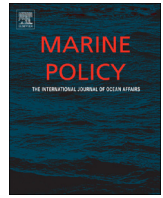




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# Actions speak louder than words: Tournament angling as an avenue to promote best practice for pelagic shark fishing



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## ARTICLE INFO

### Article history:

Received 19 September 2015

Received in revised form

30 November 2015

Accepted 30 November 2015

### Keywords:

Game fishing

Catch and release

Belief

Behaviours

*Isurus oxyrinchus*

## ABSTRACT

Social research can aid in understanding the behaviour of the general public or stakeholders towards natural resources. In the case of recreational fishing, social research aids in integrating anglers' knowledge and attitudes into management frameworks to increase the likelihood of the uptake of new management regulations. Tournament anglers were surveyed at game fishing competitions throughout New South Wales, Victoria, and South Australia between February 2012 and May 2013 to investigate their general beliefs around sharks and their behaviours when targeting pelagic sharks. Over half (55%) of the anglers interviewed practised catch and release of pelagic sharks. Of those, almost all (98%) asserted that they attempt to release sharks in good condition, but a large percentage of anglers (48%) did not use circle hooks that have been shown to increase post-release survival. Results showing some concordance between angler's beliefs and behaviours when targeting pelagic sharks suggest that anglers are cognisant of the functional role of sharks in the ecosystem and would be open to recommendations ensuring the long-term sustainability of recreational fisheries targeting pelagic sharks.

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## 1. Introduction

Recreational fisheries receive relatively little attention as a potential threat to fish populations compared to commercial fisheries, and the role of the recreational sector in driving stock declines remains largely unknown [1,2]. Recreational catches have been estimated to account for  $\approx 12\%$  of total global catches of fish, but recreational catches can also far exceed commercial catches [3,4]. For example, recreational catches from the United States account for 93% of red drum (*Sciaenops ocellatus*) catches in the South Atlantic, and 87% of bocaccio (*Sebastes paucispinus*) from the North-east Pacific [4]. The effect of recreational fishing on fish stocks is difficult to detect due to a lack of quantitative data, however, there is growing evidence that recreational angling can contribute to declines in fish populations, leading to the sustainability of recreational fisheries being increasingly questioned [3–7].

In Australia, estimates of recreational catches range from  $\approx 13\%$  [8,9] to 25% [10] of total catches, with recreational catches exceeding commercial catches of some teleost species, e.g. King George whiting (*Sillaginodes punctatus*), mulloway (*Argyrosomus*

*japonicus*), and snapper (*Pagrus auratus*) [11–13]. The most recent National Recreational and Indigenous Fishing Survey in Australia [8] provides estimates of catches for commonly caught teleost species but provides no species-specific information about sharks and rays.

Pelagic sharks have been identified as a group of particular conservation concern because they are susceptible to high levels of mortality as targeted catch and bycatch in high seas fisheries [14]. Reported declines in the northern hemisphere [15,16] and concerns about the population status of several species of pelagic sharks prompted global assessments of the longfin mako (*Isurus paucus*), shortfin mako (*I. oxyrinchus*), porbeagle (*Lamna nasus*) and of three thresher shark species (*Alopias* spp.) as vulnerable on the International Union for the Conservation of Nature Red-list. Subsequent listings of these species under Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS, of which Australia is a range state) triggered the requirement for legislative protection under the Australian governments Environmental Protection and Biodiversity Conservation (EPBC Act 1999). In addition, the Indian Ocean Tuna Commission (IOTC) passed a resolution to protect all three *Alopias* species in 2010. Following these listings and resolutions the mandatory release of live *Alopias* spp. (IOTC resolution 12/09) and of *I. oxyrinchus*, *I. paucus*, and *L. nasus* (EPBC Act 1999) is required by commercial fisheries within Australian waters. However, the same

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restrictions are not enforced (IOTC resolution 12/09) or have been directly amended (*EPBC Act amendment part 13*) to allow fishing for these species by recreational and tournament anglers.

In Australian waters, the prohibitions and restrictions on retaining these pelagic shark species by commercial fisheries has led to recreational anglers becoming important stakeholders in the management of *I. oxyrinchus*, *I. paucus*, *L. nasus*, and *Alopias* spp. stocks. While tournament anglers only make up a small proportion of recreational anglers in Australia (~5%), they tend to fish more frequently and invest more in vessels and gear than non-tournament anglers, therefore representing a disproportionately high percentage of fishing effort [17,18]. Tournament anglers are likely to account for a large proportion of recreational offshore fishing effort and pelagic shark catch as they are equipped to reach offshore areas and have additional incentives to target sharks through points bonuses and trophies during tournaments [8,19]. Catch and release angling is widely practised at game fishing tournaments in Australia with tagging of pelagic sharks playing an integral part of tournament angling [19]. Best practice methods for catch and release fishing (e.g. the use of circle hooks) are promoted by organisations at all levels (e.g. United Nations Food and Agriculture Organisation, International Game Fishing Association, Australian National Sportsfishing Association and the NSW Department of Primary Industries Game Fish Tagging Programme) although, it is unclear what percentage of anglers adopt these methods [20–23].

Recreational fisheries are inherently complex and management must consider the social and economic benefits of recreational fishing along with the effects that fishers have on both fish populations and the environment [24]. Social research can aid understanding the behaviour of the general public or stakeholders towards natural resources [25]. In the case of recreational fishing, social research aims to integrate angler knowledge and attitudes into the management framework and increase the likelihood of the uptake of new management regulations [24,26,27]. There is a large body of evidence showing that individual's beliefs and attitude towards a behaviour will influence their intentions to perform that behaviour see [28]. Few previous studies have compared angler preferences and behavioural intent with their actual behaviour [29,30]. By better understanding angler's beliefs and how they are linked to their behaviours, researchers are able to inform managers on the most appropriate methods to change angler behaviours [29]. Along with the choice to practice catch and release, the gear (e.g. circle or 'J' hooks) and methods that anglers choose to use when targeting pelagic sharks may also have an effect on the survival of line caught released sharks.

This study aims to investigate the beliefs of tournament anglers around sharks and the behaviours of anglers when targeting pelagic sharks. Specifically, the level of catch and release for pelagic sharks was quantified to gain an insight into anglers' fishing practices. Anglers' reasons behind retaining or releasing sharks was examined to better understand what is required to promote catch and release. This study also aimed to explore links between angler behaviours and their beliefs in relation to the value of catching a shark, the value of the existence of sharks to the ecosystem, and the importance of releasing sharks in a good condition. These aims were addressed by measuring the beliefs and behaviours of tournament anglers through surveys at game fishing tournaments in South Australia, Victoria, and New South Wales throughout 2012 and 2013.

## 2. Methods

Shortfin mako (*I. oxyrinchus*), longfin mako (*I. paucus*), thresher sharks (*Alopias* spp.) and porbeagle (*L. nasus*), henceforth referred

to as 'pelagic sharks', were the primary interest of this research due to global conservation concerns relating to these species. The target population for this study was tournament anglers > 18 years of age who fish in temperate Australian waters. Surveys were undertaken at game fishing tournaments throughout South Australia, Victoria, and New South Wales. A short 5–10 min questionnaire (Appendix 1) was provided to tournament anglers at boat ramps to collect data on anglers catch of pelagic sharks over the previous 12 months, release practices, gear preference, and beliefs about sharks. An interview based questionnaire was used due to their increased effectiveness at generating responses compared to mail surveys [31]. An opportunistic sampling approach was used as the angling population that we aimed to survey has previously been identified to be a minority of the recreational fishing community particularly hard to reach [32].

### 2.1. Questionnaire design

Anglers were asked to provide details about their fishing catch and effort targeting pelagic sharks during the previous 12 months. Respondents that had caught or targeted pelagic sharks were provided with the full survey, while those that had not targeted pelagic sharks were only provided with the belief and demographic questions. We surveyed both anglers who targeted pelagic sharks and anglers that did not target pelagic sharks to allow comparisons between the beliefs of these two groups. The population demographics of tournament anglers was assessed, including; age, gender, and education level.

### 2.2. Dependent variables: Angler behaviours

Respondents were asked questions about their fishing effort (days fished) and catch of pelagic sharks over the previous 12 months. Capture of pelagic sharks is considered to be memorable due to both the rarity and seasonality of these captures and we would therefore expect minimal recall bias and telescoping in estimates over the previous 12 months [33]. Fishers who had fished for, or caught a pelagic shark in the previous 12 months were also asked about the release rate for each species and the reasons for retaining or releasing sharks. We investigated the gear type used by recreational fishers when targeting pelagic sharks by asking them specific questions regarding hook shape and material, and leader material.

### 2.3. Independent variables: Beliefs about sharks

Respondents' beliefs towards sharks were evaluated through questions asking anglers to rate their level of agreement to a series of statements about catching and releasing sharks. These questions pertain to different aspects of beliefs about sharks and were grouped to measure beliefs on three different domains: (1) importance of releasing sharks in a good condition; (2) value of catching sharks; and (3) conservation of sharks. Broad terms such as 'shark' and 'fish' were used in some survey questions (e.g. I prefer to catch fish than sharks) rather than 'elasmobranch' and 'teleost' to be more easily understood by respondents. Anglers responses to the belief questions were originally asked on a five point Likert scale from strongly agree to strongly disagree. To produce discreet analysis, responses were subsequently collapsed into three categories (agree, neutral and disagree). Belief questions in each of the three domains were grouped and the mean calculated to create an index for each domain. Scores with a value over two represent a positive belief with higher mean scores (> 3) indicating strong positive beliefs. Reliability of each question to add to the consistency of each domain was investigated using Cronbach's Alpha.

Binary logistic regression models were used to test the combined effects of anglers beliefs (independent variables: importance of releasing a shark in good condition, personal value of catching a shark, and the existence values of sharks) on the various behaviours of anglers when fishing for pelagic sharks (dependant variables: choice to practice catch and release, and gear preference). Gear specific behaviours were aggregated into binary measures separating anglers who used best practice measures (e.g. circle hooks, non-stainless steel hooks and monofilament leader) and those who did not. For each logistic regression model, the model was simplified by using a backward-stepwise regression procedure that eliminated the non-significant variables. Odds ratios were used as a measure of effect size for each dependant variable and concordance statistics (measures the agreement between two variables) were used to assess the predictive ability of each model.

### 3. Results

#### 3.1. Description of the sample

We surveyed 201 individual tournament anglers, of which the vast majority (95%) were male. Respondents ranged in age from 18 to 74, with most in their thirties (39%) or forties (26%) and the remainder aged under 30 (20%), or 50 and over (19%). Forty-five percent of respondents had completed a trade or apprenticeship, 31% had completed high school or less, and 24% had attained a university degree. There was a fairly even split of respondents from each state, with 37% from South Australia, 32% from New South Wales, and the remaining 31% from Victoria. Comparison of these results with the 2003 national recreational fisheries survey [8] indicates that our sample was biased towards males, but it is likely that this is a reflection of the higher participation rates of males in tournaments [34]. The overall response rate for this survey was 76% which is considered acceptable for a face to face survey [35].

#### 3.2. Catch and effort data

Pelagic sharks were targeted by over half (58%) of the respondents to this survey. These anglers caught pelagic sharks at an average of  $4.45 \pm 5.35$  sharks in the year prior to being surveyed. Tournament anglers caught a total of 459 sharks, of which, 445 (97%) were *I. oxyrinchus* and 14 (3%) were *A. vulpinus*. No anglers reported catching porbeagles (*L. nasus*). Respondents reported releasing 282 (61%) of the captured sharks and tagged 106 (24%) prior to release. This accounts for 39% of the pelagic sharks tagged by tournament anglers in Australia over the period of this study based on a mean of 271 sharks tagged per year between 2011 and 2013 [36,37]. Anglers that had targeted pelagic sharks in the 12 months prior to being surveyed fished an average of 44.8 days per year compared to 34.4 days for anglers who did not target pelagic sharks. Anglers who targeted pelagic sharks spent an average of 11.8 days per year specifically targeting sharks, which accounts for more than the difference between the two groups in total fishing days per year.

#### 3.3. Release or retention of pelagic sharks

Of the anglers that targeted pelagic sharks, 33% released some while 32% released all of the sharks they had caught in the previous 12 months. In total, 70 respondents gave reasons for why they released some or all of the pelagic sharks that they caught. Approximately 30% of these respondents cited size (e.g. “too big” or “too small”) as a reason for releasing pelagic sharks. Tagging,

either for research or for competition points was also cited by approximately 30% of the respondents that gave reasons for releasing sharks. Other reasons for releasing sharks were that anglers had no need to kill sharks (13%), or that they had reached their catch limit (6%).

The majority (68%) of tournament anglers that had caught sharks in the previous 12 months had retained some or all of the pelagic sharks that they had caught. Of these anglers, 51 gave reasons for retaining sharks. The most common reason for retaining sharks (69%) was for consumption, expressed as either “food” or “eating”. Reasons for retaining sharks for tournaments such as “trophy fish” or “capture for competition” accounted for 33% of the reasons cited.

#### 3.4. Gear preference

Of the anglers that responded to gear specific questions ( $n=91$ ), almost half (48%) reported using only J-hooks, while slightly less (36%) used only circle hooks, with the remainder (16%) using a combination of both styles when targeting sharks. Half of the respondents reported using non-stainless steel (i.e. degradable) hooks, with 40% using stainless steel hooks and the remaining 10% using both stainless and non-stainless hooks. The use of non-stainless steel hooks was correlated with the use of circle hooks and the practice of catch and release (Table 1).

#### 3.5. Belief orientations

Anglers' beliefs about the importance of releasing a shark in a good condition, value of catching a shark, existence value of sharks, threats to sharks, and protection of sharks are presented in Table 2. The majority of anglers were of the perception that the numbers of pelagic sharks are stable (55%) or increasing (28%), while only a small proportion considered numbers to be decreasing (17%). Tournament anglers generally had positive beliefs surrounding the value of catching a shark, the importance of releasing a shark in a good condition, and the existence value of sharks. The highest score was recorded for questions about the importance of releasing sharks in good condition (mean scale score=3.69 out of 4), which included the importance of releasing all fish in good condition so that they survive and the willingness of anglers to use tackle and handling practices to ensure this. Anglers had positive responses towards the value of catching a shark (mean scale score=2.78 out of 4). While most anglers did not prefer to catch sharks over fish, the majority targeted sharks when they went fishing (mean scale score=2.55 out of 4), enjoyed the challenge of catching a shark (mean scale score=3.49 out of 4), and believed it added to the enjoyment of their fishing trip (mean scale score=3.46 out of 4). Respondents had positive beliefs towards the existence value of sharks (mean scale score=3.36 out of 4), recognised the importance of having viable shark populations, and that sharks are a sign of a healthy ecosystem. Beliefs were very strong when considering the threats to shark populations with the majority of anglers agreeing that commercial fishing is a threat to shark populations (mean score=3.31 out of 4), but not recreational fishing (mean score=1.1

**Table 1**

Correlation matrix for tournament angler behaviours when fishing for pelagic sharks.

	Hook shape		Hook material		Leader type	
	$\phi$	P	$\phi$	P	$\phi$	P
Catch and release	0.1	0.402	0.275	<b>0.009</b>	0.201	0.071
Hook Shape	x		0.29	<b>0.003</b>	0.045	0.654
Hook Material	x		x		0.232	0.12

**Table 2**

Descriptive statistics and reliability analysis for the variables used to measure the beliefs of tournament anglers about catching, releasing, and the existence value of sharks. Item wording is identical to the survey. Items were measured on a five-point scale with responses ranging from (0) strongly disagree to (4) strongly agree.

Belief dimensions and items	Mean Score	SD	Item-total correlation	$\alpha$ if item deleted
<b>Importance of releasing a shark in a good condition (<math>\alpha=0.732</math>)</b>	<b>3.69</b>			
I would be willing to use tackle and special handling practices that minimise damage to released sharks	3.55	0.703	0.615	0.603
I like to ensure that a shark is released in a good condition	3.73	0.517	0.559	0.649
It is important to me that all the fish that I release survive	3.78	0.486	0.546	0.670
<b>Value of catching a shark (<math>\alpha=0.817</math>)</b>	<b>2.78</b>			
Catching a shark adds to the enjoyment of my fishing trip	3.46	0.798	0.656	0.768
I prefer to catch fish than sharks <sup>a</sup>	1.61	1.087	0.565	0.814
I enjoy the challenge of catching a shark	3.49	0.701	0.724	0.755
I target sharks when I go fishing	2.55	1.125	0.705	0.742
<b>Existence value of sharks (<math>\alpha=0.624</math>)</b>	<b>3.36</b>			
It is important to have viable populations of sharks	3.23	0.786	0.491	0.447
It would be better if there were fewer sharks in the sea <sup>a</sup>	3.43	0.809	0.482	0.459
Sharks are a good sign of a healthy marine ecosystem	3.44	0.706	0.343	0.646
<b>Individual items</b>				
Sharks are good to eat	2.81	1.048		
More regulations are required for recreational fishing for sharks	1.48	1.163		
Commercial fishing is a threat to shark populations	3.31	0.846		
Recreational fishing is a threat to shark populations	1.10	0.954		
Sharks need to be protected	1.61	1.185		
Sharks should be conserved as they have a right to exist	2.99	0.932		

<sup>a</sup> Item reverse coded for calculation of overall dimension score.

out of 4). Most respondents also disagreed with the statements that 'more regulations are required for recreational fishing for sharks' (mean score=1.48 out of 4) or that 'sharks need to be protected' (mean score=1.61 out of 4).

3.6. Belief orientations and behaviour

Logistic regression models revealed that anglers that placed a higher value on catching sharks were more likely to fish for pelagic sharks (Table 3). Tournament anglers' decision to practice catch and release of pelagic sharks was influenced by positive beliefs around existence value of sharks, while the question of whether more regulations were required for fishing of sharks was also included in the model (Table 3).

Anglers were more likely to use circle hooks if they placed greater value on catching sharks and had more positive beliefs around the protection of sharks (Table 3). The importance of releasing a shark in good condition was also included in the hook shape model (Table 3). Beliefs around existence value of sharks as well as the belief that sharks need to be protected led to an increased use of monofilament leader (Table 3). Model concordance

statistics show that the predictive accuracy of the models was quite high for catch and release, hook shape, and leader material, while the model related to the targeting of pelagic sharks was weaker (Table 3).

4. Discussion

Levels of fishing effort by tournament anglers in this survey (44.5 days/year) are much higher than the reported national average of 6.13 days/year for recreational fishers [8]. This is consistent with previous studies, which have found that tournament anglers spend more time fishing than non-tournament anglers [18,38]. Because fishing is more central to the lives of tournament anglers, as indicated by their greater frequency of fishing, it is reasonable to expect them to be better informed, more politically organised and active, and generally more supportive of management rules and programmes [39]. The sex bias represented in our sample (95% male) when compared to the national average (68% male) reported by [8] is similar to bias reported between tournament and non-tournament black bass anglers [18] and saltwater

**Table 3**

Binary logistic regression analysis testing the effect of tournament angler beliefs about catching, releasing and the existence value of sharks on their behaviours when fishing for pelagic sharks.

Model	Parameter	df	Estimate	SE	$\chi^2$	p	Odds ratio
Target pelagic sharks	Value of catching a shark	1	-.521	0.198	6.895	0.009	0.594
	Constant	1	1.447	0.467	9.599	0.002	4.249
	Model $\chi^2=7.255$ , $df=1$ , $p=0.007$ Concordance 57%, $n=201$ (target pelagic sharks=84, do not target pelagic sharks=112)						
Catch and release	Existence value of sharks	1	-1.319	0.448	7.291	0.007	0.268
	More regulations are required for the fishing of sharks <sup>a</sup>	1	-0.505	0.271	3.491	0.062	0.603
	Constant	1	5.132	1.459	12.362	0.00	169.281
Model $\chi^2=13.784$ , $df=3$ , $p=0.003$ Concordance 77%, $n=84$ (retain all=22, release all or some=62)							
Hook shape	Sharks need to be protected <sup>a</sup>	1	0.478	0.201	5.675	0.017	1.614
	Value of catching a shark	1	1.243	0.407	9.313	0.002	3.467
	Importance of releasing a shark in good condition	1	-0.841	0.494	2.897	0.089	0.431
Model $\chi^2=12.961$ , $df=3$ , $p=0.005$ Concordance 65%, $n=95$ (Circle=40, J-hook=55)							
Leader material	Existence value of sharks	1	-1.055	0.477	4.885	0.027	0.348
	Sharks need to be protected <sup>a</sup>	1	-0.403	0.183	4.861	0.027	0.668
	Constant	1	1.773	1.040	2.908	0.088	5.887
Model $\chi^2=9.061$ , $df=2$ , $p=0.011$ Concordance 76%, $n=106$ (Wire=86, Monofilament=26)							

<sup>a</sup> Item reverse coded for calculation of overall dimension score.

anglers [40] in Texas.

The catch of pelagic sharks reported by anglers in this study was dominated by *I. oxyrinchus*, with a small number of *A. vulpinus* accounting for the remaining of the catch. The number of *I. oxyrinchus* that anglers reported tagging in this study represents 39% of those tagged by tournament anglers nationwide during this period [36,37]. Based on these numbers, the total annual catch by tournament anglers is likely to be more than double the 445 caught by respondents to this survey, with approximately 60% of these sharks being released. In comparison, annual recreational catches of *I. oxyrinchus* are estimated to be in the order of 1200–1500 individuals and therefore, tournament anglers should be considered as a key stakeholder in the management and conservation of this species [41]. Pelagic sharks have been identified as particularly vulnerable to exploitation and the cumulative effects of commercial exploitation and recreational catch requires further investigation [14].

This study found some concordance between general beliefs about sharks and anglers specific behaviours. Unsurprisingly, anglers that placed a high value on catching a shark were more likely to target pelagic sharks and were more likely to use circle hooks. Anglers that valued the existence of sharks and the held the belief that sharks need to be protected also had higher usage of gear types that are recommended for the catch and release of sharks. However, almost all anglers had very strong beliefs around the value of releasing a shark in a good condition, and we would therefore expect higher rates of use of gear that is recommended to increase the chance of survival of sharks post release than we recorded in this study [38,42].

Catch and release of pelagic sharks was common in this study with over half of the respondents releasing some or all of the sharks that they had caught. The release rate recorded for sharks in this study (61%) is lower than the release rates (82% and 96% respectively) reported for sharks and rays by recreational anglers nationally and within the Great Barrier Reef Marine Park [8,43]. Reasons for releasing sharks are also very different between anglers in the GBRMP, who released sharks because they believed that they were inedible, whereas most anglers in this study released pelagic sharks for competition or because they were either too big or too small. The differences in motivations to release sharks between these two studies can be explained by the fact that the majority of sharks caught by anglers in the GBRMP are incidental captures while pelagic sharks are more commonly caught through targeted fishing. In addition, pelagic sharks are considered more edible than many sharks and ray species captured in the GBRMP. This is confirmed by the prevalence of anglers in this study that retained sharks for consumption and the strength of anglers' beliefs that they would rather catch sharks than other fish and that sharks are good to eat. Considering the varied motivations for targeting and releasing sharks throughout Australia, future fisheries management research should incorporate human dimensions to comprehensively understand the threats posed to sharks by anglers.

Game fishing tournaments in Australia award prizes for both capture, where the fish is retained, and for tagging (catch and release), which is highly encouraged at many tournaments [19]. Previous research on saltwater anglers [40] and black bass tournament anglers in Texas [18] has shown a preference for the promotion of catch and release in tournaments. Competition points and records were cited as reasons for both releasing (30%) and retaining (33%) by tournament anglers in this study. Tagging for competition ranked as the equal most important reason given for releasing sharks, while retaining sharks for competition ranked second, only behind consumption (69%), as a reason for retaining pelagic sharks. The high rankings of competition-based responses emphasise the importance of the structure of tournaments to the

catch and release behaviour of anglers and the potential for tournament organisers to promote catch and release by tournament anglers.

Relationships between anglers' beliefs and behaviours when targeting pelagic sharks provided an insight into the driving factors behind these behaviours. We acknowledge that there are limitations in the analysis of the effect of beliefs on behaviours in the current study. Firstly, respondents' held generally positive views towards sharks making the test performed in this study a comparison of anglers who held positive views with those who held very positive beliefs about sharks. Our survey also asked questions that ascertained anglers' general beliefs around sharks, but not their attitudes towards specific behaviours. To better understand the correlation between belief and behaviour, future research should measure beliefs that are specific to that catch and release behaviour of tournament anglers [44,45], [38,42]. Anglers response to belief statements may have been influenced by a desirability bias, where respondents answer inaccurately to represent themselves in the most socially correct or acceptable way [46]. This bias could explain some of the disparity between the beliefs and behaviours that we recorded, however, we would expect this bias to also effect anglers' responses to behaviour questions. Future research could use indirect questioning methods to investigate this further [47]. Finally, when considering the behaviours of tournament anglers we must also consider what effect perceived social norms will have on these behaviours [48]. For example, anglers may believe that the use of J-style hooks is widely accepted when targeting pelagic sharks and this may be influencing their hook choice despite a desire to release sharks in a good condition. Increases in the practice of catch and release and use of best practice may have a broader influence on the behaviours of tournament angler and the general recreational fishing population through changes to the perceived social norms around these behaviours. Game fishing clubs currently play a role in educating anglers, encouraging catch and release, and improve angling practices through promotion of best practice.

## 5. Conclusions

The results of this study indicate that an increase in advocacy for the existence of sharks should lead to higher rates of catch and release. Anglers that place greater value on catching sharks are more likely to target pelagic sharks but also have higher use of best practice methods. Increased emphasis on tagging competitions at tournaments and promotion of catch and release and associated best practices should improve the sustainability of tournament angling in relation to pelagic shark populations. The lack of relationship between tournament anglers' desires to release sharks in a good condition and the use of best practice requires further investigation. The positive attitudes towards sharks recorded by this study show that the tournament anglers will be accepting of measures that improve management of these species. Subsequent changes to the behaviours of tournament anglers may also have a broader influence on the behaviours of recreational anglers when targeting pelagic sharks and through changing perceived social norms.

## Acknowledgements

Social and behavioural research ethics for this project was approved by the Flinders University Social and Behavioural Ethics Committee (Approval no. 5398). Funding was provided by Save Our Seas Foundation and the Humane Society International and

administered through Flinders University. We thank the organisers and participants of the various game fishing tournaments for their assistance and support.

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