

Behavioural and economic drivers influencing shark fishing practices in Queensland's commercial net fisheries

Phone questionnaire for Queensland Net Fishers

2018



Image: Commercial net fisher removing a meshed Hammerhead shark. Photo courtesy of Queensland Fishery Observer Program.

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Summary

The Sustainable Fisheries Strategy (SFS) shark monitoring program was tasked with informing on the retained and non-retained catch of shark in Queensland net fisheries. The non-retained, discarded or unwanted shark catch is defined here as the component of the catch discharged overboard, either live or dead (Rochet & Trenkel 2005). In addition to quantifying the scale, composition and variability of the discarded shark catch, the project identified that fishers' behaviours and attitudes on shark fishing and discarding also needed to be examined. A telephone survey was conducted to understand the relative importance of the reasons that fishers retain or discard sharks within Queensland's commercial net fisheries.

The phone survey interviewed 121 commercial net fishers (14 of which were part of a pilot survey) currently operating in Queensland waters (Gulf of Carpentaria and east coast). The survey concerned all species of shark (not rays) and involved fishers spanning the breadth of net fishery operations. While many net fishers interact with sharks, results indicated that a minority (29%) of fishers catch a lot of shark. When shark is retained, 80% of fishers said the market is the reason for keeping shark with 28% of fishers saying sharks are important to their business. Results suggest that shark discarding is common practice in Queensland's net fisheries with 76% of fishers responding that they discard a lot or all of the sharks that they catch. 41% of net fishers said that they discard more sharks now than they did in the past. Over 50% of net fishers cited new prior reporting requirements, which came into effect in January 2018, as a reason for discarding sharks. Poor market value for shark product was also commonly cited by net fishers as a reason for discarding shark, particularly in the Gulf of Carpentaria. 84% of fishers agreed that discarding dead sharks is wasteful. 78% of net fishers said that they would like to reduce shark discards but most fishers reported an intention to continue discarding under the current regulatory and reporting requirements.

Policy changes were enacted in January 2018 with the intent to improve the resolution of the retained and non-retained catch of sharks in Queensland's commercial fishing operations. The survey data suggest that shark discarding is currently common practice in Queensland's net fisheries. Moreover, results suggest there may be an increase in the number of sharks being thrown back in reaction to the new policy. Information captured through the survey highlights a potential gap in understanding of the fisher's reporting requirements. Accordingly there is foreseeable benefit in continued communication with fishers about the purpose, importance and methods surrounding prior reporting and the reporting of their retained and non-retained catch. New tools currently being developed under the SFS by Fisheries Queensland (such as a commercial fishing app, Species Identification tools, and vessel tracking) should simplify future reporting requirements. A follow-up survey, conducted after the introduction of these new tools, would be informative.

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1.0 Introduction

The *Queensland Sustainable Fisheries Strategy: 2017–2027* (SFS) sets out the government's fisheries reform agenda, taking into account the public feedback on the Green Paper. Some of the key actions in the SFS include increasing stakeholder engagement, maximising economic benefits and improving species monitoring and research. During the consultation process, stakeholders highlighted their desires for fisheries data to address knowledge-gaps to improve confidence in decision-making. Fisheries data may include ecological, biological, environmental, social and economic information. In Queensland, fisheries data are collected from various sources including commercial fishing logbooks, recreational surveys, biological monitoring of priority species and research.

The interactions between fishers and sharks in Queensland's net fisheries is one knowledge-need that the SFS aims to address (DAF 2017). Sharks are typically slow growing, late to mature and have low fecundity (Last and Stevens, 2009). These traits, which differ among species, mean that some shark species will have lower rates of population growth, making them more susceptible to fishing pressures (Walker et al., 2008). Therefore, it is important to monitor fishery activities that interact with sharks to ensure catches are sustainable.

As part of the SFS, the fishery monitoring team is undertaking a shark monitoring program to inform on the composition of the retained and non-retained (or discarded) shark catch in Queensland net fisheries. The non-retained, discarded or unwanted shark catch is defined here as the component of the catch discharged overboard, either live or dead (Rochet and Trenkel 2005). The monitoring program will improve awareness of the species caught and the size, sex, maturity and fate characteristics of the catch. In addition to quantifying the composition and variability of the retained and non-retained shark catch, it was identified that fishers' behaviours, tactics and attitudes also needed to be examined to understand reasons fishers retain or discard sharks in the Queensland net fishery. Together this information can better inform the status of shark stocks within Queensland's fisheries.

In July 2009, Fisheries Queensland introduced changes to the management of the shark fisheries on the east coast to improve oversight of sharks in Queensland's commercial fishery operations. As part of these changes, an S Symbol was introduced to allow some commercial fishers to target and retain the sharks they catch. Without the S symbol, a commercial fisher was restricted to a possession limit of 10 net-caught or four line-caught sharks. Those net fishers with an S symbol were also not restricted by the maximum legal size limit for sharks. S symbol holders were required to fill out a Shark and Ray Logbook and to prior report their shark catch, but were not required to report the discarded component of the catch.

Despite these changes, data on shark catch in Queensland remained poor, particularly at the species level. Importantly, the quantity and fate of sharks that are discarded remained largely undocumented. The implications of this data paucity for assessing the status of shark stocks were raised in the 2015 stock assessment of whaler and hammerhead sharks in Queensland (Leigh, 2015). The assessment recommended that data quality, both of retained catch and discards, be improved to increase the robustness and reliability of model outputs.

In addition, poor resolution of species-level data for hammerhead sharks has been raised in several recent assessments. This includes an analysis by the federal government on the data available for Australia's hammerhead catch, which forms parts of the response to the listing of scalloped, great and smooth hammerheads on Appendix II of CITES (Australian Government, 2017). This analysis recommended that state jurisdictions collect species-specific data to improve the certainty of hammerhead harvest levels (Australian Government, 2017). In the three years prior to this analysis, Queensland represented 95% (by volume) of Australia's 'unspecified' hammerhead catch (i.e. not species level). Moreover, the status of these hammerhead species are currently subject to assessment under the federal *Environment Protection and Biodiversity Protection Act 1999* (EPBC Act). The EPBC Threatened Species Scientific Committee in their Listing Advice recommended scalloped hammerhead be listed as conservation dependent under the EPBC Act, on the basis that management sufficiently halts population declines and supports recovery (Threatened Species Scientific Committee, 2018). Specific management measures were stipulated for Queensland's fisheries and the status is to be reviewed upon new data becoming available on the effectiveness of management and policy changes.

In January 2018, Fisheries Queensland instigated new logbook and reporting requirements for all fishers catching sharks to address the identified knowledge-needs. All retained shark catch must now be reported in the logbooks to species level (or species complex, where specified) and all discarded shark catch must be reported by hammerhead species or 'other shark'. In addition, all shark catch must be reported on a prior notice through the Automated Integrated Voice Response (AIVR) phone reporting system and lodged on an unload notice. If sharks are caught, the number of sharks caught is reported using the AIVR prior to landing. In addition, fishers holding an S symbol are required to wait at inspection points for possible inspection by compliance officers from QBFP. However, if an S symbol is not written on the authority, the fisher does not need to wait at the landing place after the Prior Notice has been given.

While these policy changes may improve the resolution of shark data, they may also incentivise discarding because of the reporting process and restrictions applied to non S symbol holders. Nonetheless, there are likely to be several factors that influence discarding in Queensland's fisheries. Accordingly, there is a need to identify the reasons why fishers do and do not retain sharks in Queensland's commercial net fisheries.

Globally, discarding in commercial fisheries has received considerable attention and many studies have attempted to quantify discards, typically via observer programs. Several studies have sought to define the reasons for the practice (Catchpole et al., 2005a; b; Feekings et al., 2012; Catchpole et al., 2014; Eliassen et al., 2014; Morandau et al., 2014; Tsagarakis et al., 2014; Damalas et al., 2015; Christou et al., 2017).

Although the reasons for discarding differ among fisheries, they generally concern the following:

- regulations
- market
- vessel capacity
- environmental conditions
- community and social norms.

Regulations refers to the mechanisms by which catch is (or is not) restricted by the state, e.g. quotas, quota transfers, minimum or maximum landing sizes, gear restrictions, effort restrictions, and likelihood of enforcement.

Market refers to the economic value of the product e.g. low or no existing market for the species, too small for market, low market price, high-grading, and the physical condition of specimens.

Vessel capacity refers to the physical and operational dimensions of the fishing vessel e.g. size, engine power, gear selectivity (including big bag syndrome), vessel carrying or processing capacity, and crew number.

Environmental conditions refers to any environmental factor that affects the stocks being fished e.g. availability of target species in a given area or region, influence of weather, season, and depth fished.

Community and social norms refers to the attitudes about discarding held by the fishing community and other relevant actors e.g. whether discarding is economically wasteful, or ecologically damaging.

In light of the above, the aim of this survey was to examine the relative importance of the reasons that fishers retain or discard sharks in Queensland's commercial net fisheries.

2.0 Methods

2.1 Data collection

Survey participants were active (i.e. reported catch in the last 2 years) commercial net fishers of the East Coast Inshore Finfish Fishery (ECIFFF) and the Gulf of Carpentaria Inshore Finfish Fishery (GOCIFFF). The ECIFFF is a multi-species, multi-gear fishery that covers all tidal waters of the east coast out to the Queensland east coast offshore constitutional settlement boundary, between the northern tip of Cape York Peninsula and the Queensland – New South Wales border. The species targeted include sea mullet, sharks, whiting, bream, flathead, tailor, school mackerel, grey mackerel, threadfins and barramundi. The GOCIFFF extends from the Queensland-Northern Territory border to the northern tip of Cape York Peninsula. The target species include barramundi, threadfins, sharks and grey mackerel.

Symbols represented in the sample were N1, N2, N3, N4, N10, N11, N13, K1, K2, K3, K4, K5, K6, K7, L8 and S. This included fishers that did not hold an S symbol.

Prior to data collection, fishers were sent an information pack about the survey containing a letter (Appendix 6.1), Frequently asked questions (Appendix 6.2) and a shark monitoring factsheet (Appendix 6.3). Fishers were also sent SMS reminders about the survey.

Data collection was undertaken by fishery monitoring staff. Fishers were recruited into the survey by telephone with up to 5 attempts made to contact fishers. Interviews were conducted via telephone, taking between 10 and 45 minutes to complete. Data were recorded into an online template using the Qualtrics platform.

2.2 Survey design

The survey was structured in three parts. Firstly, a series of open-ended questions were included to discern the reasons why fishers decide to discard or retain their shark catch. These questions were:

“What are the main reasons why you may decide to throw back a shark, whether dead or alive?”

“Would you say that you throw back more or less sharks than you did in the past and why? And how about the reasons why you may decide to keep a shark? If it were an option for you, would you keep more sharks?”

“What would you like to see in relation to shark fishing management?”

In the second part, fishers were asked multiple-choice questions about their fishing activities to categorise them by years fished, fishing region, fishing symbols, and vessel, fleet and crew size. Multiple-choice questions were also used to ask fishers if they discard a lot of their catch (all species and sharks specifically), whether they catch a lot of sharks, whether they target sharks, the importance of sharks to their business, the primary method of sharks interaction, and the species they are usually targeting when they interact with sharks.

In the final part of the survey, Likert-scale questions were used to examine discarding behaviour according to the principles given by the Theory of Planned Behaviour (TPB). The TPB is an overarching framework for examining human behaviour. The theory defines a given behaviour (e.g. discarding practices) as a product of

four related constructs: attitudes towards the behaviour, subjective norms, intention to perform the behaviour, and perceived behavioural control (Ajzen and Madden 1986; Ajzen 1991). The TPB has been shown to be robust for predicting human behaviours across many disciplines, including health sciences (e.g. Browne and Chan, 2012), social sciences (e.g. Hamid et al., 2013), and natural resource management (e.g. van Riper et al., 2010). In the case of shark fishing, TPB may be beneficial for understanding why fishers differ in their discarding practices, even where their stated reasons are similar.

See Appendix 6.4 for a full list of the questions included in the survey.

2.3 Pilot survey

In June 2018, a pilot survey was conducted to trial the questionnaire and refine the questions for the final survey (Appendix 6.5). Fourteen fishers partook in the pilot study. These fishers had a history of working closely with Fishery Monitoring staff. The pilot survey included extra open-ended questions for the purpose of gathering as much detail as possible to inform the final questionnaire. Several amendments were made to the survey questions following the pilot survey.

2.4 Data analysis

2.4.1 Reasons for discarding or keeping shark

The reasons for discarding or keeping sharks, and other issues, were coded from open-ended questions. For each reason or issue, fishers were coded as 'yes' or 'no' according to whether or not they mentioned that reason or issue. The salient reasons that emerged from open-ended questions are shown in Table 1.

These reasons were used in subsequent analyses as response variables in binary logistic regressions, which were simplified using backward stepwise regressions. Responses to closed questions from part 2 (fishing activities) of the survey were used as explanatory variables. See Table 2 for a full list of variables used in analyses.

Table 1: Responses coded from open-ended questions. Reasons for discarding or keeping sharks and other issues raised.

Reason for discarding or keeping shark, and other issues raised	Example responses
Logbooks	<i>"Logbook recording is difficult and a waste of time if you're not keeping any sharks. It's restrictive."</i>
Prior reporting	<i>"I used to keep sharks but I don't target them anymore because of the prior reporting." "I throw them all back now." "I would keep more if I could." "There must be a better system for reporting because otherwise all fishers will begin discarding all sharks."</i>
Space on boat	<i>"Space on boat." "Sharks stinking out the esky and ruining other fish being kept is a key reason for throwing them back."</i>

Size of shark	<i>"I keep all sharks that are under 69cm which fits in our box. The market wants the small sharks." "Sharks too big and dangerous to handle is a reason for not keeping shark."</i>
Possession limit	<i>"I would keep more if I could." "I throw back a lot more because of the possession limit. "</i>
Species of Conservation Interest (SOI)	<i>"I keep all sharks. I have a good market for them. I only throw back protected species and sharks that are too big."</i>
Market	<i>"No interest in keeping sharks due to their return." " Not worth targeting considering their prices." "If it is sellable I keep them."</i>
S Symbol	<i>"I would keep more if I could." " There is a market for them but the S symbol is too expensive." "Keep S symbol only because of the early barramundi season where so many are caught that it's a waste to throw them back."</i>
Non-Governmental Organisations (NGOs)	<i>"WWF is 100% responsible for the decline in the market."</i>
Sharks as threatened species	<i>"Labelling sharks as endangered or extinct is ridiculous as there's plenty of them."</i>
Depredation	<i>"Depredation is a very big problem and would like to see something done to stop/change it."</i>
Shark numbers	<i>"Would like to see this survey used to show fisheries that current management is excessive while shark abundance is very high."</i>

2.4.2 Exploratory Factor Analysis

Some questions pertaining to the Theory of Planned Behaviour were reverse-worded in the questionnaire, and the scores of these were reversed prior to analysis. This was done according to the four themes that comprise the TPB, from which the survey questions were designed: social norms (low norms – strong norms), attitude towards discarding (low discard propensity – high discard propensity), perceived behavioural control (low control – high control) and discard intention (low intention – high intention).

To examine the behavioural and attitudinal constructs in the TPB responses, an exploratory factor analysis was performed with varimax rotation, using the *psych* package in R (Revelle, 2017). Data used in the factor analyses were those of fishers for whom there were no missing values for these statements ($n = 63$). Factorability was confirmed by the Kaise-Meyer-Olkin and Bartlett's tests ($KMO = 0.55$, Bartlett's < 0.05).

The factor analysis returned three constructs in the data, which we refer to as *wastefulness*, *norms and intention to discard*, and *desire to reduce discards*.

Wastefulness comprised three statements:

- “*Throwing back dead sharks is a waste of a good product*”
- “*Throwing back live sharks is a waste of a good product*”
- “*I think that throwing back dead sharks can be bad for the marine environment*”

These statements relate to the degree to which fishers believe that throwing back sharks, whether dead or alive, is a wasteful practice.

The statements comprising *norms and intention* were:

- “*Returning sharks to the water is common in commercial fishing*”
- “*It is easy for me and my crew to throw back sharks*”
- “*I think I will have to keep throwing back sharks in the future, whether they are dead or alive*”
- “*Unless something changes, I will probably have to keep throwing back sharks in the future*”

These statements reflect fishers' opinions about the social norms that surround the practice of throwing sharks back to the water.

Desire to reduce discards comprised the statements

- “*At the moment, keeping sharks can be difficult to do*”
- “*If I could, I would reduce the number of sharks I throw back*”

These statements refer to fishers' desires to discard fewer sharks, if it were possible.

Internal consistency of these constructs was tested using Cronbach's alpha (*Wastefulness* $\alpha = 0.48$, *Norms and intention to discard* $\alpha = 0.72$, and *Desire to reduce discards* $\alpha = 0.61$). Given the poor consistency of *wastefulness*, it was not considered as a distinct construct in any further analyses. For the other two

constructs, mean scores were calculated. For those statements that did not load on to any factor, primary scores were used. These statements were:

- *“I think consumers are aware that sharks, dead and alive, are thrown back in commercial fisheries”*
- *“I think many commercial netters throw back some sharks”*
- *“I think that throwing back live sharks can be good for the marine environment”*
- *“I think that keeping some sharks can be good for the marine environment”*
- *“It is fully my choice whether I keep a shark or not”*

Resulting constructs were used in general linear models with responses to closed questions from part 2 (fishing activities) of the survey as explanatory variables. Plots of the responses to the TPB statements were created using the *likert* package in R (Byer, 2016).

2.4.3 Ethics

This survey was conducted in accordance with the principles and values of the National Statement on Ethical Conduct in Human Research 2007 and the Australia Code for the Responsible Conduct of Research. The survey was assessed against these policies following the approved Fishery Monitoring self-assessment process. Data were not identifiable to the individual fisher. Fishers were informed of their rights to refuse to answer any question and to terminate the survey at any time.

Table 2: Variables examined in the survey.

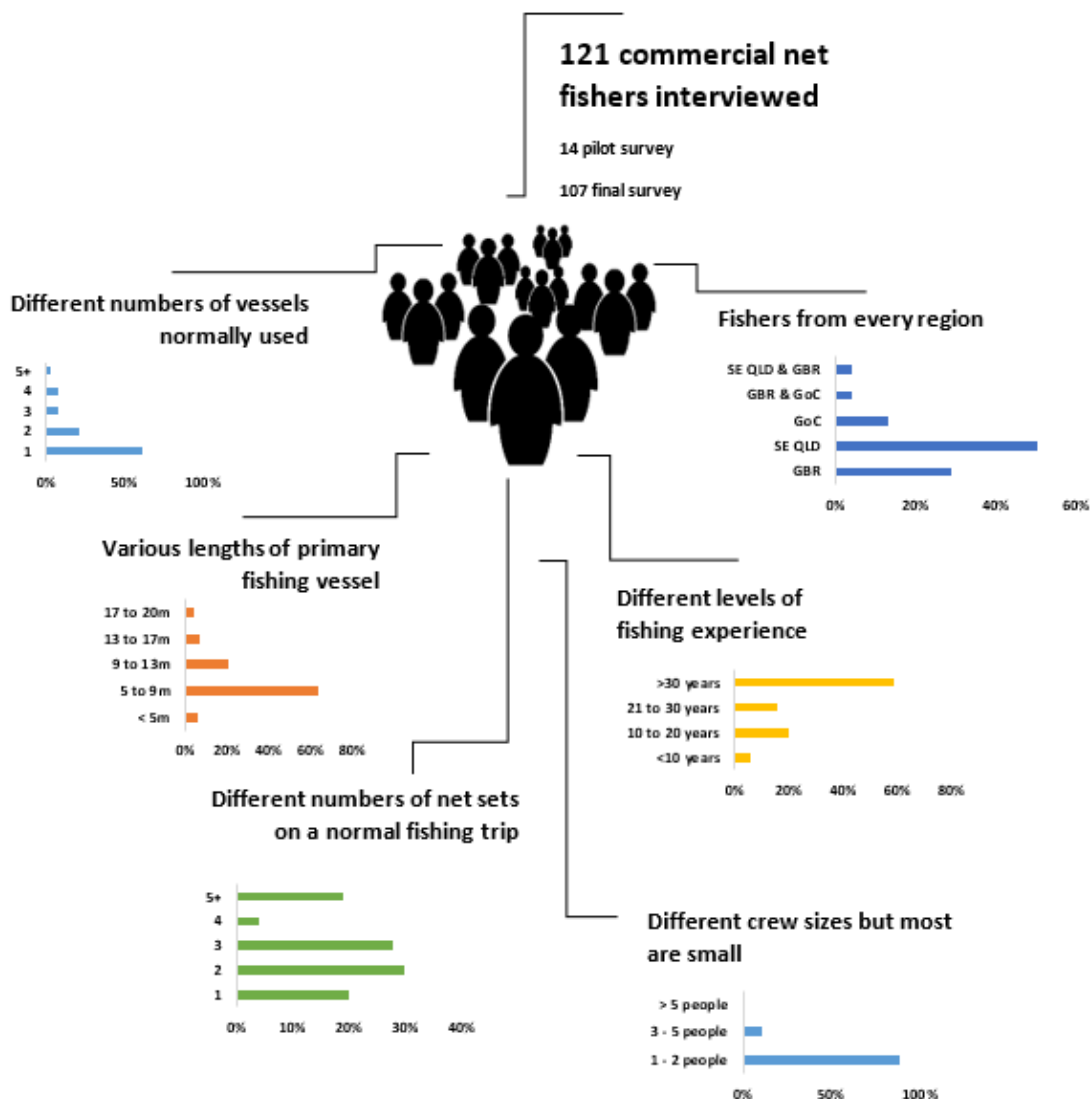
Category	Variable	Type	Levels/value
Fishing activity	Years fished commercially	Categorical	< 10; 10 – 20; 21 – 30; > 30 years
Fishing activity	Region	Categorical	SEQ; GBR; GOC
Fishing activity	Net symbols	Categorical	N1; N2; N3; N4; N10; N11; N12; N13; K1; K2; K3; K4; K5; K6; K7; L8; Unsure
Fishing activity	S symbol	Categorical	Yes; No; Unsure
Fishing activity	Vessel length	Categorical	< 5m (16ft); 5–9m (16-29ft); 9–13m (29-42ft); 13–17m (42-55ft); 17-20m (55-65ft)
Fishing activity	Fleet size	Categorical	1-2; 3-5; More than 5 people
Fishing activity	Crew size	Categorical	< 5; 5 – 10; 11 – 15; 16 – 20; 21 +
Fishing activity	Net sets	Categorical	1; 2; 3; 4; 5 or more
All catch	Throw back a lot of catch	Categorical	Yes; No; Unsure
Shark catch	Throw back a lot of shark	Categorical	Yes; No; Unsure
Shark catch	Catches a lot of shark	Categorical	Yes; No; Unsure
Shark catch	Targets shark	Categorical	Yes; No
Shark catch	Importance to business	Categorical	Yes; No; Unsure
Shark catch	Primary method of shark interaction	Categorical	Ocean beach netting; tunnel netting; bait netting; inshore gillnetting; offshore gillnetting
Shark catch	Which sp. targeted when sharks caught	Categorical	Shark; Other
Shark catch	Keep more sharks now	Categorical	Yes; No
Shark catch	Discard more sharks now	Categorical	Yes; No
Discard reason	Logbooks	Categorical	Yes; No
Discard reason	Prior reporting	Categorical	Yes; No
Discard reason	Space on boat	Categorical	Yes; No
Discard reason	Size of shark	Categorical	Yes; No
Discard reason	Possession limit	Categorical	Yes; No
Discard reason	SOCI	Categorical	Yes; No
Discard reason	Market	Categorical	Yes; No
Discard reason	S Symbol	Categorical	Yes; No
Discard reason	NGOs	Categorical	Yes; No
Keep reason	Market	Categorical	Yes; No
Keep reason	S Symbol	Categorical	Yes; No
Other issues	Depredation	Categorical	Yes; No
Other issues	Sharks not endangered	Categorical	Yes; No
Other issues	Shark numbers	Categorical	Yes; No
TPB	Norms and intention to discard	Ordinal	Mean score
TPB	Desire to reduce discards	Ordinal	Mean score

3.0 Results

3.1 Survey participants

A total of 121 net fishers were interviewed for this study, of which fourteen were part of a pilot survey (see below). Of the fishers in the final survey, 93 were from ECIFFF and fourteen were from GOCIFFF. Most fishers in this survey operated in south-east Queensland (50%), followed by the Great Barrier Reef (29%) and the Gulf of Carpentaria (13%). A small number of fishers operated in multiple regions. Given the small sample sizes, fishers operating in multiple regions were excluded from analyses that involved fishing region. The survey participants represented various fishing activities (Figure 1). 40% of survey participants held an S symbol.

Figure 1: Fishers in this survey represented different levels of fishing activity.



3.2 Shark interactions

28% of fishers in this survey said that sharks are important to their business (Figure 2). 29% said that they catch a lot of shark. Importantly, 76% of fishers said that they discard a lot or all of the sharks that they catch, while only 12% of fishers said that they discard a lot of other (i.e. finfish) species. 23% of fishers said that they believe shark numbers are too high. Most fishers interact with sharks during inshore netting (Figure 3).

Figure 2: Fishers' interactions with sharks.

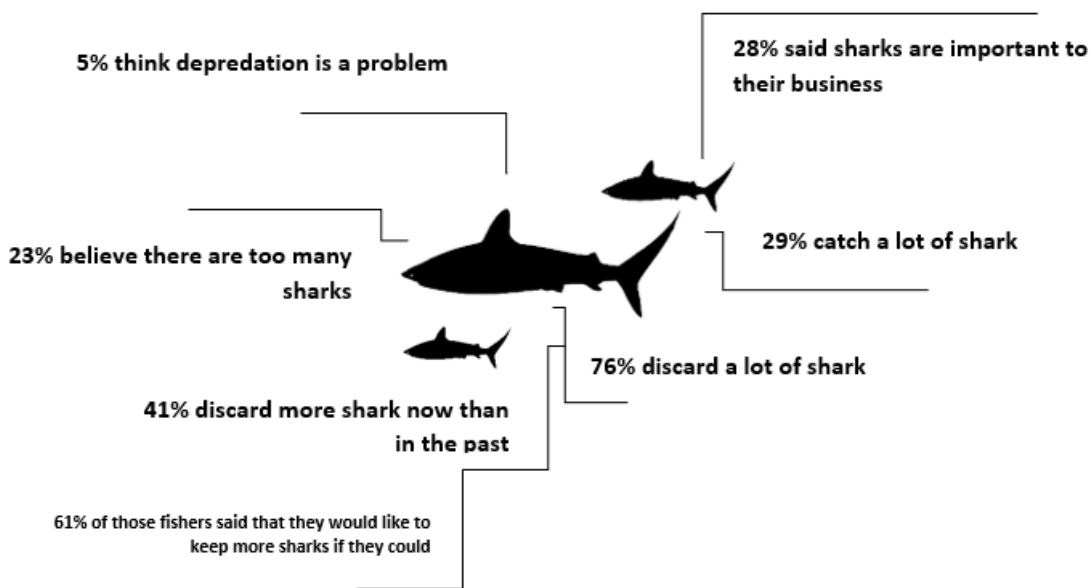
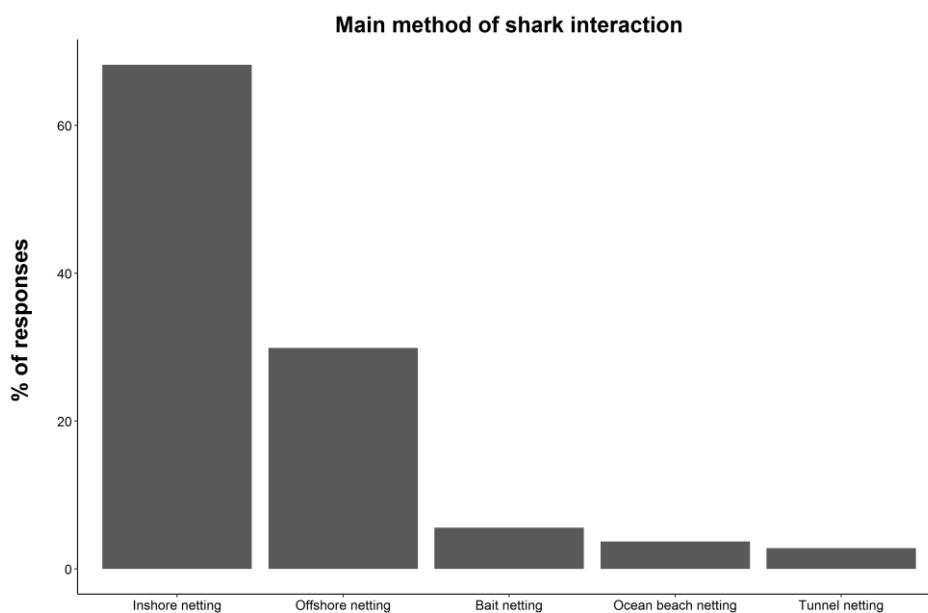


Figure 3: Methods of shark interaction by commercial net fishers.



3.3 Reasons for discarding shark

Overall, more than 50% of survey respondents cited prior reporting as a reason for discarding sharks (Figure 4). Poor market value was the second most common reason cited. Importantly, many fishers who cited the “hassle” of reporting said they would keep more sharks if the market value were higher (Figure 5). This suggest that a combination of regulations and market forces dictate whether net fishers keep or don't keep sharks.

The number of fishers citing prior reporting as a reason to discard was significantly different between fishing regions (Figure 6). Fishers operating in south-east Queensland (n = 54) were proportionately more likely than fishers in other regions to mention prior reporting as a reason to discard. Most fishers operating in the Gulf of Carpentaria (n = 14) did not cite prior reporting as a reason to discard. Instead, the majority of fishers in the Gulf of Carpentaria mentioned market reasons for discarding (Figure 7). Market reasons were also commonly mentioned by fishers operating on the Great Barrier Reef (n = 31). Comparatively, few fishers in south-east Queensland mentioned market reasons for discarding.

Logbooks were cited as a reason to discard by 13% of fishers. Fishers without an S symbol were significantly more likely to mention logbooks as a reason to discard (Figure 8). Moreover, logbooks were not mentioned by any fisher that said sharks are important to their business (n = 30).

When sharks were retained, 80% of fishers said that the market is the reason for keeping shark. A number of fishers reported having a good market for shark products.

Figure 3: Reasons for discarding sharks.

(Note that responses don't total 100% because fishers could have cited a number of reasons)

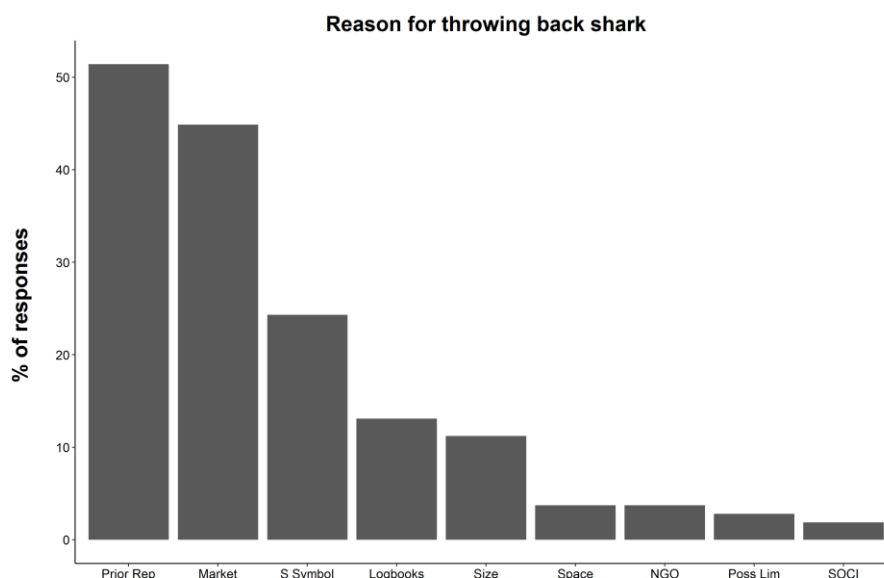


Figure 5: Example salient responses from open-ended questions about prior reporting as a shark discard reason.



Figure 6: Influence of fishing region on citing prior reporting as a discard reason.

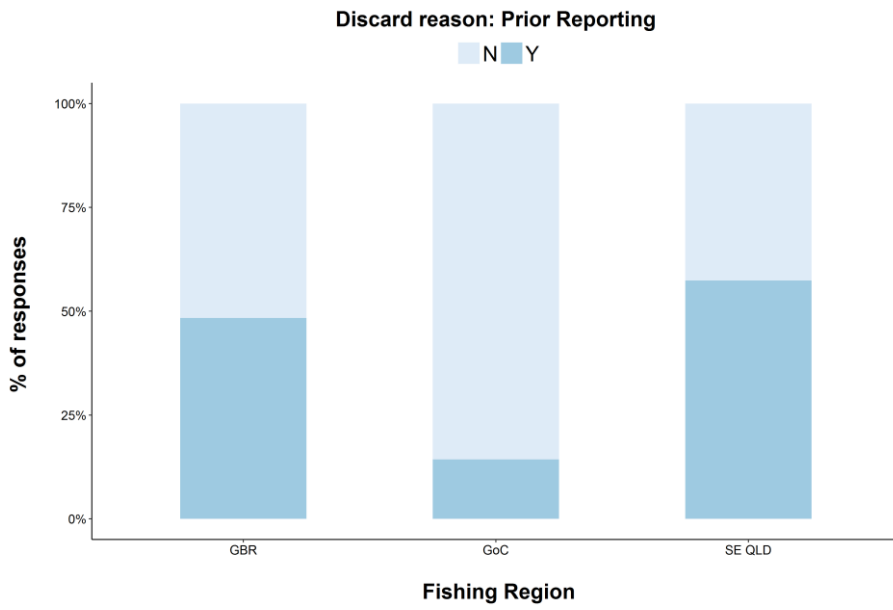


Figure 7: Influence of fishing region on citing the market as a discard reason

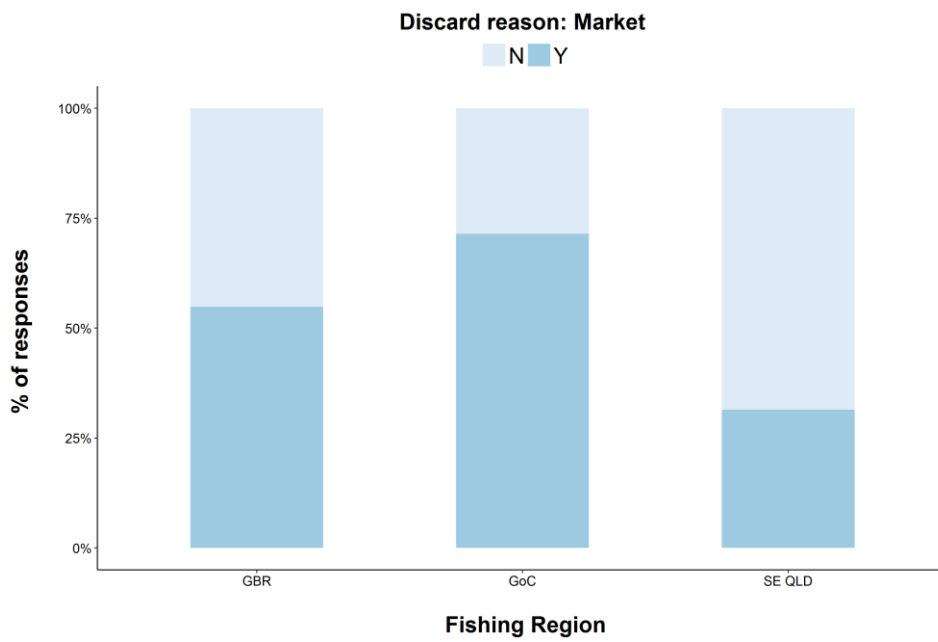
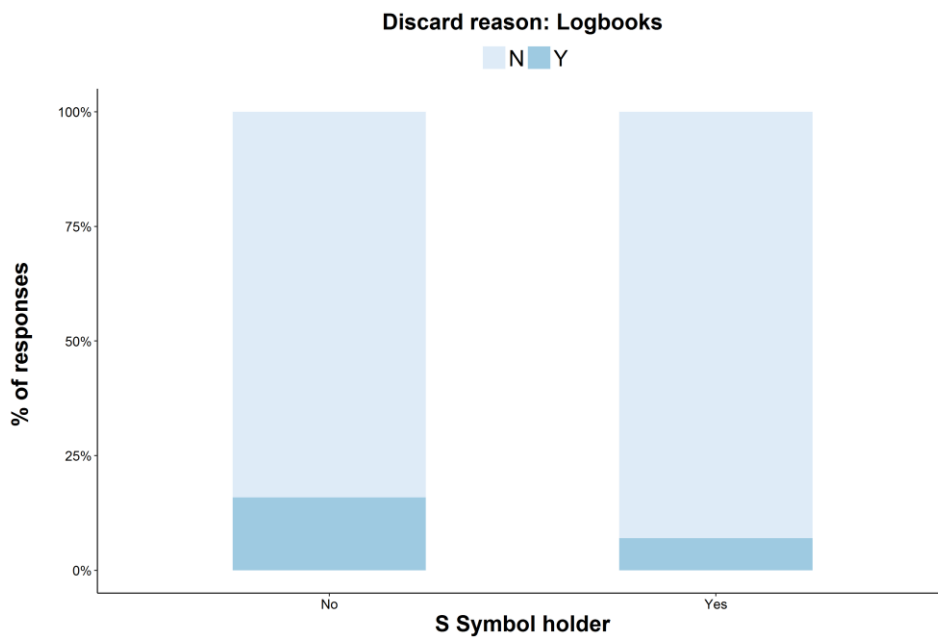


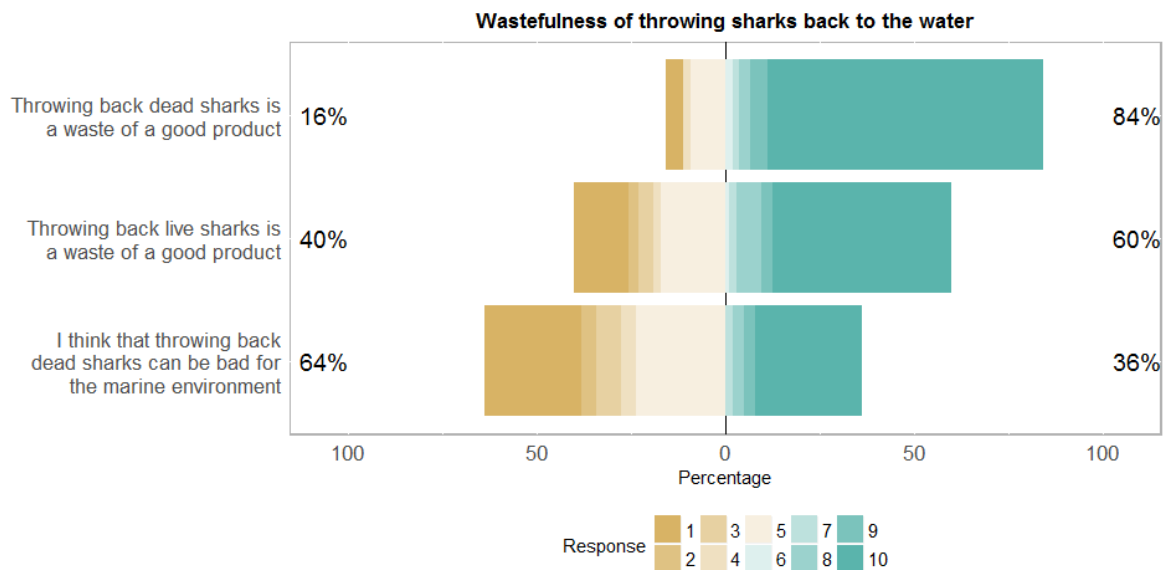
Figure 8: Logbook reporting as a reason for discard by fishers who do and do not hold an S symbol.



3.4 Wastefulness of discarding

Most fishers agreed with TPB statements that related to the wastefulness of discarding sharks (Figure 9). Overall, 84% of fishers agreed that discarding dead sharks is wasteful, and 60% of fishers agreed that discarding live sharks is wasteful. Some fishers indicated they felt particularly strongly about this when the shark being discarded was a marketable product.

Figure 9: Likert-scale responses to statements that formed the Wastefulness construct. Scores range from 1 (strongly disagree) through 10 (strongly agree).



3.5 Desire to reduce discards

78% of fishers indicated a desire to reduce discards, agreeing with the statement “If I could, I would reduce the number of sharks I throw back” (Figure 10). This related to the difficulty of keeping sharks, specifically the statement “At the moment, keeping sharks can be difficult to do” to which 75% of fishers agreed. This suggests that, for some fishers, a desire to reduce discards is not realised in part because of the challenges associated with keeping sharks.

3.6 Social norms and the intention to discard

Most fishers indicated an intention to continue discarding in the future (Figure 11), regardless of their desire to reduce discarding. These intentions were related to the ease of discarding, as well as social norms (63% of fishers agreed that discharging sharks overboard is common in commercial fishing). This means that, for some fishers, discarding is partly influenced by the perception that it is a “normal” part of fishing.

Fishers without an S symbol scored significantly higher for the ‘intention to discard’ paradigm (i.e. greater intentions to discard). Likewise, fishers who do not target sharks scored significantly higher (Figure 12a), as did fishers who said that they discard more shark now than in the past (Figure 12b).

Figure 10: Likert-scale responses to statements that formed the Desire to Reduce Discards construct. Scores range from 1 (strongly disagree) through 10 (strongly agree).

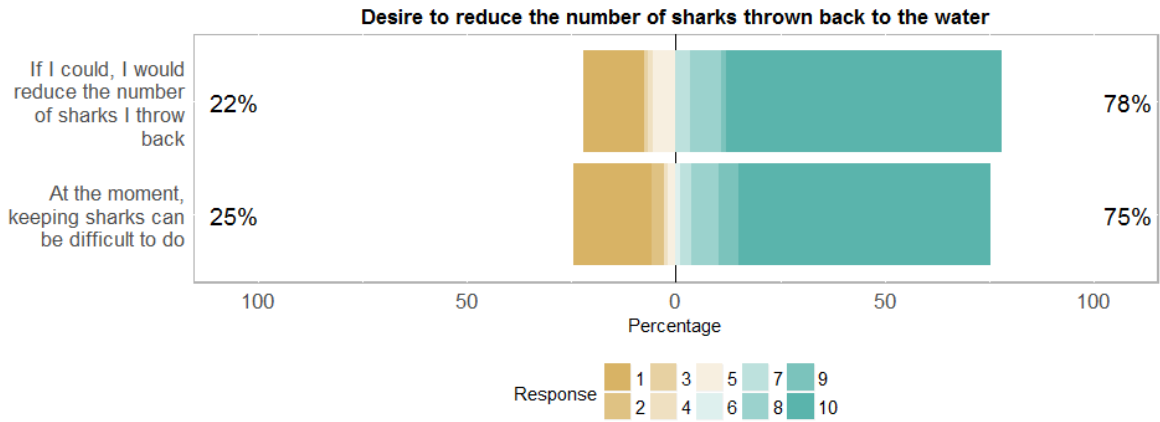


Figure 11: Likert-scale responses to statements that formed the Norms and Intention to Discard construct. Scores range from 1 (strongly disagree) through 10 (strongly agree).

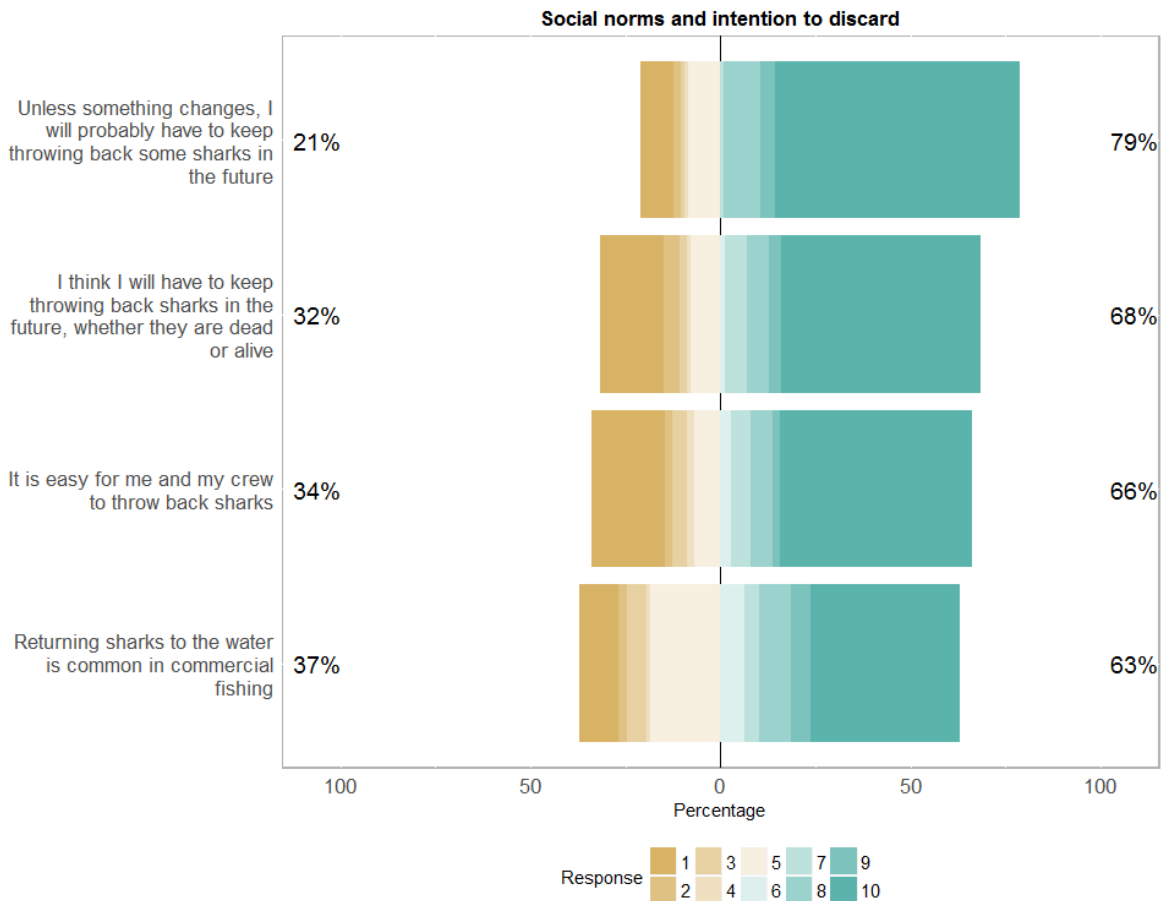
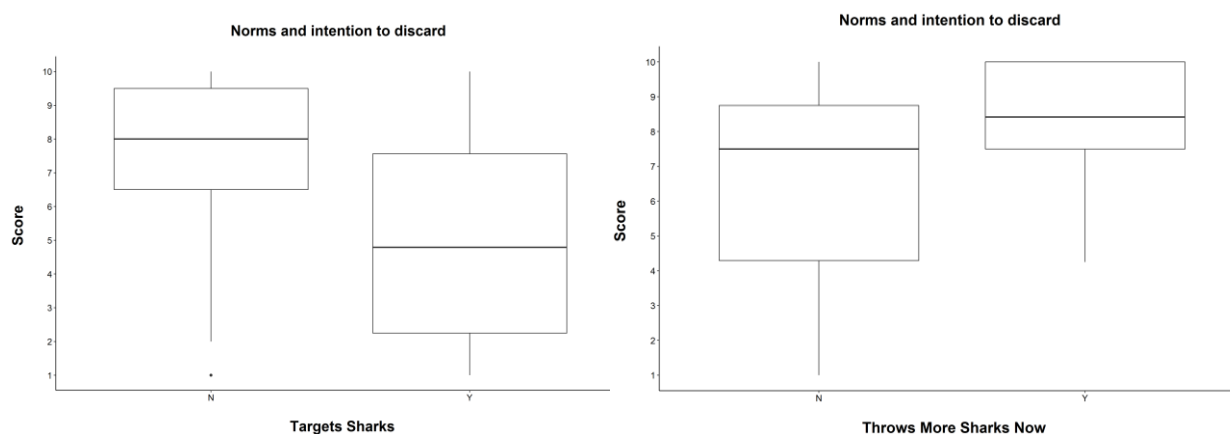


Figure 12a: Likert-scale responses to statements that formed the Norms and Intention to Discard construct. Scores range from 1 (strongly disagree) through 10 (strongly agree).

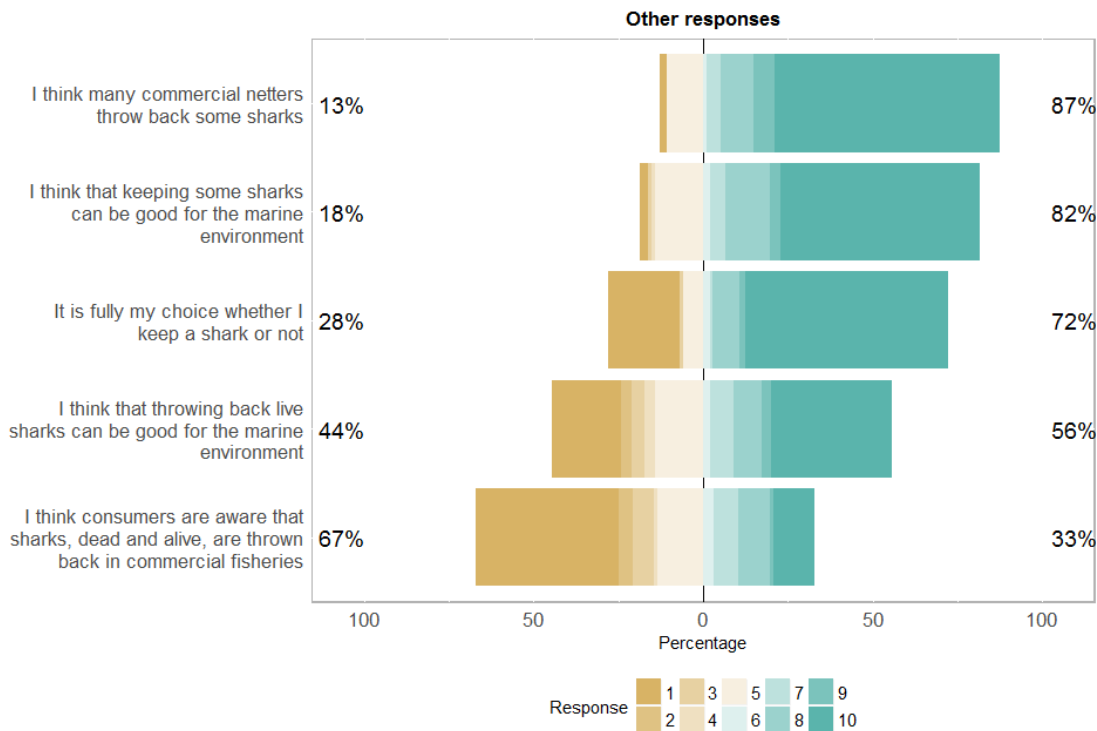
Figure 12:b Scores for Norms and Intention to Discard by fishers who do and do not target sharks, and those who do and do not discard more sharks now than in the past.



3.7 Other responses to the Theory of Planned Behaviour

Most fishers (87%) agreed that many netters discard sharks, and most (67%) disagreed that consumers are aware of sharks being discarded (Fig 13). 82% of fishers agreed that keeping some sharks is good for the marine environment, while only 56% agreed that returning live sharks to the water is good for the marine environment. 72% of fishers indicated that they had full control on whether to keep or discard a shark, despite most fishers indicating that keeping sharks can be difficult (Fig 10).

Figure 13: Likert-scale responses to statements that did not group into a construct. Scores range from 1 (strongly disagree) through 10 (strongly agree).



3.8 Reasons for not participating in the survey

In the pilot survey, of 21 selected fishers, five fishers were ineligible for the survey as they were either not active in the fishery or they did not interact with shark (Table 3). A further two fishers were unable to be contacted. No fishers refused to participate in the pilot survey. In the final survey, 51 fishers were ineligible and nineteen fishers refused to participate. Therefore, participation rates were 100% for the pilot survey and 85% for the final survey. Example reasons for refusal are shown in Table 4.

Table 3: Reasons for non-participation in the pilot and final surveys

Reason for non-participation in survey	Pilot	Final	
		ECIFFF	GOCIFFF
Refused	0	18	1
Ineligible: No shark interaction	3	18	10
Ineligible: Not fishing	2	18	5
Fisher already contacted (pilot, multiple licence fishers)	0	26	11
Leased licence - unable to track	0	26	3
NA (i.e. unknown contact details, processor)	0	3	3
Unsuccessful contact	2	75	25
	7	184	58

Table 4: Example reasons for refusal

Reason for refusal
Too busy.
Only just started net fishing.
Worried about answers being used against them.
Discards sharks because of the hassle of reporting and did not want to do the survey.
Does not want to help with information that can be turned against fisher
Doesn't have much to do with sharks.
Only fishes part time.
Doesn't think the survey will benefit from their input.
Doesn't want to know about what Fishery Monitoring is doing.

4.0 Conclusion

The survey successfully covered the breadth of Queensland net fisheries that interact with sharks. Overall encountered positive engagement and a high participation rate by fishers. The positive relationship between Fishery Monitoring staff and Professional fishers facilitated this survey being undertaken by Fisheries Queensland staff as opposed to an external third party.

While many net fishers interact with sharks, this survey's results indicated that a minority (29%) of fishers catch a lot of shark. When shark is retained, 80% of fishers said the market is the reason for keeping shark with 28% of fishers saying sharks are important to their business. This survey's results indicate that prior reporting and poor market value are the primary reasons for shark discarding by commercial net fishers in Queensland. Other reasons for discarding were mentioned much less often. Some regional differences were evident. Fishers operating in the Gulf of Carpentaria, and to a lesser extent, fishers operating in the Great Barrier Reef cited market reasons proportionately more often, relative to other fishers. Access to viable markets for these operators is likely to be more restricted than for fishers operating in south-east Queensland.

Overall, the results of this survey suggest that the policy changes enacted in January 2018, may have encouraged net fishers to discard more sharks. The results clearly indicate that most fishers intend to continue discarding sharks, because of the perceived regulatory complexity of keeping sharks. 79% of fishers agreed that unless something changes, they will probably keep discarding sharks in the future. This was especially true for fishers who stated that they discard more sharks now than they did in the past. Information captured through the survey highlights a potential gap in understanding of the fisher's reporting requirements, particularly prior reporting, wait times and reporting species and numbers incorrectly. Continued communication with fishers across a variety of media formats about the purpose, importance and methods of prior reporting, and of the reporting of their retained and non-retained catch, could have foreseeable benefit in improving fisher's perceptions and understanding of the new regulatory requirements. As part of the SFS, Fisheries Queensland is currently developing new tools such as a commercial fishing app, shark species Identification tools and vessel tracking, which aim to simplify reporting requirements in the near future. A follow-up survey, conducted after the introduction of these new tools, would be informative.

Overwhelmingly, the results of this survey suggest that fishers believe discarding to be a wasteful practice, especially when sharks are already dead. Notably, 78% of fishers said that they would like to discard fewer

sharks. Mechanisms to address this aspiration through catching less, particularly catching fewer non-marketable shark species, may be identified through dynamic ocean management (DOM) tools (Hazen et al., 2018). These DOM tools have shown promise in reducing fisher interactions with bycatch species, and supporting sustainable fisheries for targeted species in net fisheries (Hazen et al., 2018).

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6.0 Appendix

6.1 Information letter



05/06/2018

Dear Authority Holder

Telephone survey about shark fishing

Fisheries Queensland will soon conduct a telephone survey of Queensland fishers who catch sharks through the course of any net fishing operations. The purpose of this survey is to document the economic and behavioural factors that influence whether sharks are retained or not retained in commercial net fisheries.

We acknowledge that there is substantial interest in the depredation of catch by sharks. Please note that this is a separate research question that will be listed as a research priority in the next Monitoring and Research plan.

The telephone survey relates to the Monitoring and Research Plan objectives of developing and implementing monitoring strategies for shark species in Queensland's net fisheries. It also forms part of Fisheries Queensland's broader objectives to improve our understanding of the social, economic and environmental drivers of Queensland's fisheries. The Monitoring and Research plan can be found online here: (<https://publications.qld.gov.au/dataset/queensland-sustainable-fisheries-strategy/resource/fc7da976-661c-43ba-aaaa-9df8c2cb39d3>). An overview of the shark monitoring strategies is included with this letter.

Any net fisher that interacts with sharks is eligible to participate in the telephone survey. Fisheries Queensland will be approaching a random sample of authority holders to participate in the survey. Authority holders will be telephoned by, or on behalf of, Fisheries Queensland and asked if they want to take part in the survey.

The survey will take 10 - 15 minutes for you to complete. Most questions will be multiple choice. You will also have the opportunity to have your say on sharks and commercial net fishing in Queensland. A Frequently Asked Questions document about the survey is included with this letter.


We greatly appreciate your participation to ensure that the survey obtains data from as many net fishers as possible. However, your participation in the survey is not mandatory and you are free to withdraw from the process at any time.

The survey will document the key reasons why net fishers operating in the ECIFFF or GOCIFFF retain or don't retain sharks they catch. Results from the survey, together with data collected from other monitoring activities, will help ensure management arrangements are appropriate and shark stocks remain sustainably fished.

If you require any further information regarding this matter, or would like to communicate your interest in participating in the survey please contact Fernanda or Lenore on:

- Fernanda de Faria: P 07 3170 5580 E Fernanda.deFaria@daf.qld.gov.au
- Lenore Litherland: P 07 3708 8309 E Lenore.Litherland@daf.qld.gov.au

Yours sincerely,


Malcolm Pearce
Manager, Fishery Monitoring
Fisheries Queensland
Department of Agriculture and Fisheries

Business Centre 13 25 23
Website www.daf.qld.gov.au
ABN 66 934 348 189

6.2 Frequently asked questions

Frequently Asked Questions

2018 Telephone survey about shark fishing

1 Why are we monitoring the shark catch

As part of the Sustainable Fisheries Strategy 2017-2027 (the Strategy), Fisheries Queensland is committed to collecting additional biological information on sharks to address key information gaps. This project relates to the strategies Monitoring and Research Plan objectives of developing and implementing monitoring strategies for shark species in Queensland's net fisheries. The project is necessary to continue the EPBC accreditations for ECIFFF and GOCIFFF, to meet undertakings given to the Commonwealth in relation to the hammerhead shark 'conservation dependent' listing. The project will also provide much needed data to assisting in stock assessments. The key objective of the project is to get a better handle on the species composition of the shark catch (as current data is very coarse) and a better idea of discard rates.

- A copy of the Strategy is available through Fisheries Queensland (Phone 13 25 23) and is available for download at: <https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable-fisheries-strategy>
- A copy of The Monitoring and Research plan is available through Fisheries Queensland (Phone 13 25 23) and is available for download at: (<https://publications.qld.gov.au/dataset/queensland-sustainable-fisheries-strategy/resource/fc7da976-661c-43ba-aaaa-9df8c2cb39d3>).
- A copy of the shark monitoring project factsheet is available through Fisheries Queensland (Phone 13 25 23) and is available online here: <https://www.daf.qld.gov.au/business-priorities/fisheries/monitoring-our-fisheries/commercial-fisheries/species-specific-programs/monitoring-queenslands-commercial-shark-catch>

2 Why is this survey being run?

This survey relates to the Monitoring and Research Plan objectives of developing and implementing monitoring strategies for shark species in Queensland's net fisheries and forms part of Queensland's Sustainable Fisheries Strategy broader objectives to improve our understanding of the social, economic and environmental drivers of Queensland's fisheries.

As part of the Sustainable Fisheries Strategy, Fisheries Queensland has committed to improving monitoring of the shark catch. An important part of this is the non-retained part of the shark catch. We want to improve understanding of the importance of sharks to net fishing operators and understand why a fisher may decide not to keep a shark product. The purpose of this survey is to determine the economic and behavioural factors that influence whether sharks are retained or not retained in commercial net fisheries.

3 Who is conducting this survey?

This survey is being conducted by Fisheries Queensland under the Queensland Sustainable Fisheries Strategy 2017-2027 (the Strategy). You may be telephoned by, or on behalf of, Fisheries Queensland to take part in the survey. A copy of the Strategy is available through Fisheries Queensland (Phone 13 25 23) and is available for download at: <https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable-fisheries-strategy>

4 How do I participate in the survey?

You may be telephoned by, or on behalf of, Fisheries Queensland to take part in the survey. You are also welcome to directly contact either Fernanda or Lenore from the Fishery Monitoring team to communicate your interest in participating.

- Fernanda de Faria E: Fernanda.deFaria@daf.qld.gov.au
- Lenore Litherland P: 07 3708 8309 E: lenore.litherland@daf.qld.gov.au

5 How will you collect the data?

The survey will be done via telephone. However, if you prefer, we can provide a copy of the questions.

6 Does this survey relate to the changes to the shark and ray logbook?

This survey and the changes to the shark and ray logbook are part of the Sustainable Fisheries Strategy. Both of these aim to improve our understanding of sharks in Queensland's fisheries.

7 How long will the survey take?

The survey will take approximately 15 minutes to complete.

8 What kinds of questions will you ask me?

There are three kinds of questions in the survey. Some questions are multiple choice. Other questions ask you to rate your agreement with statements on a scale. There are also a small number of open-ended questions where you can have your say on topics related to the survey.

9 Will my responses be anonymous?

Yes. Your responses will not be identifiable to you personally. Your personal details will not be kept with your data, so your responses will remain anonymous.

10 Do I have to answer every question?

No. You can choose not to answer any question and you can withdraw from the survey at any time.

11 How will the survey's data be used?

The data collected in this survey will be analysed to determine the behavioural and economic factors that influence the retention or non-retention of sharks. This forms part of Queensland's Sustainable Fisheries Strategy broader objectives to improve our understanding of the social, economic and environmental drivers of Queensland's fisheries.

12 Which fishers can be in this survey?

Any commercial net fisher that catches sharks can be part of this survey. This includes fishers who target sharks and fishers who just catch sharks incidentally.

13 I don't target or keep sharks. Can I still be in the survey?

Yes. This survey includes net fishers that don't target sharks. Even if you only catch the occasional shark, and even if you release all of the sharks that you catch, you can be in this survey.

14 Do I need an S symbol to be involved in this survey?

No. Any net fisher that catches shark can be in this survey, even if they don't have an S symbol.

15 Does this survey relate to dead or alive sharks?

Both. When we talk about non-retained, not kept, or released shark, we are referring to any sharks that you return to the water, whether they are dead or alive.

16 Which fishing activity are you interviewing me about?

Most questions are about the netting activity where you most interact with sharks. You will also be asked a small number of questions about your other fishing activities, including those where you don't catch sharks.

17 What about concerns about depredation by sharks?

Concerns regarding the depredation of catch by sharks have been discussed by fishery working groups and were raised in a recent online survey completed by working group members. This research area will be listed in an updated version of the Monitoring and Research Plan as a research priority. This would be a specific project looking at the issues around depredation by sharks and aim to better quantify it.

6.3 Factsheet

Monitoring Queensland's commercial shark catch

Fisheries Queensland monitors the commercial catch of sharks through commercial fishing logbooks and the automated integrated voice response (AIVR) system. These monitoring activities collect essential catch information.

Catch information, together with licencing requirements and management arrangements enable fishers to fish at sustainable levels.

Information gaps continue to provide challenges for the future management of sharks in Queensland's fisheries. For example, more accurate species information would improve the data used to establish the status of fish stocks.

Current catch data has low species resolution and the quantity and fate of shark species being returned to the water remains largely undocumented. Improving this data will assist in more accurately determining the catch of individual shark species.

Biological monitoring

As part of the Sustainable Fisheries Strategy 2017 - 2027, Fisheries Queensland is committed to collecting additional biological information on sharks to address key information gaps.

The fishery monitoring team are undertaking a shark monitoring program to address two broad objectives:

1. Determine the species composition of the retained shark catch.
2. Develop a profile of the non-retained shark catch.

Monitoring activities will focus on net catches in the east coast inshore fin fish fishery (ECIFFF) and the Gulf of Carpentaria inshore fin fish fishery (GOCIFFF).

Shark management

Sharks typically show biological characteristics of slow growth, an older age at maturity and produce few young. These qualities mean that some shark species will have lower resilience to fishing pressures. Accordingly, it is important to monitor fishery activities that interact with shark stocks to ensure catches remain within sustainable levels.

Sharks show complexity in their use of Queensland's coastal habitats. Some species remain in inshore habitats throughout their life, others utilise inshore areas only during discrete times such as migrating through, or aggregating in particular locations.

The variation in habitat use means each shark species can be impacted differently by inshore fisheries. Knowledge of what species are interacting with fishing operations is important for adequately assessing the impacts of a fishery on shark stocks.



Monitoring the retained catch

Monitoring staff will undertake year-round representative sampling of catches in ports, at processors or on-water. The sampling will describe the species composition of the retained catch.

Sampling will include the collection of photographic and genetic samples to assist with accurate species identification and data on the size, sex and maturity of the sampled catch.

Monitoring the non-retained catch

The non-retained catch is an important part of the shark catch. The non-retained catch refers to those animals that are not kept, i.e. animals that are returned to the water either alive or dead.

To improve our knowledge about this part of the catch, monitoring staff will undertake activities such as:

- surveying commercial net fishers to document the behavioural and economic drivers within the fishery
- at-sea sampling of the fishery to collect photographic and genetic samples and record important data on fate, size, sex and maturity.



What will the data be used for?

The purpose of the monitoring program is to improve our knowledge of the species being caught and the size, sex, maturity and fate characteristics of the catch.

The program will also document the reasons that fishers decide to keep or not keep sharks they catch. Collectively, this information will assist in establishing the status of shark stocks that interact with Queensland's fisheries.

How to become involved

We encourage all commercial net fishers to become actively involved in the monitoring program. Fishers can help fill in information gaps about their fishery by allowing monitoring staff to collect samples and information from their catches or by participating in the phone survey.

Want to find out more?

For more information about monitoring Queensland's commercial shark catch, call 13 25 23, visit fisheries.qld.gov.au or email fisheriesmonitoring@daf.qld.gov.au.

What are the behavioural and economic drivers within the shark fishery?

We are seeking industry participation in a survey recording the human dimensions of the shark fishery. The survey aims to collect information on the behavioural and economic drivers which influence a fisher's decision to keep or not keep sharks.

The telephone survey will take approximately 15 minutes to complete. Questions are a mix of multiple choice, rating your agreement to a statement on a scale and open answer.

The survey responses are anonymous and will be collated to document the behavioural and economic factors that influence when sharks are kept or not kept in the ECIFFF and GOCIFFF.

All net fishers who encounter sharks while operating in the ECIFFF or GOCIFFF can contribute to this research.

A letter including details on the survey and FAQs will be distributed to fishers prior to the survey commencing.

For more information on the survey please contact us on 13 25 23 or email fisheriesmonitoring@daf.qld.gov.au

6.4 Final Survey: surveyor script

Question set 1: Broad open-ended

1. What are the main reasons why you may decide to throw back a shark whether dead or alive? Do you think that you throw back more or less sharks than you did in the past, and why? What would you like to see in relation to shark fishing management? Incorporate in the discussion

- | | |
|--|---|
| <input type="checkbox"/> Value of the species | <input type="checkbox"/> Possession limit |
| <input type="checkbox"/> Recording in logbooks | <input type="checkbox"/> No good market |
| <input type="checkbox"/> Prior reporting | <input type="checkbox"/> Not enough crew |
| <input type="checkbox"/> Unload notice | <input type="checkbox"/> Season |
| <input type="checkbox"/> Location | <input type="checkbox"/> Access to market |
| <input type="checkbox"/> Don't make money | <input type="checkbox"/> Other |
| <input type="checkbox"/> Legal size limit | <input type="checkbox"/> Because I can't ID the species |
| <input type="checkbox"/> Space on the boat | |

2. And how about reasons why you would keep a shark?

- S symbol
- Convenience
- Good market
- Season
- Not enough of other species
- Value of the species
- Location
- To not attract more sharks
- Reduce number of sharks (cull)
- Avoid habituation of different species
- Protect fishing grounds
- Other

Question set 2: Fishing activity

To begin, I will ask you some questions about your fishing activities. [Note: where answer categories are displayed in *green text*, there is no need to read these out - you will be able to fill in the category based on the fisher's response]

3. Firstly, how long have you been fishing commercially?

< 10 years; 10 – 20 years; 21 – 30 years; > 30 years

If necessary: This includes both part-time and full-time fishing, ignoring any breaks you might have had from fishing.

4. [And] Where in Queensland do you net fish?

- South-east QLD (south of latitude 24°30' i.e. Baffle Creek);
- Great Barrier Reef (waters north of 24°30' south and east of longitude 142°31'49" east);
- Gulf of Carpentaria

Note: If operating in 2 locations, ask to answer questions for the area where they interact with sharks the most

5. About the fishery you work in, which net symbols do you currently have?

[prompt for EC or GOC relevant symbols depending on fisher]

N1; N2; N3; N4; N10; N11; N12; N13; K1; K2; K3; K4; K5; K6; K7; K8; Unsure

6. Do you also have an S symbol? (*EC fishers only*)

Yes; No; Unsure

7. [And] What is the length of your primary vessel?

< 5m (<16'); 5 – <9m (16'–<29'); 9 – <13m (29'–<42'); 13 – <17m (42'– <55'); 17 – 20m (55'– 65')

8. How many vessels do you normally use during netting, including dories?

1; 2; 3; 4; 5 or more

9. Generally, what size is your crew, including yourself?

1 – 2 people; 2 - 5 people; more than 5 people

10. [And] How many net sets would you normally haul or rob on an average day?

1; 2; 3; 4; 5 or more;

Question set 3: Discard propensity– ALL species

11. Regarding all the fishing that you do and all the species that you catch (not just sharks), would you say that you throw back a lot of your catch?

Yes; No; Unsure

Question set 4: Retention and non-retention behaviour – Sharks

I will now ask you some questions about your shark catch. If your shark catch varies, just think about the time of the year and location where you catch sharks most often. For this survey, we are only interested in sharks and we are not including rays, sawfish, guitarfish and shovelnose rays.

12. At the moment, do you consider sharks to be an important part of your business?

Yes; No; Unsure

13. In which netting activities would you say that you come across sharks the most?

Ocean beach netting; tunnel netting; bait netting; inshore gillnetting; offshore gillnetting

If necessary: Inshore gillnetting means gillnetting in rivers, creeks and foreshores. Offshore gillnetting means gillnetting at depths of 2 or more metres.

14. Which finfish species are you usually targeting when you come across sharks the most?

- Barramundi
- Grey mackerel
- Spotted Mackerel
- Spanish Mackerel
- School Mackerel
- King Threadfin
- Garfish
- Dart
- Trevally
- Blue Threadfin
- Sea Mullet
- Bream, whiting, flathead
- Tailor
- Sharks
- Other

15. Would you say that you catch a lot of sharks?

Yes; No; Unsure

16. Would you say that, at the moment, you throw back a lot of the sharks that you catch?

Yes; No; Unsure

17. If it were an option for you, would you keep more sharks?

Yes; No; Unsure

Question set 5: Theory of Planned Behaviour

In this section, I will ask you about your thoughts on throwing back catch whether it is dead or alive. Please rate your agreement with the following statements on a scale of 1 to 10, where 1 means that you strongly disagree and 10 means that you strongly agree.

On a scale from 1 to 10, how much do you agree with the following statements?

1. Returning sharks to the water is common in commercial fishing.
2. I think that throwing back live sharks can be good for the marine environment.
3. Throwing back dead sharks is a waste of a good product.
4. I think I will have to keep throwing back sharks in the future, whether they are dead or alive.
5. It is easy for me and my crew to throw back sharks.
6. I think consumers are aware that sharks, dead and alive, are thrown back in commercial fisheries.
7. I think that throwing back dead sharks can be a bad for the marine environment.
8. If I could, I would reduce the number of sharks I throw back.
9. At the moment, keeping sharks can be difficult to do.
10. I think many commercial netters throw back some sharks.
11. Throwing back live sharks is a waste of a good product.
12. Unless something changes, I will probably have to keep throwing back some sharks in the future.
13. It is fully my choice whether I keep a shark or not.
14. I think that keeping some sharks can be good for the marine environment.

Wrap up

Thank you very much for your time. Do you mind if a member of our team contacts you to sample part of your retained catch as part of our biological sampling to improve information on the shark catch? (*Note: Only for fishers retaining lots of sharks*). We really appreciate you taking part in the survey. If you have any questions or concerns about the survey please contact us.

END OF SURVEY

6.5 Pilot Survey: surveyor script

Question set 1: Broad open-ended

1. What are the main reasons why you may decide to throw back a shark whether dead or alive?
Do you think that you throw back more or less sharks than you did in the past, and why?
Incorporate in the discussion

- | | |
|--|---|
| <input type="checkbox"/> Value of the species | <input type="checkbox"/> Space on the boat |
| <input type="checkbox"/> Recording in logbooks | <input type="checkbox"/> Possession limit |
| <input type="checkbox"/> Prior reporting | <input type="checkbox"/> No good market |
| <input type="checkbox"/> Unload notice | <input type="checkbox"/> Not enough crew |
| <input type="checkbox"/> Location | <input type="checkbox"/> Season |
| <input type="checkbox"/> Don't make money | <input type="checkbox"/> Access to market |
| <input type="checkbox"/> Legal size limit | |
| <input type="checkbox"/> Other | <input type="checkbox"/> Because I can't ID the species |

2. And how about reasons why you would keep a shark?

- S symbol
- Convenience
- Good market
- Season
- Not enough of other species
- Value of the species
- Location
- To not attract more sharks
- Reduce number of sharks (cull)
- Avoid habituation of different species
- Protect fishing grounds
- Other

Question set 2: Fishing activity

To begin, I will ask you some questions about your fishing activities. [Note: where answer categories are displayed in green text, there is no need to read these out - you will be able to fill in the category based on the fisher's response]

3. Firstly, how long have you been fishing commercially?

< 10 years; 10 – 20 years; 21 – 30 years; > 30 years

If necessary: This includes both part-time and full-time fishing, ignoring any breaks you might have had from fishing.

4. [And] Where in Queensland do you net fish?

- South-east QLD (south of latitude 24°30' i.e. Baffle Creek);
- Great Barrier Reef (waters north of 24°30' south and east of longitude 142°31'49" east);
- Gulf of Carpentaria

Note: If operating in 2 locations, ask to answer questions for the area where they interact with sharks the most

5. About the fishery you work in, which net symbols do you currently have?

[prompt for EC or GOC relevant symbols depending on fisher]

N1; N2; N3; N4; N10; N11; N12; N13; K1; K2; K3; K4; K5; K6; K7; K8; Unsure

6. Do you also have an S symbol? (*EC fishers only*)

Yes; No; Unsure

7. [And] What is the length of your primary vessel?

< 5m (<16'); 5 – <9m (16'-<29'); 9 – < 13m (29'-<42'); 13 – <17m (42'- <55'); 17 – 20m (55'-65')

8. How many vessels do you normally use during netting, including dories?

1; 2; 3; 4; 5 or more

9. Generally, what size is your crew, including yourself?

1 – 2 people; 2 - 5 people; more than 5 people

10. [And] How many net sets would you normally haul or rob on an average day?

1; 2; 3; 4; 5 or more;

Question set 3: Discard propensity– ALL species

11. Regarding all the fishing that you do and all the species that you catch (not just sharks), would you say that you throw back a lot of your catch?

Yes; No; Unsure

Question set 4: Retention and non-retention behaviour – Sharks

I will now ask you some questions about your shark catch. If your shark catch varies, just think about the time of the year and location where you catch sharks most often. For this survey, we are only interested in sharks and we are not including rays, sawfish, guitarfish and shovelnose rays.

12. Generally speaking, do you consider sharks to be an important part of your business?

Yes; No; Unsure

13. In which netting activities would you say that you come across sharks the most?

Ocean beach netting; tunnel netting; bait netting; inshore gillnetting; offshore gillnetting

If necessary: Inshore gillnetting means gillnetting in rivers, creeks and foreshores. Offshore gillnetting means gillnetting at depths of 2 or more metres.

14. Which finfish species are you usually targeting when you come across sharks the most?

- Barramundi
- Grey mackerel
- Spotted Mackerel
- Spanish Mackerel
- School Mackerel
- King Threadfin
- Garfish
- Dart
- Trevally
- Blue Threadfin
- Sea Mullet
- Bream, whiting, flathead
- Tailor
- Sharks
- Other

15. Would you say that you catch a lot of sharks?

Yes; No; Unsure

16. Would you say that you throw back a lot of the sharks that you catch?

Yes; No; Unsure

17. If it were an option for you, would you keep more sharks?

Yes; No; Unsure

Question set 5: Theory of Planned Behaviour

In this section, I will ask you about your thoughts on throwing back catch whether it is dead or alive. Please rate your agreement with the following statements on a scale of 1 to 10, where 1 means that you strongly disagree and 10 means that you strongly agree.

On a scale from 1 to 10, how much do you agree with the following statements (to be randomised)?

Subjective and social norms (weak norms to strong norms)

- 18. Consumers are aware that sharks, dead and alive, are thrown back in commercial fisheries.
- 19. I think consumers are fine with commercial fishers throwing back sharks.
- 20. Returning sharks to the water, dead or alive, is a normal part of commercial fishing.
- 21. Most commercial netters throw back some sharks.

Attitude towards discarding sharks (low discarder to high discarder)

- 22. I don't see a problem with the practice of throwing back sharks in commercial fisheries, dead or alive.
- 23. There should be less throwing back of dead sharks in commercial fisheries.
- 24. There should be less throwing back of live sharks in commercial fisheries.
- 25. Throwing back dead sharks is a waste of a good product.
- 26. Throwing back live sharks is a waste of a good product.
- 27. I think that throwing back live sharks is good for the marine environment.
- 28. Keeping some sharks is good for the marine environment.
- 29. I think that throwing back dead sharks can be a bad for the marine environment.

Discard intention (low intention to high intention)

- 30. I think I will have to keep throwing back sharks in the future, whether they are dead or alive.
- 31. Unless something changes, I will keep throwing back some sharks in the future.

32. If I could, I would reduce the number of sharks I throw back.

Perceived behavioural control (poor control to strong control)

33. It is easy for me and my crew to throw back sharks.

34. Keeping sharks can be difficult to do.

35. It is easy for me to keep all the sharks that I want to keep.

Wrap up

As this is a pilot survey we have some additional feedback questions before we finish up.

- Were all the questions easy enough to understand?
- Would you feel more comfortable answering this survey with someone not directly associated to Fisheries Queensland? And thinking about the other commercial net fishers that you know, do you think they would feel more comfortable talking to Fisheries Queensland directly or not?
- Any other feedback?

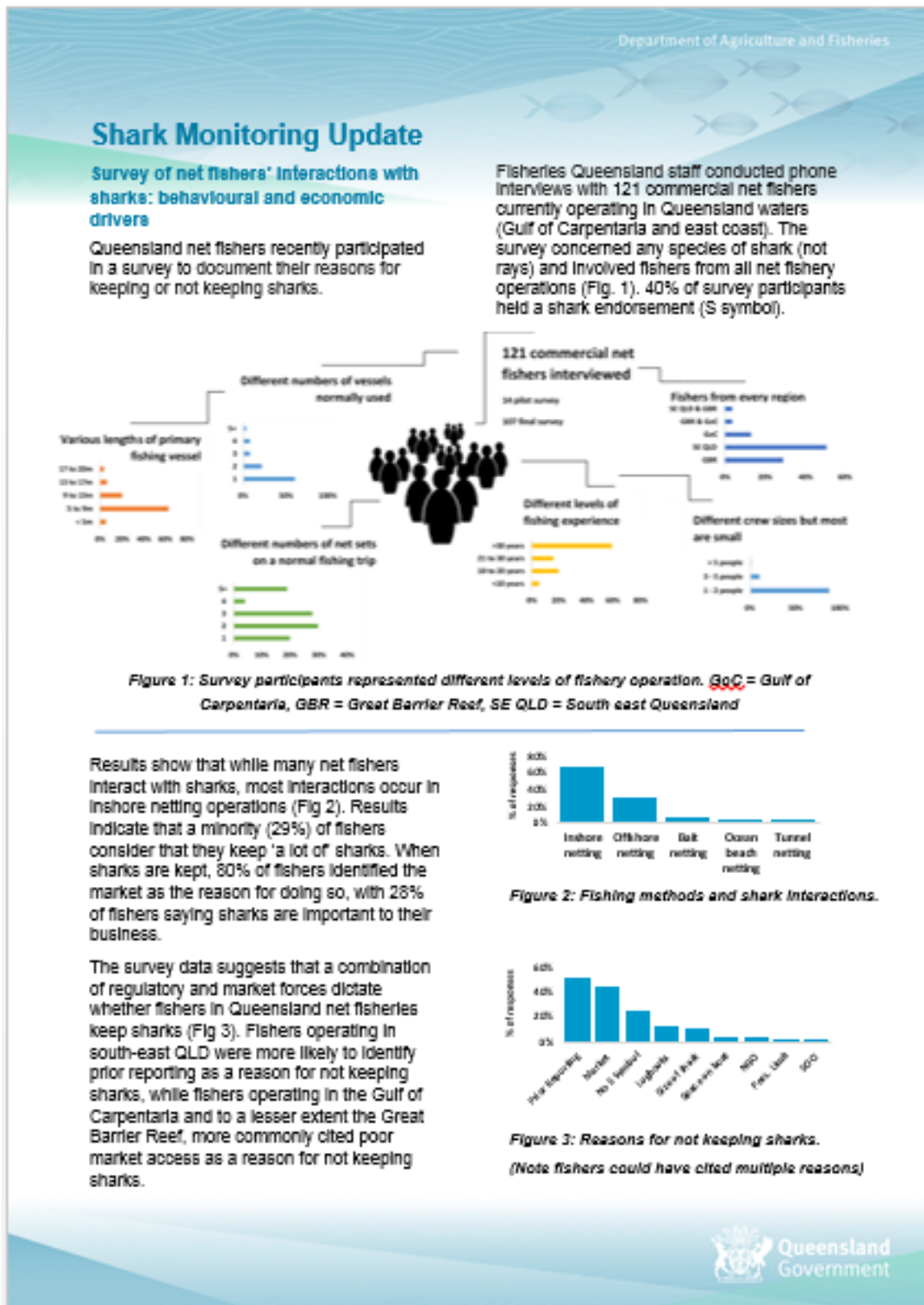
Thank you very much for your time. Would you like to receive a summary factsheet highlighting the results from this survey (aggregated data only)?

Do you mind if a member of our team contacts you to sample part of your retained/non-retained catch as part of our biological sampling to improve information on the shark catch? (*Note: Only for fishers retaining/releasing lots of sharks*).

We really appreciate you taking part in the survey. If you have any questions or concerns about the survey please contact us.

END OF PILOT SURVEY

6.6 Results Factsheet



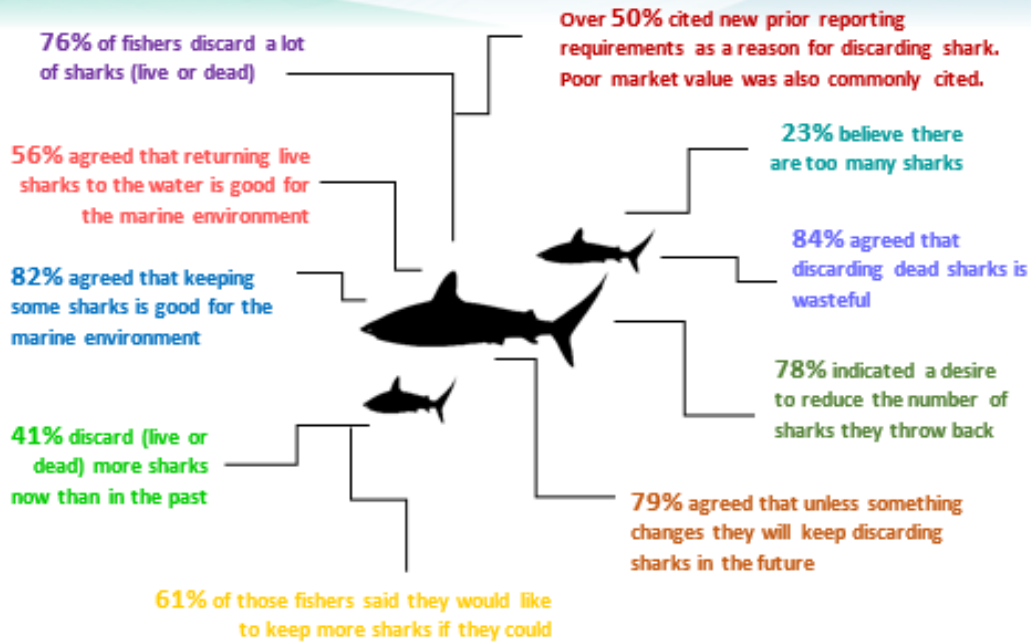


Figure 4: Snapshot of survey results. Numbers are percentage of fishers interviewed.

The survey data suggests that discarding sharks (live or dead) is common practice in Queensland's net fisheries. Results imply that there may be more sharks thrown back due to the policy changes in January 2018.

New tools currently being developed by Fisheries Queensland (such as a commercial fishing app, a species identification tool, and vessel tracking) should simplify future reporting requirements for fishers.

The survey also highlighted a potential misunderstanding about the current reporting requirements when retaining sharks. If an S symbol is not written on a fisher's authority, the fisher does not need to wait at the landing place after the Prior Notice has been given.

A copy of the full survey report can be requested by contacting fishery monitoring on fisheriesmonitoring@daf.qld.gov.au

Support and Assistance

Thank you to all fishers who have generously participated in the phone survey. Fishers can continue to contribute information about their fishery by allowing monitoring staff to collect samples and information from their catches.

The monitoring team work closely with commercial and recreational fishers as well as seafood processors and retailers to collect biological information on sharks and other finfish species.

Want to find out more?

For more information about monitoring Queensland's commercial shark catch, call 13 25 23, visit fisheries.qld.gov.au or email fisheriesmonitoring@daf.qld.gov.au.