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PRELIMINARY SURVEY OF SET-LINE USAGE IN TASMANIA

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Preliminary survey of set-line usage in Tasmania

Executive Summary

The recent introduction of set-line licences has provided an efficient sampling frame from which to survey this specialised fishery. Current licence numbers indicate that there are potentially 3700 persons with an interest in this fishery, although only an estimated 2745 persons (73% of licence holders) fished with set-lines in the 12 months prior to July 2011. Almost 1900 persons (about half of all licence holders) used longlines while just over 1000 persons (28% licence holders) used droplines. Very few fishers, less than 200 persons (5% licence holders) reported using both types of gear, suggesting that most fishers specialise in a particular set-line method.

Reliable catch and effort estimates were not feasible based on the survey method, however, it was evident that for most fishers set-line usage was an occasional activity (63% of active set-line fishers reported 5 or fewer days fished).

Set-line fishing is a seasonal activity, with fishers most active during the summer and autumn months and least active during winter, regardless of set-line method. Longlines are primarily used to target gummy shark, mainly off the north and east coasts, whereas droplines are primarily used to target blue eye trevalla or striped trumpeter, mostly off the east and south east coasts.

Gummy shark along with other shark species and flathead dominate longline catches, with various sharks and rays as well as gurnards the main by-catch. Gummy sharks are also taken by droplines but the main catch is blue eye trevalla and gemfish from the upper slope and striped trumpeter, jackass morwong and ocean perch from the shelf. Sharks and rays, ocean perch and cod represent the main by-catch of droplines.

Longlines are generally set for longer periods than droplines, with a small proportion of longlines set overnight. Typically the full entitlement of 30 hooks is used for longlines whereas as most dropline fishers use fewer hooks.

For the majority of active fishers, interactions with seabirds and marine mammals do not appear to be a major issue when using set-lines. However, for those who did report interactions, seals were the most commonly cited species, with loss of fish, damage to catch and damage to gear reported more frequently by dropline than longline fishers.

Overall there is general support and understanding of the regulations that relate to set-line fishing amongst licence holders.

Table of Contents

1 INTRODUCTION

1.1 Background

According to Tasmanian fisheries regulations recreational set-lines are defined as an unattended line with up to 30 hooks. Set-lines are distinguished from standard line fishing in that, while there are no restrictions on the number of lines, no more than 5 hooks per line can be used and fishers must be within 20 m of the gear or the lines remain attached to the vessel.

Set-lines are typically configured as longlines to target sharks, especially gummy shark, or as droplines to target species such as blue-eye trevalla and striped trumpeter. Longlines are weighted and set horizontally along the sea floor with buoys attached at either end. Droplines on the other hand are set vertically in the water column, with one end weighted and the other buoyed. The hooks are generally positioned near the bottom of the line and just off the sea floor.

Recreational fishers are permitted to use only one set-line at any one time, with no more than four set-lines on a boat and, in such instances, each person must be present when the lines are set and retrieved. In waters exceeding 150 m fishers are permitted to join up to four lines and have up to 120 hooks on a line. Set-lines are prohibited in all Shark Refuge Areas.

1.2 Set-line licensing

Recreational set-line licences were introduced for the first time in 2009, with over 3,500 licences issued for the 2009/10 licensing year and almost 3,800 in 2010/11.

The licensing database provides some basic demographic information about licence holders including age and residence. Set-line licence-holders in 2010/11 averaged 45 years of age, with a median age of 46 years. By comparison with the general fishing population of Tasmania (Lyle *et al*. 2009, Fig. 1), set-line licence holders tend to be older, with disproportionately more licence-holders in age groups older than 30 years of age and comparatively few children (< 15 years) licensed. Similar demographic profiles apply for persons holding recreational rock lobster and/or gillnet licences (Lyle and Tracey in press). There are, however, some differences in terms of where set-line licence holders tend to reside compared with other licence types and the general fisher population. Over half of all recreational fishers (Lyle *et al*. 2009) as well as rock lobster and gillnet licence holders reside in the Greater Hobart and surrounding Southern statistical sub-division (SSD), this compares with less than one third of all set-line licence holders (under 20% are from the Greater Hobart area and fewer than 10% from the Southern SSD) (Fig. 2). By contrast, holders of set-line licences tend to be more concentrated in areas adjacent to the north coast, for instance just over 20% resided in the Burnie-Devonport SSD, 15% in each of the North Western Rural and Greater Launceston SSDs and a further 10% in the North Eastern SSD.

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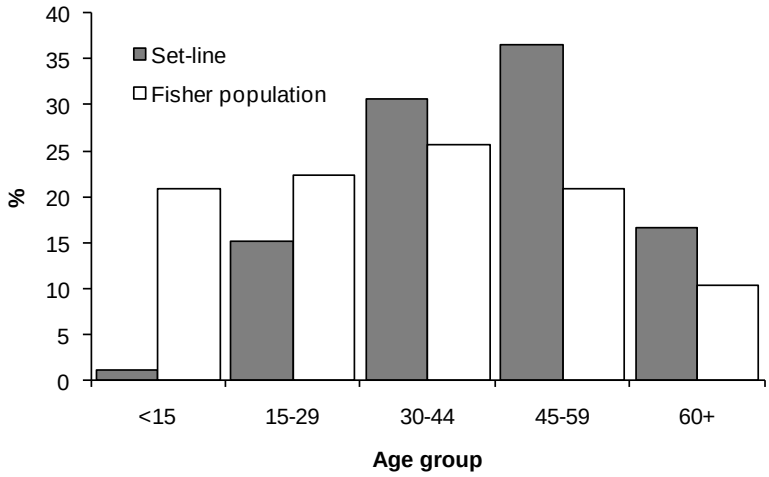

Fig. 1 Demographic profile (%) of recreational set-line licence-holders (2010/11 licensing year) and resident Tasmanian recreational fishers (during 2007 - Lyle *et al*. 2009) by age group.

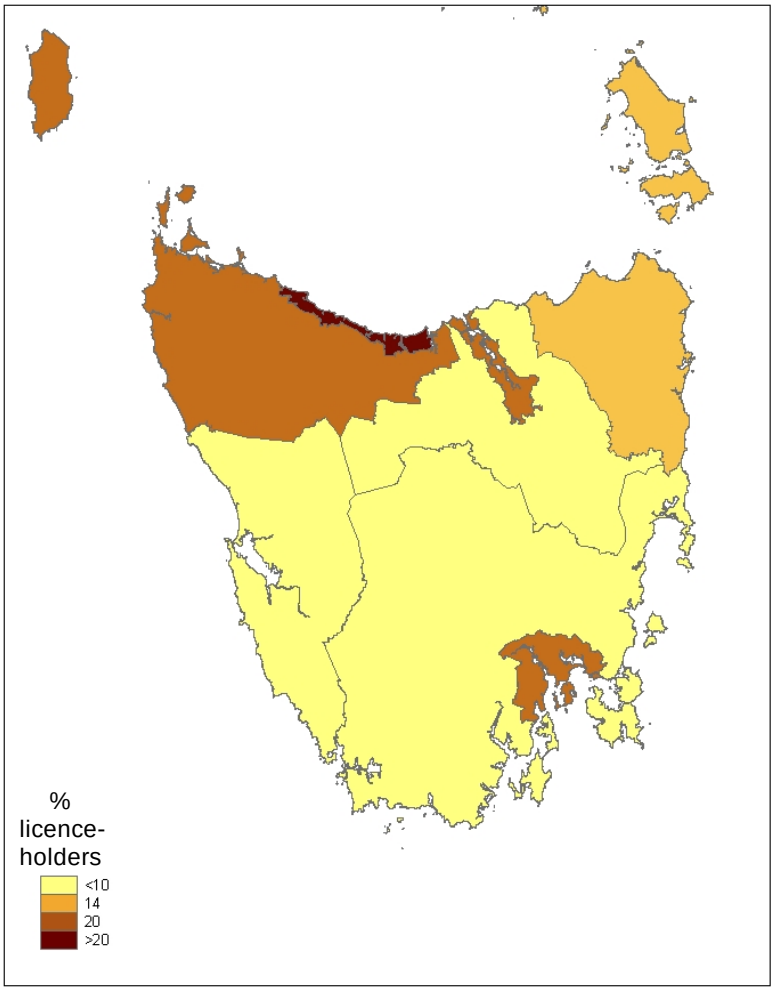

Fig. 2 Map showing the relative numbers of recreational set-line licence-holders by area of residence (ABS Statistical Sub-divisions) and based on the 2010/11 licensing year. A further 1.8% of licence-holders reside interstate.

1.3 Survey objectives

There is relatively little information available about set-line usage in Tasmania. The introduction of licensing has provided a very efficient sampling frame from which to survey fishers cost effectively, and the present study was initiated to provide a preliminary description of the set-line usage, with particular reference to current fishing practices, target species, by-catch, and temporal and spatial structure of the fishery. This information will provide baseline information that will be valuable in identifying issues that may require management action or a framework for more targeted studies. The specific objectives of the study are to:

1. assess the level of set-line usage in Tasmania (proportion of active licences) and types of activities undertaken
2. describe fishing practices, target species, catch composition by method (longline and dropline), season and region
3. assess attitudes and awareness of key issues relating to the set-line fishery in Tasmania.

2 METHODS

2.1 Survey design

A simple random sample of set-line licence holders was selected from the 2010/11 licensing database administered by the Department of Primary Industries, Parks, Water and Environment. Respondents were contacted by telephone during July/August 2011 and asked a series of structured questions relating to set-line usage and awareness and attitudes relating to aspects of the fishery. Given the sampling protocol (random sampling), responses can be considered to be representative and, unless otherwise indicated, can be scaled up to the total population of licence holders.

In reporting regional fishing activity, respondents were asked to identify the main areas that they fished with set-lines and, based on responses, the information was grouped into four main fishing regions as indicated in Fig. 3.

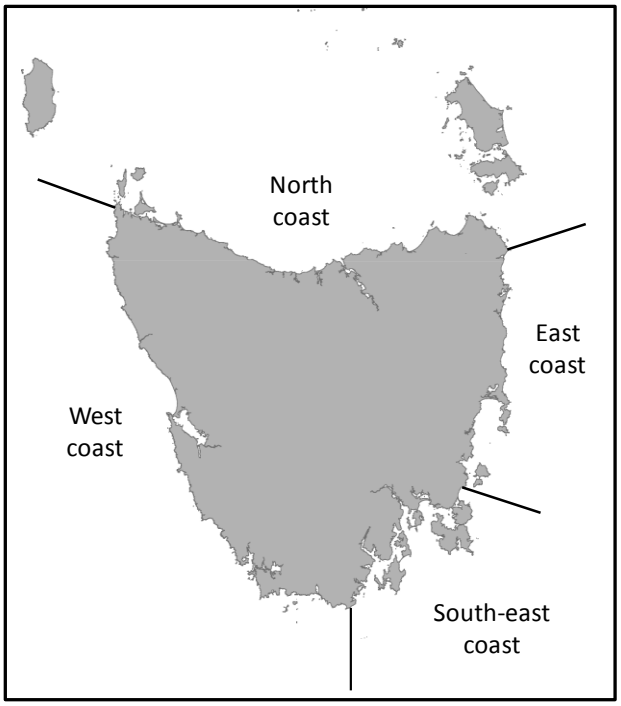

Fig. 3 Map of Tasmania showing fishing regions referred to in the text.

3 RESULTS AND DISCUSSION

3.1 Response profile

Out of a random sample of 492 licence-holders, 58 (11.8%) either had no telephone listing or the reported phone number was disconnected or incorrect. This represented sample loss and reduced the effective (net) sample to 434. Contact was made with 385 respondents, of whom 352 fully responded, representing a screening survey response rate of 81% (Table 1). Non-contacts (despite multiple attempts by telephone over a period of several weeks) accounted for 11% and refusals a further 6% of the net sample. Overall there were 3761 setline licences issued in 2010/11, with 9.4% (about 1 in 11) of the licence holders responding to the survey.

Table 1 Sample size and response profile.

	Number	(%)
Gross sample	492	
No phone /disconnected/ wrong number	58	
Net sample	434	
Full response	352	81.1
Refusal	28	6.4
Other non-response	5	1.1
No contact	49	11.3

3.2 Set-line fishing activity

Respondents were asked whether or not they had done any fishing with set-lines during the previous 12 months and, if so, how many days in total and how many by longline and dropline methods. Of the 352 respondents, 95 reported that they had not fished with set-lines (dropline or longline) in the previous 12 months, implying that 73.0% (SE ±2.2) of all licence-holders (2745 ± 85 persons) had fished with set-lines in the previous year. Respondents who had not fished were asked whether they had ever used set-lines; 41 responded that they had had no prior experience fishing with set-lines, implying that almost 12% of licence-holders (almost 440 persons) were new to the activity.

For those respondents who reported fishing, the average number of days fished with set-lines was 7.5 days, with a median of 4 days. As these data relate to activity recalled for the previous 12 months they are subject to recall bias and thus are likely to represent an overestimation of actual activity levels. Nevertheless, these estimates do suggest that for the majority, set-lines are deployed infrequently; in fact 63% of the active fishers reported set-line fishing for 5 or fewer days a year.

Longlines were used by 69% of active fishers whereas droplines were used by 38%, only a small minority (7%) of fishers reported using both types of setline during the previous year. When converted to numbers of licence-holders, these data imply 50.2% used longlines whereas 27.8% used droplines at least once during the year. In terms of

recalled effort for active fishers, longlines were used on an average of 5.2 days and droplines 4.1 days.

Respondents were asked to recall which months of the year they fished with set-lines and the areas fished in order to provide an understanding of the temporal and spatial distribution of set-line effort. In undertaking this analysis it should be emphasised that this represents a semi-qualitative assessment only, since the data have not been weighted for reported levels of effort. Longline and dropline effort followed similar seasonal patterns, with the greatest effort during the summer months (December – February) followed by autumn (March – May) (Table 2). The lowest activity was reported during winter (June-August).

Table 2 Seasonal set-line activity by method, based on % of mentions by active fishers.
No. of respondents =177 for longline; 98 for dropline; 275 for set-lines in general

Season	Longline	Dropline	Set-line
Spring	32.2	24.5	31.5
Summer	78.0	76.5	82.9
Autumn	51.4	46.9	53.3
Winter	17.5	15.3	17.9

Regionally, there were marked differences in set-line usage, with longline effort concentrated off the north coast and dropline effort off the east and south east coasts (Table 3). Reported longline activity was comparatively low for the south east and west coasts while dropline activity was low off the north and west coasts. The concentration of longline effort for shark off the north and east coasts is presumably linked to the fact that many of the suitable inshore areas for sharks in the south east lie within shark refuge areas, which are not only closed to set-line usage but also the taking of sharks. Conversely, the proximity of the continental shelf off the east and south east coasts provides opportunities for fishers to use droplines to target striped trumpeter on the shelf and blue eye trevalla on the upper slope.

Table 3 Regional set-line activity by method, based on % of mentions by active fishers.
No. of respondents =177 for longline; 98 for dropline; 275 for set-lines in general

	Longline	Dropline	Set-line
South east coast	11.9	29.6	18.3
East coast	26.0	49.0	31.5
North coast	63.3	14.3	47.1
West coast	9.6	13.3	9.7

As part of describing fishing practices, respondents were asked for the average time between setting and retrieving gear and the usual numbers of hooks used per set-line. As a general rule, longlines were set for longer periods than droplines (average time of 3.0 hours for longline and 2.1 hours for dropline), although a modal set duration of 2 h applied to both methods (Fig. 4). Overall, just over half of the active longline fishers reported average set durations of less than 3 hours compared with over three quarters of

dropline fishers. A small proportion of fishers (< 5%) reported that they typically set longlines overnight.

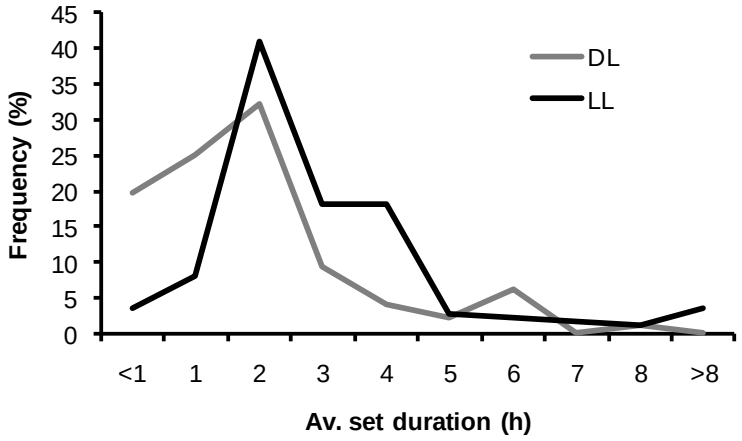

Fig. 4 Frequency distribution of average set duration (hourly bins) based on fishing method.

There was a clear distinction between methods based on the usual number of hooks used, with almost two thirds of longline fishers using the full entitlement of hooks (30) compared with just over a third of dropline fishers (Fig. 5). In practice, less than one fifth of longline fishers typically used less than 25 hooks compared with over half of dropline fishers.

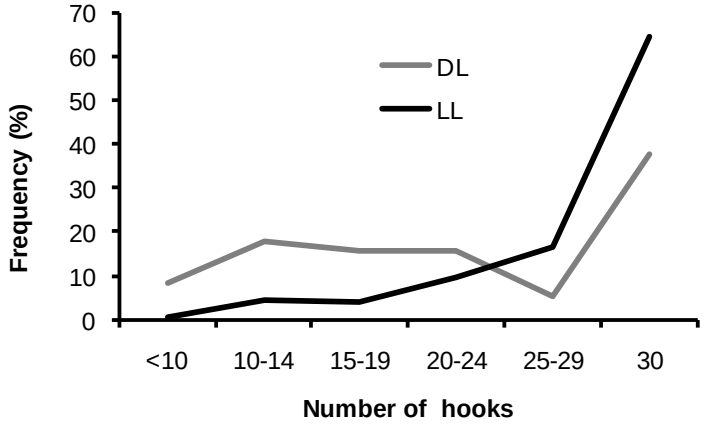

Fig. 5 Frequency distribution of average number of hooks per set-line based on fishing method.

3.3 Target species, catch and by-catch

Respondents were asked to nominate their main target species, the main species caught and the main by-catch species (i.e. those that are released or discarded) based on fishing methods used. Respondents were encouraged to identify up to three species in each of these categories and the results are summarised in Table 4. Although this approach

does not provide a quantitative assessment of catch levels, it does provide insights into the relative importance of the various species for the set-lines. The results confirmed that longlines are primarily used to target sharks, in particular gummy shark, with this species representing a major component of the catch. School shark represent an important secondary target species and catch, with other sharks including seven-gill shark and draughtboard shark, along with various skates and rays commonly reported as components of the longline catch and, in particular, by-catch. Scalefish were generally of minor significance for longline fishers apart from some targeting of species such as flathead. In terms of longline by-catch, ocean perch/gurnards were the most frequently cited scalefish species.

Droplines were also used to target gummy sharks but blue eye trevalla and striped trumpeter were more commonly targeted, with both species featuring relatively frequently as a main component of the catch. Gemfish, jackass morwong, cod, and flathead were relatively common by-product species, with ocean perch/gurnards, various sharks, skates and rays and cod amongst the main by-catch species.

Based on known species distributions by habitat and depth, it is evident that longlines tend to be mainly set in relatively shallow coastal waters over soft sediment for sharks and scalefish such as flathead. Droplines on the other hand are mainly fished over hard ground on the shelf, targeting striped trumpeter with jackass morwong and ocean perch common by-product species, or in deeper slope waters targeting blue eye trevalla with hapuka and gemfish common by-product.

Table 4 Target species, catch and by-catch by setline methods, expressed as % of mentions for active fishers.

No. of respondents = 177 for longline and 98 for dropline

	Longline			Dropline		
	Target	Catch	By-catch	Target	Catch	By-catch
Gummy shark	87.0	65.5	3.4	28.6	25.5	6.1
School shark	9.0	6.2	1.1	2.0	7.1	2.0
Other shark	6.8	36.2	58.2	7.1	3.1	17.3
Skate/rays	0	13.6	58.8	0	1.0	11.2
Blue eye trevalla	3.4	2.8	0.6	39.8	25.5	0
Hapuka	0	0	0.6	8.2	2.0	0
Gemfish	0	1.1	0.6	8.2	12.2	0
Blue grenadier	0	0	0	3.1	2.0	0
Ling	0.6	0	0	2.0	2.0	0
Striped trumpeter	5.1	4.0	0.6	39.8	21.4	0
Jackass morwong	1.7	3.4	0	4.1	9.2	5.1
Ocean perch/ gurnard	0	4.5	19.2	0	7.1	20.4
Cod	0	1.7	0.6	0	8.2	12.2
Flathead	11.8	26.5	5.1	4.1	8.1	0
Snapper	3.4	2.8	0	0	1.0	0
Other fish	1.1	2.3	5.1	5.1	6.1	11.2

3.4 Interactions with wildlife

In order to understand whether interactions with marine mammals (seals, dolphins, killer whales) or seabirds was an issue for set-lines, respondents were asked whether they had experienced interactions with wildlife, the nature of these interactions and their frequency. Overall, the majority of active fishers did not report wildlife interactions as an issue when using set-lines (Table 5a). Of those who did report interactions, seals were the most commonly cited species for both methods, followed by dolphins for longline fishers and seabirds for dropline fishers. Killer whales are at times a significant problem for commercial set-line fishers but appear to be a very minor issue for the recreational sector. For those active fishers who reported interactions, about half of the longline and over a third of the dropline fishers noted that the interactions resulted in no damage to gear or fish (Table 5b). Loss of fish, damage to catch and damage to gear were reported more frequently by dropline than longline users. In relation to the frequency of interactions, regardless of outcome, the majority of fishers who reported interactions considered that they were common (occurring in more than one in five trips) and especially so for dropliners (Table 5c).

Table 5 Percentage of active fishers who experienced interactions with wildlife – a) the species involved, b) the nature of those interactions that occurred and c) their relative frequency.

	Longline	Dropline
a) Interaction species		
No interactions	66.9	56.7
Seals	25.1	33.0
Dolphins	11.4	6.2
Killer whales	0.0	2.1
Seabirds	6.9	11.3
Other (Sharks)	0.6	1.0
No. respondents	*175*	*97*
b) Nature of interactions		
Loss of fish	25.4	40.0
Damage to catch	23.7	27.5
Damage to gear	10.2	15.0
No catch/gear impacts	49.2	37.5
Unsure	3.4	7.5
No. respondents	*59*	*40*
c) Frequency of interactions		
Common (more than 1 in 5 trips)	59.3	75.8
Occasional (once every 6-10 trips)	30.5	15.2
Rare (less than 1 in 10 trips)	6.8	18.2
Unsure	3.4	3.0
No. respondents	*59*	*33*

3.5 Attitudes and awareness of regulations

In the final part of the survey all respondents, regardless of whether they had fished or not in the previous 12 months, were asked a series of questions relating to their attitudes to, or awareness of current regulations.

The majority (77%) of respondents considered that the maximum permitted number of hooks (30) was about right, with a further 13% indicating that they considered the number to be too high and 6% too few (Table 6). Of those respondents who considered the maximum number of hooks to be too high, the majority (70%) were dropline fishers whereas there was an more even split between longline and dropline fishers amongst those who considered that the maximum was too low. Respondents were then read the following statement - "On water possession limits for species that are often targeted using setlines, such as blue eye trevalla, striped trumpeter and school and gummy sharks are quite low (5 for blue eye, 4 for striped trumpeter, and 2 for school and gummy shark combined) ... given this do you think there is a need to reduce the number of setline hooks to avoid over catching and possible wastage?" This question elicited a slightly higher support for a reduction of hook numbers but clear majority support (70%) remained for no reduction in hook numbers.

Table 6 Support for maximum hook regulations (% respondents).
No. of respondents = 350

Statement	Response	%
Do you consider that a maximum of 30 hooks is ...	About right	76.7
	Too many	12.8
	Too few	6.0
	Unsure	4.0
On water possession limits for species that are often targeted using setlines ... are quite low ... given that do you think that there is a need to reduce the number of setline hooks to avoid over-catching and possible wastage?	Yes	21.0
	No	69.6
	Unsure	8.8

There was a very high level of awareness of several of the regulations that relate to set-line fishing, in particular the fact that there are areas (shark refuge areas) where their usage is prohibited as well as the requirement for marking of gear (Table 7). There was also generally high awareness of the maximum number of set-lines that could be used from a boat but only moderate awareness of the provision allowing for hook allocations to be combined onto a single line in deep water. This latter finding is probably not too surprising, given that it relates to a very specific situation that may not be relevant to many fishers.

Table 7 Awareness of selected regulations relevant to set-line usage (% of respondents).
No. of respondents = 350

Statement	Aware	Unaware	Unsure
That some area restrictions apply to setline usage, mainly shark refuge areas?	95.2	3.7	0.6
No more than 4 set-lines are permitted on a boat?	80.4	17.9	1.1
Buoys must be marked with LL for longline and DL for dropline?	93.2	5.7	0.6
In deepwater (>150m) it is permissible to join up to 4 lines and have up to 120 hooks on a line	59.7	36.9	2.8

There was general support for the current package of regulations, with over three quarters of respondents indicating that they are about right (Table 8). Only a small proportion of respondents considered that either further restrictions were required or existing regulations were too restrictive. The main issue for those who considered that greater restrictions were needed related to hook numbers which they considered should be reduced to reduce wastage. There was also concern that soak times should be restricted, and in particular overnight sets should be prohibited (to reduce wastage). By contrast the most commonly cited issue with the existing regulations was that possession limits for sharks in particular, but also for blue eye trevalla, were too restrictive and should be increased. Other issues raised included the number of hooks (too low) and the restriction on the number of set-lines a person can use (even within existing hook limits).

Table 8 General support for regulations relevant to set-line usage (% respondents).
No. of respondents = 350

Statement	Response	%
Do you consider that the regulations on set-line usage are about right ... there is a need for further restrictions ... or the regulations are too restrictive?	About right	77.8
	Further restrictions needed	6.8
	Too restrictive	10.2
	Unsure	4.5

4 SUMMARY

The recent introduction of set-line licences has provided an efficient sampling frame from which to survey this specialised fishery. Current licence numbers indicate that there are potentially 3700 persons with an interest in this fishery, although as evident from this survey not all are active participants, a phenomenon observed in other licensed fisheries in Tasmania (e.g. rock lobster and gillnet) (Lyle and Tracey 2010, in press). In many respects the Tasmania licensing system, based around a relatively expensive first licence (inclusive of application fee) and very modest fees for additional licence categories, tends to encourage fishers to accumulate licences on the off-chance that they may be used. The important point to note is that trends in licensing do not necessarily reflect trends in fishing activity.

An estimated 2745 persons (73% of licence holders) fished with set-lines in the 12 months prior to July 2011, with longlines used by almost 1900 persons (about half of all licence holders) and droplines by just over 1000 persons (28% licence holders). Very few fishers, less than 200 persons (5% licence holders) reported using both longline and droplines, suggesting that most fishers specialise in a particular set-line method.

Reliable catch and effort estimates were not feasible based on the survey method which relied on recalled information over a 12 month period, however, it was evident that for most fishers set-line usage was an occasional activity (63% of active set-line fishers reported 5 or fewer days fished).

Set-line fishing is a seasonal activity, with fishers most active during the summer and autumn months and least active during winter regardless of set-line method, a pattern that mirrors activity in the general recreational fishery (Lyle *et al.* 2009). Longlines are primarily used to target gummy shark, with school shark a secondary target species, mainly off the north and east coasts, whereas droplines are primarily used to target blue eye trevalla or striped trumpeter mostly off the east and south east coasts.

Gummy shark along with other shark species and flathead dominate longline catches, with various sharks and rays as well as gurnards the main by-catch. Gummy sharks are also taken by droplines but the main catch is blue eye trevalla and gemfish from the upper slope and striped trumpeter, jackass morwong and ocean perch from the shelf. Sharks and rays, ocean perch and cod represent the main by-catch of droplines.

As a general rule longlines are set for longer periods than droplines, with a small proportion of longlines set overnight. Typically the full entitlement of 30 hooks is used for longlines whereas as most dropline fishers use fewer hooks, which are clustered at the end of the line near the sea floor.

For the majority of active fishers, interactions with seabirds and marine mammals do not appear to be a major issue when using set-lines. However, for those who did report interactions, seals were the most commonly cited species for both methods. Loss of fish, damage to catch and damage to gear were reported more frequently by dropline than longline users.

Overall there was general support and understanding of the regulations that relate to set-line fishing. While the vast majority of licence holders consider that current regulations

are about right, the main issues relating to dissatisfaction were either that greater restrictions were required, in particular a need to reduce hook numbers to reduce wastage, or conversely, that regulations are too restrictive, in particular in relation to possession limits for key set-line species (sharks, blue eye trevalla and striped trumpeter), hook numbers and line numbers (even within existing hook limits).

Acknowledgments

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Kelly Bolch provided invaluable assistance with the management of the survey and our team of proficient and committed interviewers – Elizabeth R, Elizabeth M, Helen, Patricia, Sandra, Sheelagh and Shirley - contributed to the success of the survey, encouraging the co-operation of fishers and maximising response rates, as well as ensuring data quality and completeness.

Finally, thanks are extended to the recreational fishers who participated in the survey.

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Appendix I. Reported species composition caught by setline, including by-catch.

Scalefish		Sharks and rays	
Australian salmon	*Arripis* spp	Blue shark	*Prionace glauca*
Bastard trumpeter	*Latridopsis forsteri*	Dogfish	*Squalus* spp
Barracouta	*Thyrsites atun*	Draughtboard shark	*Cephaloscyllium laticeps*
Blue grenadier	*Macruronus noveazelandiae*	Eagle ray	*Myliobatis australis*
Blue throat wrasse	*Notolabrus tetricus*	Elephant fish	*Callorhinchus milii*
Blue eye trevalla	*Hyperoglyphe antartica*	Gummy shark	*Mustelus antarcticus*
Blue warehou	*Seriolella brama*	Mako	*Isurus* spp
Cod	Moridae	Port Jackson shark	*Heterodontus portjacksoni*
Conger eel	*Conger* spp	Saw shark	*Pristiophorus* spp
Gemfish	*Rexea solandri*	School shark	*Galeorhinus galeus*
Gurnard	Scorpaenidae, Neosebastidae & Triglidae	Seven-gill shark	*Notrynchus cepedianus*
Hapuka	*Polyprion oxygeneios*	Thresher shark	*Alopias vulpinus*
Jackass morwong	*Nemadactylus macropterus*	Unspec. skates & rays	Various families
Ling	*Genypterus* spp		
Ocean perch	*Helicolenus* spp.		
Pink snapper	*Pagurus auratus*		
Purple wrasse	*Notolabrus fucicola*		
Southern sand flathead	*Platycephalus bassensis*		
Striped trumpeter	*Latris lineata*	Other taxa	
Tiger flathead	*Neoplatycephalus richardsoni*	Gould's squid	*Nototodarus gouldi*
Yellowtail kingfish	*Seriola lalandi*	Octopus	Octopodidae