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

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ABSTRACT

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

1. Introduction

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

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

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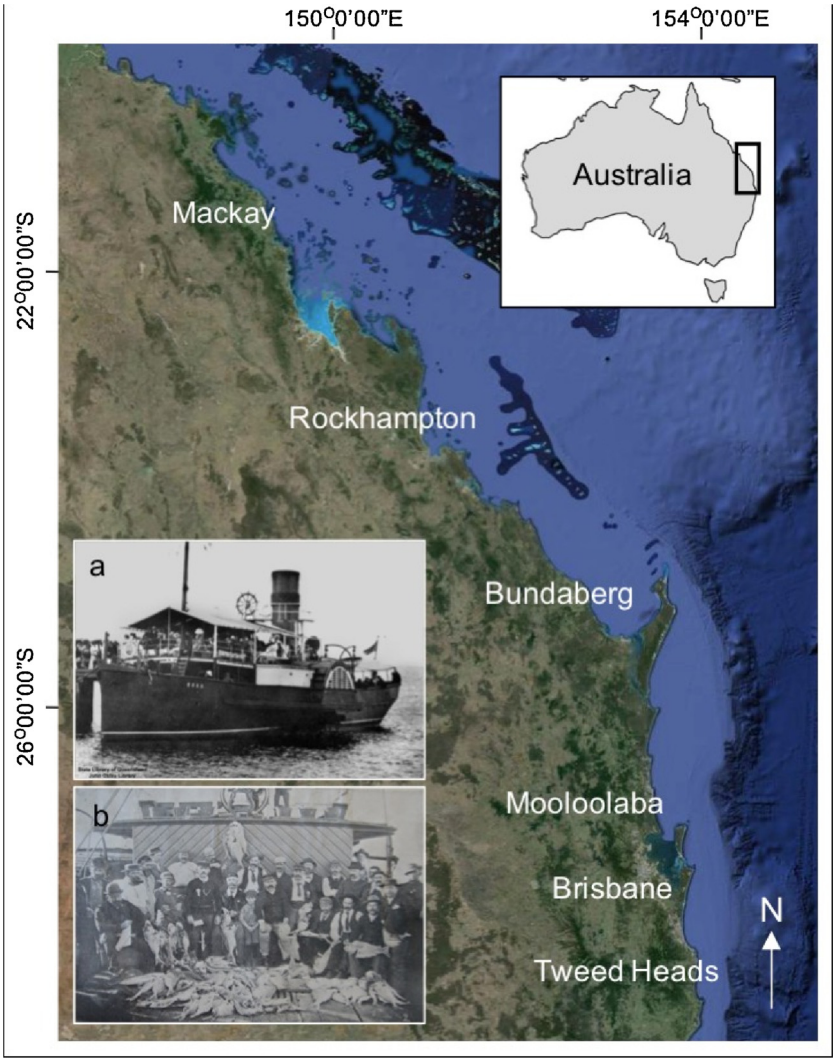

Fig. 1. Map showing the limits of the snapper fishery along the Queensland coast and the major population centres sampled for this study. Insert (a) an early steam boat, s.s. Boko, used for snapper excursions ca. 1890 (State Library of Queensland, 130107), (b) snapper fishers with their catch, extracted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

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

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

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

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