pleasure steamer trips during the last winter [...]. Marine Department Report, 1905.

The denudation of our home snapper grounds, that is those of the Moreton Bay district. It is abundantly evident that if something be not quickly done, snappering, as at present carried on here, will, within a measurable space of time, become a thing of the past, unless the boats engaged in the week-end pleasure trips can go further afield. Some persons content that the overfishing of the banks is the cause of the denudation noted, but the root of the trouble is much nearer home, and is to be found in the wanton destruction of the young fish in the Bay by week-end boating parties. If killing these undersized fish the persons composing these parties are well aware that they are acting illegally, and that they are making themselves liable to a heavy penalty for every snapper in the ‘red breast’ stage which they destroy, yet with unparalleled audacity boats pass up the river every Sunday afternoon with scores of these undersized fish hanging to the rigging. Ogilby 1916.

... Flat Rock, for the fish are good, nothing under five or six pounds, and if a school is struck all hands along the steamer’s side can make bags of two, three and fours for at least a quarter of an hour or twenty minutes before the order is given for another round turn. Welsby, 1905.

...It has been found that reef fish, such as schnapper and many other excellent food fishes [...] are in places very plentiful, and easily caught with bait [...] In Table 1 is shown the results of 73 ½ hours line fishing, carried out at different times and in various localities; and, from a commercial point of view, the capture of 200 lbs per hour, with an average of eight to ten lines, is undoubtedly very satisfactory. It will be seen that the average size of the fish is very suitable for market purposes. Endeavour survey 1910.

The practical outlook from this experience is not a scare that schnapper fishing if carried out on a large scale will in the near future demude the grounds. The safety against this lies in the vastness of many reefs, and often in their comparative inaccessibility. The lesson indicated is rather that, when establishing reef fisheries, it will be necessary to frequently change ground, so as to permit of restocking, and fixed centres may not in all cases be found convenient. Endeavour survey 1910.

A party of 15 returned to town last night from a snapper trip [...] with a haul of over 1000 fish [...] A big bag was sent along to the Military Hospital at Kangaroo Point... The Brisbane Courier 8 Jul 1916.

Now the fishing is erratic. Today you might drop upon a fair school of fish and tomorrow there may be none [...]. The reason? It puzzles me. The grounds are not fished out; of that I am certain. Welsby 1931.

Twenty years ago or more snapper parties [...] invariably caught many large fish of that species, ranging from 6 lb or 7 lb to 20 lb, although the greater portion were round about 10 lb in weight. Since then big snapper have been few and far between. The Queenslander 21 Jan 1932.

I believe we are in the midst of the best snapper fishing season for years east of the South Passage Bar. The shallow and deep reefs have been producing good numbers of excellent quality fish. On charter trips in August we had very little trouble catching our bag limit of five fish per angler and floating with pilchards has accounted for a high percentage of the fish. Fishing Monthly Sept 2005.

The 36 fathom line has capped a flogging from both charter boats and recreational vessels in recent years. Hopefully bag limits and increased size limits will make a difference with snapper catches in coming seasons, but they are a slow-growing fish and stocks will take a long time to recover. Fishing Monthly Jun 2004.

Southeast Queensland has seen amazing results from recent conservation and changes to bag limits in the last year with the best snapper and bream season most people can remember. Most of the old-timers that I have spoken to said that the snapper fishing was like it was 30 years ago. This supports the fantastic results that good management can achieve over a short period of time. Fishing Monthly Jan 2006.

I have been snapper fishing for the past 30 years and I’m catching just as much fish now as I did 30 years ago. If there really was a problem, fishermen would be the first to want to address the problem to secure our future. Gold Coast Bulletin 16 Feb 2011.

Before the Southport Seaway opened in 1986 the only thing standing between you and a haul of fish from the local reefs was the notorious Southport Bar [...] Strong winds and huge seas would quickly whip up, often making conditions impassable [...] Gold Coast Chronicle 13 Aug 2005.

Even the closer inshore snapper grounds have been very disappointing... Maybe these areas have been hit too hard by the amateurs over the past few years and we need to rethink our own fishing habits. Fraser Coast Chronicle 3 Sept 2010.

It's no bad result for an early morning session out on the water. Keen Gold Coast angler [...] and a mate returned from a fishing mission east of the Seaway two weeks ago, having hauled up five decent snapper between them (fishing for five to six hours). Gold Coast Bulletin 20 Jun 2015.

A Sunshine Coast fishing expert says Fisheries Queensland staff may be wasting their time warning local anglers about a shortage of snapper. According to Barry McEade, whose fishing reports appear in the Daily each day, good stocks of the fish remain and stocks were only lower than usual last year due to lower than normal water temperatures. Sunshine Coast Daily 2 Aug 2010.

...Snapper is a name that tends to bring a smile to an angler's face. Along the east coast, we are blessed to have some of the best snapper fisheries in the country and the techniques used to catch them have changed over the past 20 years. The old days of our Granddads going out and bringing home a bin full of fish probably lead to the lower numbers today. Sure there are fewer of them these days but in reality the fish that are there are smarter — possibly from being hooked as a junior. Gold Coast Bulletin 24 Sept 2010.

Throughout the year, most local reefs (in Hervey Bay), particularly the deeper ones, are teeming with undersize snapper (squire) — so much so that they attract some very colourful adjectives when other species are being targeted. Most of these small fish seem to leave the bay before reaching the minimum 35 cm limit. Fishing Monthly Jun 2004.

Snapper have declined but they are not in serious trouble: there is a difference between decreased and destroyed; it is still a good fishery. Recreational fisher interview.

The snapper grounds further south have been flogged. Commercial fisher interview.

I've no doubt snapper are overfished; you have to travel further and further to get good quality and quantity. Commercial fisher interview.

Snapper started to diminish in the mid-1950s, when other big boats started coming, and the outboard motor came out. As outboards increased the numbers fishhing outside the islands increased enormously. Recreational fisher interview.

In the 1980s seeing 10-15 boats would be a busy day, now there's 150 boats [...] Recreational fisher interview.

It was easier to catch more fish 60 years ago. Recreational fisher interview.

Snapper numbers are still declining inshore, even though they have changed its management. Charter fisher interview.

There’s been declines right across the board, everything has depleted. Commercial fisher interviewer.

There’s not a hundredth of what was there before. You can’t keep killing them and expect them to remain the same [...]. The fishing effort’s bigger, there’s more sophisticated gear and the fish are not there in the numbers now. Recreational fisher interview.

In the 1960s if you came back with 200 kg, you thought you’d had a bad night. [But] offshore stocks haven’t changed. Recreational fisher interview.

I don’t think there are a lot of [snapper] left; they’re pretty much fished out [...] We kept going wider and wider because it took too long to catch fish. Recreational fisher interview.

Snapper have been coming back in recent years. There’s fewer charter boats. Commercial fisher interview.

Forty years ago you would catch 20 fish an hour, now it’s 2 an hour on the same grounds if you’re lucky, and that’s with a massive amount of equipment [...] Forty years ago you could go out practically anywhere and catch heaps, now you have to be an expert to catch them [...] Now you have to be right on top of the fish to catch them, when I first started you couldn’t miss them. Recreational fisher interview.

In close the Gold Coast is just a desert, it’s starting to get that way at Mooloolaba. Localised depletion is an issue that has not yet been addressed by management. Charter fisher interview.

Snapper declined in the 1970s and 80s, but is back to a manageable level. Charter fisher interview.

I used to see aggregations of snapper at The Group, about one thousand individual fish, every winter. You don’t see these at The Group now. Recreational fisher interview.
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