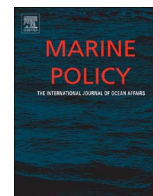




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Exploring recreational fishers' perceptions, attitudes, and support towards a multiple-use marine protected area six years after implementation



Carol L. Martin^{a,*}, Salim Momtaz^a, Alan Jordan^b, Natalie A. Moltschaniwskyj^a

^a School of Environmental & Life Sciences, University of Newcastle, PO Box 127, Ourimbah, NSW 2258, Australia

^b Department of Primary Industries, Port Stephens Fisheries Institute, Locked Bag 1, Nelson Bay, NSW 2315, Australia

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ABSTRACT

This study assessed the acceptance and awareness of an Australian MPA (Port Stephens-Great Lakes Marine Park) post implementation by recreational fishers using the MPA, and identified factors that influenced the perception of this group towards the MPA. Recreational fishers were interviewed in a multiple-use MPA to investigate their perceptions, attitudes, and support towards the MPA six years after implementation. Almost two thirds of recreational fishers supported the MPA and had positive attitudes towards the concept of MPAs. This is a key result since a similar pre-implementation survey of recreational fishers found only 12% would support the creation of PSGLMP due to fears the MPA would negatively impact their fishing activities and ability to catch fish. However, there was a sub-group of fishers who opposed the MPA and were more inclined to have negative attitudes towards the rationale behind MPAs, despite the common perception that no-take zones were for fisheries management purposes and could increase fish stocks in the MPA. More experienced fishers were inclined to oppose the MPA, as well as fishers who believed management zones did not provide clear rules for activities, penalties for non-compliance were too harsh, or that no-take zones did not increase fish stocks. An important perceived threat to the MPA was from commercial fishing due to perceptions of over-exploitation and issues of non-compliance. In contrast, the majority of recreational fishers did not believe the collective actions of recreational fishers negatively impacted the marine environment and fish stocks, or the number of fish available for capture in the future. An improved understanding of these social aspects is important to target ongoing management in order to increase acceptance, success and long-term existence of MPAs.

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1. Introduction

Marine protected areas (MPAs) are a management tool used to both conserve marine biodiversity and habitats, and address adverse impacts of anthropogenic activities by restricting human activities and controlling the distribution of anthropogenic pressure in a specific marine area [30]. Management objectives are usually established through consultation with stakeholders and often reflect societal, political, biological, and ecological ideals. Therefore, as MPAs involve the interaction of environmental, social and economic systems, an integrated management approach that considers all these components is required [14]. Social factors are increasingly recognized as the main determinants of an MPA's success or failure, and understanding these aspects of MPAs has the potential to increase acceptance, success and long-term

existence of MPAs [52,65].

Recreational fishers are a key stakeholder group of MPAs, and their support and compliance with fishing restrictions is paramount to their social acceptance and overall success [54]. Recreational fishing has the potential to directly and indirectly result in impacts on the environmental assets of the area through a range of stressors, including direct harvesting of fish, and disturbance from boats, noise and trampling [12,36]. However, recreational fishers are often unaware of the potential impacts of their activities [23], even though collectively their catch of some fish species can exceed that of commercial fishers resulting in concerns about stock status [12,21,27]. In addition, a high proportion of marine debris is attributed to recreational fishing activity, particularly on reefs [11,60].

There is clear evidence that the recreational fishing experience is often about more than just catching fish; with escape from work and domestic routine, the pleasures of fishing and boating in a natural setting, spending time with family and friends, and socializing with other fishers being important motivations to fish

* Corresponding author.

E-mail address: Carol.Martin@uon.edu.au (C.L. Martin).

[9,56]. Recreational fishers can be divided into groups according to their level of interest and involvement in fishing (i.e. specialization), which is driven primarily by their motivations to fish [7]. As a fisher's level of specialization increases, so too does their dependency on particular resources such as favorite fishing spots, trophy fish or preferred species [7,56]. Highly specialized fishers are more likely to view 'no-take' fishing areas in MPAs as an infringement on their access rights, and while they are often strong opponents to these closures, they support bag and size limits [56,66].

Identifying and monitoring recreational fishers' values, motivations, attitudes, and behaviors towards MPAs post implementation, in addition to their fishing activities and catch, is vital for effective management and long-term success of MPAs [9,34]. This is particularly important as this stakeholder group is most notably impacted by the costs associated with no-take areas in MPAs [10]. Recreational fishers' support or opposition to MPAs depends on perceived costs and benefits incurred by them, and they particularly identify the costs as restrictions that limit where they can fish [56].

Most previous research on MPAs has focused on ecological and conservation aspects, but it is increasingly recognized that social aspects play a key role in the acceptance and success of MPAs [6,10,16,52]. Socio-economic assessments on proposed MPAs are often done pre-implementation to assess likely impacts, acceptance, and support by stakeholders. However, little is known about acceptance and support of MPAs post implementation. Commercial and artisanal fishers have generally been the focus of research on fishers' perceptions, attitudes and support towards MPAs [35,51,62,63]. Since recreational fishers are a key stakeholder group, it is important for management to have information about their perceptions, attitudes and support for MPAs post implementation.

In New South Wales (NSW), Australia, there are six multiple-use MPAs (known as marine parks) incorporating design principles of comprehensiveness, adequacy, and representativeness, which includes 'no-take' areas that make up around 6% of the State's coastal waters. The planning and implementation of these have aimed to balance environmental and socio-economic objectives, but an independent review concluded that inadequate attention is given to the social dimensions of marine parks; especially social impacts [6]. Marine parks primarily aim to conserve marine biodiversity and habitats, and maintain ecological processes whilst simultaneously accommodating the various demands of multiple users in coastal areas, and providing opportunities for public enjoyment [50]. A key component of ecological change that can help meet these aims is through increasing the abundance and size of fish, although the marine parks are not specifically designed to contribute to fisheries objectives [67]. There are several management zones with differing objectives, and include sanctuary (i.e. no-take), habitat protection, general use, and special purpose zones [50]. Only sanctuary zones exclude recreational fishing activities, and hence the focus on recreational fishers' perspectives and attitudes towards MPAs is principally related to these zones.

Recent research on recreational fishers and MPAs has examined compliance with regulations [53,54,59], methods of social assessment in MPA planning [65], and understanding opposition to MPAs [66]. This study aims to contribute to the knowledge and understanding of recreational fishers' values, perceptions, attitudes, levels of support, and factors affecting support of multiple-use MPAs post implementation. It uses a case study of recreational fishers in the Port Stephens-Great Lakes Marine Park (PSGLMP), NSW, Australia, six years after implementation of the zoning scheme. Prior to the implementation of PSGLMP, a survey of recreational fishers conducted between May 2005 and April 2006 found only 12% would support the creation of the marine park

[20]. Opposition was primarily attributed to the perception of adverse effects the MPA would have on their fishing activities (particularly sanctuary zones) and their ability to catch fish [20]. However, more recreational fishers indicated they were prepared to support the creation of PSGLMP if they believed it would reduce damage to marine ecology (28%), and especially if they believed it would increase fish stocks and create a more sustainable fishery (45%) [20]. For the purpose of this study the term "social factors" refers to human factors that may positively or negatively affect support of MPAs, such as knowledge, values, perceptions, attitudes, beliefs, and demographic characteristics.

2. Methods

Port Stephens-Great Lakes Marine Park (PSGLMP) is located in the Hunter Region of NSW, Australia, and was declared in 2005, with zoning schemes implemented in 2007. The marine park extends from the mean high water mark to the 3 n-mile limit of NSW waters, and covers an area of approximately 980 km² of marine and estuarine habitats, including rivers and lakes, with their creeks and tributaries to the limit of tidal influence. This is a multiple-use marine park with the different zones varying in size, management objectives and regulations. Visitors to the marine park do not pay an access fee, but they must hold a NSW recreational fishing licence to participate in fishing activities. This study focused on the Port Stephens area of PSGLMP, which lies within a sheltered tidal influenced estuary with shoreline access at many public and private points, including beaches, jetties, and boat ramps.

Recreational fishers using PSGLMP were surveyed over a five month period: April to August 2013 (austral autumn and winter). Data were collected using anonymous questionnaires administered on site through personal interviews of both boat-based and shore-based fishers at public boat ramps and along the shoreline in the study site. Boat-based fishers were targeted during late morning and late afternoon to coincide with the most common times fishers exited the water. Additional comments made during interviews were recorded to provide further insight. Random sampling was not possible since the purpose of the study was to interview fishers using the marine park. Oral consent was obtained from participants prior to commencing the survey in accordance with human ethics protocols (Protocol No. H-2013-0057). A total of 79 fishers completed the questionnaire and were considered to be representative of recreational fishers since almost three quarters of the interviewees had been fishing recreationally for ≥ 20 years. Small sample sizes are common in this type of qualitative research and more data does not necessarily result in more information [45]. The concept of saturation is widely used in social research to determine qualitative sample size, and when the likelihood of acquiring new information is small then the sample size is considered sufficient [45]. In this study saturation was achieved, in that the last few interviews did not provide new information; indicating that the sample size was appropriate for this study.

A semi-structured questionnaire, comprising both closed and open-ended questions, was developed to collect data on a range of topics (Table 1), and was pilot tested ($n=20$) prior to implementing the study. The questionnaire took approximately 10–15 min to complete and was divided into five sections. Belief statements were developed to include: topics about marine conservation objectives for NSW marine parks (to conserve biodiversity and maintain ecological processes); the theory that sanctuary zones increase fish stocks throughout the region due to the "spillover" effect; assessment of whether different management zones provide clear rules for activities in these areas; and potential

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