

# Social, economic and environmental effects of closing commercial fisheries to enhance recreational fishing



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## ARTICLE INFO

### Article history:

Received 26 April 2016  
Received in revised form  
9 August 2016  
Accepted 14 August 2016

### Keywords:

Coastal ecosystem  
Catch and release  
*Lates calcarifer*  
*Chrysophrys auratus*  
Property rights  
Spatial marine zoning

## ABSTRACT

Recreational fishing mortality can have a major impact on coastal fish populations, bringing recreational fishers into conflict with commercial fisheries. This article reviews exclusion zones for commercial fishing, or 'recreational fishing areas' as a solution to the conflict between commercial and recreational fisheries. Recently designated recreational fishing areas in the state of Queensland, Australia are examined as a case-study. The goal of recreational fishing areas is to enhance recreational fishing and provide economic opportunities through charter fishing. However, recently designated recreational fishing areas in Queensland have not been thoroughly assessed for their social, economic and environmental impacts and they are not integrated within existing management frameworks for fisheries. The designation of recreational fishing areas is thus a shift away from evidence-based management in Queensland's fisheries and has likely occurred solely for political reasons – there are more voters in the recreational fishery than commercial fishery. In Queensland, excluding commercial fishing on its own is unlikely to result in long-term benefits to recreational fisheries because recreational harvest is a major component of fish harvest for some key species and there is no legislated limit to recreational harvest. Current political attention on recreational fishing areas provides an opportunity for fisheries managers, politicians, conservation groups and the public to discuss what is needed to manage sustainable coastal fisheries. In particular, recreational fishing areas need to be combined with efforts to enhance stewardship among recreational fishers if they are to be successful in the long-term.

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## 1. Introduction

The approaches used to manage recreational fisheries are decades old and failing to avoid overexploitation of coastal fish populations [1–3]. Many recreational fisheries are managed with limits on the size of fish caught, daily bag limits, seasonal closures and spatial closures. These 'input' controls give managers only weak control over recreational fishing mortality and cannot halt the fundamental problem of too many people fishing too often [4]. In contrast to recreational fishery management, the management of commercial fisheries has improved markedly over the last several decades [e.g. 5, 6–8]. The provision of property rights to commercial fishers and co-management where data collection and decision making are shared with fishers have provided a solution to the 'tragedy of the commons' that had plagued resource management for hundreds of years [e.g. 6, 8, 9, 10]. Commercial fishery management has thus seen some recent successes with enhanced profits in some regions [e.g. 11] and the recovery of some depleted fish stocks [e.g. 12].

Recreational and charter fishing (hereafter 'recreational fisheries') play a large role in influencing the productivity of many coastal fish stocks [1,13], bringing recreational fishers into conflict with commercial fisheries [4,14]. Recently in Australia a political solution to the conflict between commercial and recreational fisheries has been to implement spatial closures of commercial fisheries. In the state of Queensland for instance, closures of commercial net fisheries, including fixed mesh nets, drift nets and seine nets, have been implemented in estuaries and bays popular with recreational fishers [15]. Similar closures are also being implemented in other states [16]. The aim of these closures is to benefit recreational fishers with 'more fish, bigger fish' [17], reduce competition between commercial and recreational fishers for access to fishing sites and also grow local economies by improving opportunities for charter fishing [18]. These spatial closures do not affect all commercial fisheries and are targeted at net fishing, which in some areas overlaps in target species with recreational fishing and in other areas is viewed as impinging on recreational users accessing fishing sites. However, in Queensland the state government did not published any assessments of whether planned spatial closures of commercial fisheries would improve recreational harvest or access, or assessments of additional

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environmental and economic impacts. Further, the closures are not integrated within existing spatial zoning plans for the coastal waters of Queensland. It is unlikely that recreational use zones on their own will lead to effective management of coastal resources, because they do not address the problem of open-access within the recreational sector [19].

This article is a critique of recently designated and proposed commercial net fisheries closures in Queensland, and asks whether the closures can improve Queensland's recreational fisheries. Additional effects of closures on coastal ecosystems and society are also examined. The broader goal is to ask whether zoning for recreational use is an adequate strategy for managing coastal fish stocks. There is a trend towards designation of 'recreational fishing areas' in Australia [15,16], so it is important to ask whether they can be an effective management strategy. Here the literature on fisheries closures is assessed to ask whether such closures are a suitable strategy to improve recreational fisheries and what additional effects may be seen by society and ecosystems. It is then suggested that even when recreational fishing areas are appropriate, additional management measures are needed to sustain fish stocks and enhance recreational fisheries. Finally, key questions that should be answered during the assessment of new recreational fishing areas are suggested.

## 2. Will closing commercial net fisheries enhance recreational fisheries?

The goal of commercial net fisheries closures in Queensland is to enhance recreational fisheries by reducing pressure on fish stocks from commercial harvest [18]. In theory, reducing commercial harvest may enhance recreational fisheries in several ways. First, if the fishery is overexploited, population productivity may increase allowing recreational fishers to take more fish. Even if the commercial fishery is managed sustainably, for instance is at its maximum economic yield, closing commercial fisheries can enhance recreational fisheries. Reducing fishing mortality will increase fish abundance, potentially increasing the encounter rate between fishers and fish. Lower fishing mortality may also increase the number of large fish in the population and large fish are often more desirable target for recreational fishers than smaller fish. Finally, there may be access and aesthetic benefits to recreational fishing if commercial fisheries are closed. For instance, recreational and commercial fishers may compete for the same boat ramps, or recreational fishers may view the bycatch of commercial net fisheries as wasteful. However, in some regions lack of commercial boats may be alternatively viewed as an aesthetic loss, for instance fishing port areas can be a tourist attraction.

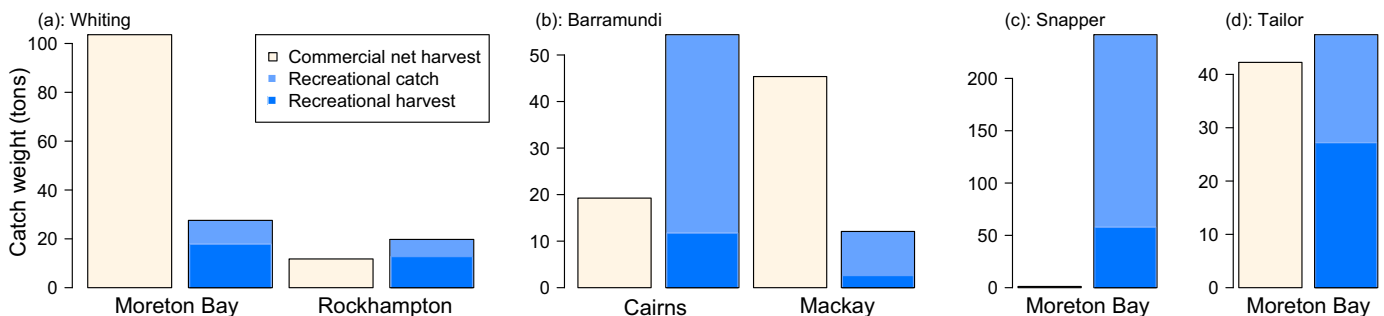
Closing a commercial fishery is only likely to increase recreational harvest if commercial harvest is large relative to recreational harvest, however recreational fishing can be a significant pressure on coastal fish stocks [e.g. 1–3]. In Queensland stock assessments for Tailor found that recreational harvest is ~10 times commercial harvest and there is concern that the current rate of harvest mortality will result in recruitment overfishing [20]. Further an assessment of recreational fishing pressure in 2010 found that across the state of Queensland, recreational harvest exceeded commercial harvest for some key recreational species, including Tailor and Snapper (*Chrysophrys auratus* formerly *Pagrus auratus*), but not for other species including Barramundi (*Lates calcarifer*) and Whiting (*Sillago* spp.) [21].

An analysis of Queensland's commercial and recreational harvest focussing on regions with designated and proposed recreational fishing areas indicates that recreational harvest is a significant contributor to mortality for some popular recreational species (Fig. 1, data from [22]). For instance, the harvested biomasses of Whiting (*Sillago* spp.) in recently designated closed areas off of Rockhampton and a proposed closed area in Moreton Bay are similar between commercial netting and recreational sectors. In Mackay commercial harvest of Barramundi (*Lates calcarifer*) exceeds recreational harvest, but around Cairns recreational catch (including released fish) was almost 3 times commercial harvest by net fisheries. In Moreton Bay, recreational harvest of Snapper (*Chrysophrys auratus*) was an order of magnitude higher than commercial harvest in nets. In Moreton Bay recreational catch of Tailor was similar between commercial and recreational fisheries, but most recreationally caught Tailor were released. Thus, closing commercial fishing may increase stock biomass, but the management of recreational harvest is an equally important concern.

## 3. Steps that should be taken for a complete assessment of recreational fishing areas

The analysis reported here is simplistic and uses only publicly available data. A complete analysis to determine the potential benefits of commercial closures to recreational fisheries should be conducted before their implementation, and should include several further considerations, which are outlined below.

- (1) The effectiveness of recreational fishery areas will depend on catch and release mortality. A large proportion of the recreational fishery in Queensland for Whiting, Barramundi and Snapper is catch and release (78.5% of Barramundi, 76.2% of Snapper 43% of Tailor and 36% of Whiting were released in



**Fig. 1.** Harvest of (a) Whiting (*Sillago* spp.), (b) Barramundi (*Lates calcarifer*), (c) Snapper (*Chrysophrys auratus*) and (d) Tailor (*Pomatomus saltatrix*) by commercial net and recreational fisheries in Queensland for 2010 in areas that have designated or proposed commercial net fisheries closures. Data for commercial harvest are from [22] (2010–11 financial year) and recreational harvest from [21]. Graphs are for 2010 using zones from [21] because data for both sectors was available in this year. Data for recreational harvest were reported as numbers caught, whereas commercial harvest was reported as biomass landed. Therefore, recreational catch was converted to biomass using the estimates of mean fish weight from Taylor, Webley and McInnes [21]. Recreational catch was estimated by multiplying harvest by proportion retained Taylor, Webley and McInnes [21].

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