

1 **Trends and transitions observed in an iconic recreational fishery across**
2 **140 years.**

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21

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29 knowledge to reconstruct historical catch rates for Queensland pink snapper
30 (*Pagrus auratus*) and Spanish mackerel (*Scomberomorus commerson*): long-term
31 data for incorporation into future stock assessments".

32 **Trends and transitions observed in an iconic recreational fishery across**
33 **140 years**

34

35 ABSTRACT

36

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

65

66 Keywords: amateur fishing, fishers' ecological knowledge, fishing power,

67 historical ecology, *Pagrus auratus*

68 1. INTRODUCTION

69

70 Fishing is one of the longest and most pervasive of human influences upon
71 marine ecosystems (Jackson et al. 2001). Recreational fishing activities, in
72 particular, remain under-examined (McPhee et al. 2002; Beaudreau and Whitney
73 2016). Until recently, monitoring efforts largely focused upon commercial
74 fisheries, with recreational fisheries assumed to have a far lower ecological
75 footprint than the commercial sector (Post et al. 2002; McClenachan 2013).
76 However, we now know that recreational fisheries comprise a significant
77 percentage of global fish harvest (Cooke and Cowx 2004), with recreational fish
78 harvest exceeding that of the commercial sector in some inshore regions
79 (Coleman et al. 2004; Ihde et al. 2011). Recreational fisheries are also recognised
80 as economically, socially and culturally significant, for example, they contribute
81 to regional economies and provide social opportunities (Peirson et al. 2001).
82 Some recreational fisheries have existed as long as, or longer than, their
83 commercial counterparts (Dayton and MacCall 1992).

84

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

94

95 In addition to a lack of understanding of fishery trends, our understanding of
96 how social and technological shifts have influenced recreational fishing practises,
97 and consequently catch and size trends, remains limited (Young et al. 2015;
98 Frawley 2015). In particular, we know little about the magnitude, timing and
99 rate of technological change in many recreational fisheries. In commercial
100 fisheries, technological advances have been shown to occur gradually, otherwise

101 known as 'technological creep'. These gradual changes are often interspersed
102 with periods of rapid change, where the adoption of a new technology has a
103 profound effect on fishers' ability to catch fish, for example, the introduction of
104 the bottom trawl (Garstang 1900; Engelhard et al. 2008; Kerby et al. 2012).
105 Other changes, such as societal shifts or the introduction of legislation that
106 restricts landings of a particular species, may also effect a rapid change in
107 fishers' targeting behaviour. Identifying these 'transition' periods, where rapid
108 changes in fishing ability or fishing behaviour occurred, and their drivers,
109 provides an enhanced, holistic understanding of change in recreational fisheries,
110 including the interpretation of catch or size trends (McClenachan 2013).

111

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

128

129 The global significance of recreational fisheries contrasts with our lack of
130 understanding of the ecological, human and policy dimensions of these fisheries.
131 However, despite a lack of formal data collection we demonstrate that, due to the
132 enduring community interest in recreational fishing and the ensuing records of
133 popular and personal accounts of recreational fishing activities, alternative data

134 sources exist that enable us to examine long-term changes in these systems over
135 time. Our interdisciplinary approach can thus be replicated for any species that
136 has a history of being targeted, and written about, by recreational fishers.

137

138 2. METHODS

139

140 2.1. *The contemporary Queensland fishery*

141

142 In Queensland, snapper is managed as part of the mixed species Rocky Reef Fin
143 Fish Fishery, which targets a range of line-caught species in rocky reef
144 environments from 10-200m depth (Allen et al. 2006). Within this fishery,
145 snapper, pearl perch (*Glaucosoma scapulare*), teraglin (*Atractoscion aequidens*)
146 cobia (*Rachycentron canadum*) and a range of other pelagic and demersal species
147 are caught by both commercial and recreational fishers (Queensland
148 Government 2011). Snapper landings dominate the commercial fishery
149 (comprising 47.5% by weight in 2016), with pearl perch the second most
150 abundant species by weight (14.4% by weight in 2016; Department of
151 Agriculture and Fisheries 2017a). Within this fishery, snapper is also the most
152 frequently caught species by recreational fishers, but pearl perch, cobia and
153 other rocky reef species are also commonly targeted by recreational fishers
154 (Department of Agriculture and Fisheries 2017b).

155

156 A charter fishery also exists, where vessels are operated by a professional
157 skipper but carry recreational fishers as passengers and operate under
158 recreational limits (Allen et al. 2006). In line with the commercial and
159 recreational sectors, snapper are targeted by this sector as part of the mixed
160 rocky reef fishery and are caught by hook and line. All sectors are regulated by
161 gear and size restrictions (Table 1), while recreational fishers are subject to in-
162 possession limits and commercial fishers operate under a limited entry license
163 system. Prior to 1990, recreational fishers were permitted to sell their catch,
164 while the only management enacted across all sectors was a minimum landing
165 size of 25cm (Allen et al. 2006). Recreational sale of fish was halted in 1990, and
166 the first recreational in-possession limits enacted in 1993 (Table 1; Allen et al.

167 2006). Due to differing management histories we separate analyses of the three
 168 sectors, but discuss the charter sector in the context of it being a recreational
 169 fishing platform.

170

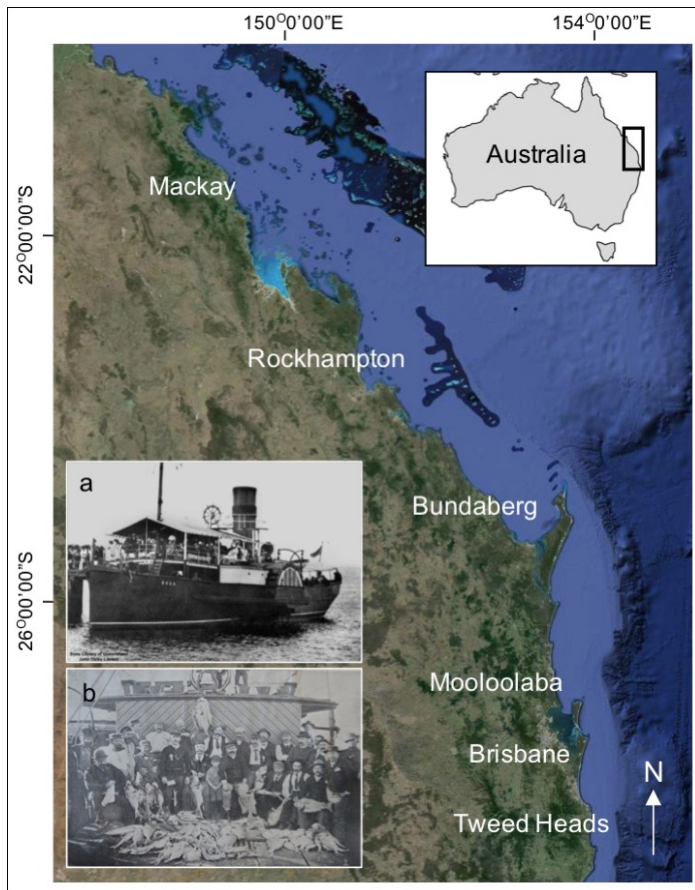
171 **Table 1. Management measures in the Queensland snapper fishery.**

Year	Management action	Sector(s) affected
1915	8 inch (20.3 cm) minimum length introduced.	All
1926	Minimum length increased to 10 inches (25.4 cm).	All
1990	Sale of fish by recreational fishers stopped.	Recreational, charter
1993	In-possession limit limited to 30 snapper per fisher.	Recreational, charter
1993	Minimum length increased to 30 cm.	All
2002	In-possession limit reduced to 5 snapper per fisher.	Recreational, charter
2002	Minimum length increased to 35 cm.	All
2011	6-week fishery closure enacted, but is not repeated in following years.	All
2011	In-possession limit reduced to 4 snapper per fisher, with no more than 1 fish >70 cm allowed.	Recreational, charter

172

173 Snapper occur as far north as the sub-tropical waters of the southern Great
 174 Barrier Reef (latitude 20.4°S), although the majority of the commercial catch is
 175 taken south of Bundaberg (Fig. 1). Commercial landings into Queensland totalled
 176 66 t in 2016 (Department of Agriculture and Fisheries 2017a). Recreational
 177 landings are estimated to be 2-3 times greater than the commercial fishery,
 178 although only fragmented data exist (Department of Employment, Economic
 179 Development and Innovation 2011). In 2009 a report into the status of the
 180 Queensland snapper fishery concluded that the stock was overfished, raising
 181 concerns for its sustainability (Campbell et al. 2009).

182



183

184 **Figure 1. Map showing the limits of the snapper fishery along the Queensland**
 185 **coast and the major population centres sampled for this study. Insert (a) an**
 186 **early steam boat, s.s. Boko, used for snapper excursions ca. 1890 (State Library of**
 187 **Queensland, 130107), (b) snapper fishers with their catch, extracted from Welsby**
 188 **(1905). Base map sourced from Google Maps.**

189

190 **2.2. Data sources**

191

192 **2.2.1. Archival data**

193

194 We gathered historical articles on snapper fishing (1871-1955) via searches of
 195 digitised newspaper articles available from the Trove database held at the
 196 National Library of Australia (2016). We sourced more recent records from
 197 digital archives available from the State Library of Queensland (2016), including
 198 ProQuest (2004-2015) and ABC news (2008-2015). Online archives of *Fishing*
 199 *Monthly*, a fishing magazine, were also searched (2007-2015). We searched
 200 digital articles using a combination of terms, including 'snapper fishing', 'snapper

201 expedition', and 'schnapper' and 'squire', which were both popular names for
202 snapper during the late 19th and early 20th centuries. Few newspaper articles are
203 digitally archived after 1955 and prior to 2004, hence we manually searched two
204 newspapers during this interval; the *Courier Mail* and the *Gold Coast Bulletin*. One
205 year out of every five was sub-sampled and searched for information on snapper
206 fishing. Additional information was sourced from the Queensland Historical
207 Society and state government records, including annual reports from the
208 Queensland Fish Board, Marine Department, Department of Harbours and
209 Marine (1882-1978) and the Department of Agriculture and Fisheries (2000-
210 2014). We recorded information on fishing trips including numbers of fish
211 caught, numbers of fishers and hours fished, vessel information including engine
212 power, length, depth fished and fishing ground names. Descriptive information
213 on the snapper fishery was also recorded.

214

215 2.2.2. Fisher interviews

216

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

229

230 Interview questions focused on individuals' past and present fishing activities.
231 We asked interviewees to describe changes in vessel length, engine power and
232 what year these had occurred, and what year they adopted new technologies.
233 They were asked to estimate typical distances they travelled to fishing grounds

234 and typical depths they fished at during the beginning and most recently in their
235 career. They were asked to recall recent 'good', 'typical' and 'poor' catches of
236 snapper, how many hours they would fish and number of people fishing for these
237 catches (Sáenz-Arroyo et al. 2005; Daw et al. 2011; O'Donnell et al. 2012). We
238 then asked each interviewee the same questions about their early experiences of
239 snapper fishing, and asked them to recall their 'best' catch during their fishing
240 career. We also asked what technology had impacted their fishing activities the
241 most and in what way, if any management actions changed their experience of
242 fishing, and any behavioural or attitudinal changes they had witnessed or
243 experienced during their period fishing. These open questions were used for the
244 qualitative component of this study.

245

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

252

253 *2.3. Data analysis*

254

255 2.3.1. Qualitative data

256

257 We used a conventional content analysis approach to qualitatively analyse the
258 descriptive data transcribed from archival documents and fishers' responses to
259 the open questions above. We use the definition of content analysis described by
260 Hsieh and Shannon (2005), the "subjective interpretation of the content of text
261 data through the systematic classification process of coding and identifying
262 themes or patterns". Rather than using preconceived categories, we highlighted
263 key words and concepts from repeated reading of the archival and transcribed
264 interview text, and from these developed a coding scheme, which we used to sort
265 the text into specific categories that captured the range of key themes repeatedly
266 raised throughout the textual sources (Braun and Clarke 2008).

267

268 Fishers' responses and archival content related to management measures (e.g.,
269 in-possession limits, size limits) in the fishery (both imposed and suggested
270 measures) were transcribed and assessed as either positive, negative or neutral
271 in tone towards the specific management measure referred to.

272

273 2.3.2. Quantitative data

274

275 We extracted records of catch rate, engine power, vessel length, depth fished and
276 fishing ground names from archival sources and fisher interviews. Where fishers
277 or archival sources provided data on catch and hours fished, we converted these
278 figures to catch rate, snapper fisher⁻¹ hour⁻¹. To calculate the distance from the
279 fisher's (or vessel's) home port to fishing ground, we located named fishing
280 grounds on maritime charts, and calculated the distance from the central portion
281 of the named ground to the named port, avoiding island and coastal land masses
282 but otherwise identifying and calculating the shortest route between the two
283 locations. Fisher interview responses enabled us to calculate the year and rate of
284 adoption of different technologies as a cumulative frequency distribution. We
285 noted the year that each fisher started using each technology, and if applicable,
286 the year the technology stopped being used, and/or the year that the fisher
287 exited the fishery. Thus, only active fishers were counted in the cumulative
288 frequency distribution results.

289

290 Many fishers were able to recall events from more than one period. When
291 calculating how catch rates, distance fished from home port, depths fished, vessel
292 length and engine power had changed over time, we used generalised linear
293 mixed model (GLMM) functions contained in the MASS package (glmmPQL;
294 Venables and Ripley 2002) in R (R Core Team 2012). Responses either fitted a
295 lognormal (catch rates, vessel length) or a negative binomial distribution (depth,
296 distance, engine power). Year fished was entered as a fixed effect, and fisher
297 identity as a random effect using an intercept-only model.

298

299 3. RESULTS

300

301 We sourced a total of 331 articles on snapper fishing trips for the years spanning
302 1871-1954, and 98 articles from 2004-2015. No articles were found from the
303 manual searches of sources from 1956-2003. Historical articles predominately
304 recorded the activities of charter fishing vessels, while the contemporary articles
305 mainly focused on recreational and charter fishing activities. Of the 107 snapper
306 fishers we interviewed, 48 (45%) predominately classed themselves as
307 recreational fishers, 18 (17%) as charter and 41 (38%) as predominately
308 commercial fishers. Interviewees' observations of the fishery spanned the years
309 1945-2013. The following broad categories were developed from content
310 analysis of the open-ended responses and qualitative text from archival sources:
311 fishing technology and technological innovation, regulation and responses to
312 regulatory change, changing attitudes towards fishing, and trends in snapper
313 abundance or catch. Each of these categories are described in detail below.

314

315 *3.1. Fishing technology and technological innovation*

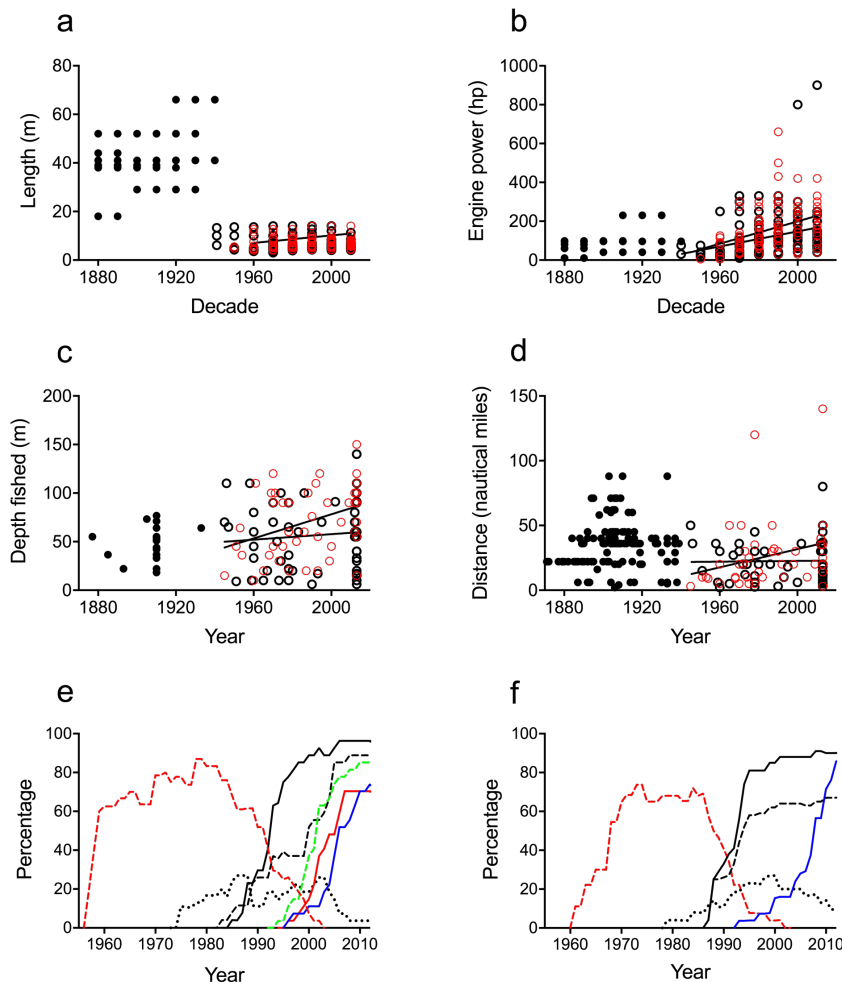
316

317 The charter fishery was the predominant sector to target snapper prior to World
318 War I, and was the most frequently recorded of the sectors in the historical
319 articles devoted to snapper fishing (87% of articles). Charter fishing trips
320 targeting snapper were documented in Queensland popular media from the
321 1870s onwards. While other fish species were caught as part of this mixed line
322 fishery, trips were almost always labelled as 'schnapper trips', targeting the
323 'schnapper grounds', with snapper being the predominant species caught
324 (Marine Department Report 1898). During this period steam-powered tug
325 vessels came into use (Jordan 1958) and these vessels were advertised for
326 charter to groups of recreational fishers (Marine Department Report 1898).
327 Although quantitative data on the vessels are limited, preventing statistical trend
328 analysis, available data demonstrates that these vessels could be >20m in length
329 with engines up to 200hp (Fig. 1a,b), holding upwards of 20 fishers. During the
330 pre-World War I period fishing grounds inside and to the north and south of
331 Moreton Bay were targeted, with vessels sometimes travelling more than 40nm
332 from port and fishing from 15-70m depth (Fig. 2c,d).

333

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

344



345

346 **Figure 2. Technological changes reported in popular media and by**
347 **commercial and recreational fishers (charter fishers plotted separately in**
348 **Fig. A1 for ease of viewing). A) Length of fishing vessel (archival, n = 37;**

349 recreational, n = 135; commercial, n = 120). B) Engine power of main engine
350 (archival, n = 28; recreational, n = 144; commercial, n = 114). C) Typical depth
351 fished, or reported depths from archival data (archival, n = 17; recreational, n = 56;
352 commercial, n = 49). D) Typical distance fished from port (archival, n = 130;
353 recreational, n = 52; commercial, n = 43). E) Percentage of interviewed
354 recreational fishers active in the fishery each year that used the named technology.
355 F) Percentage of interviewed commercial fishers active in the fishery each year that
356 used the named technology. (A-D) Open circles denote recreational fishers'
357 responses, red circles denote commercial fishers' responses, filled circles denote
358 information sourced from archival data, solid lines indicate $p < 0.05$. (E-F) Black
359 line = GPS, short dashed black line = digital monochrome echo sounder, long
360 dashed black line = digital colour echo sounder, long dashed red line = paper echo
361 sounder, blue line = 4-stroke outboard engine, red line = soft plastics, green line =
362 braid line. For mixed model outputs (A-D) see Table A1.

363

364 The post-war period saw the advent of fish-finding technologies such as paper
365 echo-sounders, as well as the introduction of monofilament lines and fibreglass
366 boats (Table A2). By 1970, paper echo-sounders were being used by >60% of
367 fishers interviewed and active during that period. Geographical positioning
368 systems (GPS) were rapidly adopted by fishers from all sectors from the late-
369 1980s, with 50% of recreational and commercial fishers using GPS by 1993. By
370 2013, >90% of fishers across all sectors used GPS (Fig. 2e,f, Fig. A1e).

371 Improvements and diversification in line and lure technology have also occurred
372 throughout the last decade. In the year 2000, <20% of recreational fishers used
373 soft plastic lures or braid line, but by 2013 63% used soft plastics, and 80% used
374 braid line, either in addition to or in place of monofilament (Fig. 2e). A similar
375 pattern of adoption was observed in the charter sector (Fig. A1e). No fishers in
376 our sample used 4-stroke outboard motors in 1990, but 50% of recreational,
377 charter and commercial fishers with outboard motors were using these by 2006,
378 2005 and 2008, respectively. By 2013, 85% of recreational, 89% of charter and
379 90% of commercial fishers using outboard motors had installed a 4-stroke
380 engine.

381

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

404

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

<i>Archival popular media</i>	<i>Contemporary popular media</i>	<i>Fisher interviews</i>
<i>Technology and skill</i>		
<i>It is true [snapper fishing] requires little piscatorial science or skill, but it is</i>	<i>A bit of burley and a floating bait seem to have been the key to the bigger</i>	<i>When GPS was combined with good quality echo sounders that allowed us</i>

<i>exciting... The Brisbane Courier 22 May 1879.</i>	<i>fish. Fishing Monthly Sept 2007.</i>	<i>to accurately identify the little reefs. Recreational fisher.</i>
<i>...An iron paddle-wheel vessel of 203 tons gross [...], 99 nominal horse power, length of 125ft., breadth 21ft. 1in., and depth 10ft. 4in. Brisbane Courier 3 Oct 1903.</i>	<i>The growing trend of bouncing soft plastics around rubble and other structure when chasing snapper is gaining momentum. Fishing Monthly Sept 2008.</i>	<i>The introduction of braid was a massive change, it increased efficiency and hook-up rates. Recreational fisher.</i>
<i>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.</i>	<i>Changing your techniques to literally trick the fish into biting your lures or baits is essential. Gold Coast Bulletin 24 Sept 2010.</i>	<i>Certain techniques allow us to catch our fish faster than when we were bait fishing. Recreational fisher.</i>

Regulations and response

<i>The schedule of the legal minimum lengths of fish is as follows [...] squire, 10in... The Telegraph, 24 Apr 1936.</i>	<i>A controversial plan to charge recreational fishermen \$90 to catch snapper has been scrapped [...]. It was a small victory for outraged commercial</i>	<i>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.</i>
<i>The fact remains that [...] the schnapper, is rarely in the market, and that its familiarity to some consumers is due rather to the efforts of amateur parties... The Brisbane Courier 6 Nov 1894.</i>	<i>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.</i>	<i>Charter fisher. Size limits have affected catches but they will be good in the long run, we were virtually wiping them out before. Commercial fisher.</i>

Changing attitudes

<i>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.</i>	<i>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</i>	<i>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.</i>
<i>...A few of Brisbane's peaceful citizens who were bent on schnapper slaughter... The Brisbane Courier 14 Jun 1887.</i>	<i>fishing shows and fishing personalities such as Rex Hunt, the fish kissing and, more importantly, the message of catch and</i>	<i>The media also altered and came round much more to catch and release, or only taking what you need. Charter fisher.</i>
<i>...Our fishermen are only just beginning to realise</i>	<i>release on Hunt's program in the 1990s have had</i>	<i>Gung-ho attitudes have</i>

<p><i>what splendid sport of its kind our waters afford.</i></p> <p>The Brisbane Courier 22 May 1879.</p>	<p><i>irreplaceable benefits. Nowadays, catch and release is widely practised... Gold Coast Bulletin 28 Oct 2006.</i></p>	<p><i>changed in the last 5 years, but those people are just getting their own boats. Charter fisher.</i></p>
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Abundance or catch trends

<p><i>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.</i></p> <p><i>Twenty years ago or more snapper parties [...] caught many large fish of that species [...]. Since then big snapper have been few and far between.</i></p> <p>The Queenslander 21 Jan 1932.</p>	<p><i>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.</i></p> <p><i>"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."</i> Gold Coast Bulletin 16 Feb 2011.</p>	<p><i>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.</i></p> <p><i>The snapper grounds further south have been flogged. Commercial fisher.</i></p> <p><i>I've no doubt snapper are overfished; you have to travel further and further to get good quality and quantity. Commercial fisher.</i></p>
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408

409 *3.2. Regulation and responses to regulatory change*

410

411 A minimum length for landed snapper was introduced under the *Fish and Oyster*
 412 *Act of 1914 (Qld)*. Prior to and during this period several well-known
 413 recreational fishers of the time voiced their support in popular media for the
 414 implementation of minimum length legislation (Table A2). This was driven by
 415 concerns that snapper and other fish species were in decline as a result of young

416 fish being destroyed by net and line fishing in inshore waters. There were no
417 data on how well this regulation or subsequent size-regulations were received
418 by the recreational community or to what extent they were enforced until the
419 mid-1990s (Ferrell and Sumpton 1998). At this time the retention of undersized
420 snapper in southeast Queensland was found to be high (75% of snapper caught
421 from inshore areas). However, more recent work (Fraser et al. unpublished)
422 indicates that compliance with minimum size limits has improved since then.
423 When questioned, 17% of interviewed recreational fishers responded positively
424 towards contemporary minimum size legislation, with 76% neutral in tone.

425

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

442

443 In-possession limits were first introduced to the recreational and charter sectors
444 in 1993. Data on recreational fishers' responses to the introduction of this first
445 in-possession limit are scarce, but 18% of interviewees stated that negative
446 views were initially held towards the 30 in-possession limit, but that these
447 reduced as time passed (Table A2). When asked about contemporary in-
448 possession limits, 37% and 42% of contemporary recreational fishers' responses

449 were supportive or neutral in tone, respectively, while the 21% who felt
450 negatively towards this regulation stated that they were not against in-
451 possession limits in principle, but only the most recent and most restrictive in-
452 possession limit enacted in 2011 (Table 1).

453

454 While in-possession and minimum landing size regulations are largely observed
455 neutrally or accepted by the recreational sector today, proposals to introduce a
456 compulsory recreational fishing license in 2011 were ultimately halted due to
457 pressure from the recreational sector (Table 2; Table A2). Similarly, a 6-week
458 ban on recreational and commercial landings of snapper was enacted in 2011
459 but was not repeated due to pressure from all sectors. The polarisation of
460 feelings towards these regulations was reflected in the media at the time, with
461 28% of contemporary popular media articles commenting on these news items
462 (Table A2).

463

464 *3.3. Changing attitudes towards fishing*

465

466 From its commencement in the 1870s, recreational snapper fishing was
467 described as a sport, with the aim to catch as many individual snapper as
468 possible (Table 2; Table A2). Early media articles described the activity as 'more
469 slaughter than sport' (Table 2; Table A2). From 1871-1919, numbers of snapper
470 reported landed by steam vessels averaged 255 snapper vessel⁻¹ (n trips = 67),
471 with >1000 snapper (plus other species) reported on three occasions. The vast
472 majority (92%) of historical media articles reported on individual fishing trips,
473 with 'good' trips considered as those which had caught the most fish. The aim of
474 fishing to catch as many fish as possible persisted throughout the historical time
475 series (1871-1955), most likely fuelled by the element of competition and the
476 ready saleability of snapper and other rocky reef fish such as pearl perch
477 (Marine Department Report 1905). Of the contemporary media articles sourced,
478 51% spoke about recent recreational or charter fishing trips where snapper
479 were caught. However, unlike historical media, only 5% of all articles provided
480 details on the number of fish caught, more commonly referring qualitatively to
481 the success of or conditions experienced during the fishing trip.

482

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

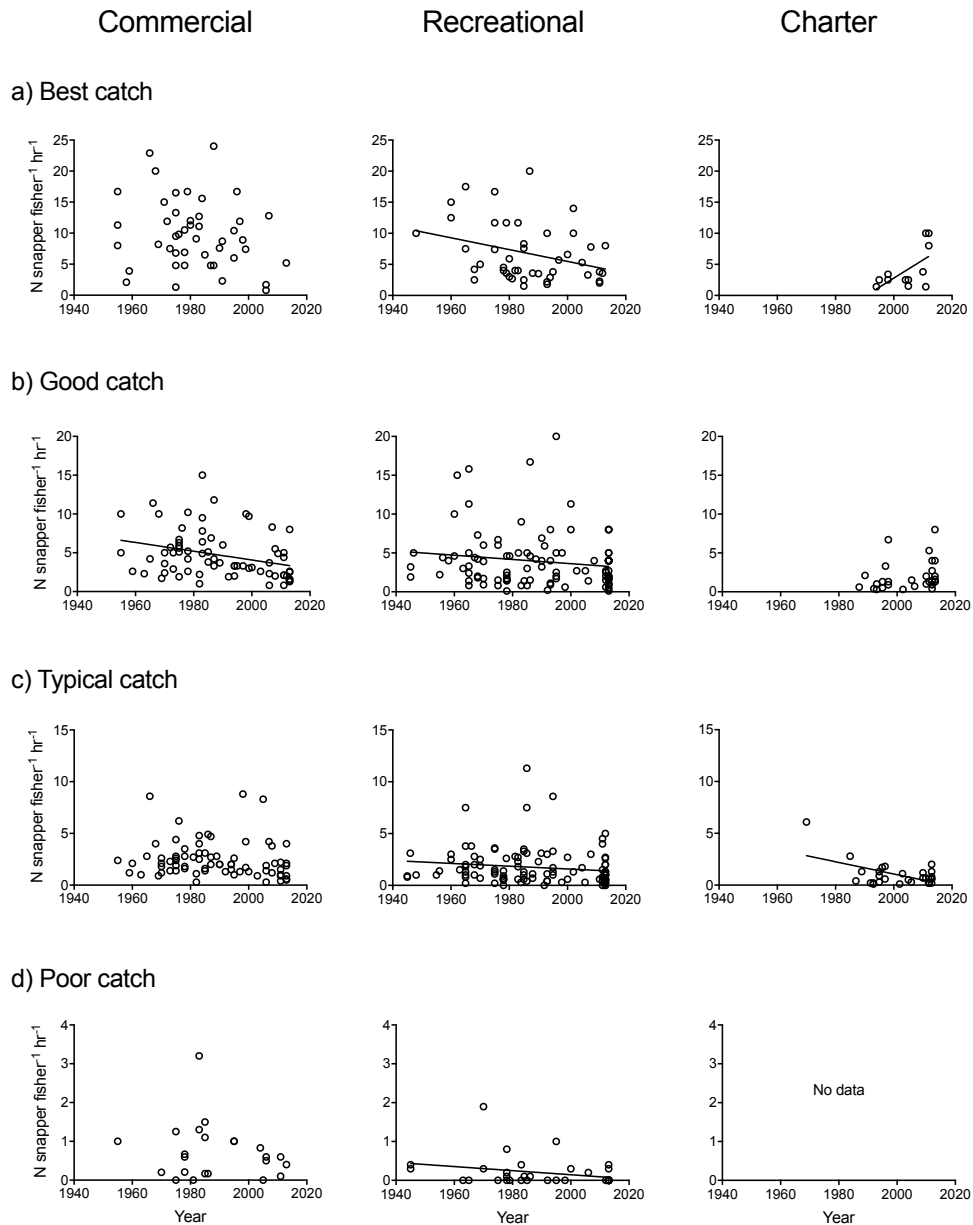
492

493 *3.4. Reported trends in catch rate and abundance*

494

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

505



506

507 **Figure 3. Catch rates (n snapper fisher⁻¹ hour⁻¹) recalled by fishers over time.**

508 A) 'Best' catch (commercial, $n = 45$, linear regression: $y = -0.07863*x + 165.6$,

509 $p=0.1789$; recreational, $n = 45$, linear regression: $y = -0.09491*x + 195.3$, $p=0.0316$;

510 charter, $n = 12$, linear regression: $y = 0.2921*x - 581.4$, $p=0.0346$). B) 'Good' catch

511 (commercial, $n = 69$; recreational, $n = 103$; charter, $n = 28$). C) 'Average' catch

512 (commercial, $n = 72$; recreational, $n = 110$; charter, $n = 30$). D) 'Poor' catch

513 (commercial, $n = 24$; recreational, $n = 35$). Solid lines indicate p -values <0.05 . For

514 mixed model outputs (good, typical and poor) see Table A1.

515

516 In early media, snapper were considered highly abundant, although a small
517 percentage (3%) of articles from 1913 onwards expressed concern about
518 declining abundance of snapper. These were usually voiced by recreational
519 fishers who were concerned about large numbers of undersized snapper being
520 caught and killed by line and net fishers. Snapper abundance was referred to in
521 26% of contemporary media articles, mostly in articles discussing the outcomes
522 of the 2009 snapper stock assessment. The content of these articles reflected the
523 polarised views emanating from the assessment, with fishers either decrying the
524 decline in snapper or stating that snapper abundance had not changed over their
525 experience (Table A2). When interviewed, 65% of recreational fishers, 71%
526 commercial and 55% of charter fishers stated they had witnessed a decrease in
527 snapper abundance over their lifetimes.

528

529 4. DISCUSSION

530

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

539

540 *4.1. Observed transitions in the snapper fishery*

541

542 Several transitional periods relating to the introduction of new fish-finding
543 technologies or fishing gear were observed, in which technologies that fishers
544 claimed significantly impacted their targeting behaviour or catch rates were
545 rapidly adopted. The technologies that fishers observed to have the maximum
546 impact on their fishing activities were echo-sounders, GPS, new motor, line and
547 lure technologies. These technologies were adopted by the majority (i.e., >50%)
548 of fishers interviewed and active during the 1960s, 1990s and 2000s,

549 respectively, having first been used less than 10 years prior. It is well known by
550 fishery scientists that technological innovations improve fishers' ability to catch
551 fish, but quantifying this impact is difficult. Our study demonstrated that snapper
552 fishers' perceptions of the impact of new technologies on their fishing abilities
553 varied widely, but that the introduction of echo-sounders and GPS were
554 perceived to have the greatest impact upon their targeting opportunities, mainly
555 by increasing the number of known fishing spots. The latest transition,
556 documented during the mid-2000s, occurred in the recreational and charter
557 fisheries and acted to increase targeting opportunities by diversifying the
558 methods used to catch snapper. While this may result in specialisation among
559 fishers in these sectors, it also enables fishers to target snapper in conditions
560 that previously may have been less conducive to successful fishing (Table A2).
561 Fishers were often unable to quantify how their catch or catch rates had changed
562 as a result of fishing technologies, with interviewees stating that these difficulties
563 were due to their inability to account for the confounding influences of
564 legislation and/or behavioural shifts that altered fishing behaviour.

565

566 The timing, rate of uptake and impact of key technologies has previously been
567 documented for commercial fisheries (e.g., Engelhard et al. 2008; Robins et al.
568 1998; Marriott et al. 2011), but rarely for the recreational sector. With the
569 exception of the last recorded transition (the diversification of line and lure
570 technologies), adoption of fishing gear in the recreational and charter sectors
571 commenced and increased at a similar rate as the commercial sector. While
572 fishing skills were likely to differ between recreational and commercial fishers,
573 these observed patterns in technological uptake suggest that the recreational
574 sector's ability to locate and target snapper has kept pace with the commercial
575 sector.

576

577 Fisher knowledge interviews enabled the rate and timing of technological
578 transitions to be uncovered during the post-war period, but earlier transitional
579 periods are also likely to have occurred. However, these are beyond living
580 memory and thus the rate of uptake of specific technologies and their impact
581 upon the fishery is harder to detect using archival sources alone. The impact of

582 the introduction of outboard motors, fibreglass boats, and monofilament line on
583 the fishery during the 1950s was mentioned by interviewees, but by <5
584 individuals (Table A2). As this period is already beyond the living memory of
585 most, the rate of adoption could not be quantified. Archival sources published
586 during the pre-War period also describe early improvements in line fishing
587 technology and the introduction of steam power and motorboats (Table A2), but
588 similarly, the rate of adoption of these technologies could not be quantified.

589

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

601

602 *4.2. Comparisons among fishing sectors*

603

604 We were able to compare technological trends among the three sectors. By and
605 large, all sectors demonstrated significant increases in vessel length, engine
606 power, depth and distance fished from port. However, fishers from all sectors
607 exhibited diversity in terms of individual choice. In 2013 some recreational
608 fishers still reported fishing as close as 3 miles from port, with the maximum
609 distance from port reported as 80 miles. This diversity likely reflects variable
610 motivations for fishing and individual preferences. For example, recreational
611 fishers stated that they moved further away to either avoid other fishers, to
612 explore, or because they perceived snapper abundance to be higher further away
613 from the main ports and shore. Conversely, some recreational fishers fished

614 close to home to reduce the cost of their fishing trip, or because they simply
615 enjoyed fishing in sheltered waters (Table A2).

616

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

636

637 *4.3. Use of non-traditional sources in informing recreational fishery trends*

638

639 Formal data collection on the Queensland recreational snapper fishery did not
640 commence until the last decade of the 20th century. However, archival and fisher
641 knowledge sources enable us to explore trends in recreational fishing
642 technology, catch rates and changing fisher motivations commencing over a
643 century prior to this. We know from archival sources that recreational fishers
644 were some of the first people to regularly exploit snapper and other rocky reef
645 fin fish species in Queensland's offshore waters. We also know that, prior to
646 regulation of the recreational sector, recreational fishers commonly acted in a

647 commercial capacity and were responsible for a considerable proportion of the
648 snapper and other rocky reef species available in the markets. Despite
649 increasingly restrictive regulations, the recreational sector today lands the
650 majority of snapper in Queensland (Campbell et al. 2009), yet our knowledge of
651 recreational fishing trends remains far more limited than the commercial fishery.
652 Archival and fisher knowledge sources provide evidence of technological creep
653 since the commencement of the fishery 140 years ago, interspersed with periods
654 of rapid technological advancement. Both archival and fisher interviews
655 demonstrate that the introduction of new technologies profoundly increased
656 fishers' ability to target snapper over time. However, this was countered in the
657 last two decades by a shift away from an emphasis on recreationally catching
658 large quantities of snapper. This shift coincided with the implementation of a ban
659 on the recreational sale of fish, in-possession limits and increased media
660 coverage of catch and release fishing. However, as recalled catch rate trends
661 were variable among individual fishers, and because individuals had fished for
662 different lengths of time it was impossible to pinpoint a specific period when
663 declines in catch rates commenced. This meant we were unable to determine
664 whether declining catch rates drove the observed attitudinal shift or vice versa.
665 It is possible that pre-1990, declining catch rate trends were masked by
666 technological advances, but after 1990 increasingly restrictive regulations and
667 the increased emphasis on catch and release altered fishers' behaviour,
668 contributing to observed declines in catch rate trends. Alternatively, it is possible
669 that declining returns have played a role in altering attitudes towards fishing,
670 but additional social and catch trend data are required to unravel this.

671

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

680 raised concerns in this context, or provided comments on long-term
681 perspectives.

682

683 Our fisher interview sampling methodology does not provide a representative
684 sample of fishers, meaning that we cannot use this source to make inferences
685 about total catch trends or the impacts of fishing power increases on catch rate.

686 It may be that further examination of these sources alongside available
687 government data will enable suitable proxies of change to be generated at the
688 fishery scale. This is particularly important if the impact of technological
689 advances, attitudinal change and regulations on the fishery are to be quantified.

690 While fishers often stated in interviews that in-possession limits, changing
691 attitudes and catch and release techniques have benefited the fishery, any
692 potential conservation gains resulting from these changes need to be contrasted
693 with the impact that increased numbers of recreational fishers and improved
694 access to the fishery resource will have at the fishery scale. For example,
695 increases in fishing power together with lure and line diversification mean that
696 fishers today are able to target snapper in environmental conditions and
697 locations that historically would not have been conducive to snapper fishing.

698

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

713 quantitative data derived from popular media sources with data derived from
714 fisher interviews.

715

716 *4.4 How these findings could inform management*

717

718 In many countries recreational fish harvest levels are significant, yet the social
719 and economic contributions of recreational fisheries, as well as the potential
720 ecological issues resulting from high recreational harvest, are commonly
721 overlooked because of a lack of monitoring data (Coleman et al. 2004; Idhe et al.
722 2011). Within the Queensland Rocky Reef Fin Fish Fishery the high level of
723 recreational snapper harvest compared to the commercial sector is recognised,
724 yet data on the recreational sector only became available from the late 1990s
725 onwards, and remains limited today. Our findings demonstrate that recreational
726 snapper harvest has a far longer history that spans at least 140 years in length.
727 Furthermore, we demonstrate that there are been marked shifts in technological
728 capacity of the recreational sector over the decades, at a level comparable to the
729 commercial sector, as well as significant changes in recreational fishers'
730 behaviour and catch rate trends.

731

732 The incorporation of historical data into contemporary management
733 frameworks is not without its challenges, yet the consideration of the historical
734 data presented here may inform management of the snapper fishery in a number
735 of ways. The most recent stock assessment of snapper (Campbell et al. 2009)
736 assumed the start of significant fishing activities just after World War II, when
737 annual landings data began to be collated. Our sources suggest that significant
738 fishing activity, enough to provide a marketable supply of snapper for at least
739 part of the year, occurred from the beginning of the 20th century if not before.
740 Knowing when significant levels of fishing began is highly relevant for informing
741 fishery model inputs. Moreover, the large number of popular articles describing
742 snapper catches and the vessels involved sometimes enable annual landings to
743 be estimated for this pre-War period, again informing model inputs for a period
744 of time when no other known data exist. Time series of catch rates for the early
745 years of the fishery, which often comprise detailed information on individual

746 trips, including fishing locations and vessel identifiers, can also be incorporated
747 into models, potentially as a proxy of abundance (e.g., Thurstan et al. 2016b).

748

749 Fisher interviews also provide information for fishery assessment: data on the
750 year of introduction of specific fishing technologies, their rate of uptake and the
751 impact of these technologies on fishing efficiency can contribute to catch
752 standardisation, thus helping to minimise the confounding effects of increased
753 fishing power on abundance estimates (e.g., O'Neill and Leigh 2006). Likewise,
754 uncovering information on the spatial dynamics within the fishery may also help
755 to reduce the confounding effects of spatial expansion within fishery models.

756 Historical data can also contribute to informing broader marine resource
757 management goals. Greater engagement of stakeholders in fishery management
758 advice is beneficial for both scientists and stakeholders (Sampedro et al. 2017).
759 Historical perspectives are often of great interest to industry stakeholders, and
760 hence this is one avenue that may facilitate increased engagement in
761 management processes. Finally, an understanding of the drivers of resource use,
762 stakeholder perceptions and changes over time may also help inform managers
763 of common concerns held by stakeholders, and thus aid understanding of the
764 likely level of support for particular management actions.

765

766 5. CONCLUSIONS

767

768 In this study we examined technological, social and catch rate trends of a
769 recreational fishery throughout its documented history. During the 19th century
770 snapper was arguably one of the most talked about fish in Queensland popular
771 media. In 21st century media the fishery and its management continues to be
772 discussed, often animatedly. The long history of this fishery and the archival
773 documents that exist allowed us to examine both popular media, a source that is
774 rarely considered by natural resource managers and scientists, and fisher
775 knowledge, an underused source of data on fisheries and fishing practises, to
776 unravel multi-decadal fishery trends. While data gaps remain, these sources
777 contribute towards a fuller understanding of recreational fishery trends and
778 changing fisher motivations. The importance of an interdisciplinary knowledge

779 base for fisheries management is increasingly recognised (Arlinghaus et al.
780 2016) and this study highlights that non-traditional data sources can contribute
781 to this goal.

782

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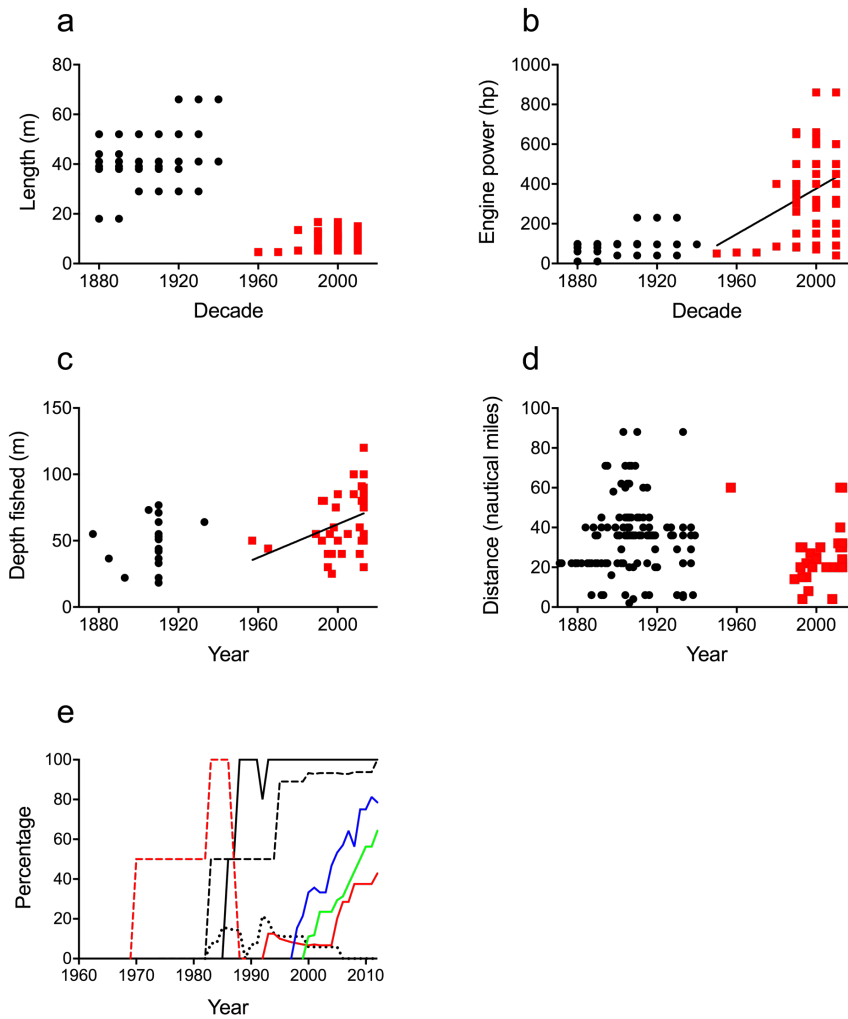
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982

983 **Figure A1. Technological changes reported in popular media and by charter**

984 **fishers.** A) Length of fishing vessel (archival, $n = 37$; charter, $n = 73$). B) Engine

985 power of main engine (archival, $n = 28$; charter, $n = 75$). C) Typical depth fished, or

986 reported depths from archival data (archival, $n = 17$; charter, $n = 35$). D) Typical

987 distance fished from port (archival, $n = 130$; charter, $n = 32$). E) Percentage of

988 interviewed charter fishers active in the fishery each year that used the named

989 technology. (A-D) Red squares denote charter fishers' responses, filled circles

990 denote information sourced from archival data. (E) Black line = GPS, short dashed

991 black line = digital monochrome echo sounder, long dashed black line = digital

992 colour echo sounder, long dashed red line = paper echo sounder, blue line = 4-

993 stroke outboard engine, red line = soft plastics, green line = braid line. For mixed

994 model outputs (A-D) see Table A1.

995

996 **Table A1. Generalised linear mixed model outputs from interview data.** Model997 *estimates were not calculated for historical data due to low sample sizes and an*998 *inability to always distinguish between individual vessels. * denotes $p < 0.05$.*

Data source (fitted distribution)	Model estimate	SE	z-value	df	p-value
Vessel length					
Recreational (lognormal)	0.003	0.0012	2.85	111	0.0052*
Commercial (lognormal)	0.002	0.0014	1.57	90	0.1189
Charter (lognormal)	0.004	0.0028	1.39	18	0.1730
Engine power					
Recreational (negative binomial)	0.023	0.0028	8.28	113	<0.0001*
Commercial (negative binomial)	0.020	0.0043	4.68	85	<0.0001*
Charter (negative binomial)	0.014	0.0047	2.98	18	0.0028*
Depth fished					
Recreational (negative binomial)	0.008	0.0025	3.34	26	0.0008*
Commercial (negative binomial)	0.005	0.0016	2.96	22	0.0031*
Charter (negative binomial)	0.008	0.0033	2.42	16	0.015*
Distance fished from home port					
Recreational (negative binomial)	0.007	0.0028	2.39	24	0.0170*
Commercial (negative binomial)	0.010	0.0032	3.12	23	0.0018*
Charter (negative binomial)	0.001	0.0078	0.13	16	0.8900
Catch rates					
Recreational good (lognormal)	-0.014	0.0033	-4.25	49	0.0001*
Recreational average (lognormal)	-0.010	0.0020	-5.21	53	<0.0001*
Recreational poor (lognormal)	-0.006	0.0021	-2.99	17	0.0082*
Commercial good (lognormal)	-0.010	0.0040	-2.42	27	0.0225*
Commercial average (lognormal)	-0.003	0.0047	-0.64	29	0.5304
Commercial poor (lognormal)	-0.001	0.0051	-0.26	13	0.7973
Charter good (lognormal)	-0.026	0.0134	-1.97	10	0.0737
Charter average (lognormal)	-0.050	0.0048	-10.37	13	<0.0001*

999

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.

<i>Archival popular media</i>	<i>Contemporary popular media</i>	<i>Fisher interviews</i>
<i>Technology and skill</i>		
<i>It is true [snapper fishing] requires little piscatorial science or skill, but it is exciting... The Brisbane Courier 22 May 1879.</i>	<i>A bit of burley and a floating bait seem to have been the key to the bigger fish. Fishing Monthly Sept 2007.</i>	<i>When GPS was combined with good quality echo sounders that allowed us to accurately identify the little reefs. Recreational fisher interview.</i>
<i>...An iron paddle-wheel vessel of 203 tons gross [...], 99 nominal horse power, length of 125ft., breadth 21ft. 1in., and depth 10ft. 4in. Brisbane Courier 3 Oct 1903.</i>	<i>The growing trend of bouncing soft plastics around rubble and other structure when chasing snapper is gaining momentum. Fishing Monthly Sept 2008.</i>	<i>The introduction of braid was a massive change, it increased efficiency and hook-up rates. Recreational fisher interview.</i>
<i>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</i>	<i>Changing your techniques to literally trick the fish into biting your lures or baits is essential. Gold Coast Bulletin 24 Sept 2010.</i>	<i>Certain techniques allow us to catch our fish faster than when we were bait fishing. Recreational fisher interview.</i>
	<i>The most successful snapper anglers are very keen on burley and floatlining. In some</i>	<i>Outboards and fibreglass boats provided access to the offshore fishery. Recreational fisher interview.</i>

<p>Standard 17 May 1918.</p> <p><i>...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 bored 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 [...].</i> The Brisbane Courier 16 Jun 1877.</p>	<p><i>situations a good burley trail, delivered judiciously as opposed to dumping large quantities of chopped fish at irregular intervals, will bring the fish close to the surface and very close to the boat.</i> Fishing Monthly Feb 2008.</p> <p><i>Soft plastics, octa jigs and pilchards are all effective, but to specifically target big nobbies over 8kg nothing beats small livies 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 pinnacles surrounded by flat stuff for the best results. Early morning and late afternoon are usually the best time to fish, and there is often a frantic bite just on dusk, especially when quality fish are around.</i></p>	<p><i>GPS gave a significant and immediate improvement; the duds got good.</i> Recreational fisher interview.</p> <p><i>Sounders expanded the fishing grounds extensively.</i> Recreational fisher interview.</p> <p><i>Everyone is using lures now, which are better for catch and release.</i> Recreational fisher interview.</p> <p><i>Plastics target the big fish, so does live bait, so they help with the size limits.</i> Commercial fisher interview.</p> <p><i>Prior to GPS you stayed within sight of land, now you travel further.</i> Commercial fisher interview.</p> <p><i>Back then the snapper grounds were common</i></p>
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<p><i>she is brought near the desired sports, drifts back again [...], do your best in 10 minutes, for no longer can we remain in such dangerous neighbourhood [...]. Our fishing lasts not more than two hours, and a large portion of that time is occupied in steaming [...].</i></p>	<p>Fishing Monthly Aug 2011.</p> <p><i>I am always drifting or using the electric motor when chasing snapper. There are a few things that you can do when drifting to increase your chances of getting that big specimen. Work out your drift line before you go over your spot so you are not driving over the top of your mark with excess motor noise. This too can shut the fish down.</i></p>	<p><i>property, everyone went to more or less the same grounds.</i> Recreational fisher interview.</p>
<p>The Brisbane Courier 16 Jun 1877.</p>	<p>Fishing Monthly Aug 2012.</p>	<p><i>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.</i></p> <p>Recreational fisher interview.</p>
<p><i>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.</i> The Brisbane Courier 12 April 1879.</p>	<p><i>I watch my sounder like a hawk while I am travelling around between spots. Not only am I looking for pinnacles but also patches of soft spiral shaped coral that grows like grass out of the rubble bottom. We have a lot of foul grounds in the bay and its places like these that you will find this soft coral</i></p>	<p><i>Communication and safety increased in the 1990s.</i> Recreational fisher interview.</p> <p><i>In the mid-2000s cheap efficient 4 stoke outboards transformed recreational fishing.</i></p> <p>Recreational fisher interview.</p>
<p><i>The bait of baits is mullet, and a truly good bait it is.</i> The Queensland 4 Sept 1886.</p>	<p><i>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.</i></p>	<p>Recreational fisher interview.</p>

<p><i>...by 5 o'clock [we] were well off South Passage awaiting for dawn to pick up the rock and our proper fishing ground. The Queenslander 4 Sept 1886.</i></p>	<p><i>growing [...]. It does pay to have a colour sounder. This makes it a lot easier to distinguish between the bottom and the coral growing out of the bottom, as it shows up in a different colour. Fishing Monthly May 2012.</i></p>	<p><i>Braid is one of the biggest changes in my fishing time. Recreational fisher interview.</i></p>
<p><i>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.</i></p>		<p><i>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.</i></p>
<p><i>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</i></p>		<p><i>You couldn't go to the far-out reefs until you got a [paper] sounder. Commercial fisher interview.</i></p>
		<p><i>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.</i></p>
		<p><i>Charter boats have to increasingly fish secret places when no one is around. They are not</i></p>

Courier 14 Jul 1904.

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.

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.

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

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

<p><i>The schedule of the legal minimum lengths of fish is as follows [...] squire, 10in... The Telegraph, 24 Apr 1936.</i></p>	<p><i>could become a yearly shutdown. The move to restore depleted fish stock of snapper, pearl perch and teraglin 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.</i></p>	<p><i>good in the long run, we were virtually wiping them out before. Commercial fisher interview.</i></p>
<p><i>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</i></p>	<p><i>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.</i></p> <p><i>Dangerously low stocks of snapper have prompted the Queensland State Government to announce a six-week ban for next year</i></p>	<p><i>Bag limits altered the way you fished, as you had to diversify your catch. Recreational fisher interview.</i></p> <p><i>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.</i></p> <p><i>Management needs to be more regionalised, not a blanket rule. Recreational fisher interview.</i></p> <p><i>Size limits made a massive difference in the bay, people stopped fishing because many squire are below the limit. Commercial fisher interview.</i></p>

<p><i>expected that they will have about six hours on the fishing ground. The Brisbane Courier 8 May 1890.</i></p>	<p><i>[...]. 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.</i></p>	<p><i>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.</i></p>
<p><i>The Otter brought about 900 fine 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.</i></p>	<p><i>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.</i></p>	
<p><i>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</i></p>	<p><i>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</i></p>	

industry. The Brisbane Courier 6 Nov 1894.

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.

Changing attitudes

<p><i>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.</i></p> <p><i>...A few of Brisbane's peaceful citizens who were bent on schnapper slaughter... The Brisbane Courier 14 Jun 1887.</i></p> <p><i>...Our fishermen are only just beginning to realise what splendid sport of its kind our waters afford.</i></p>	<p><i>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 Remy Boy - the man, in my view, who changed fishing forever. Gold Coast Bulletin 28 Oct 2006.</i></p>	<p><i>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.</i></p> <p><i>Gung-ho attitudes have changed in the last 5 years, but those people are just getting their own boats. Charter fisher interview.</i></p> <p><i>When the 30 bag limit came in there was an outcry, but it modified the behaviour of a</i></p>
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<p>The Brisbane Courier 22 May 1879.</p>	<p><i>Snapper are one of those fish that anyone who has picked up a fishing rod dream</i></p>	<p><i>minority who could catch the most. Recreational fisher interview.</i></p>
<p><i>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.</i></p>	<p><i>about catching. Fishing Monthly Jul 2010.</i></p>	<p><i>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.</i></p>
<p><i>...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.</i></p>	<p><i>While decent 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.</i></p>	<p><i>Attitudes changed in the early 1990s, we're seeing a lot more catch and release now. Recreational fisher interview.</i></p>
<p><i>In reading the "Courier" a letter</i></p>	<p><i>During the next couple of months as the</i></p>	<p><i>Fishers will highgrade once they reach their bag limit. Commercial fisher interview.</i></p> <p><i>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.</i></p>

<p><i>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.</i></p>	<p><i>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.</i></p> <p><i>Generally they are caught at 2-4kg or so with standout specimens pushing 10kg [...]. At that size they would be a good catch and release candidate. Fishing Monthly Feb 2008.</i></p> <p><i>The circle [hook] design nearly always hooks the fish in the corner of the mouth. This makes the release of unwanted fish far easier. Fishing Monthly Aug 2007.</i></p>	<p>Recreational fisher interview.</p> <p><i>I'll often sneak off the patch of fish if customers are catching too many. Charter fisher interview.</i></p> <p><i>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.</i></p> <p><i>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></p> <p><i>I began targeting larger fish as the bag and size limits came in. Recreational fisher interview.</i></p>
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The Brisbane Courier 9 Jun 1909.

There is one matter I would like to bring before the members [of the Amateur Fishermen'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 Mud 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.

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.

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.

Abundance or catch trends

<i>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.</i>	<i>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 floatlining with pilchards has accounted for a high percentage of the fish. Fishing Monthly Sept 2005.</i>	<i>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.</i>
<i>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>	<i>The 36 fathom line has copped 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.</i>	<i>The snapper grounds further south have been flogged. Commercial fisher interview.</i> <i>I've no doubt snapper are overfished; you have to travel further and further to get good quality and quantity. Commercial fisher interview.</i>
<i>I am able to account for, say, 25,000 fish so landed from pleasure steamer trips during the last winter [...]. Marine Department Report</i>		<i>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 fishing outside the islands increased enormously. Recreational fisher interview.</i>

1905.	Fishing Monthly Jun 2004.	
<p><i>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 measureable 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</i></p>	<p><i>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 Jun 2006.</i></p> <p><i>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. 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.</i></p>	<p><i>In the 1980s seeing 10-15 boats would be a busy day, now there's 150 boats [...]. Recreational fisher interview.</i></p> <p><i>It was easier to catch more fish 60 years ago. Recreational fisher interview.</i></p> <p><i>The inshore, traditional shallow reefs in the south were covered because of coastal development, but there are still plenty of fish out wide [...]. A few areas have shown localised depletion, like Deep Tempest. Recreational fisher interview.</i></p> <p><i>The snapper fishery is very healthy, in winter you always get a healthy group of snapper, there are thousands out there. Recreational fisher interview.</i></p>

<p><i>Bay by week-end boating parties. In 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 bream' stage which they destroy, yet with unparalleled audacity boats pass up the river every Sunday afternoon with scores of these undersized fishes hanging to the rigging. Ogilby 1916.</i></p> <p><i>... 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 hauls of twos, threes and fours for</i></p>	<p><i>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 [...].</i></p> <p>Gold Coast Chronicle 13 Aug 2005.</p> <p><i>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.</i></p> <p>Fraser Coast Chronicle 3 Sept 2010.</p> <p><i>It's not a bad result for an early-morning session out on the water. Keen Gold Coast angler [name] and a mate returned from a</i></p>	<p><i>Snapper numbers are still declining inshore, even though they have changed its management.</i></p> <p>Charter fisher interview.</p> <p><i>There's been declines right across the board, everything has depleted.</i> Commercial fisher interviewer.</p> <p><i>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.</i></p> <p>Recreational fisher interview.</p> <p><i>In the 1960s if you came back with 200kg, you thought you'd had a bad night. [But] offshore stocks haven't changed.</i> Recreational fisher interview.</p>
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<p>at least a quarter of an hour or twenty minutes before the order is given for another round turn. Welsby 1905.</p>	<p>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.</p>	<p>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.</p>
<p>...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</p>	<p>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 McDade, 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.</p> <p>...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</p>	<p>Snapper have been coming back in recent years. There's fewer charter boats. Commercial fisher interview.</p> <p>Forty years ago you would catch 20 fish an hour, now its 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.</p>

<p><i>suitable for market purposes. Endeavour survey 1910.</i></p>	<p><i>best snapper fisheries in the country and the techniques used to catch them have changed</i></p>	<p><i>In close the Gold Coast is just a desert, it's starting</i></p>
<p><i>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 denude 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.</i></p>	<p><i>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.</i></p> <p><i>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</i></p>	<p><i>to get that way at Mooloolaba. Localised depletion is an issue that has not yet been addressed by management. Charter fisher interview.</i></p> <p><i>Snapper declined in the 1970s and 80s, but is back to a manageable level. Charter fisher interview.</i></p> <p><i>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.</i></p>
<p><i>Endeavour survey 1910.</i></p>	<p><i>minimum 35cm limit. Fishing Monthly Jun</i></p>	

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. 2004.

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 6lb or 7lb to 20lb, although the greater portion were round

*about 10lb in weight. Since then big
snapper have been few and far
between.* The Queenslander 21 Jan
1932.
