2017-18 SURVEY OF RECREATIONAL FISHING IN TASMANIA

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EXECUTIVE SUMMARY

This study represents the fourth comprehensive assessment of recreational fishing in Tasmania and complements other more targeted assessments of specific fishing activities. It provides a big-picture perspective of recreational catch and effort and thus comparatively rare or highly specialised activities may not be well represented. Therefore, if more focussed surveys are available (e.g. recent assessments of the rock lobster, abalone, gillnet, gamefish and offshore fisheries), it is recommended that greater credence be given to results of these focussed surveys, especially where results differ to those for the general fishing surveys.

Fishing participation

Information about participation rates (i.e. proportion of the population who fished at least once a year) and the demographic profile of recreational fishers was derived from a telephone survey involving 3010 Tasmanian households. This was followed by a telephone-diary survey involving 584 households (1491 persons) in which fishing activity was monitored over a 12-month period.

In the 12 months prior to October 2017 over 106,000 Tasmanian residents aged 5 years or older fished at least once in Tasmania, representing an overall participation rate of 24%, or just under one in four Tasmanians. Residents of the South East (Australian Bureau of Statistics region) had the highest participation rate of 31%, which compared with 22-26% for other Tasmanian regions. Recreational fishing was more popular among males, with a state-wide participation rate of 33%, compared with about 15% for females. Participation rates varied with age; 5-14 year olds had the highest rate of participation (35%) although the greatest numbers of fishers were in the 45-59 years age group. Participation rates for age groups between 15 and 59 years were generally similar at around 26% but declined sharply in the 60 years plus age group to around 15%.

Catch and effort

Recreational fishing activity of responding diarists was monitored in detail between December 2017 and November 2018 and results expanded to represent the private dwelling resident population of Tasmania. Just over 90,000 Tasmanians were estimated to have fished in Tasmania during this period, 15% fewer persons when compared to that estimated for the previous 12 months. This lower participation was influenced by the higher proportion of potential fishers who reported no fishing during the diary period (*drop-outs*) compared with the number of persons who unexpectedly went fishing (*drop-ins*).

During the 12-month survey period recreational fishers accounted for about 474,500 person days of effort, with an average of 5.3 days per fisher. At the individual level, the majority fished for only a few days (< 5 days) whereas a small proportion of particularly keen or avid fishers contributed disproportionately to the total effort (and catch). For instance, it was estimated that just 20% of fishers accounted for more than half (55%) of the total fishing effort.

During the survey period the vast majority (88%) of recreational fishers fished at least once in saltwater while one in four fished at least once in freshwater. Overall, saltwater fishing represented 75% of the total fishing effort (fisher days) while fishing in freshwater accounted for the remaining 25%. Freshwater fishing in lakes and dams accounted for about double the effort in rivers while most of the saltwater fishing occurred in inshore coastal waters, with estuarine fishing of secondary importance. Offshore fishing (>5 km off the coast) was a minor component of the fishery.

Line fishing was the dominant activity undertaken, representing 420,000 fisher days (88% of total) or 1.3 million fisher-hours of effort. This was followed by pot fishing (8%), dive harvesting (4%) and the use of gillnets (1%). A range of other fishing methods were also reported, including the use of spears, set-lines, seine or bait nets and hand collection, but these were of minor importance by comparison.

A wide variety of fish species were caught by recreational fishers, with an estimated 1.10 million finfish (excluding small baitfish) retained and 1.35 million finfish released or discarded. Flathead (predominantly Southern Sand Flathead) represented 68% of the total finfish catch by number, with an estimated 733,000 kept and 948,000 released. Other finfish species or species groups of significance included Trout (86,000 kept and 120,000 released), Australian Salmon (80,600 kept and 49,000 released), Gurnards (21,400 kept and 77,800 released) and Wrasse (8,000 kept and 32,000 released).

Overall, 55% of all finfish captured were released or discarded; with low release rates (<10%) for species such as Flounder, Striped Trumpeter and Jackass Morwong; intermediate rates (10-30%) for Pike, Redfin and Tunas; moderate rates (31-50%) for Leatherjacket, Silver Trevally, Mullet, Whiting, Australian Salmon, and Cod; and high rates (>50%) for Trout, Black Bream, Flathead, Bastard Trumpeter, Wrasse, Gurnard and sharks and rays. Reasons for release were varied, with size (under legal size or "too small") being an important factor for species such as Flathead, Bastard Trumpeter, Whiting, Australian Salmon, and Silver Trevally; poor eating qualities were identified as important factors for release for Marblefish, Pike, Cod, Gurnard and Wrasse; while catch and release (sport) fishing was important for Trout and Atlantic Salmon. Sharks, skates and rays tended to be released or discarded because of poor eating qualities and/or due to regulations preventing the taking of sharks from specified areas (i.e. Shark Refuge Areas).

Recreational fishers also caught a variety of shellfish and other invertebrate species. Comparatively high catches of squid, namely Southern Calamari (41,500 kept) and Gould's Squid (47,500 kept), were taken along with Rock Lobster (43,000 kept), Abalone (34,000 kept) and scallops (130,000 kept). Amongst these taxa, rates of release were low for squid, scallops and Abalone and moderate for Rock Lobster.

Estimated harvest weights for key species were compared with commercial fisheries production. The annual recreational harvest of Sand Flathead was estimated at 184 tonnes, about fifty times greater than the commercial Sand Flathead catch taken from state fishing waters. By contrast, the catch of Tiger Flathead, estimated at about 15 tonnes, was less than half the size of the Tasmanian commercial catch. By weight, other species of importance included Australian Salmon (35 tonnes), Striped Trumpeter (29 tonnes), Southern Calamari (31 tonnes), and Gould's Squid (24 tonnes). As a contributor to total harvest for key species from Tasmanian waters, the share taken by

the recreational sector during 2017-18 was similar to or larger than that taken by the Tasmanian commercial scalefish fishery for Flathead (species combined), Barracouta, Flounder, Mullet, Cod, Jackass Morwong, Bastard Trumpeter and Striped Trumpeter. By contrast, the recreational harvest represented a minor component (<10%) of the total catch for species such as Whiting, Garfish, Wrasse, Banded Morwong and Gould's Squid.

Catch and effort data for the key species was examined in detail (by region, method, platform, water body and seasonality) and regional fisheries characterised (effort by where fishers resided, effort by method, and catch composition). The waters of south-eastern Tasmania represent a particularly significant area for catches of Flathead, Australian Salmon, Flounder, Black Bream, Tuna, Gould's Squid, Southern Calamari, Rock Lobster and Abalone. Apart from Flounder, these species were also important components of the fishery off eastern Tasmania. Species of significance off northern Tasmania included Australian Salmon, Flathead, Mullet, Flounder, Gould's Squid, Southern Calamari, Rock Lobster and Abalone, while Australian Salmon and Rock Lobster were key west coast species. The inland fishery for Trout was largely concentrated in the Western and Central Plateau lakes regions, with catches from rivers of secondary importance.

Expenditure

Recreational fishers were estimated to have spent $161 million on goods and services relevant to fishing in Tasmania during 2017-18, equivalent to almost $1800 per active fisher. Direct expenditure on boats and trailers accounted for a third of the total spend.

Fisher motivations, attitudes and awareness

For most fishers, non-catch motives relating to relaxation, socialising and environment were perceived to be more important than catching and consuming fish. Consistent with this observation and in the context of the degree to which fishers value the catch related aspects of the fishing experience, there was strong agreement that fishing trips could be satisfying regardless of whether any fish were caught. This does not imply that catch related aspects (including consumption) are unimportant, but rather that fishers derive benefits from the fishing experience that are unrelated to catching fish.

Although most fishers indicated general satisfaction with the management of recreational fishing, there has been a gradual decrease in satisfaction and increase in the proportion of fishers indicating dissatisfaction with management over the past decade. Fisher perceptions about the quality of key regional fisheries suggested that those in the north of the state, e.g. Port Sorell and Georges Bay, had either improved over the past 3-5 years or were unchanged. By contrast, in the south of the state areas such as the D'Entrecasteaux Channel, Great Oyster Bay and Norfolk-Frederick Henry Bay were rated as the poorest performing of the marine fisheries. Apart from Arthurs Lake, the quality of most freshwater fisheries were rated quiet favourably, with Penstock Lagoon and the Brady's/Binney/Tungatinah Lakes complex amongst the best performing.

In obtaining information about fishing regulations, other fishers/friends emerged as the most commonly cited information source, followed by government publications and websites, each considered reliable sources of information. There was a high level of

awareness of many of the traditional information products (printed fishing guides, rulers) produced by government agencies, with only moderate awareness of smart phone fishing apps. Awareness of these apps was, however, higher than in 2013, indicating growing recognition and support for these platforms.

There was a slight decline in awareness of the Fishcare Program which up until 2013 had been growing, this was accompanied by a fall in the proportion of respondents who had had direct contract with the program. Overall awareness of the peak fishing representative bodies was moderate amongst the relevant fisher groups, with an underlying trend of increasing awareness of TARFish.

Opinions on the continued use of recreational gillnets were polarised, with 45% of respondents opposed, 31% in favour and 24% unsure. Although opposition to the method has risen over the past two decades (from 36% in 2001) there continues to be a reasonable level of support (or uncertainty) from within the sector. Concerns about excessive catches, by-catch and wastage were amongst the main reasons provided for opposing gillnet usage.

Recreational fishery since 2000

Since 2000 there have been some notable changes in the Tasmanian recreational fishery. The most conspicuous has been a general decline in participation, both in absolute and relative terms (i.e. percentage of population). Fisher numbers have declined from around 125,000 in 2000 to 106,000 in 2017, a fall in participation rate from 29% in 2000 to 24% in 2017. Much of this change has been driven by changing demography, in particular the 'aging population' that is due to the large cohort of so-called 'baby boomers'. For example, the number of Tasmanians aged 60 years or older has increased from about 78,000 in 2000 to about 122,000 in 2017, an increase from 18.3 to 27.5% of the population. Significantly, participation rates in this age group are substantially lower (about half) that for the younger age groups. Coupled with this, has been a general decline in participation rates in each of the age groups under 45 years of age.

Linked to changing participation has been a general decline in fishing effort since 2000-01; total fisher days have fallen from 0.75 million in 2000-01 to 0.47 million in 2017-18. Effort levels have declined for both freshwater and saltwater fishing, this decline being more marked for shore-based than for boat-based fishing activities. Between 2000-01 and 2012-13 there was a steady decline in effort in most coastal regions. By comparison with 2012-13, effort in 2017-18 was comparable or even slightly higher in the north coast regions (apart from the Tamar), the East Coast, D'Entrecasteaux Channel and Norfolk-Frederick Henry Bay regions. The most conspicuous declines have occurred off the West, Central East and South East Coasts and in the two major estuaries (Tamar and Derwent).

Overall, finfish catches (kept plus released) in 2017-18 were slightly lower (93%) than in 2012-13 and about 70% of 2000-01 levels While the catch composition and relative importance of the key species has been consistent over time, catch levels have varied for many species, linked in part to differences in effort and changes in fishing practices and species availability. Species for which 2017-18 catches were higher to those reported in 2012-13 included Trout, Leatherjacket, Gurnard, Whiting, Silver Trevally

and Gould's Squid. Flathead and Trumpeters catches were comparable between the two recent surveys whereas catches of Australian Salmon, Barracouta, Black Bream, Cod, Flounder, Mullet, Wrasse and Southern Calamari were considerably lower in 2017-18.

One of the more conspicuous developments in the recreational fishery over the past two decades has been the growth in the fishery for Southern Calamari. Much of this growth has been around increased awareness of the species and its eating qualities. Despite this growth, the lower catch taken during 2017-18 is consistent with a sharp decline in commercial catch in same period and is likely related to reduced availability of the species in that year rather than indicating a decline in recreational interest.

Although the current survey does not represent Rock Lobster and Abalone catches as well as targeted surveys, the general trend of declining catches is consistent with that based on the targeted surveys, and reflects a combination of factors, including changing stock status and recent management changes. In relation to Blue Warehou, Bastard Trumpeter, and Mullet, a significant reduction in recreational gillnet effort, along with lower abundances of Blue Warehou and Bastard Trumpeter (classified as depleted stocks) represent key factors in the decline in catches.

Recreational fishers are generally becoming more conscious of the need for resource conservation and ethical fishing practices. Voluntary catch and release fishing is a manifestation of this, as has the implementation (and acceptance) of size and bag limits. Release rates in 2017-18 were typically higher than in 2000-01 but comparable to those reported since 2007-08 for most species. Flathead and Trout are notable exceptions, with substantially higher release rates in 2017-18, the former influenced by a recent increase in minimum size limit and the latter by growing interest in catch and release fishing.

In conclusion, this study highlights the complex and dynamic nature of the recreational fishery and emphasises the need to consider management and research at appropriate regional and temporal scales.

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1. INTRODUCTION

With growing awareness of the significance of recreational fishing in the early 1990s, a national policy for recreational fishing was developed in Australia. The policy was released in 1994 and endorsed the principle that 'fisheries management decisions should be based on sound information including fish biology, fishing activity, catches and economic and social values of recreational fishing' (NRFWG, 1994). The policy recommended that a national survey of recreational fishing be undertaken once every five years. Recognition was also given to public concern over the poor quality of data on recreational fishing.

Following extensive consultation and development phases, the Commonwealth, state and territory fisheries agencies implemented the National Recreational Fishing Survey (NRFS) in 2000. The principal objectives of the NRFS were to determine participation rates in recreational fishing; profile the demographic characteristics of recreational fishers; quantify recreational catch and effort; collect data on expenditure by the recreational sector; and establish attitudes and awareness of recreational fishers to issues relevant to the fishery (Henry and Lyle, 2003).

The NRFS was implemented as a series of state-wide surveys using a common methodology, having the advantage of providing comparable information Australia-wide as well as including the activity of interstate visiting fishers. In addition to nationally aggregated information, Henry and Lyle (2003) provided summary statistics for each of the states and territories. In Tasmania it was established that the rate of recreational fishing participation was higher (29.5%) than the national average (19.5%), the average number of days fished per fisher (6.5 days per year) was slightly higher than the national average (6.1 days per year) while the average annual expenditure per fisher[1] was lower than the national average ($416 compared with $552). Lyle (2005) provided a more in-depth analysis of the NRFS dataset as it pertained to Tasmania, examining the data at a regional level, for key species and by fishing methods. Following improvements to the statistical analyses of the survey data (Lyle *et al.*, 2010), the data from 2000-01 were re-analysed to include only the activity of Tasmanian residents (Lyle *et al.*, 2009). The 2000-01 survey represents an important benchmark against which future trends in participation, catch and effort can be measured.

Prior to the NRFS, only limited information was available about recreational fishing in Tasmania. In 1983 an Australian Bureau of Statistics (ABS) household survey provided some general statistics on recreational fishing but no estimates of catch or effort (ABS, 1984). At that time about one third of all persons aged 15 or older were engaged in some form of recreational fishing activity. A subsequent survey of home food production estimated home seafood 'production' for the year ending April 1992 at over 1000 tonnes for finfish (including Trout), 60 tonnes for Rock Lobster and 25 tonnes for Abalone (ABS, 1994).

[1] Based on attributed expenditure on selected recreational fishing-related items (refer Henry and Lyle, 2003).

In the absence of plans to repeat a national survey, the Tasmania government committed to undertake regular state-wide recreational fishing surveys, the first of which was undertaken in 2007-08 (Lyle *et al*., 2009), followed by a survey in 2012-13 (Lyle *et al*., 2014). The surveys have used essentially the same methodology developed for the national survey, enabling valid comparisons to be made with information collected in 2000-01. Key findings of the surveys have included a decline in participation both in terms of numbers of fishers and participation rate (proportion of population) which seemed to be linked to changing population demographics, specifically an aging population. Notwithstanding this, recreational fishing remains a very popular and significant activity amongst Tasmanians and, for several species, the recreational catch is comparable, if not larger, in size than catches taken by the commercial sector in Tasmania. The surveys have highlighted several changes over time, for instance the growing recreational interest in Southern Calamari and Black Bream as well as the dominance of Southern Sand Flathead in the saltwater fishery and Brown Trout in the freshwater fishery.

State-wide surveys provide 'big-picture' information on recreational fishing catch and effort. It is recognised, however, that more targeted or focussed surveys are also required to provide greater precision for specialised or localised activities such as fishing for Rock Lobster, game fishing, gillnetting, etc. In this regard there have been a number of studies conducted in Tasmania that complement general fishing surveys. Amongst the earliest of these included surveys of charter boat fishery (Smith, 1994; Evans, 1995), the inland trout fishery (Davies, 1995) and licensed marine recreational fishing activities (Lyle and Smith, 1998; Lyle, 2000). Since 2000 there have been regular surveys of the rock lobster and abalone fisheries (e.g. Lyle, 2018; Lyle *et al*., 2019), gillnet fishery (Lyle and Tracey, 2012a), set-line fishery (Lyle and Tracey, 2012b), scallop fishery (Tracey and Lyle, 2011), and gamefish and offshore fisheries (Morton and Lyle, 2003; Forbes *et al*., 2009; Tracey *et al*., 2013) which, together with general fishing surveys, have contributed to a greater understanding of the significance of recreational fishing in Tasmania.

The present study represents the fourth state-wide assessment of recreational fishing and seeks to provide not only a snapshot of participation, catch, effort and economic activity but also examine trends in the fishery that will assist in the on-going management and development needs of the fishery.

2. METHODS

Primary data collection was based on a telephone-diary survey method. This is an off-site methodology developed to provide cost-effective data over large spatial scales, in this case for the entire state. A detailed description of the telephone-diary design philosophy and methodology is provided in Lyle *et al*. (2002a) and Henry and Lyle (2003). Data analysis procedures are described in detail by Lyle *et al.* (2010) and have been undertaken using the statistical computing language R (R Development Core Team, 2018). An overview of the survey methodology and data analysis is provided below.

2.1 Survey scope

The surveyed population encompassed the resident private-dwelling (PD) population of Tasmania, aged five years and older. The survey was designed to capture information on their recreational fishing activity and in this context, recreational fishing is defined broadly as the capture or attempted capture of aquatic animals in all Tasmanian waters (freshwater, estuarine or marine) other than for commercial purposes. All recreational fishing techniques and harvesting activities, including dive and hand collection, the use of pots, nets and spears in addition to line fishing, were considered in-scope.

In contrast to the 2000-01 survey, but consistent with the 2007/08 and 2012/13 surveys, fishing activities by non-Tasmanian residents in Tasmania and fishing by Tasmanians in other states of Australia was considered out-of-scope.

2.2 Survey methodology

The telephone-diary methodology involved a two-phase design, the principal components being an initial screening phase to gather profiling information from a sample of the population and a subsequent, intensive phase, in which respondents provided detailed catch and effort information over a predefined survey period. In this second phase, effectively a longitudinal panel survey, respondents were encouraged to use a simple diary to record key fishing data and were contacted regularly by survey interviewers who were responsible for collecting this information. The underlying design philosophy is focussed on minimising respondent burden and maximising response and data quality.

Additional survey components included call-backs of non-intending fishers, and a survey of expenditure, fisher motivations, awareness and attitudes. The non-intending fisher call-backs involved a sample of households that had indicated at screening that none of the residents were likely to do any recreational fishing during the diary period. This component was designed to identify and account for ‘unexpected fishing’ that may have occurred during the diary period. Expenditure, motivation, awareness and attitudes to fishing-related matters was assessed for diary participants at the end of the diary period in a ‘wash-up’ survey.

2.2.1 Screening survey

The primary role of the screening interview was to collect profiling information for all household members as well as establish eligibility to participate in the follow-up diary phase. Profiling information was important not only to characterise the sample population but also to examine issues relating to representation and response biases.

The screening survey was administered as a structured interview by telephone on a sample of Tasmanian private dwelling (PD) households. A regionally stratified, random sample of phone numbers was drawn from the SamplePages database. At the time of drawing the survey sample, the SamplePages database included more than 161,000 Tasmanian household phone numbers (equivalent to 81% of residences). As suburb of residence was associated with each telephone number it was possible to assign each phone number to an Australian Bureau of Statistics (ABS) statistical area in accordance with the Australian Statistical Geography Standard (ASGS) (Pink, 2011).

Stratified random sampling was undertaken at the Statistical Area Level 4 (SA4) scale; the four Tasmania SA4s are Hobart, South East, Launceston and North East, and West and North West (Fig. 1). A higher sampling rate was applied for the South East, lower but equal sampling rates were applied to the each of the other three statistical areas. Within each SA4, care was taken to ensure that the proportional breakdown of the sample at the smaller SA3 level did not differ significantly to the known proportions of private dwellings based on available ABS data[2]. Mobiles accounted for 25% of the selected phone numbers.

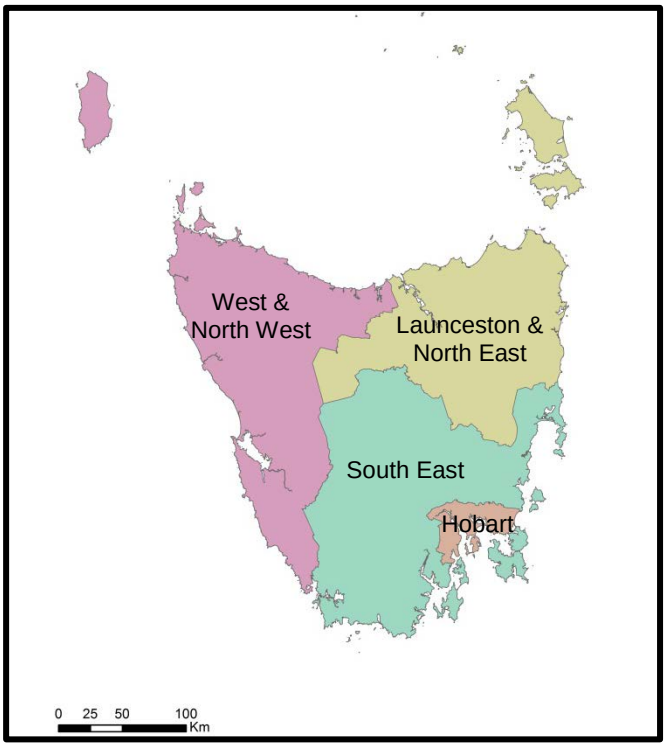


Fig. 1. Map of Tasmania showing ABS Statistical Areas (colour coded) used for sample stratification.

The screening survey was conducted between September and December 2018 by a market research company. In order to minimise non-contacts, up to 10 calls were made to each live telephone number. Disconnected numbers, business and facsimile numbers were treated as sample loss and not replaced.

[2] SA4s are built from whole SA3s, each Tasmanian SA4 comprises of between 3-6 SA3s.

Within each responding household, the demographic profile (age group and gender) of all usual residents, involvement in recreational fishing over the previous 12 months and likelihood (expectation) of doing any recreational fishing in the following 12 months for residents aged five years or older was established. All respondents who had fished during the 12 months prior to interview were asked whether they had fished in fresh and/or saltwater, whether they had fished interstate and to estimate how many days they had fished in the previous 12 months. This latter detail was used as an index of avidity rather than a direct or reliable measure of prior fishing activity. Fishers were broadly classified as infrequent (1-4 days), occasional (5-14 days) and regular (15 plus days) based on the number of days reported. Previous and intending fishers were also asked whether they were members of fishing clubs or associations. Boat ownership was also established for all households, regardless of whether they contained fishers or not.

All households in which at least one member (regardless of prior fishing history) expressed a likelihood of fishing during the following 12 months were considered eligible for the diary phase of the study.

2.2.2 Diary survey

All households identified as eligible for the diary survey were invited to participate in this phase of the study. For households that agreed to participate, fishing activity of each household member aged five years and older was monitored between December 2017 and November 2018, inclusive.

The approach taken in this survey differs to conventional angler diary surveys in two important ways. First, the diary is employed more as a 'memory jogger' than a logbook and second, responsibility for data collection rests with the survey interviewers and not the diarists. Typically, diary survey response rates are low and data quality can suffer in terms of completeness, generality and consistency. Since the burden of maintaining the diary rests with the respondent, instructions may be misinterpreted, and data may be incomplete or ambiguous. The need to periodically remind respondents to submit documentation creates a further problem, whereby information that has not been diarised must be collected based on recall, if at all.

By contrast, the telephone-diary approach applied here effectively transfers the burden of data collection from the respondent to the survey interviewer. Data collection is undertaken by brief telephone interview in which trained interviewers record details of any fishing that has occurred since the last contact. The level of fishing activity determines the frequency of such contact but, as a general rule, respondents are called at least once a month even if no fishing is planned.

After receiving the diary kit which included the diary, a colour species identification guide to common Tasmanian species and survey cover letter, data requirements were explained to respondents in a brief interview and the next contact arranged. Respondents were encouraged to record basic information in their diaries, such as trip date, fishing location, start and finish times, and catch and release numbers of each species encountered. More detailed information, such as target species, fishing method, platform (boat or shore), water body type (river, lake, estuary, coastal, offshore, etc), and reason(s) for release were collected for each individual fishing event and recorded during the interviews. By maintaining regular contact, usually within a couple of weeks of any

fishing activity, details of any non-diarised fishing could be obtained with minimal concern in relation to recall bias. Furthermore, interviewers were able to immediately clarify ambiguities and ensure completeness of information. This in turn, provided for greater data utility, for example fishing effort could be apportioned between target fisheries, methods, fishing platform, and so on.

2.2.3 Non-intending fisher call-backs

The objective of the call-backs was to account for those persons who may have unexpectedly 'dropped-in' to the fishery, providing symmetry for those persons who unexpectedly 'dropped-out' of the fishery; the latter group being identified as diarists who, despite indicating an expectation to fish, did no fishing during the diary period.

For this survey component a random sample of households which, at screening, had indicated no likelihood to go fishing during the diary period (i.e. not eligible for the diary survey) was re-contacted close to the end of the diary period (September-October 2018). Whether fishing had occurred during the diary period by any member of the household (five years or older) was established in a brief telephone interview, with particular care to identify whether there had been a change in household (e.g. re-allocated telephone number) and that household members were the same as those at screening. Further details were collected from those households in which fishing was reported, including demographic profile (age group and gender), whether individual members had fished in Tasmania and/or interstate, in salt and/or freshwater, and number of days fished during the 12 months of the diary period. Respondents who were identified as not being residents of the household at the time of screening were excluded from the analysis.

2.2.4 Wash-up survey

At the end of the diary survey, diarists were offered a structured questionnaire seeking information about motives, attitudes and experiences to do with recreational fishing as well as collecting household expenditure information related to fishing activities undertaken during the diary period. The survey was administered by telephone and was conducted between December 2018 and February 2019.

The wash-up questionnaire comprised three sections. The first section sought confirmation that fishing information recorded on the database for each household member was complete (days fished reported during the diary period) along with reasons for any changes in fishing activity levels compared to the 12 months prior to the diary period (constraints or opportunities). The second section collected details of household fishing-related expenditure incurred by households in which at least one member had fished during the diary period. The third section examined motivations, attitudes and awareness of a selected household member, typically the main fisher or diary reporter, to issues relevant to the recreational fishery. This survey was conducted with respondents aged 18 years and older; an abbreviated interview confirming fishing information was conducted where the only recreational fisher was less than 18 years old.

2.3 Regions

2.3.1 Sampling strata

Initial household selection (i.e. telephone number) was based on stratified random sample design using the ASGS SA4 regions as strata (Fig. 1). In describing household and population characteristics data have been analysed at stratum and state-wide levels.

2.3.2 Fishing regions

During the diary survey, interviewers classified the location of each fishing activity (event) into one of 23 fishing regions, these regions were consistent with those used in the NRFS (Lyle, 2005). The reported fishing location was also recorded in the database, both to validate the allocated fishing region and to provide added flexibility in future analyses.

For reporting purposes, it has been necessary to collapse some regions to ensure that a minimum of 125 fishing events (i.e. raw unexpanded data) occurred in each reporting region. The fishing regions used for data reporting include inland, selected estuarine, and coastal regions as indicated in Fig. 2. There were, however, two cases where the sample sizes were lower, namely the West Coast and Derwent Estuary. Nonetheless these regions have been maintained for spatial reporting of fishing activity.

Other fishing location information was also collected in the diary survey based on water-body type: marine waters > or < 5kms from the coastline; estuarine waters; freshwater rivers; and freshwater lakes/dams (public or private).

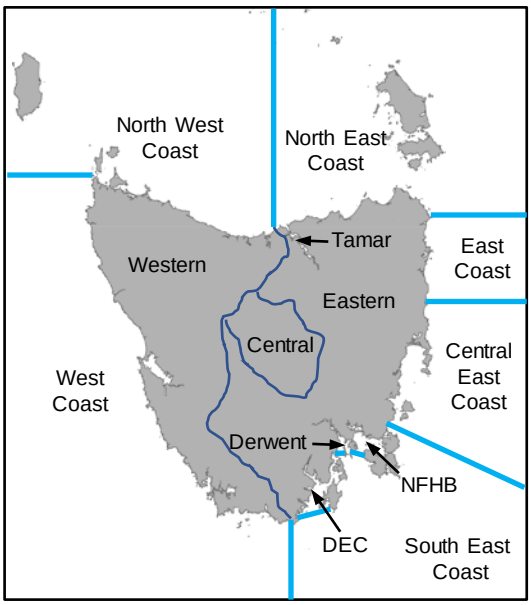


Fig. 2 Map of Tasmania showing analysis regions used for reporting fishing activities. NFHB Norfolk and Frederick Henry bays; DEC D'Entrecasteaux Channel**.**

2.4 Fishing effort

Fishing information was collected on an 'event' basis, where an event was defined as a discrete fishing episode by one or more household member. Separate fishing events were defined if there was a change in fishing region or water body type, target species and/or fishing method. In this way a day's fishing trip could comprise more than one event; for instance, fishers may set a pot for Rock Lobster and then go line fishing for Flathead. Each of these activities were considered separate events since potting effort and any capture of Rock Lobster cannot be attributed to the capture of Flathead, and vice versa. The delineation of fishing activity in this manner provided an ability to analyse effort (and catch) based on fishing method and target species/fishery. Furthermore, three measures of effort could be defined, namely fisher days (i.e. separate days on which some form of fishing was undertaken by a fisher), fishing events, and hours fished.

It should be noted that person-based effort has been calculated for this report. For active fishing methods such as line fishing and dive harvesting this is clearly appropriate, but where shared or joint activities occurred, such as fishing with pots or using graball nets, this can over estimate effort. In such instances, effort was calculated as the number of pots/nets used divided by the number of persons who participated in the fishing activity on a given day, providing an effort measure of the number of person pot/net days of effort.

2.5 Fishing methods

A variety of fishing/harvesting methods were identified by diarists but for the purposes of analysis the following reporting categories have been defined: line fishing (bait and/or lure/jig/fly); lobster pot; gillnet (graball and/or mullet net); dive collection (includes underwater spearfishing and hand collection), and other methods (including use of set-lines, surface spearing, lobster rings, beach seine, dip nets, cast nets, bait nets and hand collection). Grouping of the minor fishing methods in this way ensured that there were more than 80 events reported for each method category.

2.6 Catch

A Species Identification Guide including clear colour images was provided to all diarists to optimise the accuracy of species identification in the survey. A key factor here is that the resolution required for individual species must recognise the identification capabilities of fishers, on a lowest-common-denominator basis. Although excellent reporting precision can be achieved at the species level in some instances (confirmed through on-site surveys - Lyle and Campbell, 1999; Lyle *et al*., 2002b), species groupings were required where fishers could not reasonably be expected to delineate species, even with the aid of the identification booklets. For example, iconic species such as Striped Trumpeter were readily recognisable whereas identification to species level for the flounders (i.e. Greenback Flounder or Longsnout Flounder) was less certain, even though flounders could be readily distinguished from other groups of fish.

For the purpose of reporting catches, species (e.g. Australian Salmon, Black Bream) or taxonomic groupings (e.g. Gurnards, Flounder) have been used in most instances. Nonetheless, several species or species groups were represented by very few records and thus it was necessary to pool these into broader taxonomic categories for analysis (e.g.

'sharks and rays', 'other scalefish'). A listing of taxa reported in catches and the catch analysis groupings are provided in Appendix 1.

Catches were reported as numbers of individuals kept (harvested) and numbers released or discarded by species. In a small number of instances, respondents reported catches of small and generally abundant baitfish (e.g. Whitebait) in units of weight or volume.

2.7 Data analysis

2.7.1 Data expansion

Data analysis was based on a stratified random survey design using single stage cluster sampling, with the private dwelling household representing the primary sampling unit (PSU) and residents within the household the secondary sampling unit (SSU). In determining household and individual expansion factors (to expand catch and effort estimates from the sample to the resident population), an integrated approach was applied that adjusted for non-response and calibrated against population benchmarks (Lyle *et al*., 2010). Adjustment for non-response at screening was based on fishing propensity determined amongst households that refused to complete the screening interview but answered the question about whether household members had fished in the previous 12 months. Calibration against ABS estimated resident population (ERP) data for Tasmania as at July 2017 and adjusted for the proportion of people in occupied private dwellings (OPDs) was implemented taking account of household size and demographics (Appendix 2). Using diary phase uptake and completion rates for eligible households, further non-response adjustment was applied to expansion factors in calculating catch and effort information. This adjustment was made sensitive to the avidity classification for the household (the maximum avidity index for any member of the household as determined at screening) and region of residence (stratum).

Not all eligible fishers fished during the diary period and these in effect represented unexpected 'drop-outs' from the fishery. In order to account for unexpected 'drop-ins' to the fishery, a final adjustment was necessary and was based on the non-intending fisher call-back survey. This adjustment was made sensitive to the avidity index reported for 'drop-ins' and region of residence (stratum). A full account of the analytical process is provided by Lyle *et al.* (2010).

Unless otherwise indicated, parameter estimates provided in this report are based on expanded data, scaled-up to represent the *resident PD population of Tasmania* rather than the sample from which they were derived.

2.7.2 Statistical uncertainty

A consequence of surveying a sub-sample rather than the entire population of fishers is that all parameter estimates have some statistical uncertainty and estimates may differ from those that would have been produced had the entire population been surveyed. This uncertainty can be expressed in terms of standard error (SE), which indicates the extent to which the estimate might have varied from the true population value due to chance. There are about two chances in three (67%) that sample estimates will vary by less than one SE and about 19 chances in 20 (95%) that the difference from the true population value will be less than two SEs. It should be noted that as survey data are disaggregated, for example by region or method, SEs expressed as a percentage of the estimate (known

as relative standard error or RSE) will increase and there may become a point where the disaggregated estimates become unreliable because of excessively large variance.

When interpreting survey estimates, consideration needs to be given to: a) the magnitude of the RSE and b) the actual number of households that contributed records to the estimate. *Estimates with RSEs of 40% or greater (implying a 95% confidence range of ± 80%) have been highlighted and are regarded as imprecise. Estimates derived from records involving fewer than 30 households have also been highlighted since they may be particularly influenced by the activities of very few fishers and hence may not be representative.*

2.7.3 Wash-up survey analysis

In order to examine how demographics and experience influenced responses, respondents were stratified by four grouping factors: age (18-29 years, 30-44 years, 45-59 years and 60 years and older); residence (ASGS areas - Hobart, South East, Launceston and North East, and West and North West); avidity (days fished during 2017-18 – 0 days, 1-4 days, 5-9 days, 10-14 days, and 15 or more days); and water body fished (none, saltwater only, freshwater only, both fresh and saltwater). Age and residence were based on information provided in the screening phase, avidity and water body fished were based on information provided by respondents during the diary survey.

The effect of each of the grouping factors on responses to questions was explored with Kruskal-Wallis tests using the 'kruskal.test' function in base R. When significant differences were identified, post-hoc pairwise comparisons were made with the Mann-Whitney test using the 'pairwise.wilcox.test' function in base R with alpha values corrected for multiple pairwise comparisons with the Benjamini and Yekutieli method (Benjamini and Yekutieli, 2001). Level of statistical significance was set at $\alpha = 0.05$.

Responses to motivation and consumptive orientation questions were also compared with those obtained from previous general fisher surveys conducted in 2001 and 2008 (Frijlink and Lyle, 2010) and 2013 (Lyle *et al*., 2014).

3. SAMPLE AND RESPONSE PROFILES

3.1 Screening survey

Table 1 provides a summary of the number of occupied private-dwelling households in Tasmania as at July 2017 (modified from ABS ERP and Census data), sampling details and the response profile relating to the screening survey. Since sampling was undertaken without replacement for sample loss (e.g. disconnected numbers, non-private dwellings including businesses, nursing homes, etc), the gross sample was reduced from 7000 to 6712, of which 3010 households (48.5%) fully responded to the screening survey. Response rates were generally consistent across all sampling strata. Overall, demographic profiling information was collected from 6599 persons aged five years or older.

Non-response was due to refusals (28.7% overall), non-contacts (26.2%) and other non-response (0.1%), such as language or communication difficulties. Within the refusal group, there were 258 partial refusals (where at least the substantive question relating to previous household fishing was answered), the remainder were full refusals where no information was provided. For the vast majority of these full refusals, respondents refused or simply hung up before any introductions or background to the survey were provided, suggesting the reason for the refusal was unrelated to the subject matter (fishing). Partial refusals, on the other hand, had been made aware of the subject matter and this regard could be assessed for potential subject (fishing) response bias, which can be corrected for as part of the weighting process outlined in Section 2.7. As for most of the full refusals, no inferences about potential subject matter bias can be made from non-contacted households. Declining response to unsolicited phone calls and unfamiliar phone numbers through call-screening or hang-ups, represents a growing challenge in Australia and internationally when conducting telephone-based surveys.

Table 1 Tasmanian private dwelling population (number of households), survey sample size, and responses to the screening survey by stratum

Net sample- initial sample less sample loss

Statistical Area Level 4	Households	Initial sample	Net sample	Response	Refusals	Non-contact	Other non-response	% response
Hobart	86,580	2,876	2,744	1,185	790	764	5	43.2
South East	14,448	874	840	414	230	196		49.3
Launceston & North East	54,723	1,822	1,751	810	494	446	1	46.3
West & North West	43,057	1,437	1,377	601	417	355	4	43.6
Total	198,808	7,000	6,712	3,010	1,931	1,761	10	44.8

3.2 Diary survey

Table 2 summarises response details as they related to the diary survey. Of those households identified at screening as having at least one resident with an intention to do some recreational fishing during the diary period (December 2017 to November 2018), 60% fully responded to the diary survey. In total, 584 Tasmanian households,

representing 1491 persons aged five years and older, completed the diary survey, with response rates consistent across all strata. Fully responding households reported a total of 5187 fishing events.

Based on households which initially agreed to take part in the diary survey (748), the effective diary completion rate was 78.1%. Similar diary completion rates were achieved in the previous state-wide fishing surveys (Lyle, 2005; Lyle *et al*., 2009, 2014).

Table 2. Diary survey response profile by stratum

Statistical area Level 4	Eligible households	Completed diary	% response
Hobart	333	195	58.6
South East	190	117	61.6
Launceston & North East	252	149	59.1
West & North West	197	123	62.4
Total	972	584	60.1

By comparison with other general population surveys and traditional mail-back diary studies, the response rates achieved in all components of this study are high and represent an important performance metric in terms of the efficacy of the survey instrument.

3.3 Non-intending fishery call-backs

Response rates for the non-intending fisher call-backs are presented in Table 3. Approximately 75% of the 2038 households that indicated no intention to go fishing during the diary period were selected at random to be followed up at the end of the diary period to ascertain whether any unexpected fishing had occurred. When sample loss (disconnected numbers) was considered, an overall response rate of about 82% was achieved for this segment of the study, with consistently high response rates for each of the strata. Within the response group, 12 (1%) were established to represent different households to those at the time of screening and thus excluded, and 54 (<5%) reported that at least one member had done some ('unexpected') fishing during the diary period.

Table 3. Response profile (household) to the non-intending fisher call-back survey by stratum

Statistical area Level 4	Initial sample	Net sample	Response	Refusals	Non-contact	Other non-response	% response
Hobart	637	587	494	52	40	1	84.2
South East	168	160	134	13	13		83.8
Launceston & North East	416	376	304	31	41		80.9
West & North West	303	283	226	23	33	1	79.9
Total	1,524	1,406	1,158	119	127	2	82.4

3.4 Wash-up survey

Out of the 584 diarist households, 503 (86%) completed the wash-up survey, 42 (7.2%) were non-contacts and 39 (6.7%) represented some form of non-response (predominantly partially completed interviews).

4. FISHER CHARACTERISTICS

The following analyses are based on information derived from the screening survey and are expanded, with non-response adjustments, to represent the resident private dwelling population of Tasmania aged five years or older.

4.1 Participation rates

The screening survey established that an estimated 106,192 (SE ± 3945) Tasmanian residents aged five years or older fished in Tasmania at least once in the 12 months prior to October 2017, representing a participation rate (proportion of resident population) of 23.8% (SE 0.9%) (Appendix 3). Inclusion of Tasmanians who only fished in other states of Australia during that period brought the total number of recreational fishers to 107,533 (SE 3996) or 24.1% (SE 0.9%) of the resident population. Unless stated otherwise, subsequent analyses exclude those residents who fished exclusively outside of Tasmania.

About 40% of fishers resided in the Hobart area, 27% in the Launceston and North East, 23% in the West and North West and 10% in the South East statistical areas (Fig. 3A). Apart from the South East where 31.2% of the population engaged in some form of recreational fishing, regional participation rates were relatively consistent, ranging between 21.9 – 25.5% (Fig. 3B).

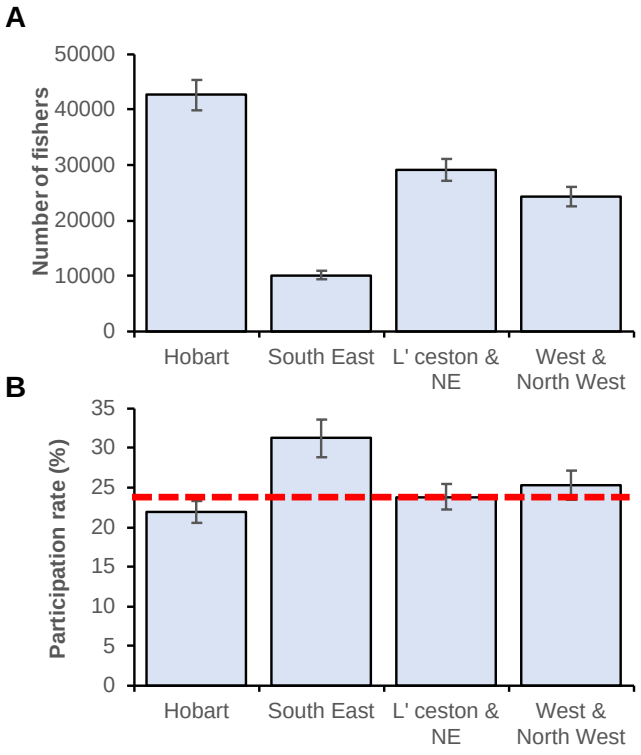


Fig. 3. Recreational fishing participation in Tasmania during the 12 months prior to October 2017 by region of residence for persons aged five years or older: A) Number of persons; and B) proportion of the resident population. Error bars represent one standard error and the dotted line represents the overall participation rate.

4.2 Age and gender

Recreational fishing was more popular among males, with 32.5% (SE 1.2%) of males and 15.4% (SE 0.9%) of females aged five years or older having fished in Tasmania during the 12 months prior to October 2017 (Appendix 4). By numbers, over twice as many males (71,330; SE 2582) than females (34,862; SE 1999) did some form of recreational fishing.

The prominence of males involved in fishing was evident across all age groups (Fig. 4) and by region of residence (Appendix 4). The number of persons (both males and females) who fished generally increased with age up until 45 – 59 years, after which numbers declined quite markedly in the oldest age group (Fig 4A, Appendix 4). Participation rates, in contrast, were highest for the youngest age group, relatively stable for the intermediate age groups before falling sharply in the oldest age group, to just 14.8% amongst persons aged 60 years plus (24.7% of males and 5.6% of females) (Fig 4B, Appendix 4). That is even though the greatest number of fishers were in the 45-59 years age group – 25,131 persons (16,477 males and 8653 females) - the highest participation rate occurred in the 5-14 years age group – 35.2% overall (38.0% for males and 25.4% for females).

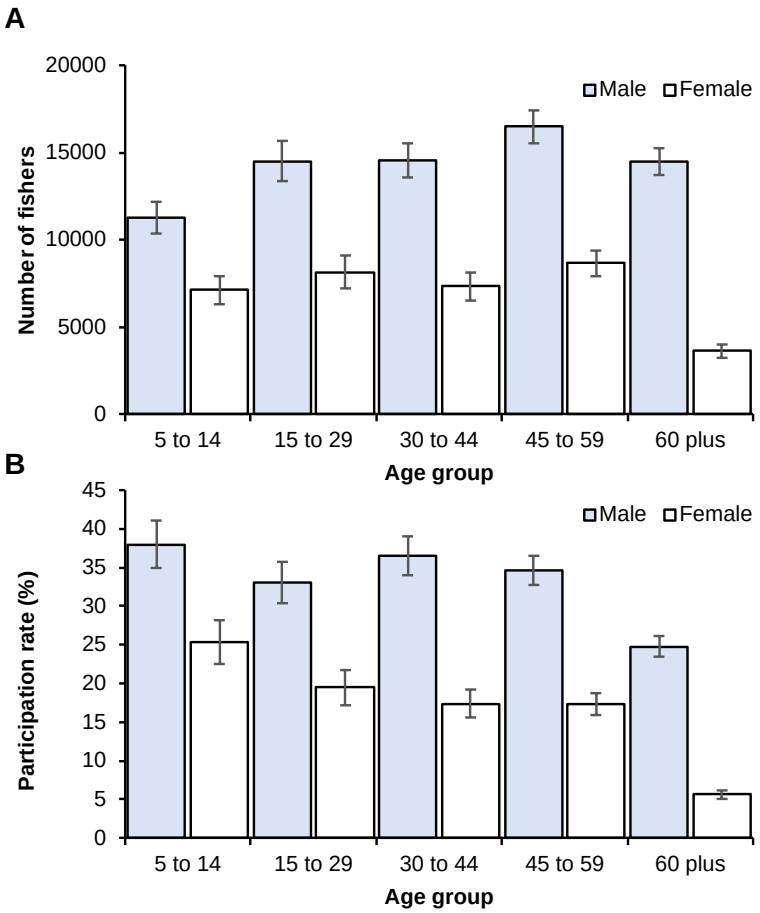


Fig. 4. Fishing participation in the 12 months prior to October 2017 by age group and gender by Tasmanian residents aged five years or older: A) number of persons; and B) proportion (%) of the resident population. Error bars represent one standard error.

5. FISHING EFFORT

Fishing effort is used to describe the pressure applied to a resource by fishers and to derive (with catch data) indices of resource abundance and fishing success. The response of fish populations to variations in fishing effort represents an important foundation for stock assessment.

Effort can be described in several ways, for instance based on days fished (regardless of time fished on the day), hours fished or number of fishing events (as defined in this study). For this report, the primary effort metric used is fisher days, noting that a fisher day of effort can be disaggregated by fishing region, water body type, platform and/or method.

The following analyses are based on information derived from the diary survey and are expanded, with non-response adjustments and adjustments to account for unexpected fishing by non-intending fisher households, to represent the activities of the resident private dwelling population of Tasmania aged five years or older.

It was estimated that 90,196 (SE 4528) Tasmanians fished at least once between December 2017 and November 2018 (Table 4). This represents a 15% decrease compared to the number of persons estimated to have fished in the 12 months prior to this period (as determined by the screening survey). However, as the screening survey was based on recalled activity, it is likely that that estimate may have been subject to recall and other biases. In particular, a phenomenon referred to as telescoping can result in respondents reporting activity that occurred outside of the period of interest and thus produce an overestimate of the activity of interest.

In terms of effort, Tasmanian residents accounted for 474,471 (SE 35,290) fisher days of effort during the 12-month diary period. Overall 25.3% of fishers fished at least once in freshwater while 88.0% fished at least once in saltwater, with 25.2% of the effort (fisher days) involving freshwater fishing and 74.8% fishing in saltwater (Table 4).

Table 4. Estimated number of persons and days fished by Tasmanians aged five years or older who fished in freshwater and saltwater in Tasmania during 2017-18.
SE is standard error

	Freshwater		Saltwater		Total	
Effort	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Persons	22,785	2243	79,378	4443	90,196	4528
Fisher days	119,413	15,596	355,058	31,245	474,471	35,290

5.1 Days fished

In recreational fisheries, most fishers typically do relatively little fishing (and catch few fish) while, at the other extreme, relatively few fishers are very active and contribute disproportionately to the overall effort (and catch). The distribution of fishing effort is, therefore, characteristically highly skewed. Consistent with this generalisation, just under 64% of all fishers (about 58,000 persons) were estimated to have fished fewer than five

days during the 12-month survey period whereas just over 4% (about 3,800 persons) fished more than 20 days (Fig. 5). The average number of days fished was 5.3 days per person for the survey period. However, it was the avid fishers who contributed disproportionately to the total fishing effort; for instance, over half of the effort (55%) could be attributed to just 20% of fishers while 10% of fishers accounted for about a third (34%) of total effort.

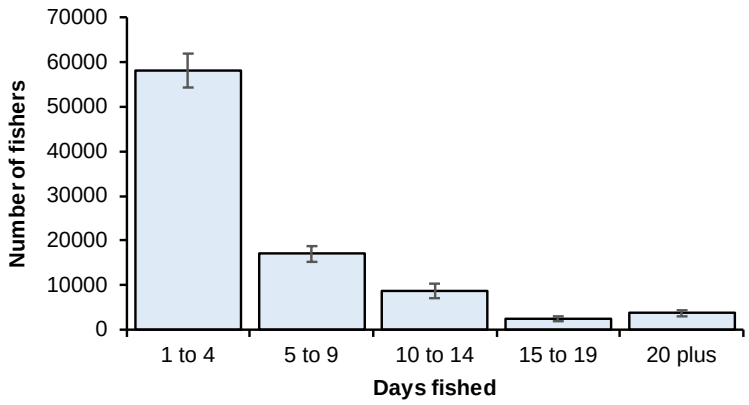


Fig. 5. Individual fishing effort (days fished) by Tasmanian residents aged five years or older fishing in Tasmania during 2017-18.

5.2 Water body

An important feature of the Tasmanian fishery was the concentration of fishing effort in inshore coastal (59% fisher days) and estuarine waters (15% fisher days) (Fig. 6, Appendix 7). Comparatively little fishing effort was directed in waters greater than 5 km offshore. In inland waters, more than double the effort was directed at lake fishing compared with river fishing.

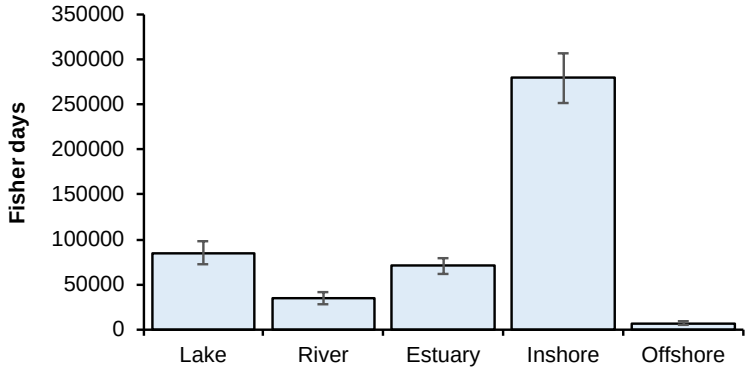


Fig. 6. Fishing effort (fisher days) by water body type for Tasmanian residents aged five years or older who fished in Tasmania during 2017-18. Error bars represent one standard error.

5.3 Fishing method

Line fishing (including the use of bait and/or artificial lures and jigs) was by far the dominant fishing mode in Tasmania, occurring on 88% of all fisher days during 2017-18 (Fig. 7, Appendix 9). Overall, line fishing accounted for almost 420,000 fisher days or 1.3 million fisher hours of effort, implying an average of 3.1 hours per line fishing trip. Pot fishing was next in importance, reported on 7.5% of fisher days, followed by diving (4.4%), 'other 'methods (3.8%) and gillnet fishing (1.1%).

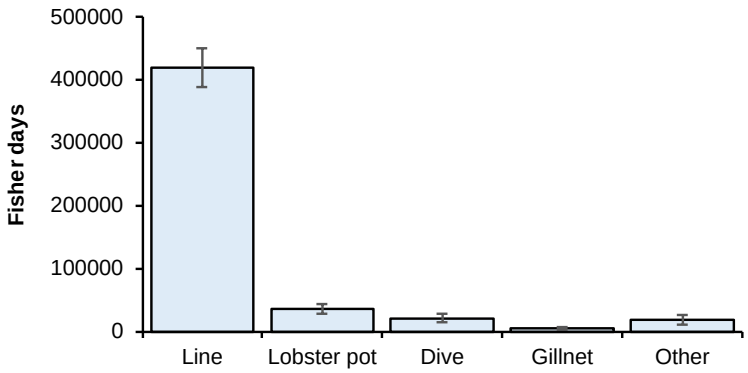


Fig. 7. Fishing effort (fisher days) by fishing method for Tasmanian residents aged five years or older who fished in Tasmania during 2017-18. Error bars represent one standard error.

5.4 Fishing region

Half of the state's total fishing effort (fisher days) was focused off the east and southeast coasts, with the southeast, including the D'Entrecasteaux Channel, Derwent Estuary and Norfolk-Frederick Henry Bay regions, collectively accounting for 31% of the state-wide effort (Fig. 8, Appendix 13). The north coast attracted over 20% of the overall fishing effort, with the effort more or less evenly distributed between the North West and combined Tamar-North East Coast regions. By comparison with the other coastal areas, effort on the West Coast was comparatively low (1%). The inland fishery was particularly concentrated in the Central Plateau region (11%), followed by Western (8%) and Eastern (7%) regions.

The significance of the D'Entrecasteaux Channel as a recreational fishing area was clearly evident based not only on the number of fisher days of effort (58,000) but also by the number of fishers (14,500) estimated to have accessed the region during 2017-18 (Appendix 13). Norfolk-Frederick Henry Bay, the South East and North West Coasts were also popular regions, with over 14,500 persons estimated to have fished in each of them during the diary period.

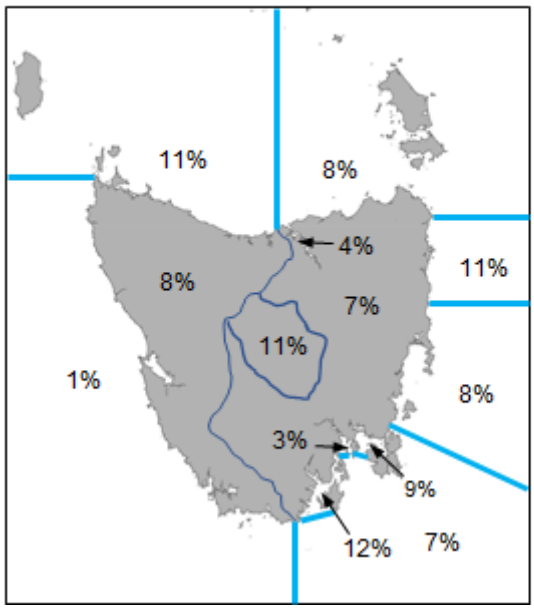


Fig. 8. Regional distribution (percentage) of fishing effort (fisher days) for Tasmanian residents aged five years or older who fished in Tasmania during 2017-18.

5.5 Fishing platform

Boat-based activities dominated the state-wide fishing effort (58% of fisher days), although there were considerable differences in the relative proportion of shore- and boat-based effort by water body (Fig. 9). Shore and boat fishing effort levels were similar in magnitude in the inland lake fisheries whereas river fishing was primarily conducted from the shore. Shore-based effort was about 40% higher than that from boats in the estuarine fisheries while boat-based effort was over 2.4 times greater than shore-based effort in the inshore coastal fishery. Offshore fishing was exclusively boat-based.

Shore-based fishing was split according to whether the activity occurred from jetties or wharves, other manmade structures (e.g. bridges, dam walls, breakwaters) or from natural structures (e.g. river bank, beach, rocks). Most fishing events occurred from natural structures: 77% overall; >95% for lakes and rivers; 50% for estuarine; and 75% for coastal fishing. Jetties and wharves represented significant shore-based access points for estuarine (38%) and coastal (22%) fishing, the use of other manmade structures was comparatively minor (5% overall).

In terms of boat-based fishing activities, the vast majority (>99%) of events occurred from privately owned vessels. Charter fishing was reported in the offshore, inshore and freshwater fisheries but represented less 0.5% of the overall boat-based fishing effort.

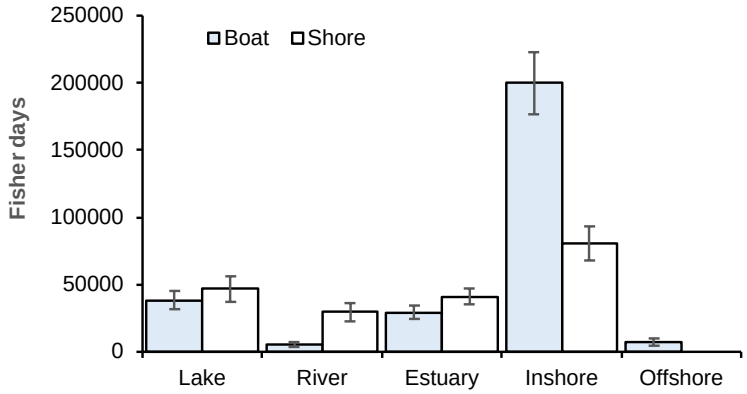


Fig. 9. Fishing effort (fisher days) for Tasmanian residents aged five years or older who fished in Tasmania during 2017-18 by fishing platform and water body type. Error bars represent one standard error.

6. CATCHES

The following analyses are based on information derived from the diary survey and are expanded, with non-response adjustments and adjustments to account for unexpected fishing by non-intending fisher households, to represent the activities of the resident private dwelling population of Tasmania aged five years or older.

Recreational fishers harvested a diverse range of finfish, crustaceans, molluscs, and other taxa; a listing of all species and their relative occurrence by fishing method is provided in Appendix 1. For the purposes of reporting and analysis, some species have been grouped (typically at the family level) which recognises that fishers may not reasonably be expected to delineate to species or where particular species were rarely reported. A listing of the taxa that comprise each of the reporting groups is provided in Appendix 1.

6.1 Total catch, harvest and release/discards

In recreational fisheries, catches can be split into retained (harvested) and released/discarded components. The harvested portion may be used for a variety of purposes including consumption or bait, whereas fish may be released because of regulation (e.g. size and/or bag limits), ethical reasons, undesirability of the species, and so on.

Excluding small baitfish (including Whitebait), an estimated 2.45 million finfish were caught by Tasmanian recreational fishers during 2017-18, 68% of which (1.68 million) were Flathead (Table 5). Other species of significance in order of descending importance included Trout (206,000 or 8%), Australian Salmon (129,000 or 5%), Gurnards (99,000 or 4%), Wrasse (40,000 or 2%) and Black Bream (27,000 or 1%). While the bulk of the finfish were marine species, freshwater species other than Trout included Atlantic Salmon and Redfin Perch (Table 5).

Furthermore, approximately 101,500 cephalopods (squid and octopus) were captured, with Gould's Squid accounting for 53% (54,000) and Southern Calamari 46% (47,000) of the numbers. Other invertebrate species of significance included Rock Lobster (59,000), Abalone (34,500) and Scallops (130,000). A range of other taxa, including crabs, prawns, oysters, mussels, and clams were caught by recreational fishers.

In total, 1.10 million finfish (excluding small baitfish) were retained, indicating that just under half (45%) of all finfish caught were harvested (Table 5). Flathead dominated the retained catch (733,000 fish or 67% of retained numbers), followed by Trout (86,000 or 8%) and Australian Salmon (81,000 or 7%). Amongst the other key taxa, significant numbers of Gould's Squid (47,000), Southern Calamari (41,000), Rock Lobster (43,000), Abalone (34,000) and Scallops (130,000) were harvested.

Catches of Whitebait, tended to be reported in terms of weight rather than numbers and using these estimates it was calculated that in the order of 1350 kg of Whitebait was harvested from north coast rivers, including the Duck, Inglis and Rubicon Rivers.

Overall, 1.35 million finfish were released or discarded; actual release rates varied depending upon species (Table 5). High release rates (>70%) were reported for Wrasse and Gurnards, whereas very low release rates (<10%) were reported for Flounder, Striped

Trumpeter and Jackass Morwong. Relatively low release rates were also apparent for Atlantic Salmon, Tunas, Southern Calamari and Gould's Squid. When species were grouped based on reported release rates a continuum from those species that were almost exclusively released or discarded to those that are rarely released was apparent (Table 6).

The survey also identified species such as Snapper (1500 kept and 2400 released), Yellowtail Kingfish (1000 kept and 500 released) and King George Whiting (14,200 kept and 10,000 released) in the catch, confirming a growing interest from the recreational sector in opportunities offered by climate driven range-extending species.

6.1.1 Reasons for release

The reasons why fish are released or discarded varies and include adherence to regulations (size and bag limits, closed seasons or protected species), ethical factors such as catch and release fishing, damage or poor quality, or the species being considered undesirable which was often based on perceived poor eating qualities. To better understand fisher motivations in relation to releasing or discarding species, respondents were asked to identify their reason(s) for release. This approach recognised that there may be several reasons for releasing the catch and sought to attribute a reason for each individual fish that was not retained. Based on terminology used by the respondent, the following release categories were identified: 'too small' - implying that the fish was too small to be retained (not necessarily due to size limits regulations); 'undersized' – implying some knowledge and adherence to size limit regulations; 'catch and release' – implying a voluntary release ethic associated with either sport fishing or conservation (no inference about fish size); and 'too many' – implying a catch number in excess of needs (note, while 'over the bag limit' was a reporting category there were very few instances where this was an identified reason, for analysis such responses have been treated as the same as 'too many'). Other reasons for release included poor eating qualities, "did not want", damaged or poor quality, and prohibited species.

A breakdown of reasons for release for the main species is presented in Fig. 10. Size, partly in response to minimum size limits, was the primary reason for release of Bastard Trumpeter, Flathead, Silver Trevally, Australian Salmon and King George Whiting. The only species for which catch and release was identified as a significant motivation were Trout, Atlantic Salmon, Bream and Snapper. Several species were identified as having poor eating qualities and therefore not retained, these included Marblefish, Pike, Cod, Gurnard and Wrasse. Poor eating qualities were also identified as the main reasons for release of several shark and ray species (in particular Draughtboard Shark and Spurdogs) while regulations prohibiting the take of sharks and rays caught in shark refuge areas was also cited.

Table 5. Estimated annual catch (total, kept and released) and proportion released/discarded for key species during 2017-18, based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Total		Kept		Released		%
Species	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**released**
Trout	206,213	42,912	85,921	13,946	120,293	37,342	58.3
Atlantic Salmon	*10,183*	*4,073*	*7,835*	*2,818*	***2,348***	***1,928***	23.1
Redfin	*5,836*	*1,946*	***4,313***	***1,801***	***1,523***	***740***	26.1
River Blackfish	+		+		+	***251***	65.6
Australian Salmon	129,479	22,284	80,608	14,315	48,870	10,623	37.7
Barracouta	15,086	3,102	6,902	2,180	8,184	1,855	54.2
Bastard Trumpeter	***7,192***	***4,382***	***3,451***	***1,515***	***3,740***	***3,299***	52.0
Black Bream	27,137	10,455	**9,135**	**4,445**	**18,002**	**8,188**	66.3
Blue Warehou	+		+		+		27.5
Cod	14,849	4,445	**8,801**	**3,913**	6,048	1,815	40.7
Eel	***3,525***	***1,777***	***2,304***	***1,607***	***1,221***	***681***	34.6
Flathead	1,681,299	251,980	733,489	115,525	947,810	145,040	56.4
Flounder	*13,201*	*5,239*	***12,272***	***5,103***	+		7.0
Garfish	***3,770***	***1,978***	***2,605***	***1,365***	***1,165***	***872***	30.9
Gurnard	99,189	21,870	21,409	6,905	77,780	18,475	78.4
Jack Mackerel	***6,536***	***2,689***	*4,862*	*1,563*	***1,674***	***1,447***	25.6
Jackass Morwong	***13,000***	***6,013***	***12,387***	***5,744***	+		4.7
Banded Morwong	***5,244***	***2,899***	***1,522***	***694***	***3,723***	***2,708***	71.0
Leatherjacket	14,554	5,604	**7,493**	**3,599**	7,060	2,608	48.5
Mullet	16,073	5,806	**9,441**	**4,210**	6,632	1,917	41.3
Pike	*13,112*	*5,156*	***9,404***	***4,615***	***3,708***	***2,168***	28.3
Silver Trevally	20,408	6,183	11,091	3,571	**9,317**	**4,096**	45.7
Striped Trumpeter	*6,775*	*2,319*	*6,360*	*2,150*	+		6.1
Tuna	***9,217***	***4,308***	***7,531***	***3,703***	***1,686***	***816***	18.3
King George Whiting	*24,146*	*8,866*	*14,207*	*5,352*	***9,939***	***4,056***	41.2
School Whiting	*7,404*	*2,929*	*4,627*	*2,058*	*2,777*	*1,381*	37.5
Wrasse	40,081	8,249	8,125	2,340	31,955	7,299	79.7
Scalefish, other	32,857	5,742	15,167	3,666	17,691	3,715	53.8
Sharks & rays	27,269	4,311	8,888	1,775	18,381	3,303	67.4
Rock Lobster	58,823	12,752	42,851	10,152	15,972	4,888	27.2
Crustaceans, other	***16,637***	***12,320***	***16,041***	***12,313***	+		3.6
Southern Calamari	46,735	11,561	41,498	9,515	**5,237**	**3,043**	11.2
Gould's Squid	54,177	11,826	47,467	10,279	**6,710**	**3,235**	12.4
Cephalopod, other	+		+		+		67.2
Abalone	***34,498***	***13,809***	***34,075***	***13,797***	+		1.2
Scallop	***129,670***	***65,627***	***129,670***	***65,627***	-	-	0.0
Bivalve, other	***808,479***	***773,087***	***806,505***	***773,096***	***1,975***	***2,035***	0.2

Table 6. Summary table indicating groupings based on the proportion of the recreational catch for key species that was released or discarded by fishers during 2017-18.

Released → **Kept**

Proportion released				
> 70%	**51-70%**	**31-50%**	**10-30%**	**< 10%**
Wrasse	Sharks & rays	Leatherjacket	Pike	Flounder
Gurnards	Black bream	Silver trevally	Redfin	Striped trumpeter
Banded morwong	Trout	Mullet	Atlantic salmon	Jackass morwong
	Flathead	KG Whiting	Tuna	
	Barracouta	Cod	Gould's squid	
	Bastard trumpeter	Australian salmon	Southern calamari	
		School whiting		
		Eel		

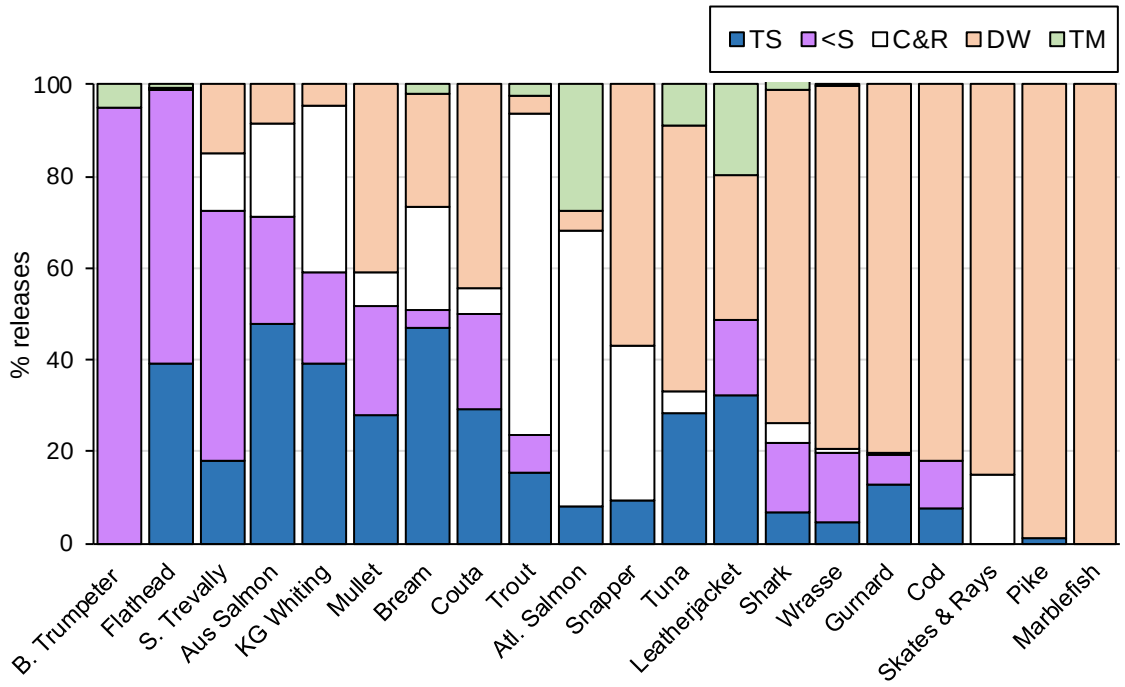


Fig. 10. Relative importance (% release numbers) of different reasons for release of key species taken by Tasmanian residents aged five years or older who fished in Tasmania during 2017-18. TS too small; <S "undersized"; C&R catch and release; DW don't want/ not edible; TM too many.

6.1.2 Targeted fishing

For each fishing event respondents were asked whether they were fishing for specific species (up to two species could be nominated as targets). This enabled fishing effort to be defined as targeted and whether or not the target species was captured. Non-targeted

effort was often articulated by respondents as “fishing for a feed”, “whatever takes the bait” or “nothing in particular”.

Since recreational fisheries are typically characterised by a high proportion of nil catch events, knowledge of targeting enables effort and catch rates to be attributed appropriately. For instance, in this study about 21% of all events resulted in no catch (kept or released) and if situations where target species were not caught are considered, this proportion would be substantially higher. While it is possible to estimate targeted effort and targeted catch rates (which take account of nil catches), the primary objective of the current analysis was to examine the extent to which catches of key species were the result of targeted, as opposed to non-targeted, effort.

Targeted and non-targeted catch estimates for the key species are provided in Appendices 5 and 6 and the proportion of the catches contributed to by targeted effort is summarised in Table 7. At one end of the continuum, Trout, Rock Lobster, Flathead, Tuna, Flounder and Abalone and were taken almost exclusively as a result of targeted effort, implying a very high level of fishery specialisation for these species. For example, the game fishery for tuna is a very discrete activity as is the inland fishery for trout or the lobster fishery which is based on pots, rings or dive collection methods. Other species that tended to be caught primarily as a result of targeted effort included Australian Salmon, Atlantic Salmon, and squid (Southern Calamari and Gould’s Squid), also implying a level of fishery specialisation for these species. By contrast, non-targeted effort accounted for the bulk of the Mullet, Silver Trevally, Morwong (mainly Jackass Morwong) and sharks captured, indicating that these species tend to represent by-product (if retained) or by-catch (if released). Other key species with high release rates such as Leatherjacket, Wrasse, Gurnard, Cod and Marblefish were rarely if ever targeted. As indicated in the previous section, most of these latter species were held in low esteem by fishers.

Table 7. Summary table indicating groupings based on the proportion of the recreational catch (kept and released) of key species that was taken by targeted effort during 2017-18.

Non-target → **Target**

Proportion of catch targeted				
< 30%	**31 - 50%**	**51 - 70%**	**71 - 90%**	**> 90%**
Mullet	Trumpeter	Australian salmon	Flathead	Rock lobster
Morwong	Black bream	Squid	Tuna	Trout
Silver trevally		Atlantic salmon	Abalone	
Shark			Flounder	

6.1.3 Harvest weights

Catch information reported during the diary survey was based on numbers rather than weight or size (length) since these latter parameters tend to be estimated less reliably when self-reported by recreational fishers. However, the weight of the recreational harvest is of interest to resource managers, scientists, the broader fishing community (commercial and recreational) and other stakeholder groups with an interest in the aquatic environment. Commercial production is generally reported in terms of weight and thus to permit comparisons between sectors it is also desirable to report recreational harvest by weight.

It is possible to approximate recreational harvest weights for a given species by multiplying numbers caught by the average weight of an individual. However, achieving accuracy and precision in determining average weights is complex because fish populations tend to exhibit structuring based on size (and age) over a range of temporal and spatial scales. There are also issues of gear selectivity, skill and personal ethics of individual fishers that will also affect the sizes of fish captured and retained. Ideally all of these factors should be considered when calculating average species weights. As this is rarely the case in most studies, the simple application of an average individual weight will introduce an additional degree of uncertainty to the harvest (weight) estimates. Furthermore, grouping of species for reporting purposes will confound the notion of a simple average individual weight for all the species in the group. *For these reasons it is necessary to view harvest weights as indicative rather than absolute point estimates of recreational fishery production.*

A range of data sources were used to approximate the average size of fish retained by recreational fishers; where lengths were available, length/weight relationships have been used to derive mean weights and these have been applied to harvest numbers to derive catch weights of the recreational catch (Table 8).

This survey established that, for a range of species, recreational catches were significant, with catches of Sand Flathead, Australian Salmon, Striped Trumpeter, Southern Calamari and Gould's Squid each exceeding 20 tonnes. Overall, the harvest of Flathead (species combined) dominated the recreational catch (approximately 200 tonnes); significantly, the recreational harvest of Sand Flathead (184 tonnes) was more than 50 times greater than the commercial catch of Sand Flathead taken from Tasmanian waters.

The provision of harvest weights for selected species enables comparisons with commercial production and has relevance for stock assessment and management, including issues relating to resource sharing and allocation. Recreational catches were roughly equivalent to or greater than those for the Tasmanian commercial scalefish fishery for species such as Sand Flathead, Barracouta, Mullet, Jackass Morwong, Flounder, Silver Trevally, Cod, Bastard Trumpeter and Striped Trumpeter (Table 8). Although catches for many of these species are relatively small, these findings indicate that both sectors need to be considered in management and assessment decision making. Conversely, compared with the commercial sector, the recreational harvest represented a minor component (<10%) of the total catch for Whiting, Garfish, Wrasse, Banded Morwong, Blue Warehou and Gould's Squid. Commercial fishers are not permitted to take Black Bream and apart from eels and Whitebait, there are no commercial fisheries in inland waters meaning that Trout, Redfin Perch and River Blackfish are effectively recreational-only species (apart from any Trout by-catch taken in marine waters). Atlantic Salmon are stocked in selected inland waters, whereas in marine waters escapees

from fish farms are targeted by recreational fishers (Lyle, 2019) and may be marketed by commercial fishers.

Table 8. Annual harvest (numbers), average weight and estimated harvest weight for key species taken by recreational fishers in Tasmania during 2017-18, based on Tasmanian residents aged five years or older, and compared with commercial production in Tasmania for 2017-18 (Moore *et al.*, 2019). Commercial finfish catch data are based on General Fishing logbook returns.

Weights based on size composition data based on: [A] research fishing and/or IMAS research angler logbook (unpubl. data); [B] commercial/recreational catch sampling; [C] based on Lyle *et al.* (2009); [D] research gillnet fishing (Lyle *et al*., 2014); na not available

	Recreational					
Species	**Harvest (No.)**	**Av. weight (kg)**	**Estimated harvest (tonnes)**	**Commercial catch (tonnes)**	**Combined catch (tonnes)**	**% recreational**
Sand flathead	700,305	0.26[A]	184.3	3.5	187.8	98.1
Tiger Flathead	28,012	0.55[A]	15.5	39.4	54.9	28.2
Trout	85,921	na		-		
Australian Salmon	80,608	0.44[C]	35.5	76.4	111.9	31.7
Gurnard/ Ocean perch	21,409	0.39[A]	8.4	1.8	10.2	82.4
King George Whiting	14,207	0.51[A]	7.2	-		
Whiting	4,627	0.30[A]	1.4	16.1	17.5	8.0
Jackass Morwong	12,387	0.68[C]	8.4	3.3	11.7	71.9
Flounder	12,272	0.31[C]	3.8	3.9	7.7	49.4
Silver Trevally	11,091	0.76[A]	8.5	3.3	11.8	72.3
Mullet	9,441	0.49[A]	4.6	0.3	4.9	93.9
Pike	9,404	na		5.9		
Black Bream	9,135	na		-		
Sharks & rays	8,888	na		-		
Cod	8,801	0.45[A]	3.9	0.9	4.8	81.4
Wrasse	8,125	1.18[A]	9.6	83.8	93.4	10.3
Atlantic Salmon	7,835	na		-		
Tuna	7,531	na		-		
Leatherjacket	7,493	0.65[A]	4.9	2.6	7.5	65.4
Barracouta	6,902	0.40[A]	2.8	0.9	3.7	75.3
Striped Trumpeter	6,360	4.58[B]	29.1	14.1	43.2	67.4
Jack Mackerel	4,862	0.18[C]	0.9	2.00	2.9	30.4
Bastard Trumpeter	3,451	0.99[D]	3.4	4.3	7.7	44.3
Garfish	2,605	0.12[B]	0.3	8.9	9.2	3.5
Blue Mackerel	2,338	0.39[A]	0.9	0.5	1.4	64.4
Banded Morwong	1,522	1.32[B]	2.0	31.0	33.0	6.1
Blue Warehou	526	1.43[D]	0.8	12.6	13.4	5.6
Gould's Squid	47,467	0.50[C]	23.7	528.0	551.7	4.3
Southern Calamari	41,498	0.76[A]	31.4	60.6	92.0	34.1

6.2 Catch by water body

Catch details by water body are provided in Appendices 7 and 8 and the relative importance of the main finfish (excluding small baitfish) and squid species are summarised in Fig. 11. Of the total 2.55 million fish and squid, about 5% were taken from lakes and dams, 3% from rivers, 15% from estuarine waters, 75% from inshore coastal waters and 1% from offshore waters.

Trout accounted for the vast majority (>90%) of the freshwater catch, with Atlantic Salmon, Redfin Perch, and eels of minor importance in both lake/dam and river fisheries (Fig. 11). Flathead and Australian Salmon dominated catches from estuarine and inshore waters, accounting for 66% of the estuarine and 81% of the inshore finfish catches (Fig. 11). Other species of significance included Black Bream and Whiting in the estuarine fishery, and Gurnard and Wrasse in the inshore fishery. Although based on comparatively low numbers, offshore catches included a range of pelagic and demersal species, dominated by Tuna and followed by Gurnard (mainly Ocean Perch), Striped Trumpeter and Jackass Morwong.

Southern Calamari and Gould's Squid were primarily taken from inshore waters, with a minor component of the catch also taken from estuarine waters and a small proportion of the Gould's Squid catch reported from offshore waters. Catches of Rock Lobster, Abalone and scallops were concentrated in inshore coastal waters (Appendices 7 and 8).

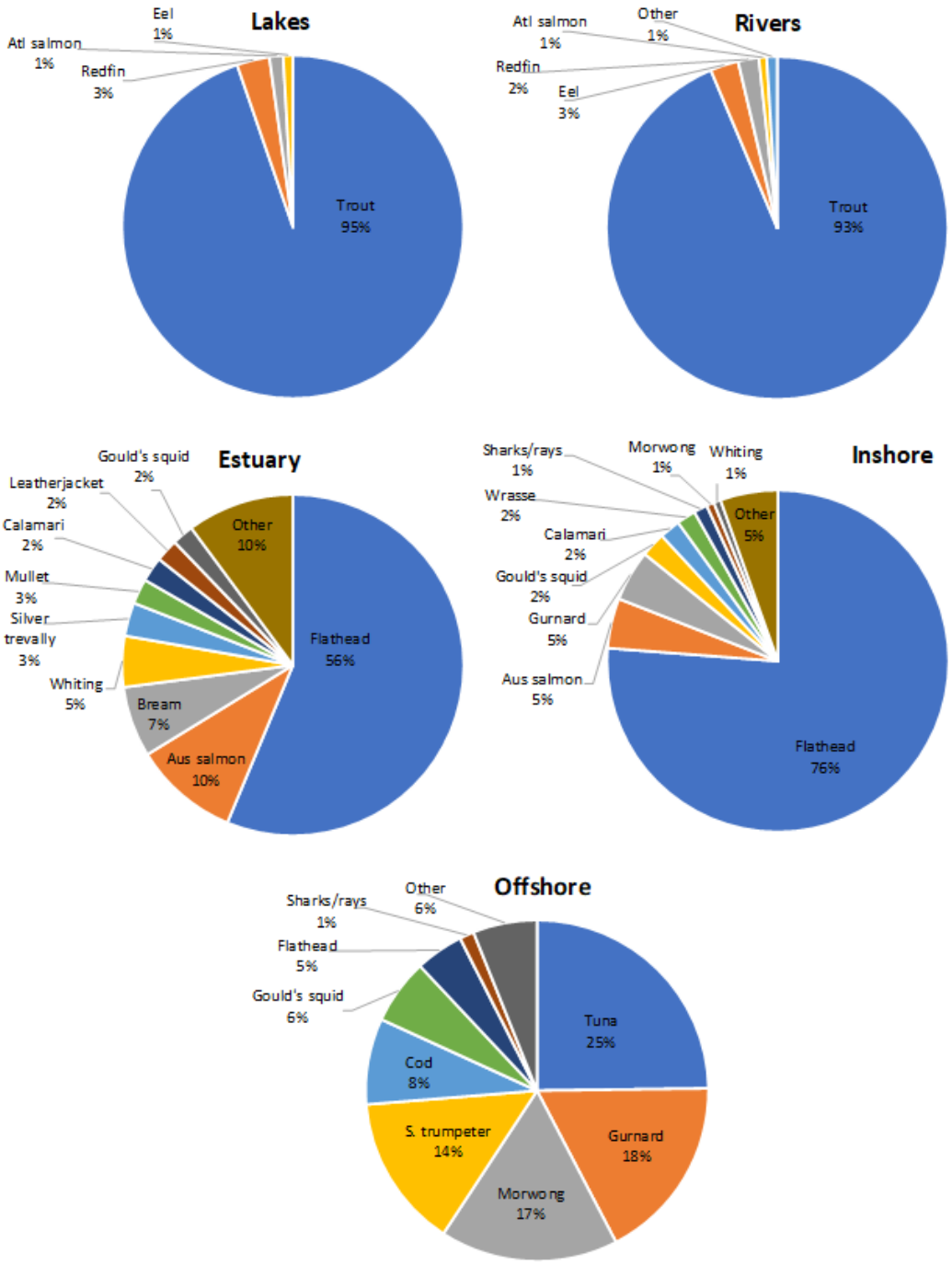


Fig. 11. Percentage composition of the recreational finfish and squid catch (numbers kept and released) by water body for Tasmania during 2017-18.

6.3 Catch by method

Catch details by fishing method are provided in Appendices 9 and 10. Overall, line fishing accounted for 97.8% of the total finfish and squid catch (2.5 million fish), with a further 1% (22,500 fish) taken by gillnet. Flathead represented 67% of the line catch, while Trout, Australian Salmon, Gurnard, Gould's Squid, Southern Calamari and Wrasse were of secondary importance (Fig. 12). The main species taken by gillnet included Bastard Trumpeter, Silver Trevally, Wrasse and Flathead (Fig. 12). Flounder were mainly captured by spear while small baitfish (especially Whitebait) were mostly

captured in bait nets or traps (Appendix 9 and 10). Rock Lobster was the primary species taken in pots as well as being targeted by divers. Abalone and scallops were exclusively harvested by divers (Appendices 9 and 10).

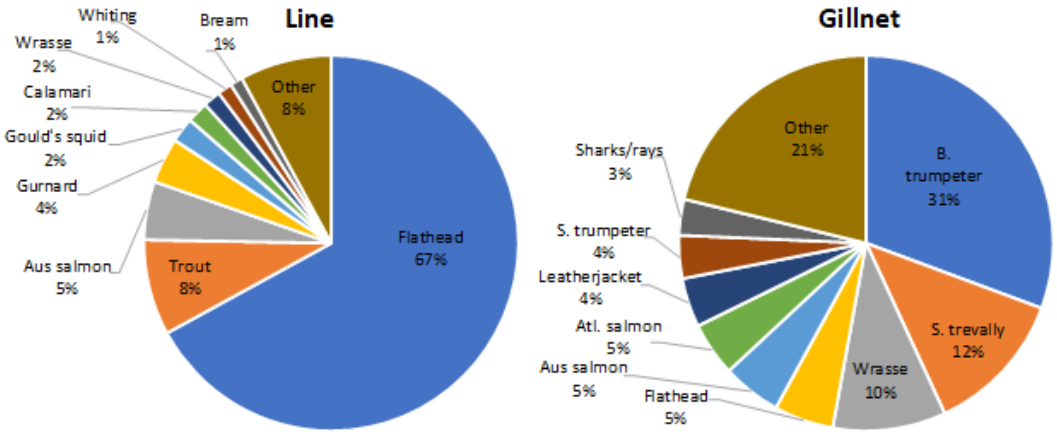


Fig. 12. Percentage composition of the recreational finfish catch (kept and released numbers) by line and gillnet fishing methods for Tasmania during 2017-18.

6.3.1 Line fishing

Line fishing was categorised by whether bait, lures/flies, or a combination of bait and lure/fly fishing was undertaken. The use of set-lines was also identified, with recreational fishers permitted to use up to 15 hooks (typically baited) on a line, either set as a longline or dropline. Table 9 summarises the relative importance of the different line fishing modes (excluding set-lines) for the key species. For such species as Garfish, Striped Trumpeter, Leatherjacket, Mullet, Flathead and Shark at least 75% of the line catch was taken using bait. By contrast, Black Bream, Trout, and Southern Calamari were primarily targeted using lures or flies. Both bait and lure fishing were significant capture techniques for Australian Salmon.

In Australia there has been a growing awareness and acceptance of the use of lures, in particular soft plastics, for what have traditionally been bait capture species. Species for which this is particularly true include Flathead and Black Bream and the extent to which this trend has impacted on the Tasmanian fishery is evident by comparison with results of the 2000-01 survey where at that time around 90% of the catch of both species was taken by bait fishing (Lyle, 2005).

Table 9. Estimated catch by line fishing mode indicating catch numbers and proportions taken by bait and/or lure/fly for key species during 2017-18, based on Tasmanian residents aged five years or older.

Values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group; + indicates fewer than 1000 individuals.

	Numbers			% total	
Species	**Bait**	**Lure/fly**	**Both**	**Bait only**	**Lure only**
Garfish	***2,745***			100.0	0.0
Striped Trumpeter	*5,540*	+	+	93.3	3.2
Leatherjacket	***11,647***	+	+	92.2	5.5
Mullet	*13,792*	+	*1,134*	90.0	2.6
Cod	12,012	+	1,732	81.9	6.3
Flathead	1,323,008	129,496	227,967	78.7	7.7
Shark	12,552	1,342	2,712	75.6	8.1
Gurnard	72,335	6,878	19,248	73.5	7.0
Barracouta	10,344	1,763	2,990	68.5	11.7
Whiting	21,644	2,116	7,918	68.3	6.7
Snapper	*2,503*	+	+	64.9	19.8
Pike	*8,398*	*2,116*	*2,493*	64.6	16.3
Morwong	*8,252*	*1,671*	*3,015*	63.8	12.9
Wrasse	22,489	2,582	12,659	59.6	6.8
Blue Mackerel	*4,020*	*2,172*	+	57.9	31.3
Silver Trevally	10,023	3,548	4,024	57.0	20.2
Australian Salmon	50,761	54,042	21,145	40.3	42.9
Jack Mackerel	***2,561***	***2,248***	***1,657***	39.6	34.8
Atlantic Salmon	***2,907***	***5,207***	**+**	32.1	57.5
Gould's Squid	15,206	15,824	22,985	28.2	29.3
Black Bream	7,105	19,210	+	26.0	70.3
Trout	19,186	177,281	9,808	9.3	85.9
Southern Calamari	4,073	31,735	10,803	8.7	68.1
Redfin	+	*5,378*	+	2.9	92.2

6.4 Catch by platform

Over 85% of the total finfish catch (excluding small baitfish) was taken by boat-based fishers. The proportion of the catch taken by boat as opposed to shore-based fishing, however, varied considerably between species (Appendices 11 and 12).

Offshore species - for example, Tuna and Striped Trumpeter - were caught exclusively from boats (Table 10). Other finfish that were primarily captured by boat-based fishers (>90%) included Flathead and Gurnard, while boat-based effort also produced most of the catch for species such as Atlantic Salmon, Australian Salmon, Barracouta, Black Bream, Jackass Morwong, Whiting, Wrasse and Cod. By contrast, shore-based catches dominated for freshwater species such as Trout and estuarine or inshore species such as Flounder, Silver Trevally and Mullet. The majority of the Rock Lobster, Abalone and Gould's Squid were taken by boat fishers, whereas Southern Calamari were mainly taken by shore-based fishers.

Table 10. Summary table indicating groupings based on the proportion of the recreational catch of key species that was taken by boat-based fishers during 2017-18.

Shore → **Boat**

% boat-based catch				
< 30%	**31-50%**	**51-70%**	**71-90%**	**>90%**
Mullet	Trout	Atlantic salmon	Barracouta	Flathead
	Flounder	Australian salmon	Black bream	Gurnard
	Leatherjacket		Cod	Trumpeter
	Southern calamari		Jackass morwong	Tuna
	Jack mackerel		Pike	Rock lobster
	Silver trevally		Whiting	
			Wrasse	
			Gould's squid	
			Abalone	

7. KEY SPECIES

In the following section, the fisheries for key species are described in terms of regional distribution of the catch (refer Appendix 13), numbers kept and released (Table 5), catch by fishing platform (Appendix 11), method (Appendix 9), water body (Appendix 7) and season. Catch information was provided by fishers during the 12-month diary survey and has been presented as expanded estimates.

7.1 Flathead

Flathead were by far the most commonly caught species Tasmanian waters; Southern Sand Flathead (*Platycephalus bassensis*) represented 96% (1,606,862; SE 243,149) and Tiger Flathead (*Neoplatycephalus richardsoni*) 3% (57,056; SE 21,765) of the total catch (kept and released) by number. The balance (17,381; SE 8,683) was comprised mostly of Bluespotted Flathead (*Platycephalus speculata*) (11,138, 83% of which were released) as well as non-specified flatheads.

Just over half of the total catch of 1.68 million Flathead was derived from the south eastern Tasmania, with the D'Entrecasteaux Channel and Norfolk-Frederick Henry Bays particularly significant areas (Fig. 13A). The Central East, including Great Oyster Bay, and North West were also important regions for the fishery. Relatively low catches were taken from the East and North East (including the Tamar) coasts while West Coast catches were insignificant. Over half of the Flathead caught were released or discarded (Fig. 13B); boat-based fishing accounted for the vast majority (95%) of the catch (Fig. 13C); and line fishing was the dominant fishing method (Fig. 13D), mostly with bait rather than lures. Flathead catches were concentrated in inshore coastal waters with catches also taken from estuarine and, to a lesser extent, offshore waters (Fig. 13E). The Flathead fishery was highly seasonal, with a marked peak during summer (December-January) and a distinct trough between June and September (Fig. 13F). The main fishing period between December and May accounted for the vast majority (84%) of the annual catch.

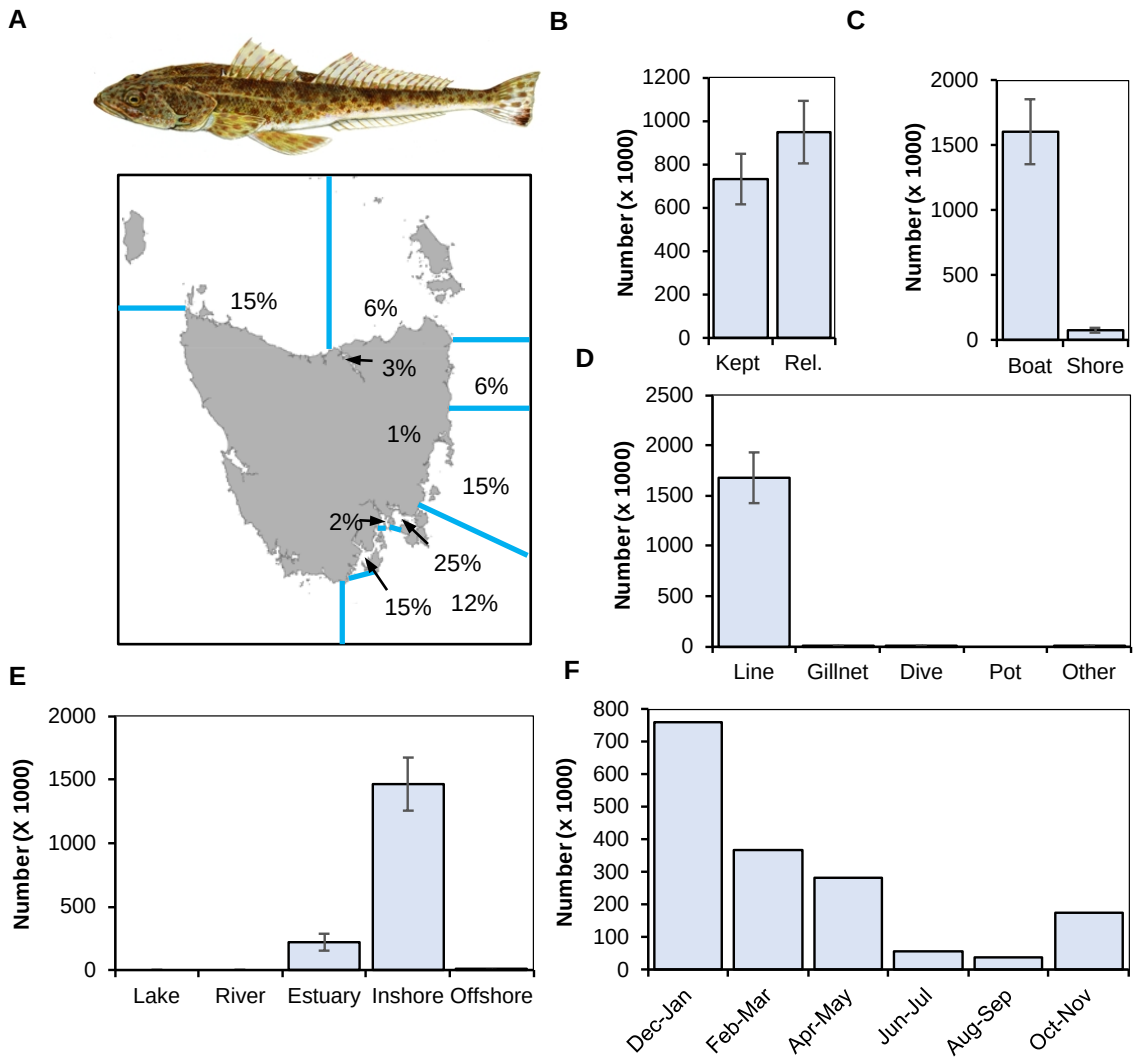


Fig. 13. Characteristics of the recreational fishery for Flathead in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.2 Trout

Overall, Brown Trout (*Salmo trutta*) represented 78% (161,016; SE 36,152) of the catch, with Rainbow Trout (*Oncoryhnchus mykiss*) comprising the bulk of the remainder (44,226; SE 11,593). A small proportion of the catch (<1%) was not identified to species by survey respondents or reported as Brook Trout (*Salvelinus fontinalis*).

The importance of the Western and Central Plateau regions to the trout fishery is evident in Fig. 14A, accounting for over 85% of the state's catch of Trout. More than half of the catch was released (Fig. 14B), being taken more or less equally by boat- and shore-based fishers (Fig. 14C). Trout were caught almost exclusively by line fishing (Fig. 14D), with lures/flies the main (>85%) method used. The catch from lakes and dams was over two times greater than that from rivers, small quantities were also taken from estuarine waters (Fig. 14E). Catches peaked during spring and summer and then declined to low levels during the winter months, corresponding to the closure of many parts of the fishery (Fig. 14F).

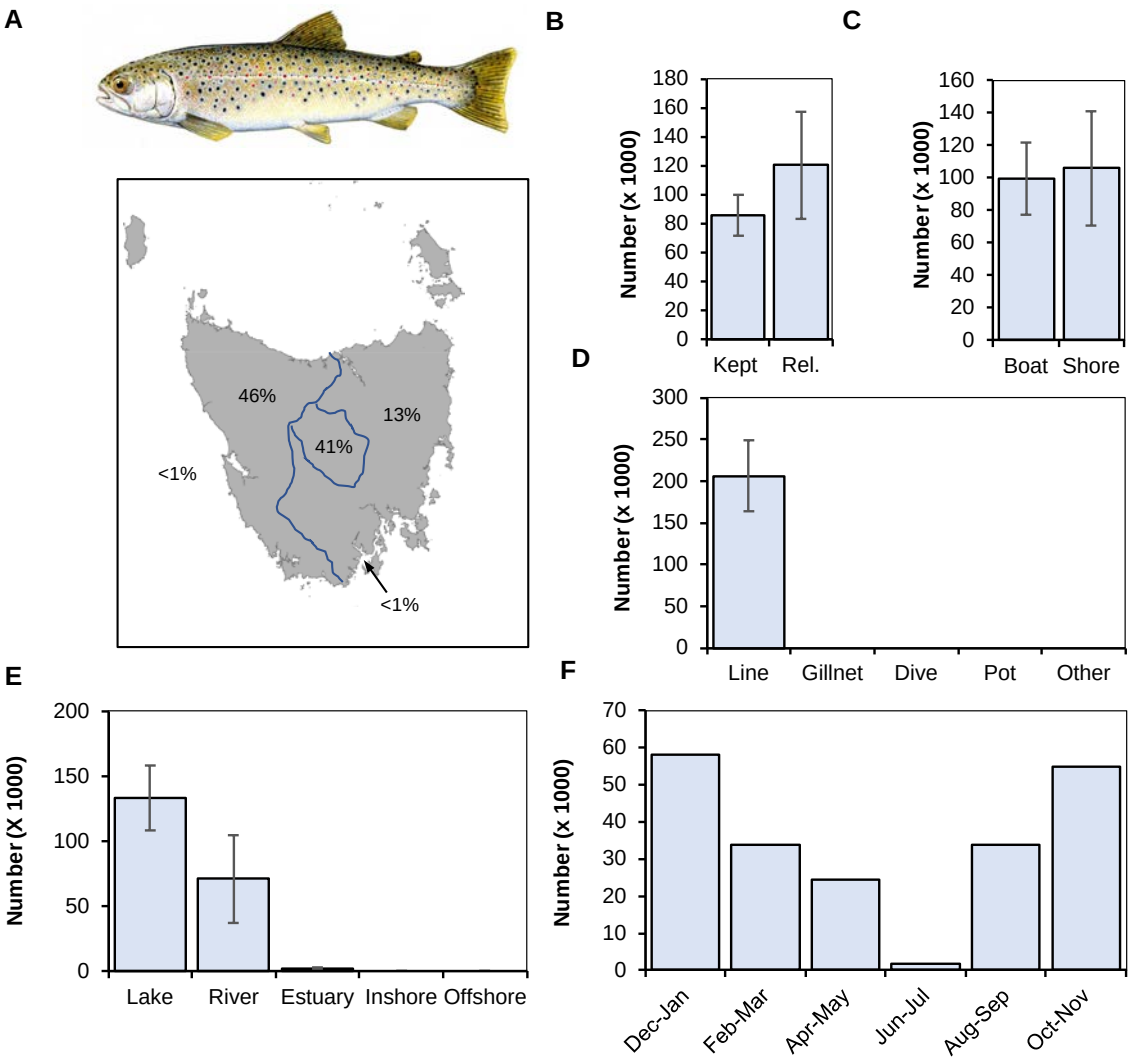


Fig. 14. Characteristics of the recreational fishery for Trout in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.3 Australian Salmon

The recreational fishery for Australian Salmon (*Arripis trutta* and *A. truttaceus*) was concentrated off northern Tasmania, in particular the North West (22%) and East Coast (23%) regions (Fig. 15A). In the south, the Derwent and D'Entrecasteaux Channel were relatively important areas, small catches were taken from other areas of the state. Numerically, Australian Salmon were the third most commonly caught finfish, with just under 40% of the total catch of 129,500 fish released or discarded (Fig. 15B). In addition to boat-based catches, there was a substantial shore-based fishery for the species (Fig. 15C), with line fishing the main fishing method (Fig. 15D). Bait and lure fishing methods accounted for similar catch proportions. Catches were concentrated in estuarine and inshore coastal waters (Fig. 15E), with evidence of a spring-autumn (October- May) peak in catches (Fig. 15F).

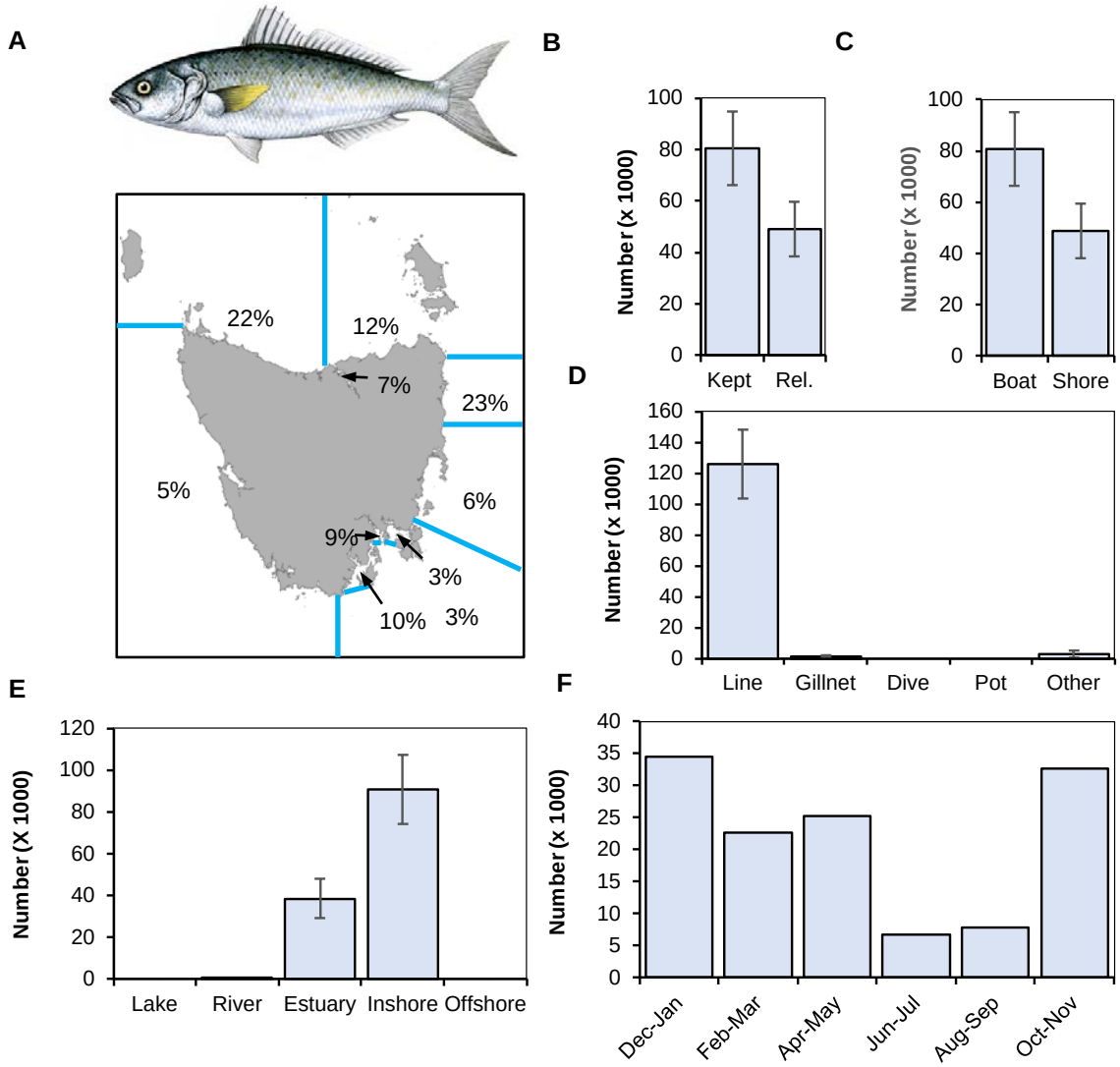


Fig. 15. Characteristics of the recreational fishery for Australian Salmon in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.4 Mullet

Yellow-eye Mullet (*Aldrichetta forsteri*) and Sea Mullet (*Mugil cephalus*) occur in Tasmania waters, and although survey respondents did not distinguish species, Yellow-eye Mullet are known to dominate catches. Catches were concentrated off the north coast, especially in the North West (Fig. 16A). About 40% of the total catch of 16,000 Mullet was not retained (Fig. 16B), with shore-based fishers accounting for the majority (77%) of the take (Fig. 16C). Mullet were captured mainly by line and seine nets ('Other' in Fig. 16D), with some fish also taken by gillnets (so-called mullet nets) (Fig. 16D). The species was caught mainly in inshore coastal waters (Fig. 16E) and the fishery was characterised by a strong peak in catches during summer and autumn and comparatively low quantities taken at other times of the year (Fig. 16F).

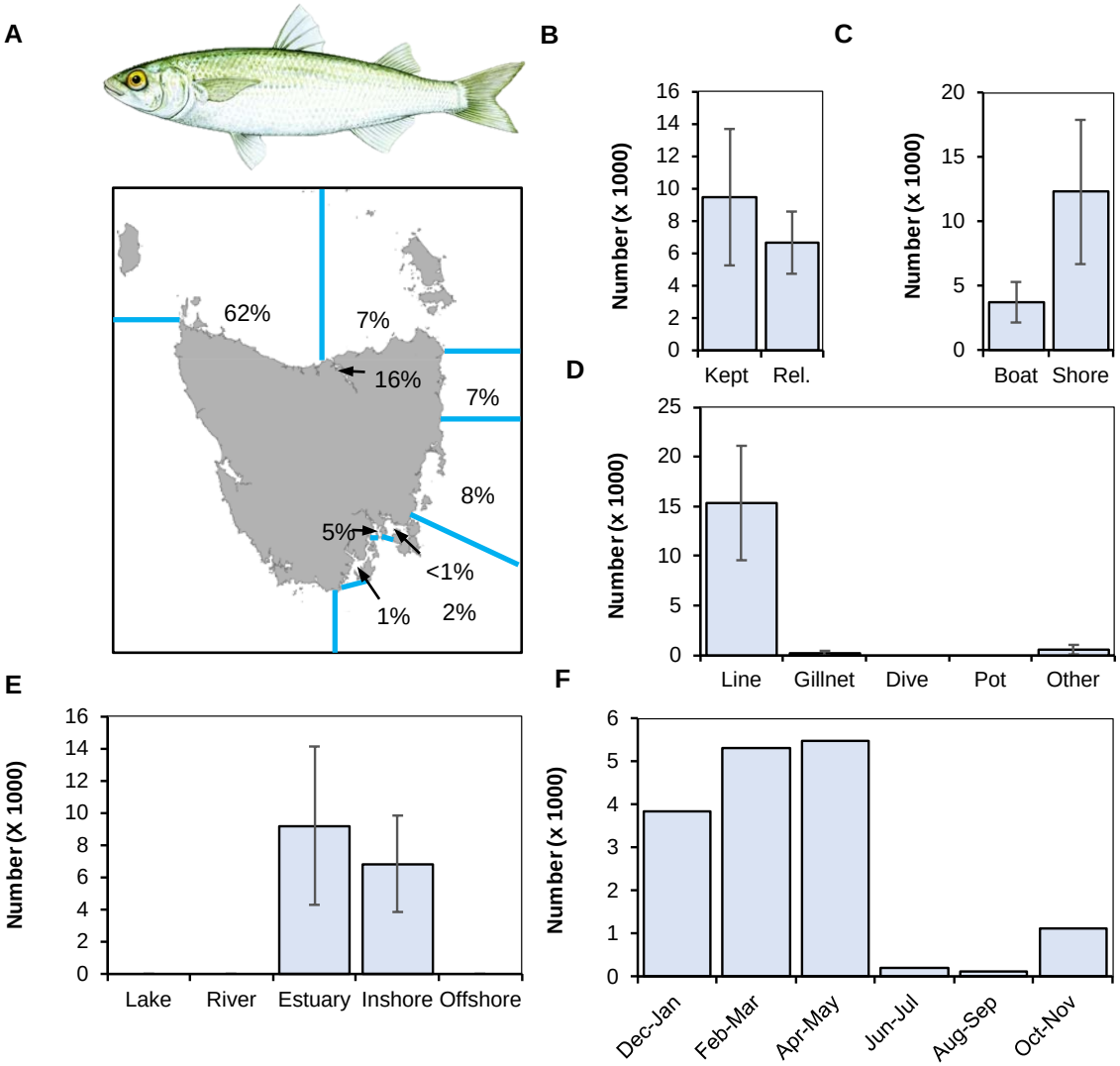


Fig. 16. Characteristics of the recreational fishery for Mullet in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.5 Flounder

Several species of flounder occur in Tasmanian waters, the most commonly caught being Greenback Flounder (*Rhombosolea tapirina*), with Long-snouted Flounder (*Ammotretis rostratus*) also occasionally taken. Survey respondents did not, however, distinguish catches by species.

Flounder were mainly caught off the North West and in sheltered inshore waters off south eastern Tasmania, in particular Norfolk-Frederick Henry Bay and the D'Entrecasteaux Channel (Fig. 17A). The vast majority of the Flounder caught were retained (Fig. 17B) with shore-based fishing accounting for the bulk of the catch (Fig. 17C). Spearing was the main method of capture ('Other' in Fig. 17D), typically undertaken at night wading in the shallows. As indicated above, Flounder were caught exclusively in inshore coastal and estuarine waters (Fig, 17E). Catches peaked during spring-summer and were lowest in winter (Fig. 17F).

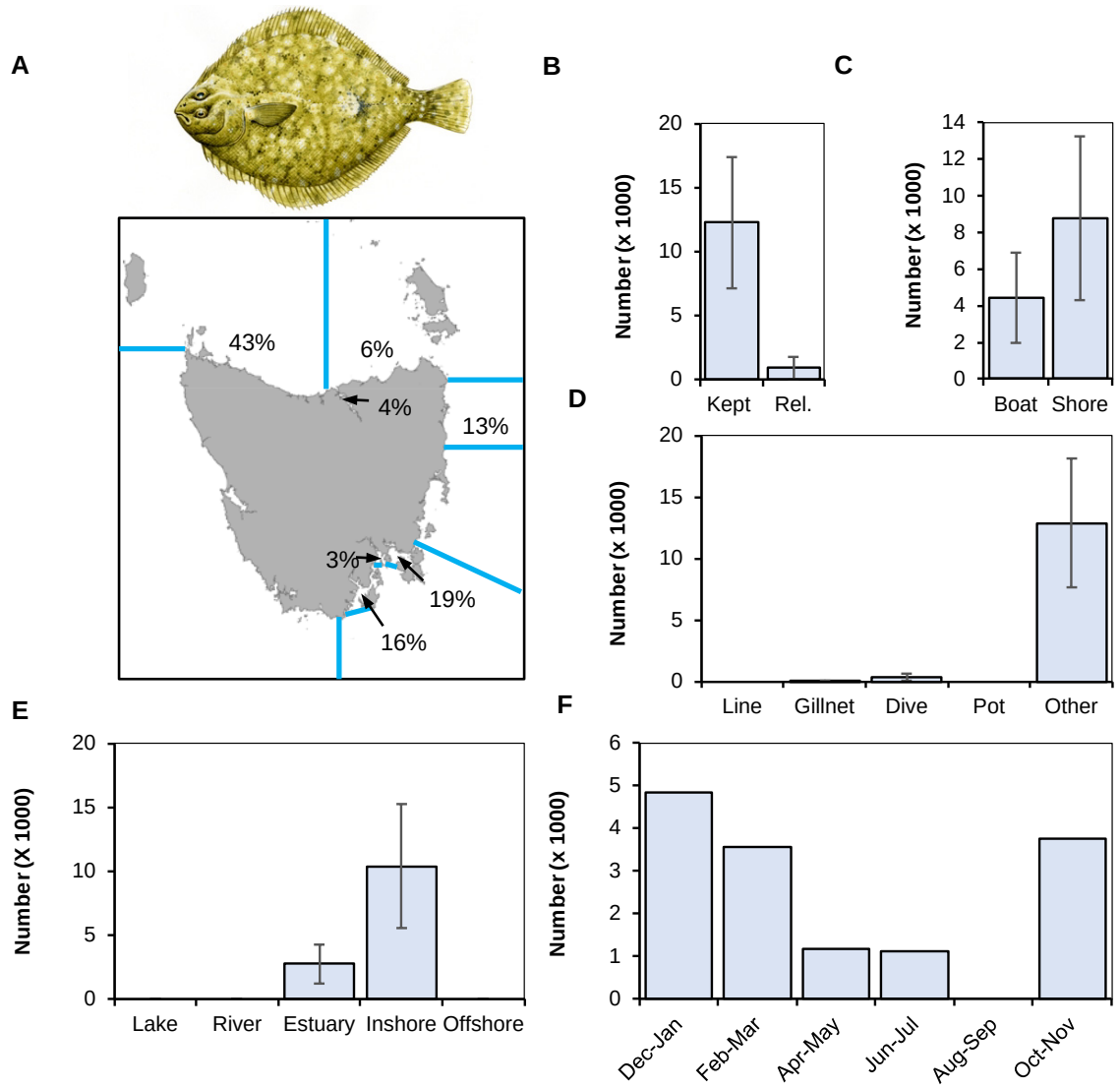


Fig. 17. Characteristics of the recreational fishery for Flounder in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.6 Black Bream

The Central East (in particular the Swan River), Derwent Estuary and the East coast (mainly Scamander River and Ansons Bay) represented key areas for the Black Bream (*Acanthopagrus butcheri*) fishery and collectively accounted for over 90% of the total catch (Fig. 18A). Most of the Black Bream were released (Fig. 18B), reflecting a strong catch and release ethic amongst some fishers (refer Fig. 10). Catches were dominated by boat-based fishing effort (Fig. 18C), with line fishing (mainly using lures) accounting for the vast majority of the catch (Fig. 18D). Black Bream were almost exclusively taken from estuarine waters (Fig. 18E), with lowest catches taken during the winter months and little evidence of catch variability at other times of the year (Fig. 18F).

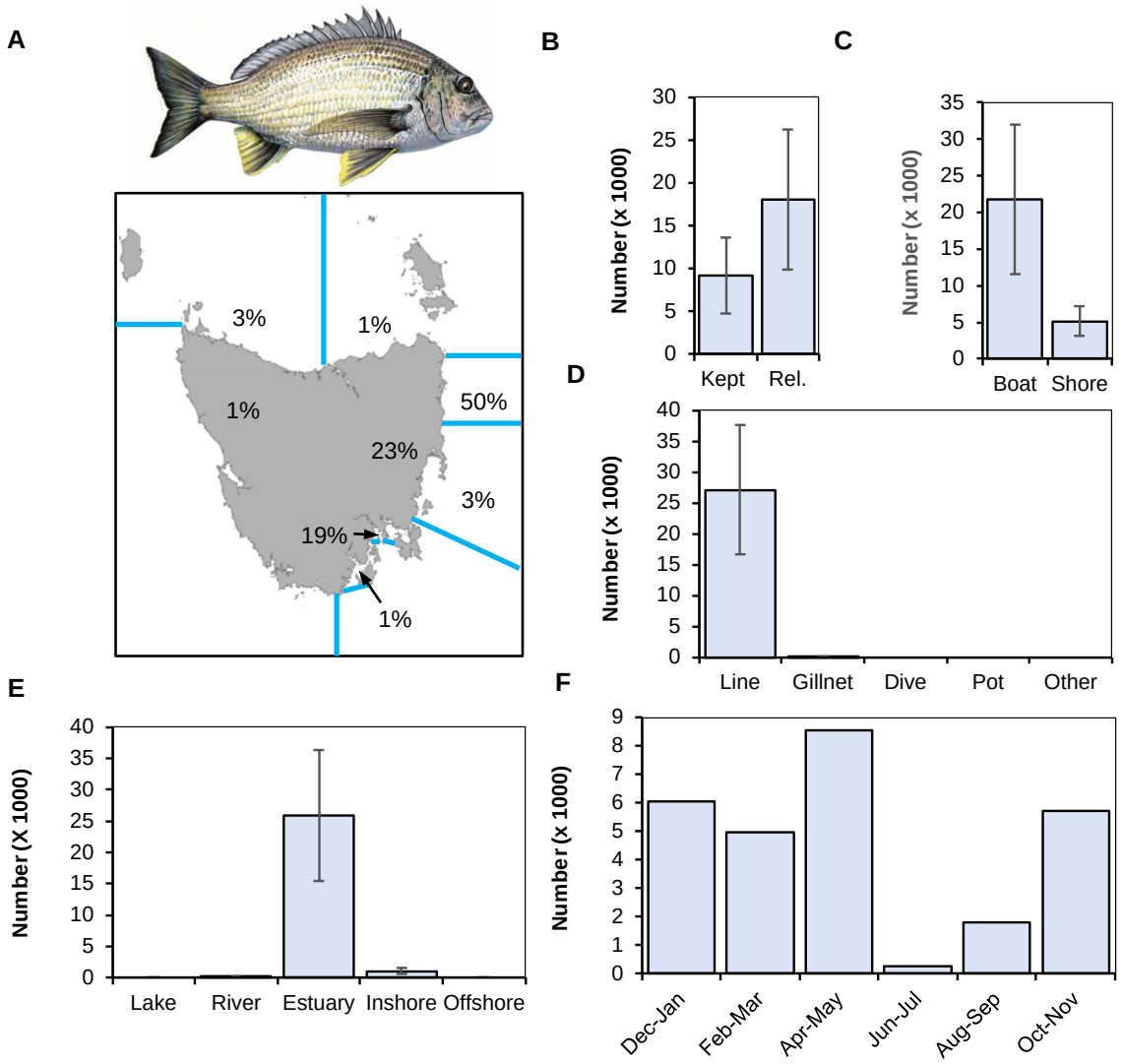


Fig. 18. Characteristics of the recreational fishery for Black Bream in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.7 Tuna

Recreational fishers reported catching several species of tuna; Albacore (*Thunnus alalunga*) was the most common, representing 55% of catch numbers (5,009; SE 3,216), followed by Southern Bluefin (*T. maccoyii*) (3,340; SE 1,273), with Skipjack Tuna (*Katsuwonus pelamis*) also taken but in low numbers (< 1000 fish). The specialised nature of the game fishing meant that compared with other types of fishing there were relatively few trips reported and thus the figures should be treated with caution. The fishery for tuna was effectively restricted to the east coast of Tasmania, in particular the East and South East coasts (Fig. 19A). Overall about 18% of the Tuna were released (Fig. 19B), the proportions varying between species - a quarter of the Southern Bluefin Tuna were released compared with 9% for Albacore. The fishery was exclusively boat-based (Fig. 19C) and involved the use of rod and line (Fig. 19D). Catches were derived from offshore waters (>5 km from the coast) and to a lesser extent from more inshore areas (Fig. 19E). Tuna catches were restricted to the summer–autumn period, with a marked peak during December- January (Fig. 19F).

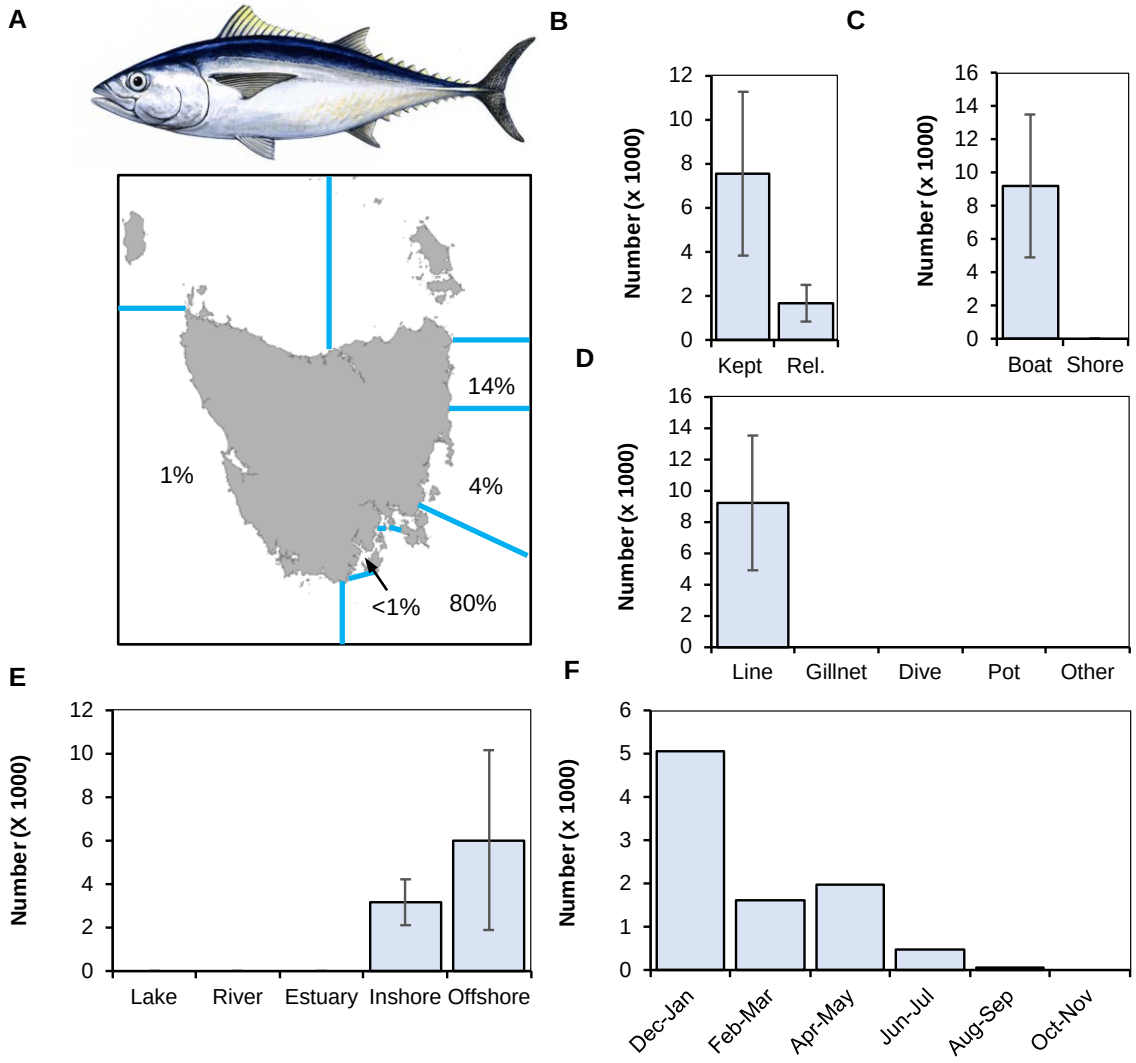


Fig. 19. Characteristics of the recreational fishery for tunas in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.8 Gould's Squid

Gould's Squid (*Nototodarus gouldi*) catches were concentrated in south eastern and northern Tasmania, with the Central East and East coast regions of secondary importance (Fig. 20A). The majority of the catch was retained (Fig. 20B), being taken primarily by boat-based fishers (Fig. 20C). Line fishing (mostly using lures) (Fig. 20D) in inshore waters (Fig. 20E) was the predominant fishing method. Catches were largely restricted to summer and early autumn months, with a marked peak during December and March (Fig. 20F). Closures to squid fishing applied to selected areas of the state during October and November and were reflected in low catches during these periods.

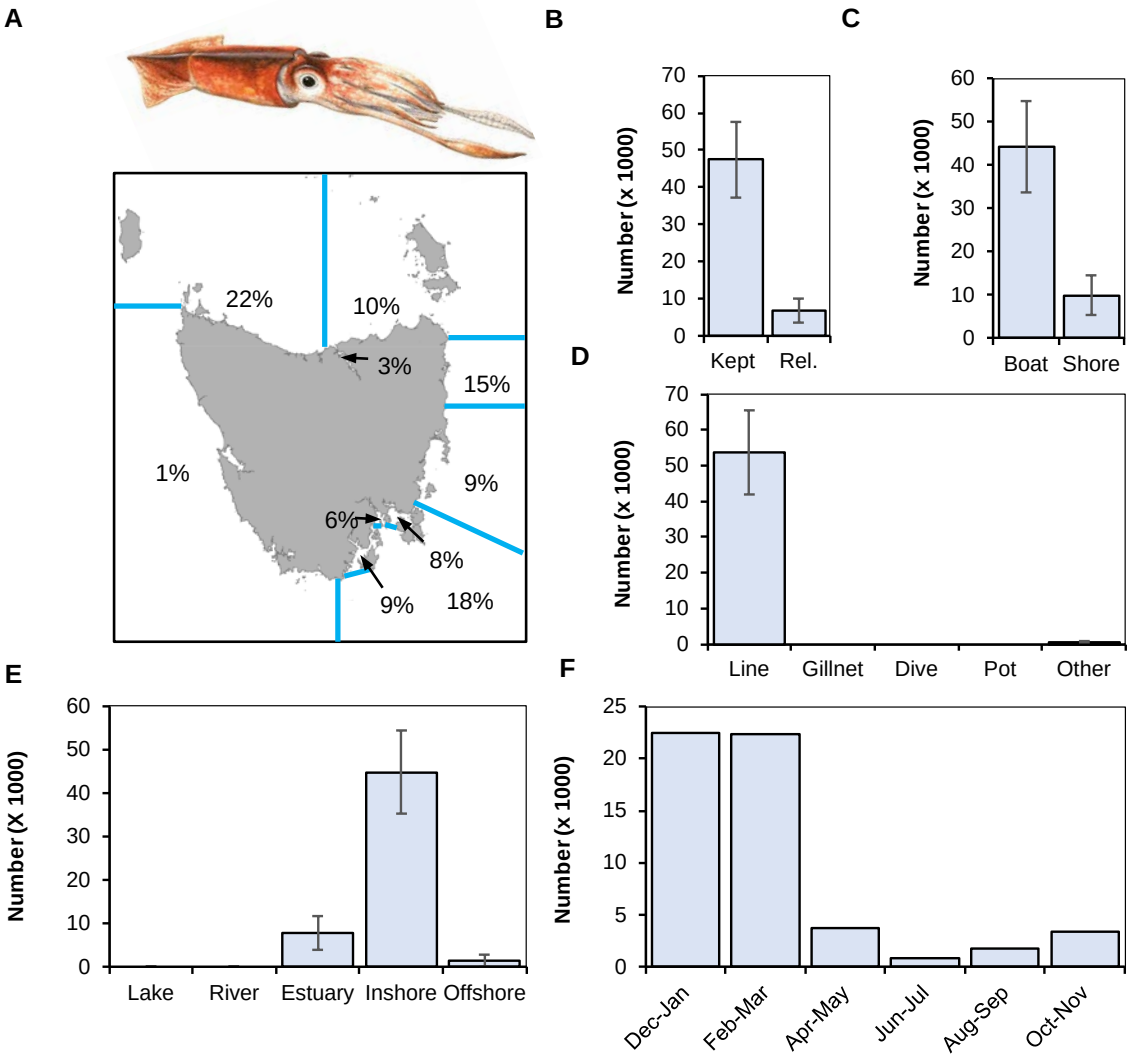


Fig. 20. Characteristics of the recreational fishery for Gould's Squid in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.9 Southern Calamari

Over half of the Southern Calamari (*Sepioteuthis australis*) catch was taken off south eastern Tasmania, including the D'Entrecasteaux Channel and Derwent Estuary; outside of this general region the Central East and East coasts were of secondary importance followed by waters off northern Tasmania (Fig. 21A). The majority of the catch was retained (Fig. 21B), with more or less equal catches taken by boat- and shore-based fishers (Fig. 21C). Line fishing (primarily using lures/jigs) represented the main capture method but there was also a small quantity taken by spear (Fig. 21D). Most of the Southern Calamari were taken from inshore coastal waters, with moderate quantities reported from estuarine areas (Fig. 21E). Catches were concentrated over the summer–autumn period (December–May); relatively low numbers were taken at other times of the year, including during October and November when fishery closures in some areas were in place (Fig. 21F).

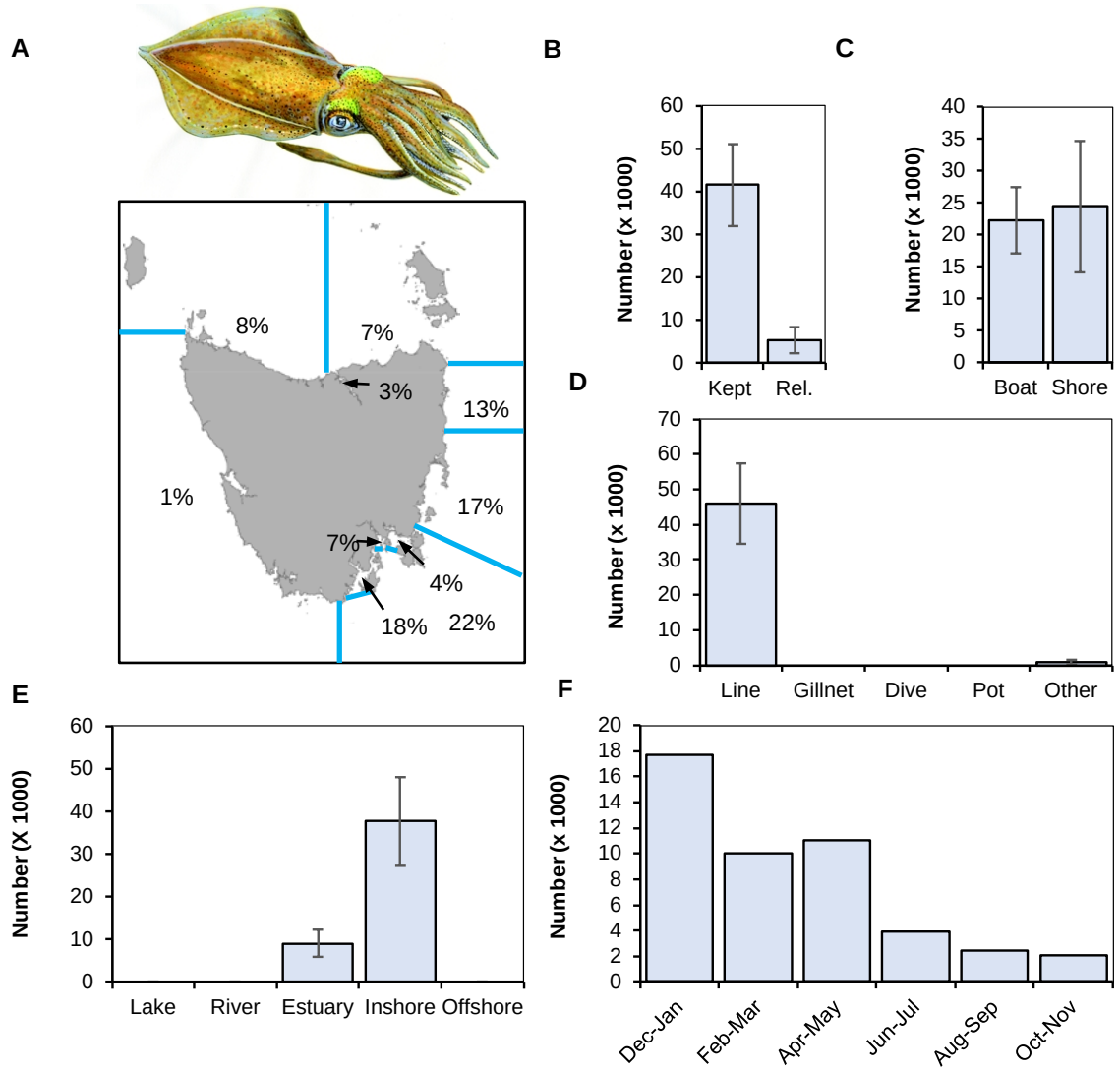


Fig. 21. Characteristics of the recreational fishery for Southern Calamari in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.10 Rock Lobster

Catches of Rock Lobster (predominantly *Jasus edwardsii*) were concentrated in south eastern Tasmania (including D'Entrecasteaux Channel and Norfolk-Frederick Henry Bay) (Fig. 22A). Moderate quantities were also taken from the North East, with smaller catches taken from the other regions, including the West coast. Most of the lobsters were retained (Fig. 22B), with boat-based fishers accounting for the bulk of the catch (Fig. 22C). Lobster pots accounted for about 56% of the catch with dive collection accounting for most of the remainder (Fig. 22D). Virtually all the catch was taken from inshore coastal waters (Fig. 22E), primarily between December and March and prior to the closure of the Eastern Region of the fishery in May (Fig. 22F). The impact of the fishery closure during September and October was clearly evident.

The characterisation of the recreational lobster fishery based on fishing region, method and seasonality in this study is generally consistent with that reported for a targeted survey of lobster licence-holders conducted over the same period (Lyle, 2018). The harvest estimate for the current survey (42,851 lobster) is, however, significantly lower than that estimated for the survey of licence-holders (72,009)[3]. This discrepancy can be attributed to the use of different bases for data expansion (general population verses licence-holders) and the fact that specialised activities, such as use of pots and dive methods to target Rock Lobster are not as well represented in the present survey compared with common activities such as line fishing for key scalefish species. This is highlighted by the fact that just 12% of all fishing events reported by diarists were targeted at Rock Lobster. In such instances where alternative estimates are available it is preferable to give greater weight to estimates from the more focussed survey (i.e. Lyle, 2018).

[3] Note: while dive harvest estimates were similar between surveys (24,128 for the present survey compared with 24,455 for the rock lobster survey) there was a large discrepancy between pot catch estimates (18,576 compared with 45,388 for the rock lobster survey).

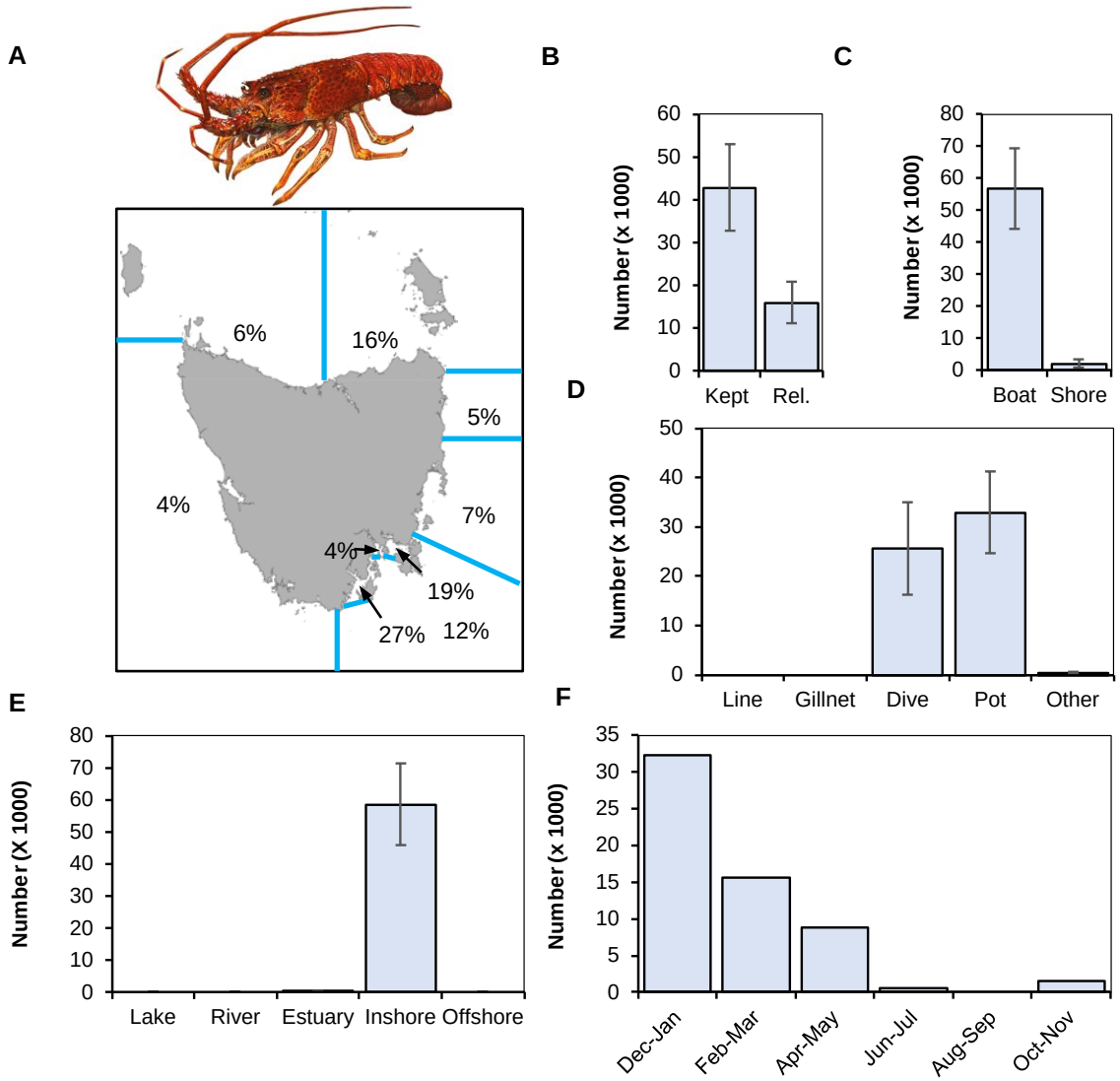


Fig. 22. Characteristics of the recreational fishery for Rock Lobster in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

7.11 Abalone

Two species of abalone are fished in Tasmanian waters, Blacklip Abalone (*Haliotis. rubra*) and Greenlip Abalone (*H. laevigata*). Blacklip Abalone are widely distributed in Tasmanian coastal waters and dominated (63%) the recreational catch (22,015; SE 6,695). Greenlip Abalone have a more restricted distribution off northern Tasmania and represented a minor component (36%) of the catch total (12,484; SE 10,824).

Abalone catches were concentrated in the North East and off south eastern Tasmania, including the D'Entrecasteaux Channel (Fig. 23A). Moderate catch levels were also reported from the Central East and North West regions. Most of the catch was retained (Fig. 23B), taken mainly by boat-based rather than shore-based divers (Fig. 23C&D)

operating in inshore coastal waters (Fig. 23E). Catches were highest during summer, with a strong December-January peak, declining thereafter (Fig. 23F).

The spatial, temporal and species composition characterisation of the abalone fishery reported here is generally consistent with that reported for a targeted survey of abalone licence-holders conducted over the same period (Lyle, 2018). The harvest estimate for the current survey (34,075 Abalone) is, however, lower than that estimated for the survey of licence-holders (45,142). This discrepancy can be attributed to the same issues outlined for Rock Lobster (Section 7.10), noting that in this instance only 2% of all fishing events reported by diarists in this study were targeted at Abalone.

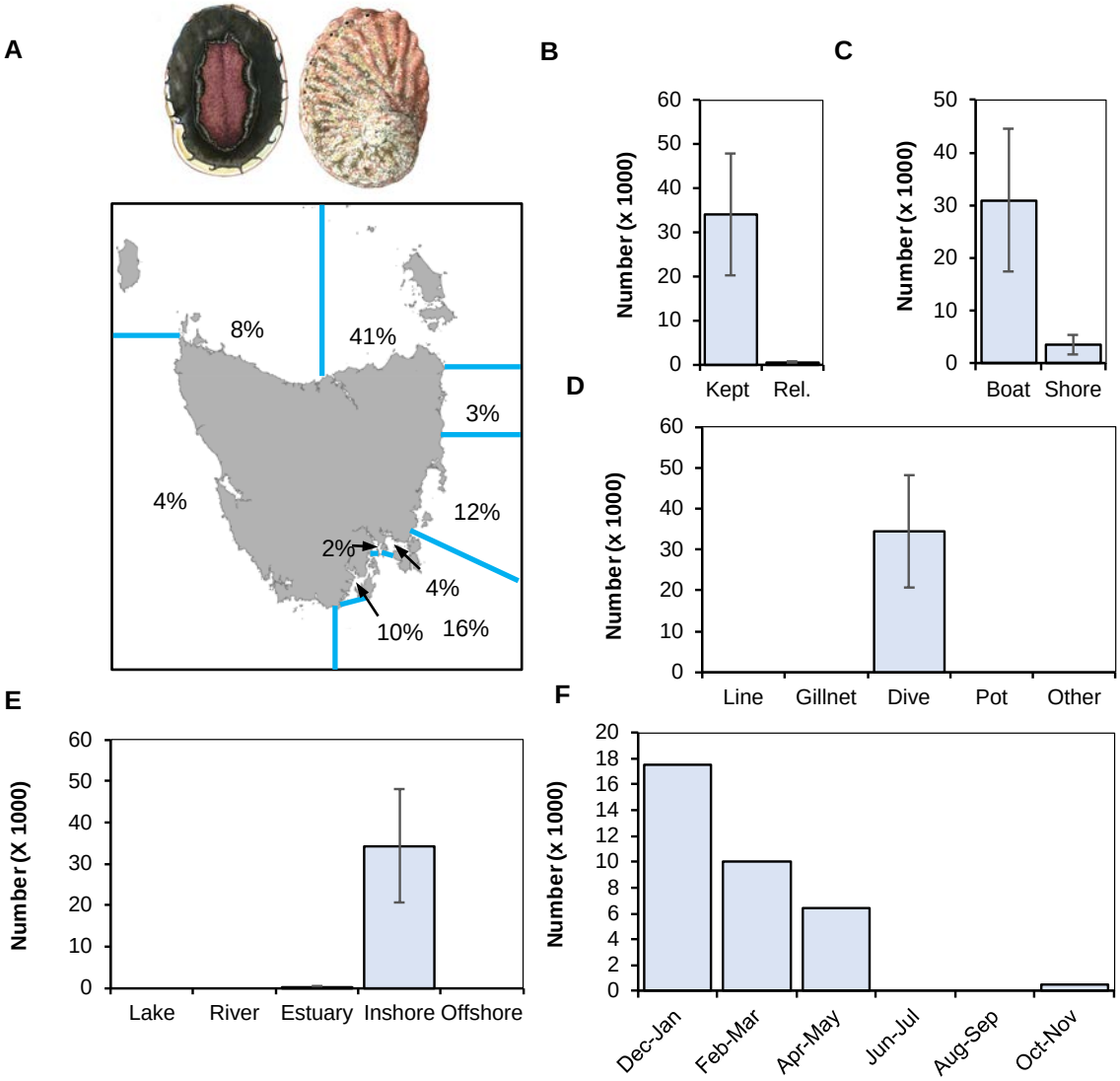


Fig. 23. Characteristics of the recreational fishery for Abalone in Tasmania during 2017-18: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; E) total catch (numbers) by water body fished; and F) seasonality in the catch (numbers). Error bars represent one standard error.

8. REGIONAL FISHERIES

In this section, effort within a fishing region is considered in the context of where fishers reside, providing an understanding of the level of fishing effort that is 'imported' to the region by residents from outside of the immediate area, the relative importance of the fishing methods used and catch composition. Catch and effort information was provided by fishers during the 12-month diary survey and has been presented as expanded estimates.

All references to fishing regions relate to those depicted in Fig. 2, while area of residence relates to the ABS statistical areas (Level SA4) in which fishers reside (Fig. 1). Detailed information on catch and effort by region is provided in Appendices 13 and 14.

8.1 Inland fisheries

For the purpose of reporting, Tasmania's inland fishery was split into three key regions: Western, Central Plateau and Eastern regions. Fishing effort in the Western region was primarily derived from West and North West residents followed by residents of the Launceston and North East area; there was very limited activity from fishers resident outside of these bordering areas (Fig. 24A). A different pattern was evident for the Central Plateau where a significant proportion of the effort was derived from residents travelling from Hobart in addition to residents of adjoining areas, indicating the importance of effort 'imported' from the south of the state (Fig. 24B). Launceston and North East and Hobart residents accounted for the bulk of the fishing effort in the Eastern region with very limited activity from West and North West residents (Fig. 24C).

The inland fisheries were almost exclusively rod and line based, with some Whitebait trapping or netting activity reported in the Western and Eastern regions (Fig. 24D-F).

Trout clearly dominated catches (excluding Whitebait), accounting for over 82% the Eastern, 95% of the Central Plateau and 96% in the Western region catches (Fig. 24G). The balance was comprised mainly of Atlantic Salmon in the Eastern region, Redfin Perch in the Central region and Redfin Perch and Eels in the Western region.

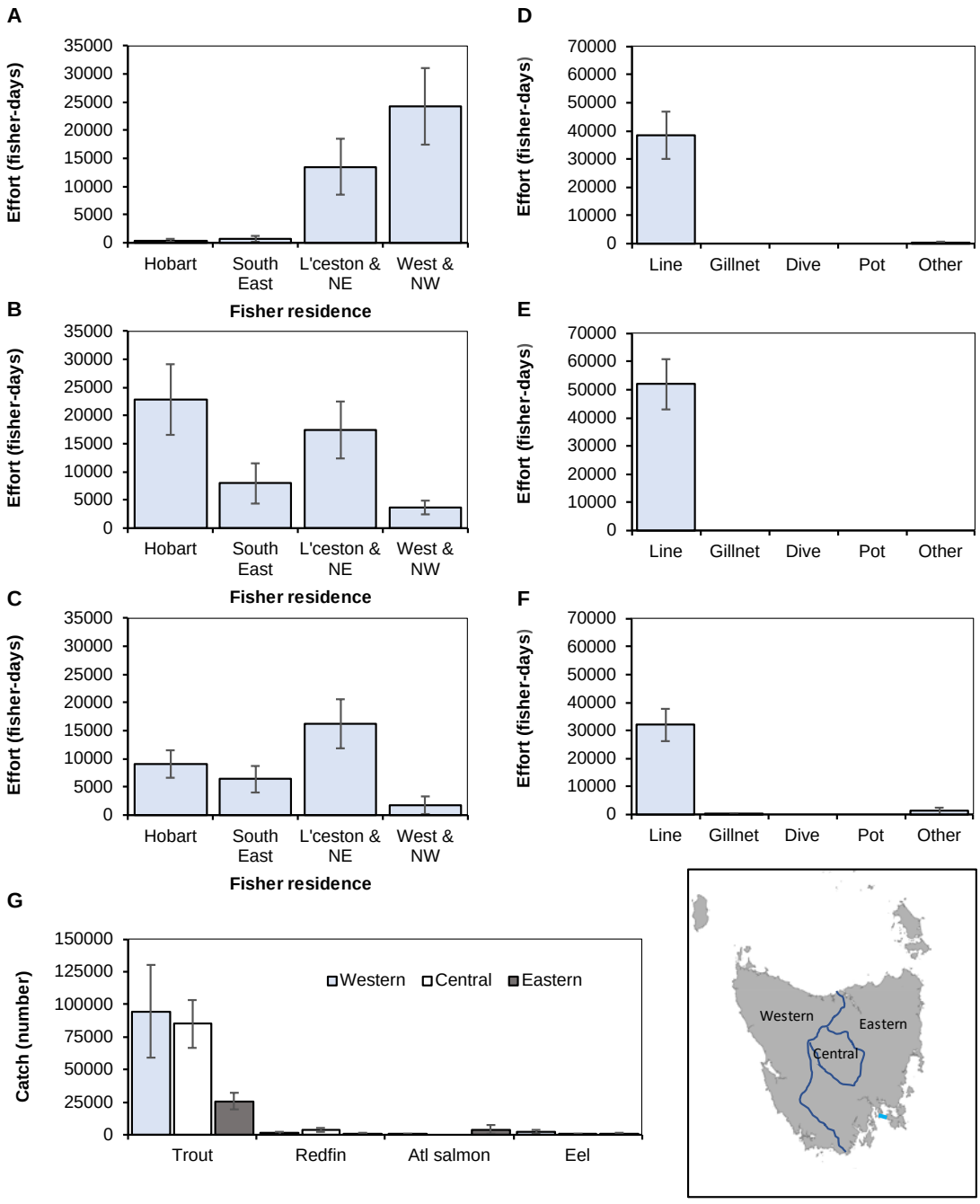


Fig. 24. Characteristics of the inland recreational fishery based on based on 2017-18 activity: A) fishing effort (fisher days) in the Western region; based on region of residence (statistical area) of fishers B) fishing effort in the Central Plateau region, based on region of residence of fishers; C) fishing effort in the Eastern region, based on region of residence of fishers, D) fishing effort by method in the Western region, E) fishing effort by method in the Central Plateau region; F) fishing effort by method in the Eastern region; and G) catch (numbers) for the key finfish species by fishing region. Error bars represent one standard error.

8.2 West coast

As limited survey data were available for the West coast the results should be treated with caution.

The majority (77%) of the effort on the West coast was attributed to fishers residing in the adjacent area (West and North West), indicating comparatively limited imported effort (Fig. 25A). A range of methods, including line, lobster pot and gillnet dominated effort in this region (Fig. 25B). Australian salmon was the most commonly caught species, albeit the numbers were relatively small, followed by Whiting, Rock Lobster, Striped Trumpeter and Abalone (Fig. 25C).

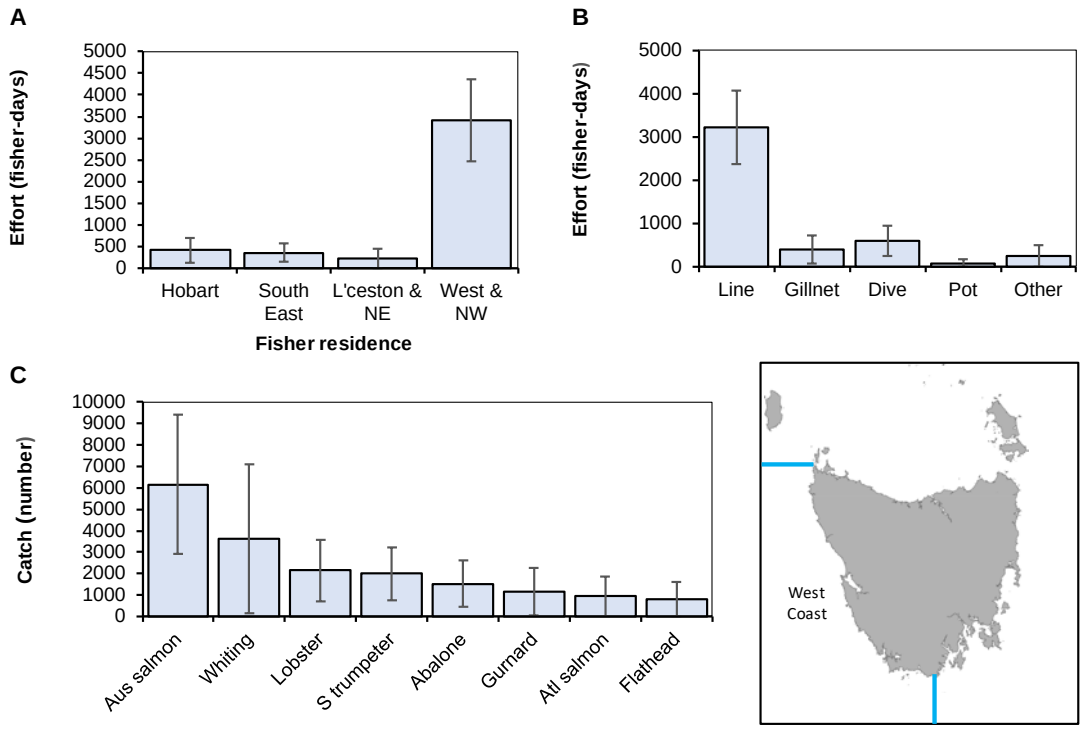


Fig. 25. Characteristics of the west coast recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.3 North West coast

Effort in this region was almost entirely (90%) due to the activities of residents from the West and North West (Fig. 26A). Line fishing was the main method used; the 'other' methods category included set-line and beach seine usage (Fig. 26B). Flathead, dominated catches, with Gurnards, Australian Salmon and a range of other finfish of secondary importance (Fig. 26C).

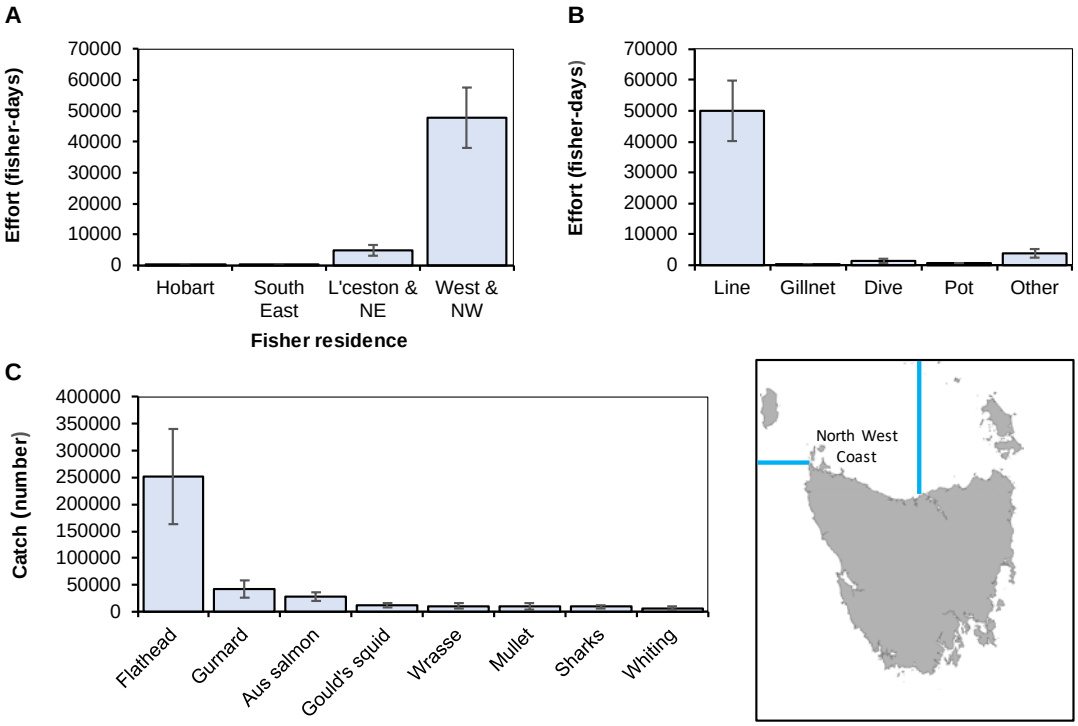


Fig. 26. Characteristics of the North West coast recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by platform; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.4 Tamar Estuary

Residents of the surrounding area (Launceston and North East) accounted for the vast majority (95%) of the fishing activity in the Tamar (Fig. 27A). Line fishing was the most commonly used method (Fig. 27B), with Flathead and Australian Salmon dominating catches, followed by minor catches from a range of other finfish and squid species (Fig. 27C).

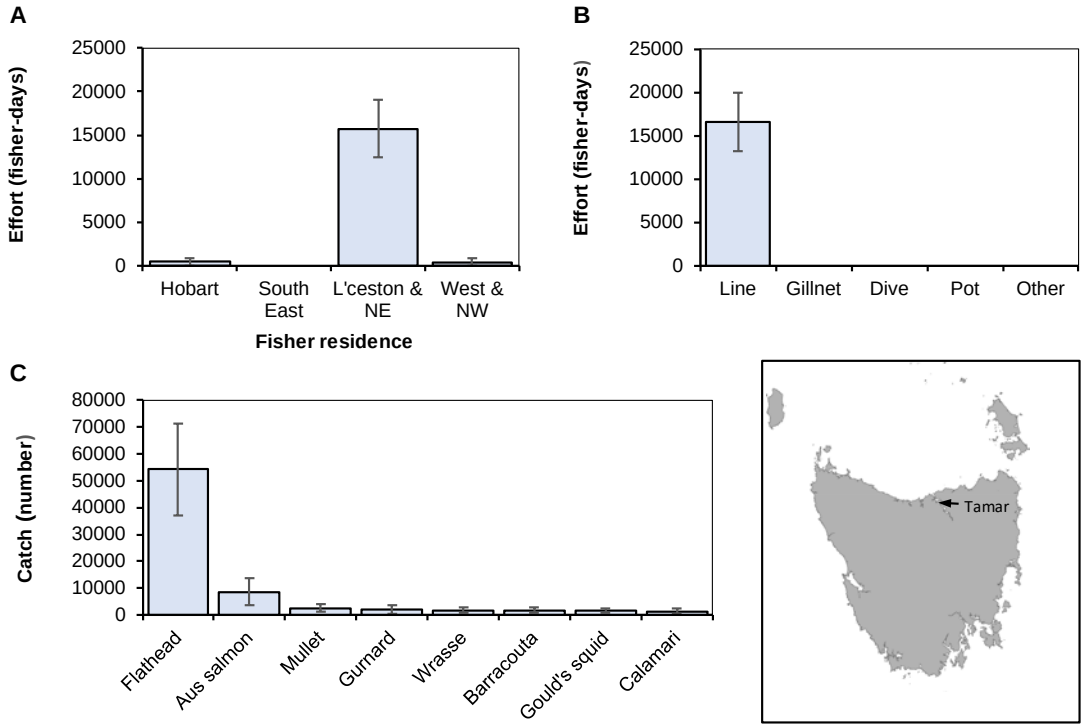


Fig. 27. Characteristics of the recreational fishery in the Tamar Estuary based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.5 North East coast

Locally based fishers (Launceston and North East) accounted for over 85% of the total effort in the North East, with low levels of effort from residents of other parts of the state (Fig. 28A). Line fishing was the main method used, dive and pot methods were of secondary importance (Fig. 28B). Flathead was the most commonly caught species, followed by comparatively low catches of a range of other species including Australian Salmon, Abalone and Gurnard (Fig. 28C).

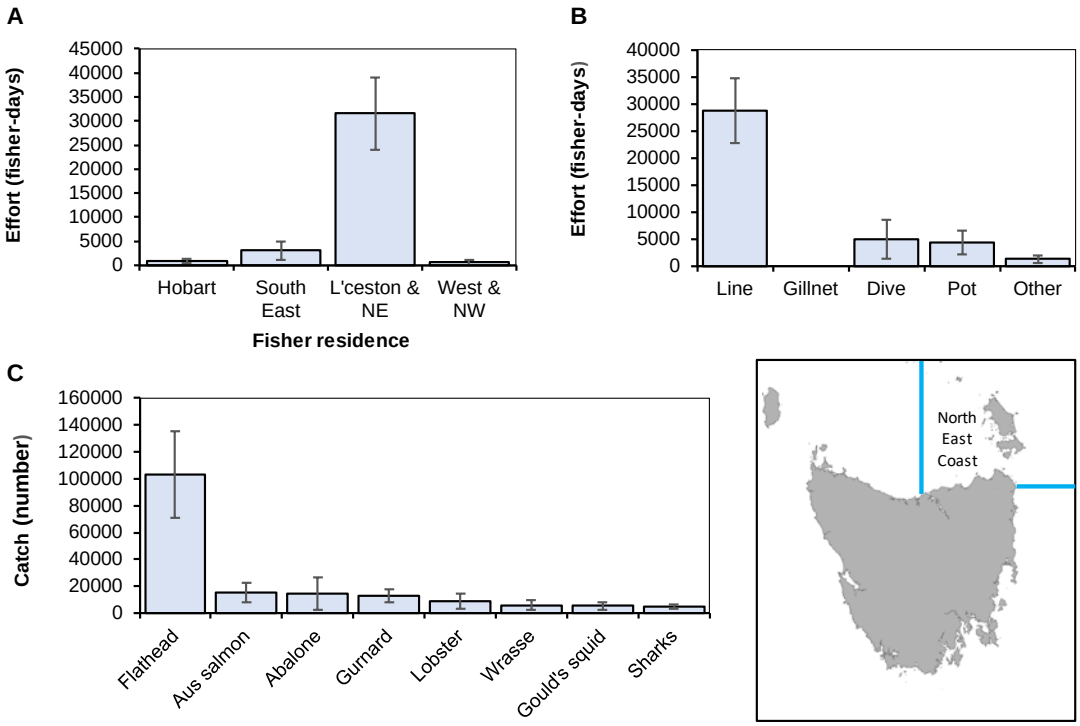


Fig. 28. Characteristics of the recreational fishery in the North East region based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.6 East coast

Residents from Launceston and North East statistical area were the main contributors to the East coast region fishing effort (58%), with residents travelling from the Hobart and West and North West areas of secondary importance (Fig. 29A). Line fishing followed by pot effort were the main fishing methods (Fig. 29B), and Flathead and Australian Salmon the main species caught (Fig. 29C). Whiting (mostly King George Whiting), Silver Trevally and Black Bream were also relatively common species.

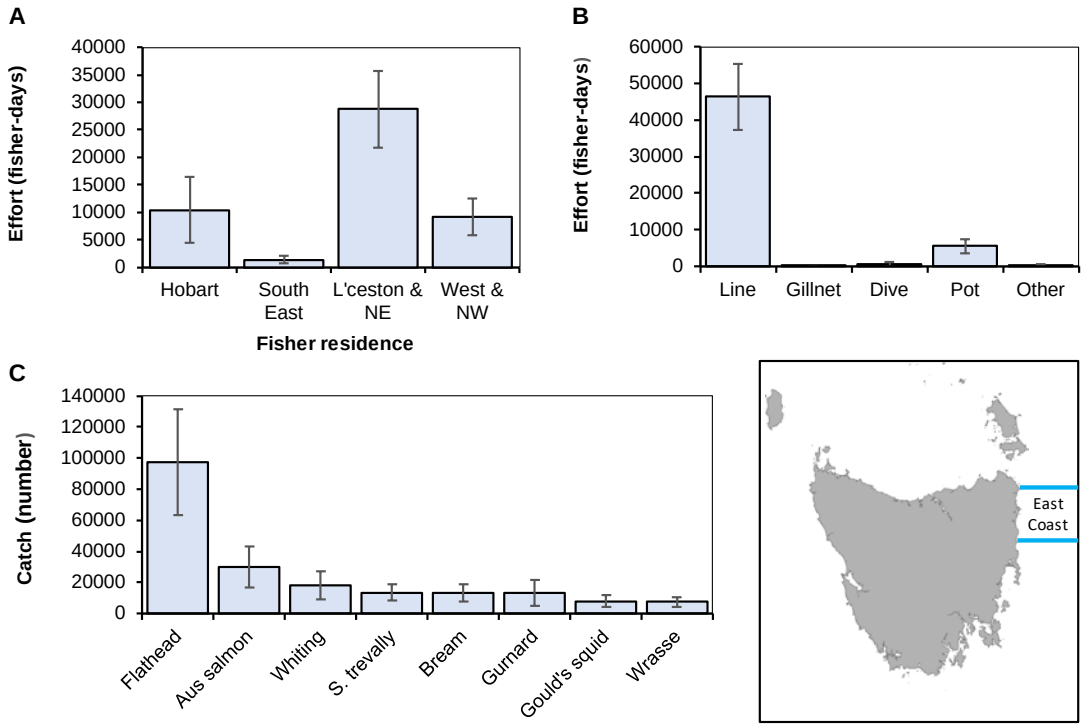


Fig. 29. Characteristics of the East coast recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.7 Central East coast

Although the South East statistical area represented the adjacent region, fishing effort by Launceston and North East (38%) and Hobart (35%) residents exceeded that of local residents (19%) (Fig. 30A). Line, dive and pot fishing methods were the main activities in the region (Fig. 30B) with Flathead and dive-caught Scallops the most commonly caught species (Fig. 30C). A variety of other finfish and squid were also caught but in comparatively low numbers.

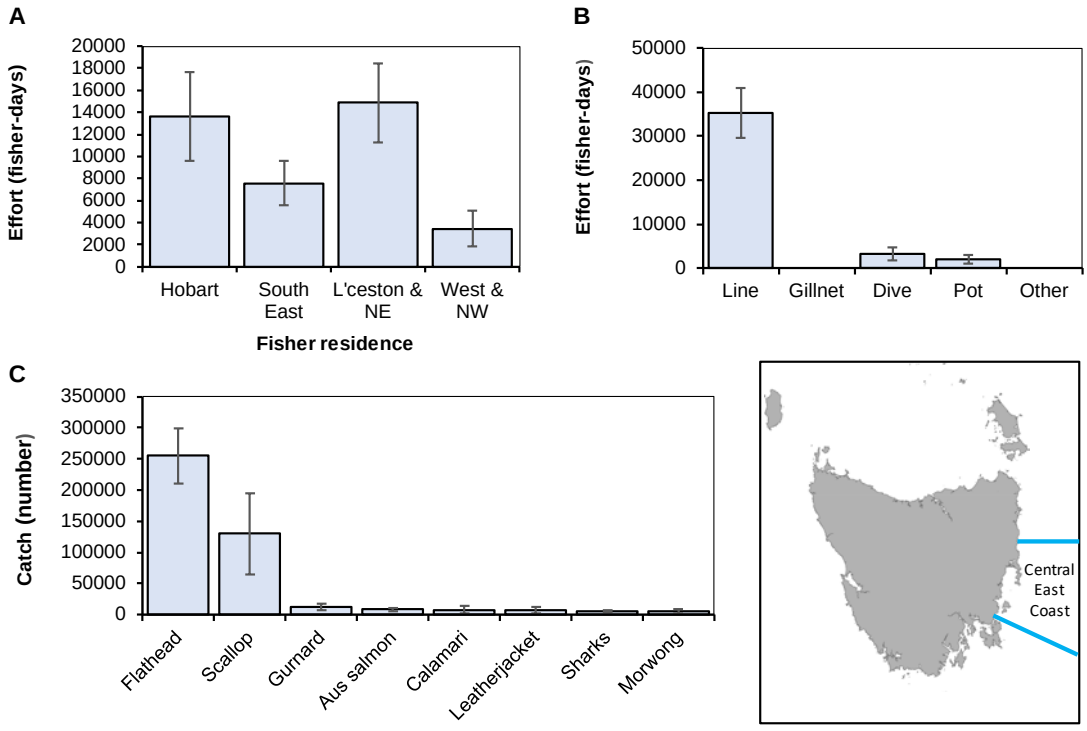


Fig. 30. Characteristics of the Central East coast recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.8 South East coast

The impact of fishers residing in the Hobart area was clearly evident, accounting for 78% of the fisher days effort in the South East coast, with South East residents representing the bulk of the remainder (Fig. 31A). Line and potting were the dominant fishing methods, with gillnet and dive effort of secondary importance (Fig. 31B). Catches were dominated by Flathead, followed by Gurnard, Southern Calamari, Gould's Squid and Tuna (Fig. 31C).

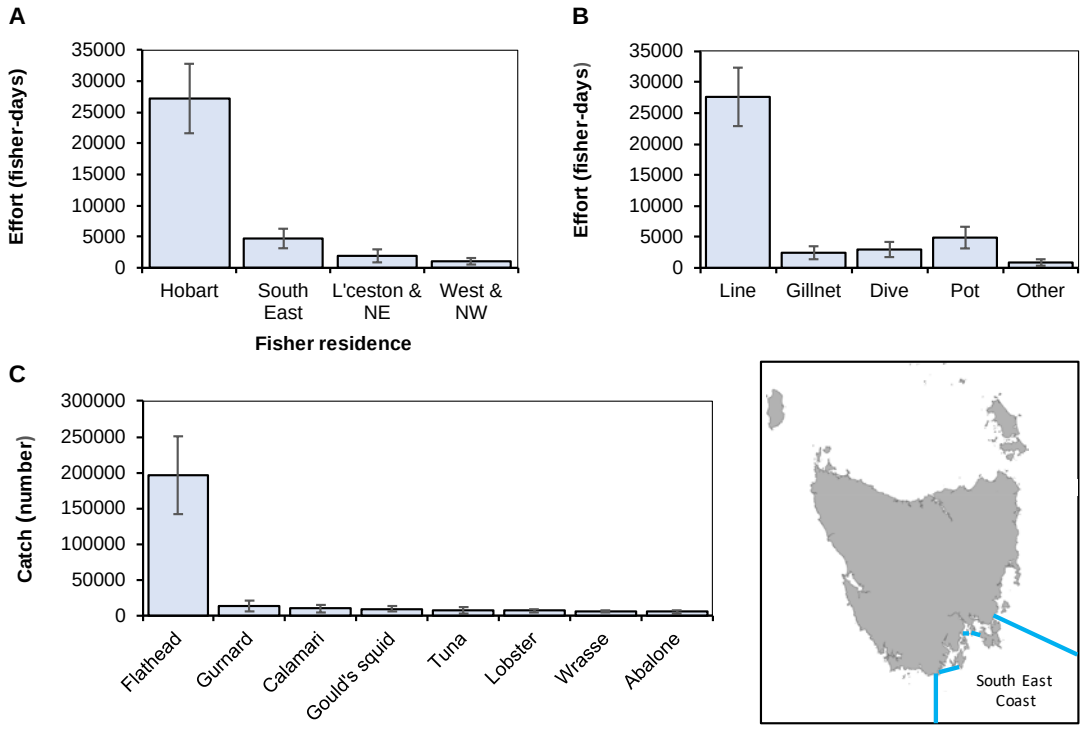


Fig. 31. Characteristics of the South East coast recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.9 Norfolk-Frederick Henry Bay

Fishers from Hobart accounted for the majority (90%) of the fishing effort in the Norfolk-Frederick Henry Bay region, with South East residents accounting most of the remainder (Fig. 32A). Line and pot fishing were the main fishing methods (Fig. 32B), with Flathead accounting for most of the total catch from the region (Fig. 32C).

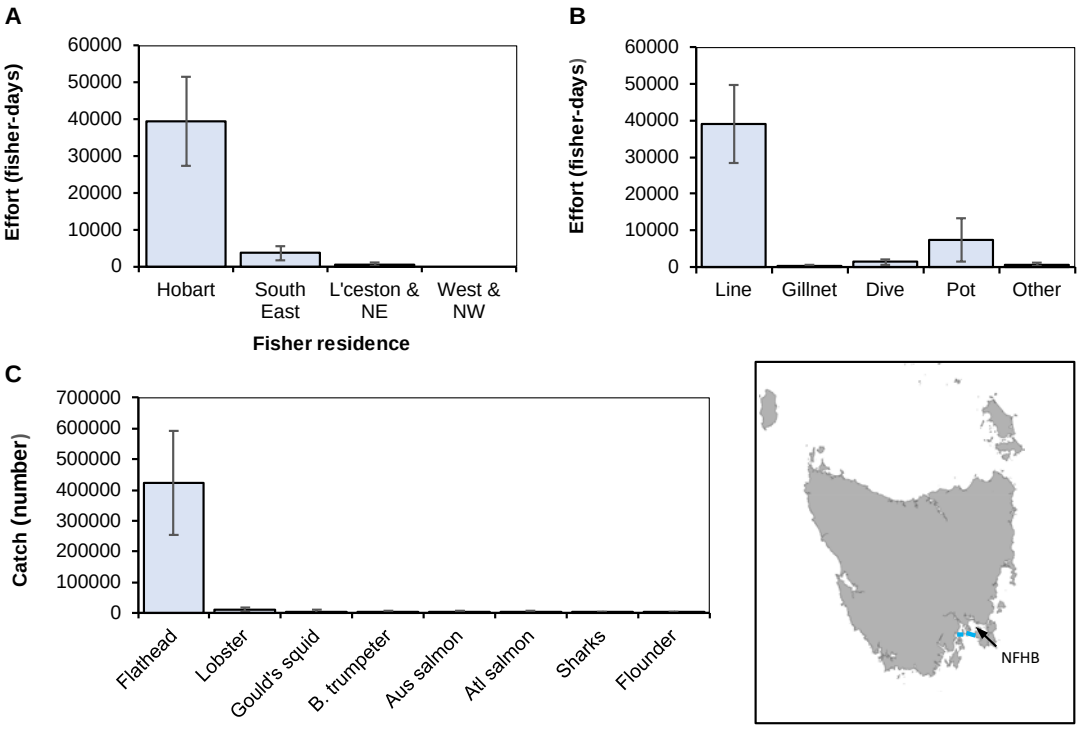


Fig. 32. Characteristics of the Norfolk-Frederick Henry Bay recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.10 Derwent Estuary

The vast majority (91%) of the fishing activity in the Derwent Estuary was attributed to locally based fishers (Fig. 33A) and primarily involved line fishing (Fig. 33B). While Flathead dominated catches, Australian Salmon, Black Bream and the two squid species were of secondary importance (Fig. 33C).

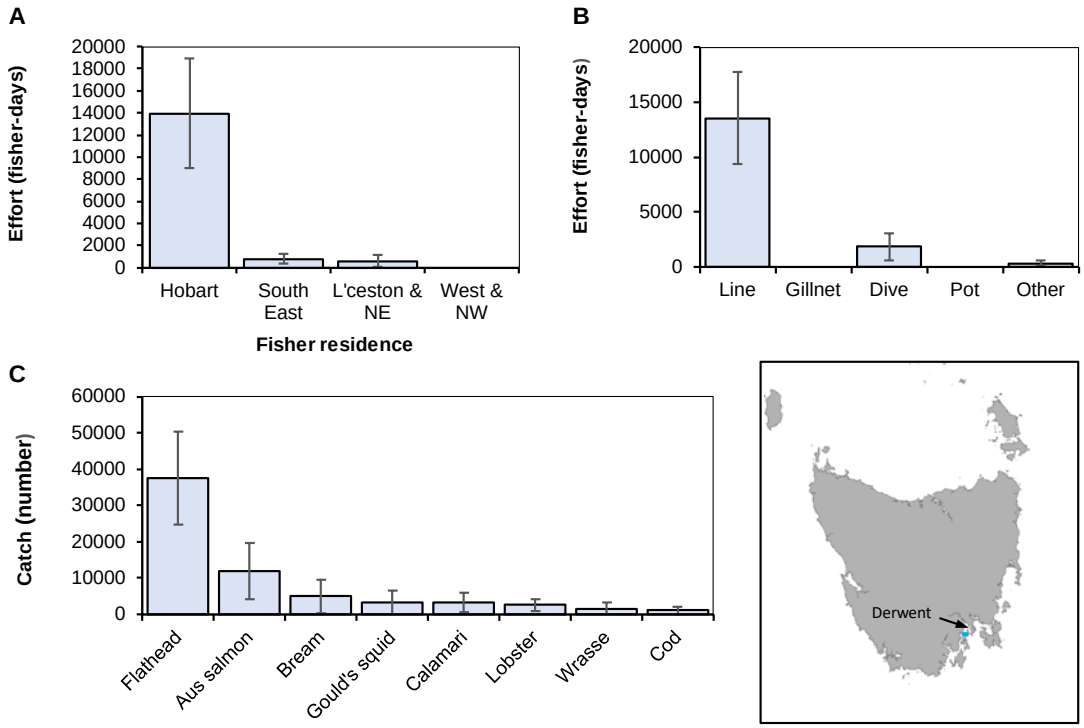


Fig. 33. Characteristics of the Derwent recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.11 D'Entrecasteaux Channel

Based on total fisher days of effort, the D'Entrecasteaux Channel represented the most heavily fished region in Tasmania (Appendix 13). The Channel was clearly very popular amongst locals, with effort attributable to residents of the Hobart (74%) and South East (24%) statistical areas (Fig. 34A). Line fishing accounted for most of the fishing activity in this region, with potting of secondary significance (Fig. 34B). Numerically Flathead were the most commonly caught species, species of secondary importance included Rock Lobster, Australian Salmon, and the two squid species (Fig. 34C). This region has, in the past, been the primary focus for the recreational scallop fishery but owing to overfishing and poor recruitment the area has been closed to diving for scallops for several years (Tracey and Lyle, 2011).

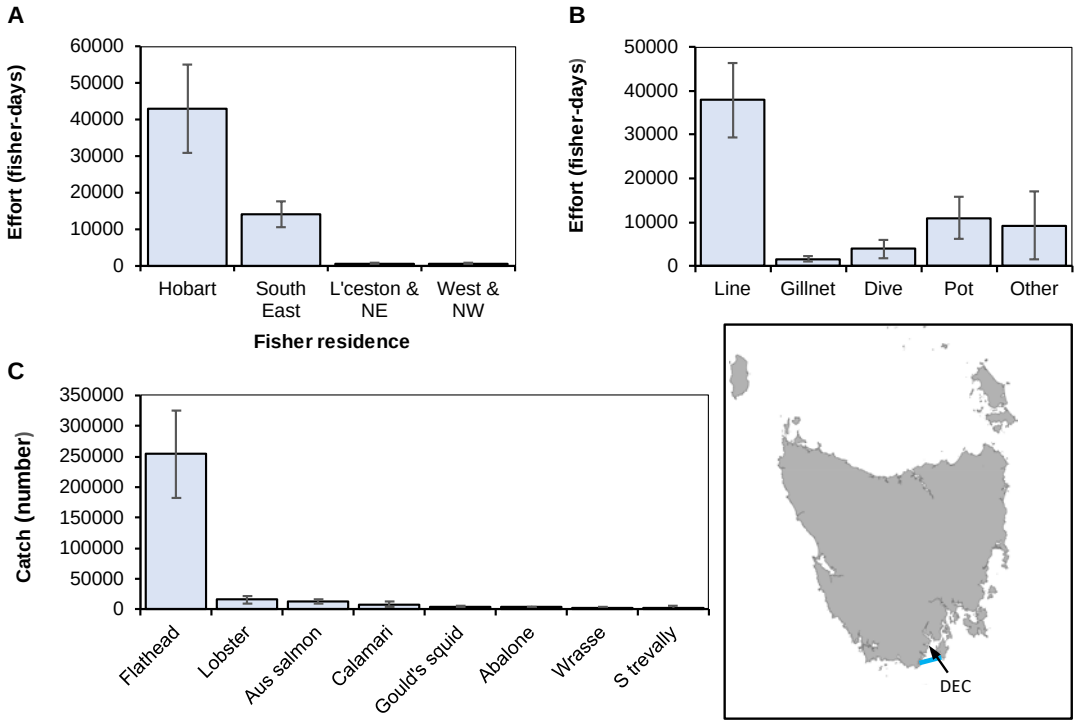


Fig. 34. Characteristics of the D'Entrecasteaux Channel recreational fishery based on 2017-18 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

9. FISHING RELATED EXPENDITURE

The following analyses are based on information derived from the wash-up survey and are expanded, with non-response adjustments and adjustments to account for unexpected fishing by non-intending fisher households, to represent the resident private dwelling fisher population of Tasmania aged five years or older. As household expenditure was based on a 12-month recall period the data is likely to be subject to bias and should, therefore, be treated as being indicative.

During 2017-18 Tasmanian residents were estimated to have spent $161 million on goods and services relevant to recreational fishing, equivalent to an average of $3157 per active fishing household and $1787 per active fisher (Table 11).

Direct expenditure on boat and trailer capital items accounted for $56.3 million (35% of the total). Fishing gear purchases, vehicle travel costs (fuel), vessel insurance/registration, boat/trailer maintenance, and vessel running costs (mainly fuel and oil) were also significant expenditure items ($12 million or more). Other items involving expenditure in excess of $3 million included accommodation (associated with fishing), camping gear, safety gear, licences and fees, boat mooring, marina and storage fees, and bait/berley/ice. Reported total expenditure on fishing charters and vessel hire of $0.9 million is likely to be an underestimate, partly due to the rare occurrence of charter boat fishing reported by survey respondents but also because it does not account for expenditure by interstate visitors who likely represent an important component of the charter boat fishery.

Table 11. Estimated annual expenditure by Tasmanian households for key items directly attributed to recreational fishing for 2017-18.

SE is standard error; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households reported the expenditure item, * includes cash contributions to trip expenses.

Expenditure item	Expenditure $	SE
Accommodation (associated with fishing)	7,919,361	1,637,815
Bait/berley/ice	3,066,126	538,735
Boat/trailer purchase or capital items (e.g. motors, electronics)	56,315,112	11,873,656
Boat running costs - fuel/oil	11,973,673	1,911,620
Boat/trailer- maintenance (incl. servicing)	13,206,583	1,860,204
Boat/trailer - insurance/registration	14,416,224	2,734,571
Boat - mooring/marina/storage fees	***3,739,223***	***1,523,350***
Camping gear (associated with fishing)	5,925,437	1,395,103
Fishing gear/tackle (including dive gear)	16,555,524	2,710,747
Fishing books/magazines	804,137	144,818
Fishing charter/vessel hire	*912,541*	*333,914*
Safety gear (life Jackets, flares etc)	4,198,027	541,985
Specialised clothing (e.g. wet weathers, waders)	2,546,104	487,834
Licences/fees (fishing club membership, competitions)	3,806,067	594,171
Travel costs - vehicle fuel	15,848,405	2,132,302
Total	161,232,546	18,637,445

10. FISHER MOTIVATIONS, ATTITUDES AND AWARENESS

The following analyses are based on information derived from the wash-up survey and relate to responses from a single household member, typically the main fisher or survey reporter.

10.1 Fishing motivation

10.1.1 General

Respondents were presented with ten motivational items chosen to represent both catch and non-catch related facets of the recreational fishing experience and asked to rate each as being either 'not at all important', 'not very important', 'quite important', or 'very important'. For analysis, values have been assigned to the responses, on a scale from 1 (not at all important) to 4 (very important).

The highest ranked motivations in terms of overall importance scores (means 3.6 and 3.5) were non-catch related ("to be outdoors … in the fresh air … to enjoy nature' and "to relax or unwind") followed by experiential catch and consumptive motives ("for the enjoyment or sport of catching fish, lobsters, etc" and "to catch fresh fish, lobsters, etc for food") (Fig. 35). Motivations based around social interactions ("to spend time with family" and "to spend time with other friends") were also rated highly whereas spending time alone ("to be on your own … to get away from people") was identified as being not important by most respondents, emphasising that, for most, recreational fishing is a social activity. Catching large fish ("to catch a trophy-sized fish") and fishing competitions ("to compete in fishing competitions of any kind") were rated as being of low importance most respondents.

In order to assess the primary motive for fishing, an individual's response to each statement was compared to determine which was assigned the highest importance. If unclear, respondents were asked to nominate the motive that best represented their main reason for fishing. The motives were then grouped into five key categories; relaxation ("to relax or unwind" and "to be on your own … to get away from people"), social ("to spend time with family" and "to spent time with other friends"), environment ("to be out doors … in the fresh air … to enjoy nature"), catch ("for the enjoyment or sport of catching fish, lobsters, etc", "to catch a trophy-sized fish" and "to compete in fishing competitions of any kind"), and consumption ("to catch fresh fish, lobsters, etc for food" and "to catch fish to share with friends and family"). Respondents who were unable to identify a single main reason were recognised as having multiple main motives for fishing.

Non-catch motives relating to relaxation, socialising or environment emerged as the most important reasons for fishing for about two-thirds of respondents, further highlighting the significance of non-catch motives for recreational fishers (Fig. 36). Consuming or catching fish were the most important motives for one third of the fishers interviewed.

10.1.2 Factors influencing motivation

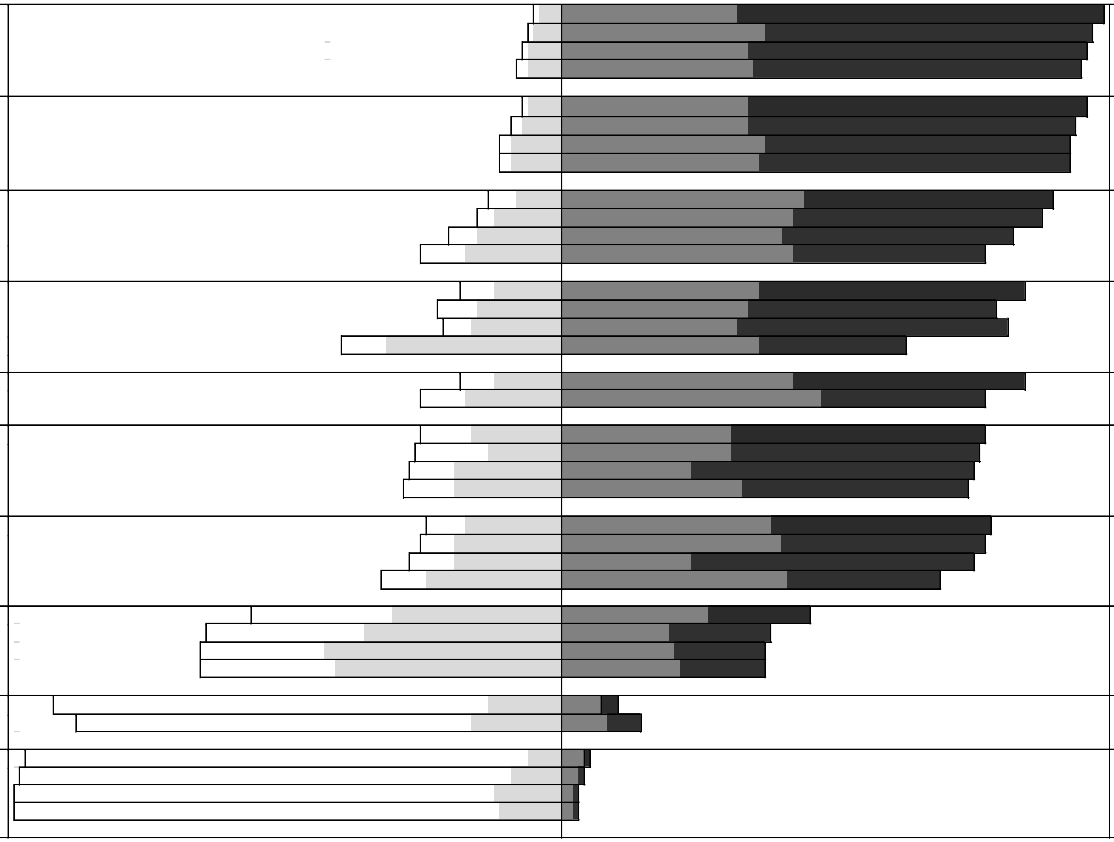
Of the respondent grouping factors (age, residence, avidity, and water body fished), water body fished emerged as a significant factor in responses to most of the motivational

items, whereas avidity was a significant factor for responses relating to catch, environment and relaxation based motives, age was a significant factor for selected social and consumption motives, and residence was a significant factor for only one of the consumptive motives (Table 12). Based on pairwise comparisons between grouping factors and responses to motivational items, the main differences can be summarised as follows:

- freshwater fishers tended to attribute less importance to consuming catches than other fishers,
- fishers in the 30-44 age group attributed higher importance to the social aspects (friends and family) of fishing than the other age groups.

10.1.3 Comparison with previous surveys

The results of the present survey are generally consistent with previous recreational fishing surveys that have established that non-catch motives ("to be outdoors … in the fresh air … to enjoy nature" and "to relax and unwind") are ranked more highly than catch ("for the enjoyment or challenge of catching fish") or consumptive ("to catch fresh fish, lobsters, etc. for food") motives by Tasmanian fishers (Fig. 35). The overall ranking of the different motives has been relatively stable since 2001, although within several categories there have been significant differences between surveys in terms of responses. For instance, there has been a general increase in the level of importance that fishers attribute to "… the enjoyment or challenge of catching fish", and to the importance of catching "... fresh fish, lobsters, etc. for food" over the past two decades (Fig. 35).

Motivation items	Survey	Mean	Rank	Response Distribution	χ^2	*P*
to be out doors … in the fresh air … to enjoy nature	2018	3.60	1		8.7	0.03
	2013	3.51	1			
	2008	3.53	1			
	2001	3.48	1			
to relax or unwind	2018	3.52	2		9.68	0.02
	2013	3.47	2			
	2008	3.41	2			
	2001	3.41	2			
for the enjoyment or challenge of catching fish	2018	3.29	3		47.58	<0.0001
	2013	3.27	3			
	2008	3.17	4			
	2001	3.01	3			
to catch fresh fish, lobsters, etc for food	2018	3.26	4		139.5	<0.0001
	2013	3.16	4			
	2008	3.22	3			
	2001	2.77	6			
to catch fish to share with friends and family	2018	3.16	5		19.03	<0.0001
	2013	2.96	7			
to spend time with family	2018	3.12	6		11.86	0.008
	2013	3.05	5			
	2008	3.15	5			
	2001	3.01	3			
to spend time with other friends	2018	3.07	7		31.24	<0.0001
	2013	3.04	6			
	2008	3.09	6			
	2001	2.87	5			
to be on your own … to get away from people	2018	2.40	8		7.8	0.05
	2013	2.26	8			
	2008	2.30	7			
	2001	2.26	7			
to catch a trophy-sized fish	2018	1.36	9		4.72	0.03
	2013	1.47	9			
to compete in fishing competitions of any kind	2018	1.21	10		0.71	0.87
	2013	1.19	10			
	2008	1.19	8			
	2001	1.17	8			

Response Key: Not at all important | Not very important | Quite important | Very important

Fig. 35. Mean scores and response distribution for the importance of motivational factors for recreational fishing provided by recreational fishers (2018 survey), compared with results from previous state-wide surveys of recreational fishers (2001, 2008 and 2013).

Rankings are based on the overall level of importance given to each statement.

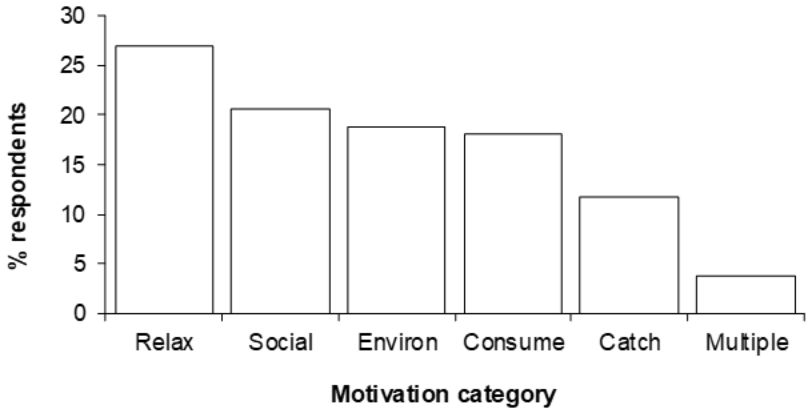


Fig. 36. Main motivational categories identified by recreational fishers (number of respondents = 416).

Table 12: Kruskal-Wallis test for the effect of respondent grouping factors on the importance of motivational factors for recreational fishing
ns - not significant (p>0.05)

Motivation		Age			Residence			Avidity			Water body		
category	**Statement**	**χ^2**	**df**	***p***	**χ^2**	**df**	***p***	**χ^2**	**df**	***p***	**χ^2**	**df**	***p***
Catch	for the enjoyment or sport of catching fish, Lobsters, etc	1.61	3	ns	4.53	3	ns	23.99	4	<0.001	18.72	3	<0.001
	to catch a trophy-sized fish	2.41	3	ns	3.77	3	ns	20.00	4	<0.001	39.58	3	<0.001
	to compete in fishing competitions of any kind	2.47	3	ns	0.23	3	ns	10.82	4	0.02	14.97	3	0.002
Consumption	to catch fresh fish, Lobsters, etc for food	12.50	3	0.005	2.27	3	0.008	5.50	4	ns	19.56	3	<0.001
	to catch fish to share with friends and family	1.39	3	ns	1.56	3	ns	7.15	4	ns	7.87	3	0.05
Relaxation	to relax or unwind	6.29	3	ns	4.45	3	ns	15.73	4	0.003	11.30	3	0.01
	to be on your own … to get away from people	5.39	3	ns	1.23	3	ns	7.57	4	ns	6.52	3	ns
Social	to spend time with family	10.72	3	0.01	0.83	3	ns	4.76	4	ns	3.24	3	ns
	to spend time with other friends	6.32	3	ns	5.18	3	ns	8.21	4	ns	12.35	3	0.006
Environment	to be outdoors ... in the fresh air … to enjoy nature	2.54	3	ns	5.53	3	ns	9.55	4	0.05	12.95	3	0.005

10.2 Consumptive orientation

10.2.1 General

In the context of recreational fishing, consumptive orientation is the degree to which fishers value the catch-related aspects of the fishing experience. The concept is typically used to evaluate fisher's attitudes to four experiential components: (1) catching something as a factor contributing to a satisfying fishing experience; (2) catching numbers of fish; (3) catching large fish; and (4) retaining fish. For the present study a further two catch-related elements were considered, namely catching a variety of fish, and consuming the catch. Eleven item statements pertaining to these six elements were used, with respondents indicating their level of agreement with each statement on a scale from 1 (strongly disagree) to 5 (strongly agree), with 3 being neutral (neither agree nor disagree).

In relation to catching something (or more precisely the prospect of catching nothing), the vast majority (94%) of respondents agreed that they would still consider a fishing trip successful even if no catch was taken, the majority (75%) also indicated that they would still go fishing even if they thought they would not catch anything, and most (66%) disagreed with the statement that were not satisfied unless they at least caught something (Fig. 37). These responses highlight the sentiment that fishers derive benefits from the fishing experience that are unrelated to catching fish but should not be interpreted that catch-related aspects are unimportant or incidental, rather the reasonable prospect of catching a fish remains at the very core of the activity.

There was strong agreement from respondents (92%) with the statement "I usually eat the fish I catch", this statement had the highest mean score (4.62) (Fig. 37). This was followed in level of agreement (89% respondents and mean score 4.44) to the statement "I would rather keep just enough fish for a feed than take the bag limit". Together, these responses infer that most fishers prefer to retain enough fish to be consumed fresh ("a feed") rather than catching bag limits.

Various statements relating to preference for (or satisfaction with) catching larger fish, catching many fish, and releasing fish elicited quite polarised responses (Fig. 37). Slightly more respondents tended to disagree with statements relating to preference for catching large fish while there was a more even split between agreement and disagreement over preferences for catching greater numbers of fish and releasing most of the fish.

10.2.2 Factors influencing consumptive orientation

Of the grouping factors, water body fished emerged as the main factor influencing responses to several of the statements relating to consumptive orientation, age was a significant factor in relation to releasing and consuming catches (Table 13). Based on pairwise comparisons between grouping factors and responses to motivational items, the main differences can be summarised as follows:

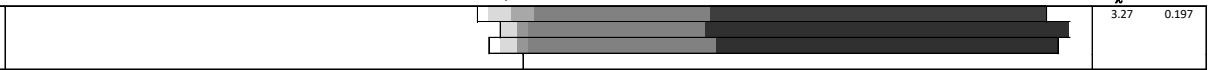
- freshwater-only fishers were less concerned about fishing in areas there were several kinds of fish to catch than 'other' fisher groups;
- freshwater-only fishers were less motivated by consuming the catch than 'other' fisher groups;

- freshwater-only fishers were less motivated about catching bigger fish than 'other' fisher groups;
- freshwater-only fishers were more motivated about releasing fish than 'other' fisher groups;
- fishers in the oldest age group (60 plus) were more motivated by consumption of the catch than fishers in the 30-44 age group.
- fishers in the youngest age group (18-29) were more motivated to release fish than any other age group; and the oldest age group (60 plus) were the least motivated to release fish;
- motivation to consume catches was highest in fishers in the oldest age group (60 plus) and reduces with age to the youngest age group who were the least motivated to consume the catch.

In relation to freshwater fishers, these findings are consistent with a high level of specialisation amongst freshwater fishers, with few target species (primarily trout), typically low catch rates and a relatively high prevalence of catch and release fishing.

10.2.3 Comparison with previous surveys

The ranking of responses in terms of levels of agreement or disagreement to statements relating to catching something, and catch variety were comparable to the 2013 recreational fishing survey (Fig. 37). There were, however, significant differences for response profiles to statements relating to preference for catching of large fish, with fishers in the current survey generally indicating stronger agreement to statements regarding catching large fish and more fish and greater disagreement with statements about taking just enough for a feed or to go fishing with an expectation of taking no catch.

Domain	Consumptive orientation item	Survey	Mean	Rank	Response Distribution	χ^2	*P*
Catching 'something'	A fishing trip can still be successful, even if no fish are caught	2018	1.57*	11		3.27	0.197
		2013	1.45*	11			
		2008	1.55*	8			
	If I thought I wouldn't catch any fish on trip, I would still go fishing	2018	2.17*	10		7.21	0.03
		2013	2.01*	10			
		2008	1.96*	7			
	I'm not satisfied unless I catch at least something	2018	3.40*	5		3.24	0.07
		2013	3.52*	4			
Catch variety	I like to fish where there are several kinds of fish to catch	2018	3.69	3		1.41	0.49
		2013	3.62	3			
		2008	3.69	3			
Catching large fish	I'd rather catch one or two bigger fish than ten smaller fish	2018	3.55	4		39.24	<0.0001
		2013	3.30	5			
		2008	3.70	2			
	The bigger the fish I catch the better the trip	2018	2.82	8		2.39	0.12
		2013	2.69	9			
	I prefer to fish where I know I may catch a very large fish	2018	2.77	9		23.47	<0.0001
		2013	2.73	8			
		2008	3.03	4			
Catching numbers of fish	The more fish I catch, the happier I am	2018	3.23	6		21.4	<0.0001
		2013	3.03	6			
		2008	2.89	6			
Retaining fish	I would rather keep just enough fish for a feed than take the bag limit	2018	4.44	2		7.1	0.03
		2013	4.47	2			
		2008	4.60	1			
	I like to release most of the fish I catch	2018	3.15*	7		7.91	0.019
		2013	3.02*	7			
		2008	2.94*	5			
Consume catch	I usually eat the fish I catch	2018	4.62	1		8.32	0.004
		2013	4.57	1			

Response Key: Strongly disagree Mildly disagree Neutral Mildly agree Strongly agree

Fig. 37. Mean scores and response distribution to consumptive orientation statements provided by recreational fishers (2018 survey), compared with results from the 2008 and 2013 state-wide surveys of recreational fishers. * reverse coded to be consistent with the relevant consumptive domains of 'catching' or 'retaining' something.

Table 13: Kruskal-Wallis test for the effect of respondent grouping factors on responses to consumptive orientation statements

ns - not significant (p>0.05)

Consumptive		Age			Residence			Avidity			Water body		
Domain	**Statement**	**χ2**	**df**	***p***	**χ2**	**df**	***p***	**χ2**	**df**	***p***	**χ2**	**df**	***p***
Catch something	a fishing trip can still be successful, even if no fish are caught	3.56	3	ns	0.51	3	ns	5.19	4	ns	3.40	3	ns
	if I thought I wouldn't catch any fish on a trip, I would still go fishing	0.49	3	ns	7.84	3	ns	2.12	4	ns	4.84	3	ns
	I'm not satisfied unless I catch at least something	0.63	3	ns	0.38	3	ns	6.24	4	ns	7.52	3	ns
Catch variety	I like to fish where there are several kinds of fish to catch	1.43	3	ns	0.52	3	ns	2.89	4	ns	36.46	3	<0.001
Catching large fish	I'd rather catch one or two bigger fish than ten smaller fish	2.43	3	ns	3.11	3	ns	4.24	4	ns	4.79	3	ns
	the bigger the fish I catch the better the trip	2.13	3	ns	1.96	3	ns	9.34	4	ns	11.10	3	0.01
	I prefer to fish where I know I may catch a very large fish	2.71	3	ns	1.28	3	ns	6.82	4	ns	3.79	3	ns
Catching numbers of fish	the more fish I catch the happier I am	2.87	3	ns	0.97	3	ns	3.01	4	ns	4.79	3	ns
Retaining fish	I would rather keep just enough fish for a feed than take the bag limit	2.90	3	ns	6.42	3	ns	5.44	4	ns	4.67	3	ns
	I like to release most of the fish I catch	17.32	3	<0.001	6.73	3	ns	5.96	4	ns	13.62	3	0.003
Consume catch	I usually eat the fish I catch	10.95	3	0.01	1.70	3	ns	4.18	4	ns	21.03	3	<0.001

10.2.4 Satisfaction with management

Respondents were asked about general satisfaction with the management of recreational fishing in Tasmania, with focus split between management of the saltwater and/or freshwater fisheries depending on the fishery (or fisheries) relevant to the respondent. Although most fishers indicated general satisfaction with management, 68% for both saltwater and freshwater fisheries (Fig. 38), there appears to have been a general trend of declining satisfaction with management over the past decade, from 81% in 2008[4] and 72% in 2013. Dissatisfaction rates in 2018 were 24% for saltwater and 15% for freshwater fisheries, this compares with about 18% for previous surveys.

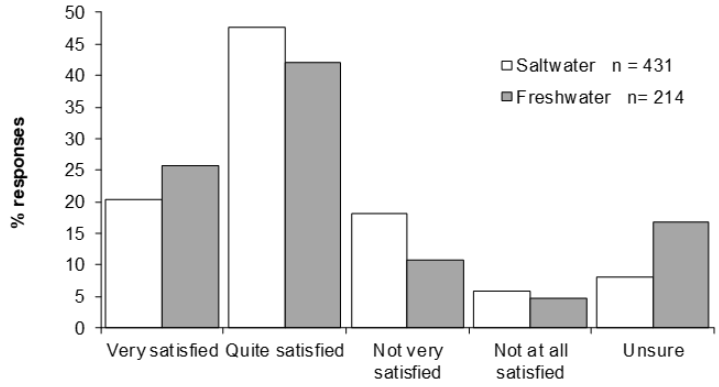


Fig. 38. Response category distribution for satisfaction with the management of sea fishing (saltwater) and freshwater fishing in Tasmania. n is the number of responses for each fishery.

10.3 Quality of regional fisheries

Respondents were offered a list of fishing areas and, for each one, asked whether they had fished the area regularly over several years and if so, whether they considered that general quality of the fishery in that area had improved, declined or stayed about the same over the previous 3 to 5 years.

10.3.1 Key marine areas

When responses are considered in the context of whether the quality of fisheries have remained the same or improved over time it was apparent that the majority (> 50%) of regular fishers in Port Sorell, Tamar Estuary and Georges Bay considered that the quality had remained unchanged or improved in recent years (Table 14). Georges Bay received the highest level of support (39%) for general fishery improvement, netting has been prohibited in the area for several years and this may have been a contributing factor. Fewer than half of the respondents considered that the quality of the fisheries in Great Oyster Bay/Mercury Passage, Tasman Peninsula, Norfolk-Frederick Henry Bay, D'Entrecasteaux Channel, Derwent Estuary and Storm Bay had improved or were about the same in recent years. The D'Entrecasteaux Channel emerged as the poorest

[4] In 2008, the question relating to management was not explicitly split between sea and freshwater fishing.

'performing' fishery, with two thirds of the regular fishers suggesting that the quality had declined in recent years. This is significant since the Channel is a recreational-only fishery and, when compared with a 2013 survey, this represents a substantial increase (from 46%) in the proportion of fishers rating quality of the fishery to have declined (Lyle *et al*., 2014). Great Oyster Bay/Mercury Passage and Norfolk-Frederick Henry Bay also rated poorly with 45% and 46% of fishers indicating that the fishing quality had declined. These areas along with the D'Entrecasteaux Channel attract substantial recreational fishing pressure. Other areas where >40% of fishers considered that fishing quality had declined included the Tasman Peninsula, the Derwent Estuary and Storm Bay.

10.3.2 Key freshwater areas

In general, the quality of the freshwater fisheries rated quite favourably, with most respondents indicating that they considered the quality to have remained unchanged or improved over time (Table 15). The highest rated areas were the Western Lakes, Penstock Lagoon, Brady's/Binney/Tungatinah Lakes and south-eastern rivers with >60% of respondents suggesting that the quality had remained unchanged or improved in recent years. Arthurs Lake was the poorest performing fishery, with more than half of the regular fishers suggesting that the overall quality had declined recently. The only other area where >30% of fishers considered that fishing quality had declined was the South Esk/Macquarie/Break O'Day Rivers. When compared with a similar survey conducted in 2013, the most obvious changes related to a decrease in the proportion of fishers reporting declines in the Western Lakes and Brady's/Binney/Tungatinah Lakes fisheries (Lyle *et al.*, 2014).

Table 14. Perceptions about changes in fishing quality over the past 3-5 years for selected marine areas, based on fishers who have regularly fished the nominated areas.

GOB is Great Oyster Bay, NFHB Norfolk-Frederick Henry Bay, DEC D'Entrecasteaux Channel. Colour codes based on decline in quality: green 10-19%; yellow 20-29%; pale orange 30-39%; dark orange >40%

Fishery quality	Port Sorell	Tamar	Georges Bay	GOB/ Mercury	Tasman Peninsula	NFHB	DEC	Derwent/ Storm Bay
Improve	16	21	39	12	14	4	3	7
Same	42	29	21	34	34	35	19	31
Decline	23	33	13	45	40	46	67	41
Unsure	19	17	27	9	12	15	11	21
No. respondents	43	48	62	85	77	74	107	81

Table 15. Perceptions about changes in fishing quality over the past 3-5 years for selected freshwater fisheries, based on fishers who have regularly fished the nominated areas.

Colour codes based on decline in quality: green 10-19%; yellow 20-29%; pale orange 30-39%; dark orange >40%

Fishery quality	Great Lake	Arthurs Lake	Penstock Lagoon	Western lakes	Bradys/ Binney/Tungatinah Lakes	South Esk/ Macquarie/Break O'Day Rivers	SE rivers
Improve	10	10	17	11	23	12	6
Same	47	23	47	68	37	32	56
Decline	25	52	14	11	14	32	23
Unsure	18	16	22	11	26	24	15
No. respondents	68	62	36	28	35	25	34

10.4 Fish handling

Respondents were asked to nominate the main species of fish they usually caught and were then presented with a series of questions that sought to establish how they determined whether fish were legal-sized (if relevant), perceptions about the survival of fish they released and whether they did anything 'special' in the way they handled fish to promote survival. Of a wide range of species mentioned by respondents, Flathead, Australian Salmon, Black Bream and Trout emerged as the only species with sufficient responses to assess practices at the species level.

In determining whether fish are legal-sized, most fishers (80%) indicated that they routinely measured rather than estimated lengths (Fig. 39A). For Flathead and Bream over 88% of respondents indicated that they measured fish sizes whereas Australian Salmon yielded the highest proportion of respondents who estimate size (34%).

Interestingly, for each of the key species less than 35% of the fishers considered that "practically all" of the fish released would survive, the vast majority (89%) did, however, expect that at least most would survive after being released (Fig. 39B).

Overall most fishers (> 55%) reported that they took special care when intending to release fish to promote survival (Fig. 39C). Respondents were then asked about the types of things they did to promote survival (Table 16). A range of practices were cited which recognized the importance of reducing hooking damage (including preference for circle or barbless hooks and use of de-hookers), minimising handling stress (general care in handling, use of wet gloves or wet cloths, prompt return to the water, and release without landing) and assisting recovery of exhausted fish (by swimming prior to release). Most approaches were used for each of the species, with prompt release the primary focus for all species. Also important for all species was hook type and wet cloth for handling, and for Trout, swimming on release was a key strategy used by fishers.

Table 16. Handling procedures used by recreational fishers to promote prospects of survival for released key target species of fish.

Values represent the number of positive responses to handling procedures, expressed as a percentage of the total number of responses for each key target species.

Handling procedures	Flathead	Australian Salmon	Black Bream	Trout
'Swim' fish on release	33.2	25.6	27.3	61.4
Release without landing	35.6	13.9	27.3	33.0
Handle with wet hands/cloth/glove	56.9	59.1	90.9	79.8
Use hook types that minimise damage	43.8	38.6	45.4	38.6
Try and release quickly	98.9	100	100	98.2
Use de-hooker	2.5	-	-	-
Other	1.8	-	-	2.6
Number of respondents	276	43	11	114

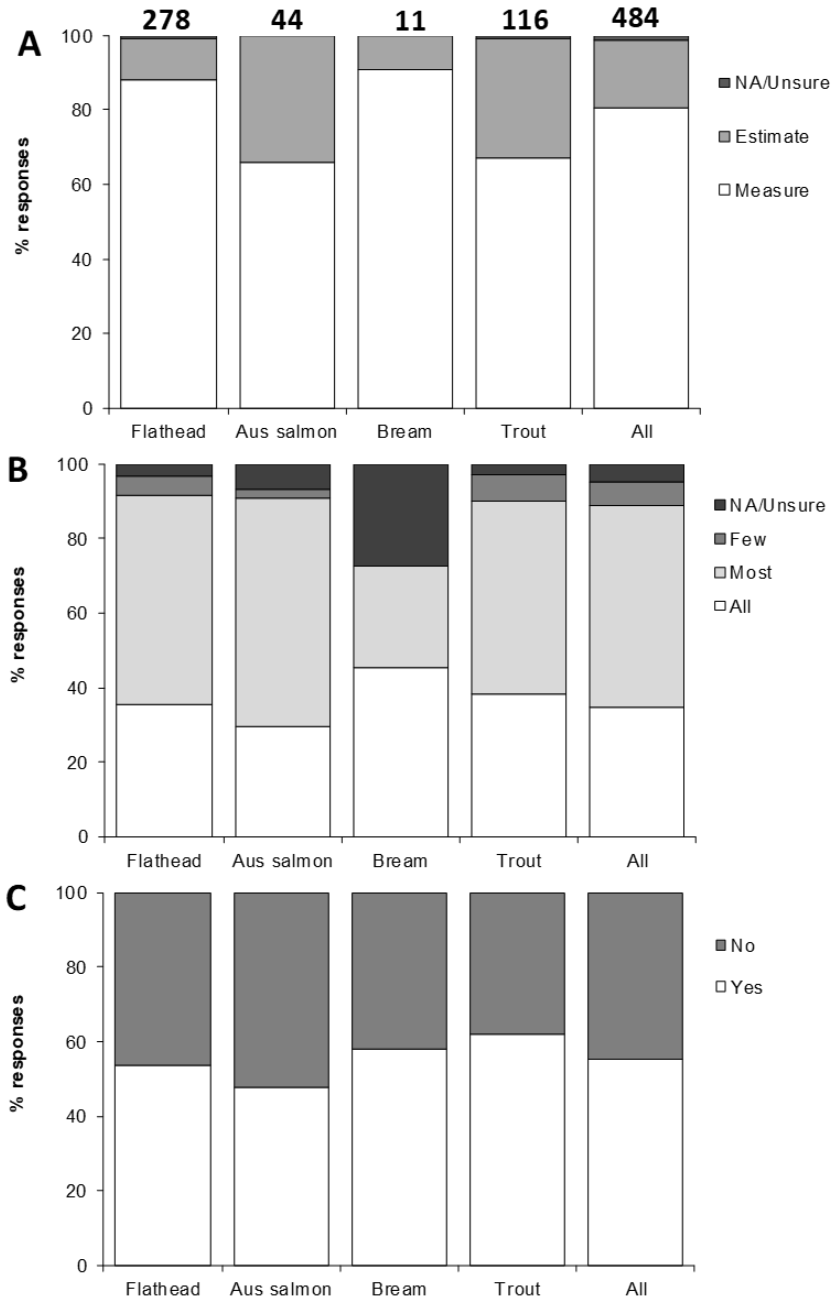


Fig. 39. Approaches to fish handling used by recreational fishers for the main species caught by the respondent. (A) Main approach to determining whether fish are legal-sized (measure or estimate length); (B) perceptions about the proportion of released fish that survive; and (C) use of special handling procedures to promote prospects of survival. Respondent numbers are indicated at the top of the figure.

10.5 Accessing information about fishing

Respondents were asked about the main ways they found out about fishing regulations and other information to do with recreational fishing in Tasmania, and for each method mentioned whether they considered it to be a trusted or reliable source of information. Overall, other fishers/friends (51%), government publications (37%), government websites (36%) and newspapers (25%) were the top four sources of information identified (Table 17). In terms of reliability, government publications and websites scored highly (around 90%), as did other fishers/friends (85%). As reliable sources of information, fishing clubs (58%) followed by social media rated lowest (57%).

By comparison with 2013, the most recent survey suggests a growing influence in the use of social media (up from 9% in 2013 to 17% of respondents in 2018) and a decline in the use of traditional print media (down from 45% in 2013 to 24% in 2018) (Lyle *et al*., 2014).

Table 17. Proportion (%) of respondents who indicated that they used the nominated information sources to find out about things to do with fishing (Mentioned) and the proportion (%) of these respondents who considered that the nominated source was reliable and could be trusted.

Number of respondents = 509

	% respondents	
Source	**Mentioned**	**Reliable**
Other fishers/friends	50.9	84.9
Government publications	36.9	92.5
Government websites	36.3	86.4
Newspaper	24.7	76.2
Government social media	21.0	79.4
Social media (e.g. Facebook, Fishing forums)	16.5	57.1
Radio	14.9	72.4
Tackle shop	14.5	75.7
Television	13.6	63.8
Fishing magazines	10.8	76.4
Fishing club/associations	4.7	58.3
Other	15.3	60.3

10.6 Awareness of information products and programs

The Department of Primary Industries, Parks, Water and Environment (DPIPWE) and the Inland Fisheries Service (IFS) produce a range of recreational fishing information products relevant to sea and freshwater fishing, respectively. Respondents were asked whether they had seen or were aware of a number of specific products.

Greatest awareness was evident for fish rulers (plastic and stick-on) with over 82% of fishers having seen them, and even though these are products relevant to sea fishing, awareness was high across all fishers, noting that most freshwater fishers also participate in saltwater fishing (Table 18). Most fishers (74%) were aware of the Recreational Sea Fishing Guide whereas awareness of the Inland Fishing Code was lower overall (45%)

but very high (85%) amongst freshwater fishers. Awareness of smart phone applications for sea fishing and inland fishing was moderate amongst the relevant fisher groups (36 and 44%, respectively), representing doubling in each case of the reported awareness levels in 2013 (Lyle *et al*., 2014). This confirms that the uptake of these products is increasing and likely to continue to grow.

Table 18. Awareness of government products and programs relevant to the Tasmanian recreational fishery

Saltwater fishers include respondents who fished at least once in saltwater and freshwater fishers include those who fished at least once in freshwater during the 2017-18 diary period (note: some respondents fished in both salt and freshwater and their responses are counted against each water body type). Total respondents = 499; Saltwater fishers = 353, Freshwater fishers = 142.

	% respondents		
Information product/program	**Total**	**Saltwater fishers**	**Freshwater fishers**
Recreational Sea Fishing Guide (booklet)	74.0	79.8	66.7
Inland Fishing Code (booklet)	44.8	40.6	84.5
Plastic ruler (for measuring fish)	89.9	92.6	88.5
Stick-on ruler (for measuring fish)	82.4	87.0	83.7
Plastic gauges (Lobster, Abalone & scallops)	59.2	65.1	52.1
Tas Sea Fishing Guide App (smart phone app)	30.2	35.6	30.5
Infish App (smart phone app for inland waters)	17.2	14.7	43.7
Angler Access Program (brochures showing access to inland waters)	13.1	10.8	33.8

Just over a third (37%) of respondents indicated an awareness of the Fishcare Tasmania program, of whom 31% (or 11% of all respondents) reported having had some contact or interactions with the program during 2017-18 (Fig. 40).

General awareness of the Recreational Sea Fishing Guide has increased since 2001 but there has been little change in awareness in relation to the rulers and gauges for measuring fish at least since 2008 (Fig. 40). Awareness and interactions with the Fishcare program have fallen slightly since 2013, despite the marked increase between 2001 and 2013.

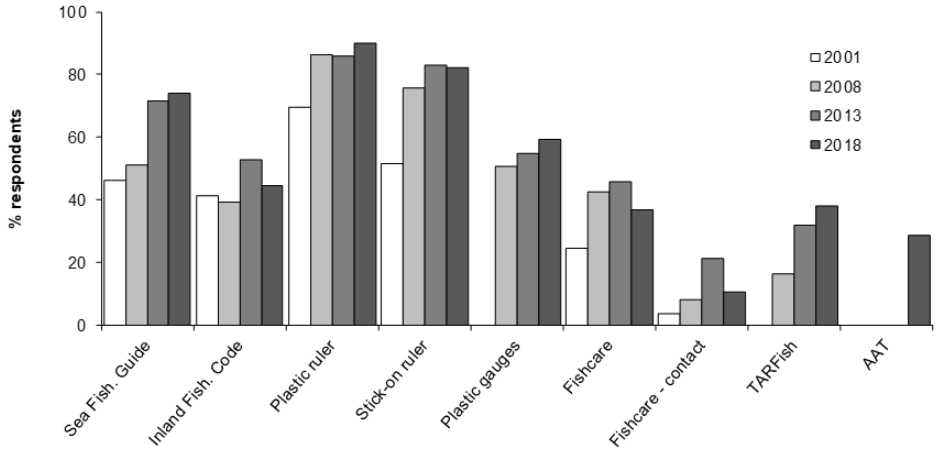


Fig. 40. Percentage of respondents aware of government information products and programs, including interaction with the Fishcare program, and awareness of peak representative bodies for marine and freshwater fishing in Tasmania (TARFish, and AAT) based on 2001, 2008, 2013 and 2018 general fishery surveys.

10.7 Awareness of peak representative bodies

The Tasmanian Association for Recreational Fishing (TARFish) was established in 2004 as an independent peak body representing the interests of marine recreational fishers in Tasmania. Overall familiarity with TARFish was at 38% of the fishers surveyed, continuing the steady increase in recognition since it was established (Fig. 40). The Anglers Alliance Tasmania (AAT) is the peak body representing freshwater fishers, with 28% of respondents indicating some awareness of the organization (Fig. 40). Amongst saltwater fishers, 41% indicated awareness of TARFish while amongst freshwater fishers 59% indicated awareness of AAT.

10.8 Recreational gillnet usage

In Tasmania recreational fishers are permitted to use gillnets (graball and mullet nets), subject to licensing and other regulations. Opinions relating to the future management of gillnetting was canvassed amongst recreational fishers.

Respondents were asked whether they supported the continued use of recreational gillnets, 31% indicated support, 45% opposed and 24% of respondents were unsure. Responses to similar questioning about gillnet usage in early surveys suggests that general support for the method has declined, from 48% in 2001, 43% in 2008 (Frijlink and Lyle, 2010), 40% in 2013 and 31% in the current survey. While opposition amongst recreational fishers to recreational gillnet usage has risen, from 36% in 2001 to 45% in 2018, it is evident that recreational fishers remain divided on this issue.

Respondents were asked for the primary reason for their attitude to the continued use of gillnets. The main reasons for opposing gillnets related to perceptions surrounding excessive and indiscriminate catches (including by-catch) and high mortality rates of by-catch and undersized target species (Table 19). Respondents who supported the continued use of gillnets cited increased and more diverse catches and the ability to target

species not readily vulnerable to capture by other fishing methods (e.g. Bastard Trumpeter and Blue Warehou).

Table 19. Main reasons cited for support and opposition to the continued use of recreational gillnets in Tasmania.

Continued gillnetting	Reason	%
In support	Increases catches	9.5
	More diverse catches	3.0
	Only way to catch certain target species	2.5
Opposed	Too effective (unsustainable, unfair)	35.3
	Indiscriminate	25.9
	High bycatch	10.0
	High mortality of undersize target species and bycatch	9.0
	Cruel on fish	2.5
	Other	2.0

11. COMPARISONS WITH PREVIOUS SURVEYS

In this section data from the Tasmanian component of the 2000-01 National Recreational Fishing Survey and state-wide fishing surveys conducted in 2007-08 (Lyle *et al*., 2009) and 2012-13 (Lyle *et al.*, 2014) are compared with the present survey to investigate key developments in the recreational fishery since the early 2000s.

In relation to comparability between surveys, the only analytical difference has been in how the fisher 'drop-in' adjustment was implemented in the 2000-01 survey. Although the National Survey included non-intending fisher call-backs, the sample size proved insufficient to enable a robust drop-in adjustment to be made. In the 2000-01 survey 'equilibrium' was assumed; that is, fishers who dropped out of the fishery were effectively replaced by counterparts who dropped-in such that the participation rate and fisher characteristics (demographic and avidity profiles) determined at screening were effectively maintained for the diary period (Lyle *et al*., 2009). Apart from this issue, the application of consistent survey methodology and analytical procedures means that the datasets can be validly compared.

11.1 Fisher characteristics

11.1.1 Participation rates

Between 2000 and 2017 the estimated number of Tasmanian residents aged five years or older who fished at least once a year in Tasmania declined from 125,000 in 2000 to 98,000 in 2012 before increasing to 106,000 in 2017 (Fig. 41, see also Appendix 3; and Appendix 15). When expressed as proportion of the resident population, this represents a decline in participation from 29.4% in 2000 to 21.6% in 2012, followed by a slight increase in 2017 to 23.8% (Fig. 41).

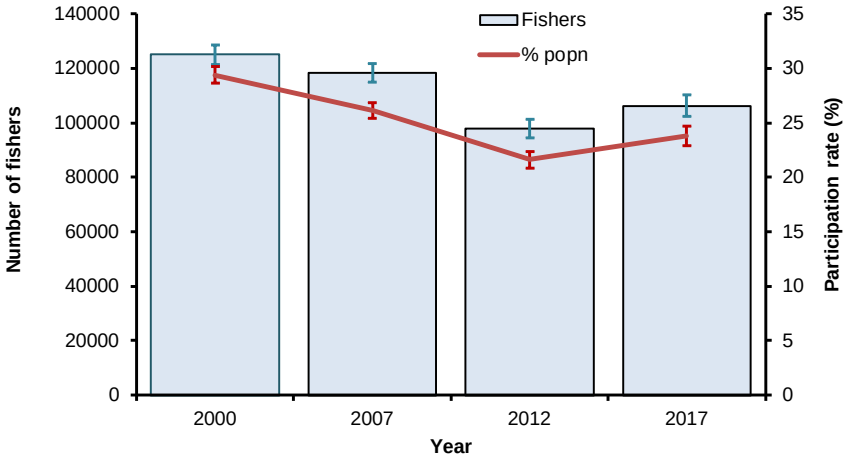


Fig. 41. Fishing participation (number of fishers and proportion of population or participation rate) in the 12 months prior to May 2000, November 2007, October 2012 and October 2017 by Tasmanian residents aged five years or older. Error bars represent one standard error.

Fisher numbers in each of residential regions were slightly higher in 2017 when compared with 2012, with participation rates (% population) in all regions other than Hobart also higher and comparable to 2007 levels (Fig. 42A). Across all surveys participation rates in the South East region have been consistently higher (by about 7-10%) than rates for each of the other Tasmanian regions (Fig. 42B).

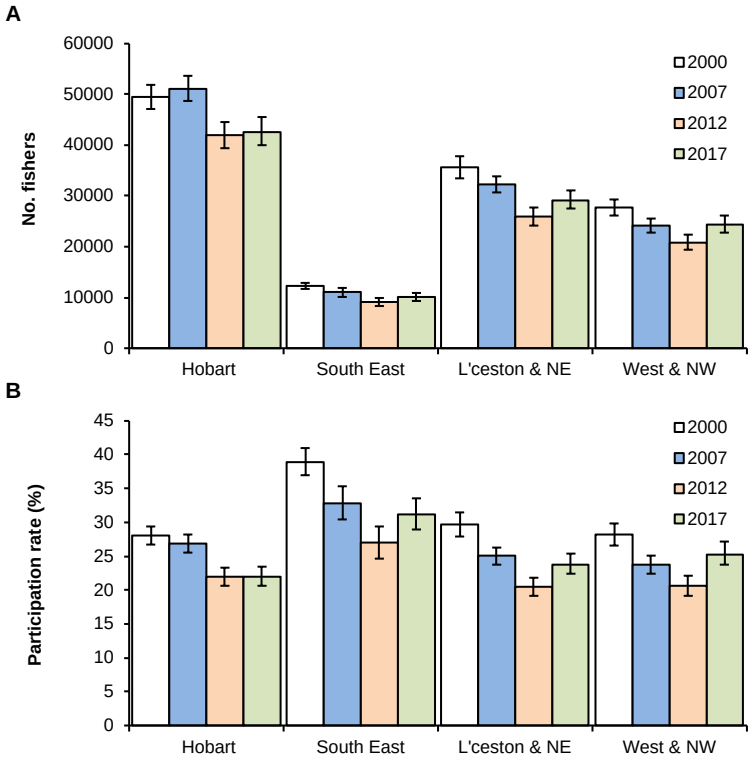


Fig. 42. Fishing participation in the 12 months prior to May 2000, November 2007, October 2012 and October 2017 by area of residence for persons aged five years or older: A) number of persons; and B) proportion of the resident population. Error bars represent one standard error. *Note*: regional boundaries applied in 2000 and 2007 were based on the Australian Standard Geographical Classification (Pink, 2011a) rather than the Australian Statistical Geography Standard (Pink, 2011b).

11.1.2 Age and gender

In absolute and relative terms, the decline in fishing participation has been more pronounced amongst males, from 83,580 (SE 2267) persons or 40.0% (SE 1.1%) of males in 2000 to 71,330 (SE 2582) or 32.5% (SE 1.2%) in 2017. This compares with the decline for females, from 41,428 (SE 1897) persons or 19.1% (SE 0.9%) of females in 2000 to 34,862 (SE 1999) or 15.4% (SE 0.9%) in 2017.

Based on age, it is evident that while participation amongst the younger age groups has declined quite sharply, the numbers of fishers in the 45-59 years age group have remained stable over time and the number of fishers aged 60 years and older have increased (Fig. 43A). Participation rates have been relatively stable for age groups 45 and older since 2000 but have declined for each of the younger age groups (Fig. 43B).

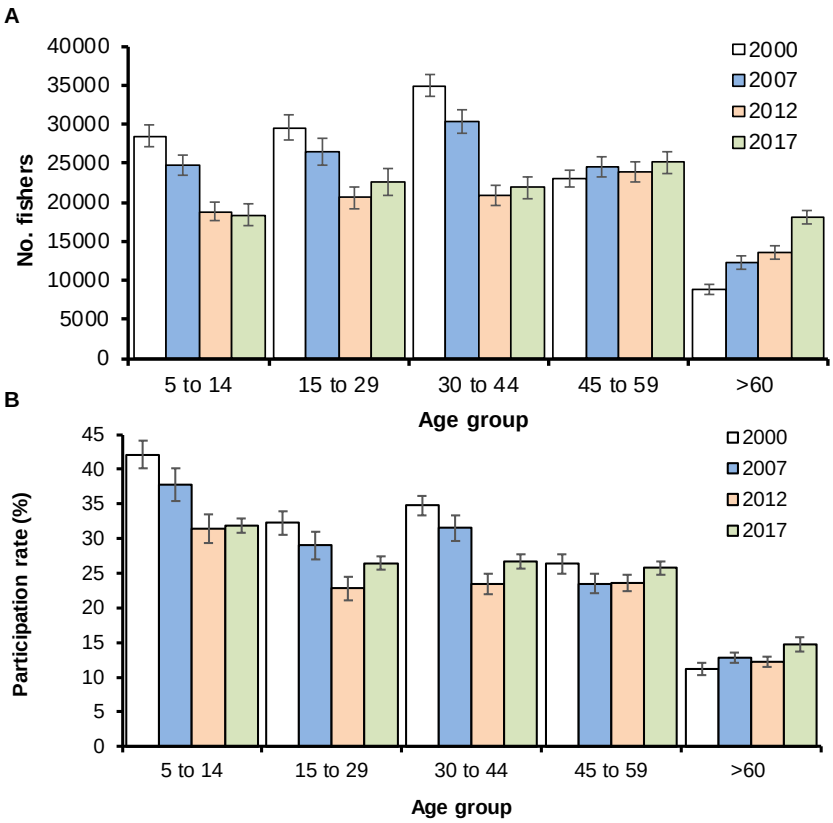


Fig. 43. Fishing participation by age group for Tasmanian residents aged five years or older for 2000, 2007, 2012 and 2017: A) number of persons; and B) proportion (%) of the resident population.

The pattern of overall declining participation that is emerging appears to be linked to both the ageing of the population and a decline in retention of younger fishers, noting that the highest participation rates have consistently been amongst children (<15 years). As children enter adulthood there appears to be a general movement away from fishing as a pastime, with the participation rate amongst 15-29 year olds between 5-10% lower than for 5-14 year olds. Furthermore, even though the number of persons aged 60 years and older in Tasmania is growing disproportionately to population size[5], resulting in an increase in numbers of fishers in this age group, participation rates are consistently low (11-13%) for this age group. Thus, the growth in numbers of older fishers has not been sufficient to offset the shift away from fishing in the younger age groups and suggests that overall participation rates are likely to continue to decline unless new participants to the fishery are recruited or 'lapsed' fishers are attracted back to the pastime.

[5] The size of the population in Tasmania has varied very little since 2000.

11.1.3 Participation rates since 1983

The only other estimate of recreational fishing participation in Tasmania was based on an ABS survey of about 2100 private dwelling households in 1983 using face to face interviews to obtain information about fishing activities (ABS, 1984). The survey established that 107,031 Tasmanian residents aged 15 years or older fished at least once a year, representing a participation rate of 33.1%[6]. Using the same age criterion, there were an estimated 96,470 persons in 2000, 93,650 in 2007, 78,950 in 2012 and 87,783 in 2017 who fished at least once a year, representing participation rates of 26.9, 24.1, 20.1% and 22.6%, respectively.

By gender, 48.7% of males aged 15 years and older (77,665 persons) fished at least once in 1983 compared with 37.6% (65,594 persons) in 2000, 33.1% (63,025 persons) in 2007 28.5% (55,222 persons) in 2012, and 31.6% (60,033 persons) in 2017. For females, the equivalent rates were 17.9% (29,366 persons) in 1983, 16.8% (30,876 persons) in 2000, 15.4% (30,624 persons) in 2007, 11.9% (23,723 persons) in 2012, and 14.0% (27,750 persons).

Thus, in absolute and relative terms there appears to have been a general decline in recreational fishing participation since the early1980s, the decline being more accentuated amongst males than females. Declining participation in Tasmania is generally consistent with patterns observed in several other Australian states (Webley *et al.*, 2015; West *et al.*, 2015) and overseas (e.g. Brownscombe *et al*., 2014; Arlinghaus *et al*., 2015).

11.2 Fishing effort

Since 2000-01, recreational fishing effort (fisher days) has declined by 31%, largely linked to the decline in the number of active fishers. In 2000-01, Tasmanian residents aged 5 years and older expended an estimated 746,335 (SE 44,462) fisher days of effort in Tasmania, some 16% higher than the equivalent measure for 2007-08 (641,489 fisher days; SE 28,934), which in turn was 26% higher than in 2012-13 (506,802 fisher days, SE 27,787). The most recent estimate (474,471 fisher days SE 35,290) was about 6% lower than for 2012-13 and was largely influenced by the lower number of *active* fishers in 2017-18 (90,196, SE 4528) when compared with 2012-13 (91,874, SE 3835). Declines in effort have been more pronounced in the marine fishery (Fig. 44A) and for shore-based rather than boat-based effort (Fig. 44B).

By method, line fishing effort has declined by a third since 2000-01, 40% for lobster pots, and more than 85% for gillnet effort (Fig 45). The marked change in gillnet effort can been linked to increased restrictions on net usage, specifically prohibition of overnight netting in most areas, coupled with apparent lower availability of several key net species; for example, Blue Warehou and Bastard Trumpeter (Lyle and Tracey, 2012b).

When effort was disaggregated by region, a number of conspicuous changes are apparent, though it is acknowledged that some of the variability at this level of disaggregation may have occurred by chance, reflecting the limitations of sampling (reflected in the statistical uncertainty, i.e. standard errors) (Fig. 46). In relation to the inland fishery, effort levels in

[6] ABS document 3201.0 Population by Age and Sex, Australian States and Territories - Table 6. Estimated Resident Population By Single Year Of Age, Tasmania (December 2003).

the Western region have remained relatively stable since 2000-01 whereas in the Central Plateau and Eastern regions effort has stabilised at lower levels since the late 2000s.

Effort levels in most coastal regions were lower than those estimated for 2000-01 but either comparable or only slightly lower when compared with 2012-13. Overall, however, the magnitude of change has been relatively low in the North East, East Coast and Norfolk-Frederick Henry Bay regions (Fig. 46). By contrast, effort has declined steadily over time off the West, North West and Central East Coasts as well as in the Tamar and Derwent estuaries. Effort in the D'Entrecasteaux Channel experienced a sharp rise in 2007-08 (influenced in part by the opening of a Scallop fishery in the area) but has stabilised at about 80% of the 2000-01 level since 2012-13.

Estimated fisher numbers and days fished by region by survey period are presented in Appendices 16 and 17, respectively.

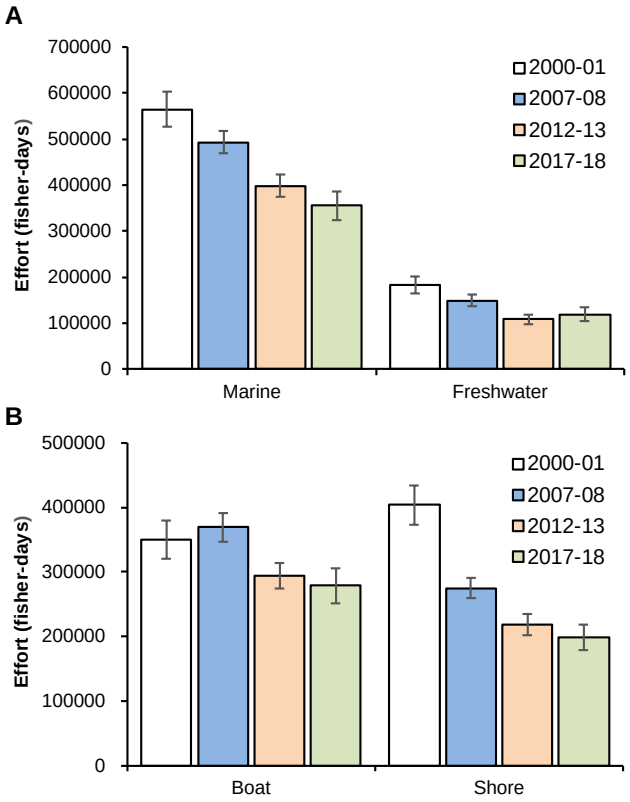


Fig. 44. Comparison of fishing effort (fisher days) for Tasmanian residents aged five years or older who fished in Tasmania during 2000-01, 2007-08, 2012-13 and 2017-18: A) based on marine and freshwater waters; and B) based on fishing platform. Error bars represent one standard error.

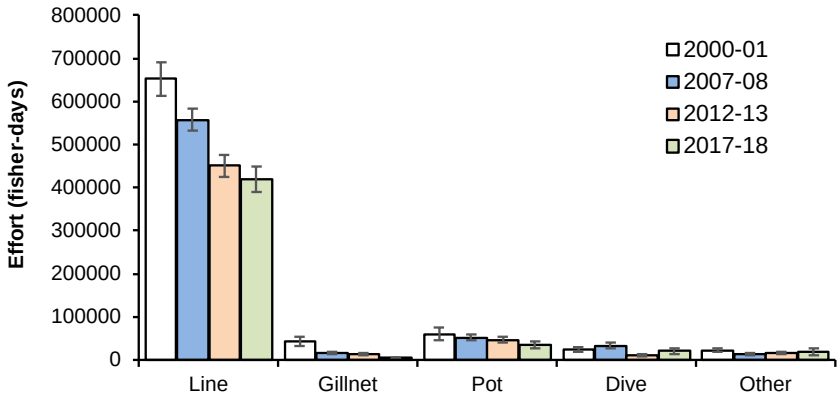


Fig. 45. Comparison of fishing effort (fisher days) by fishing method for Tasmanian residents aged five years or older who fished in Tasmania during 2000-01, 2007-08, 2012-13 and 2017-18. Error bars represent one standard error.

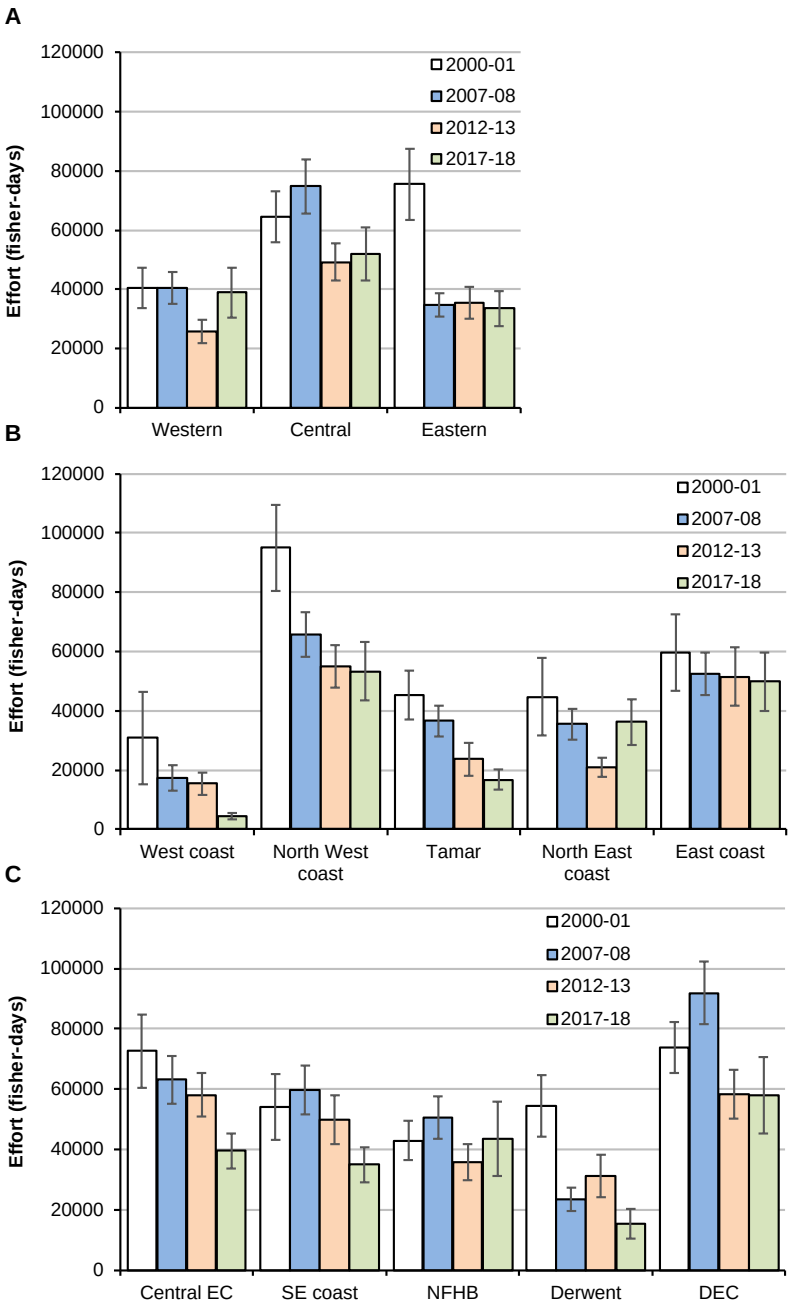


Fig. 46. Comparison of fishing effort (fisher days) by fishing regions and fishing platform for Tasmanian residents aged five years or older who fished in Tasmania during 2000-01, 2007-08, 2012-13 and 2017-18. NFHB is Norfolk-Frederick Henry Bay, DEC is D'Entrecasteaux Channel.

11.3 Catch trends

Catch information for key species and survey period are provided in Appendices 18 and 19 and compared in Fig. 47. Excluding small baitfish, an estimated 3.52 million finfish were caught (kept plus released) by Tasmanian recreational fishers during 2000-01, this compared with 2.86 million in 2007-08, 2.62 million in 2012-13 and 2.45 million in 2017-18. Flathead have consistently accounted for over half of the total finfish catch

numbers, with Australian Salmon and Trout next in terms of importance. The general decline in catches is linked to the decline in fishing effort over the period.

Based on harvest, the total retained catch of finfish has fallen from 2.29 million in 2000-01 to 1.61 million in 2007-08, 1.48 million in 2012-13, and 1.10 million in 2017-18. Numbers of finfish released have, however, varied little over time, ranging between 1.22 million fish in 2000-01 to 1.24 million in 2007-08, 1.14 million in 2012-13 and 1.35 million in 2017-18. This reflects a general increase in the proportion of the catch that has been released or discarded, from about 35% in 2000-01 to 43% in 2007-08 and 2012-13, increasing to 55% in 2017-18. Such a finding appears to be consistent with the greater emphasis being placed on catch and release fishing by the recreational sector, as well as Government messages promoting only keeping what is required for "a feed", and effects of bag and size limits regulations, many of which have been either introduced or become progressively more restrictive in Tasmania since 2001.

Although the recreational catch (kept and released) of Flathead has varied little over time, the harvest has declined substantially reflecting an increase in release rates, from 35% in 2000-01 to 56% in 2017-18. The sharp increase in the proportion of the catch released in the most recent survey is likely influenced by the 2015 increase in minimum size limit for Flathead (from 300 to 320 mm). Similarly, while catches of Trout have fluctuated without obvious trend since 2000-01 the harvest has fallen steadily as a greater proportion of the catch is released. In this instance there is a strong and growing catch and release ethic associated with the fishery. Australian Salmon catches (including harvest) have been relatively stable since 2007-08, albeit at a lower level than in 2000-01. Of the other key species, catches of Flounder, Rock Lobster and Abalone have declined since 2000-01 whereas Black Bream, Barracouta, Jackass Morwong and Whiting have fluctuated without trend. In the case of Black Bream, release rates increased sharply after 2000-01, and have remained high (about 70%) since, reflecting interest in the species as a sport fish. Barracouta availability is known to exhibit considerable inter-annual variability as reflected in recreational catches (and commercial catches, refer Moore *et al.,* 2019). Various species of Tuna are captured by recreational fishers, data suggest that catches have been variable over time and that release rates appear to be correlated with the size of the catch, i.e. when catches are higher release rates are also higher. Being a highly specialised activity, however, this fishery is not well represented by general fishing surveys and more targeted surveys are required to provide greater precision and detail (e.g. Tracey *et al*., 2013).

Catches of squid, principally Southern Calamari and Gould's Squid have generally increased since 2000-01, the former due to increased targeting of the species and the latter due to increased availability of the species in Tasmanian coastal waters. Commercial catches clearly indicate that the availability of Gould's Squid exhibits substantial inter-annual variability, with variability in commercial landings that correspond closely to the pattern observed in recreational catches (refer Moore *et al*., 2019).

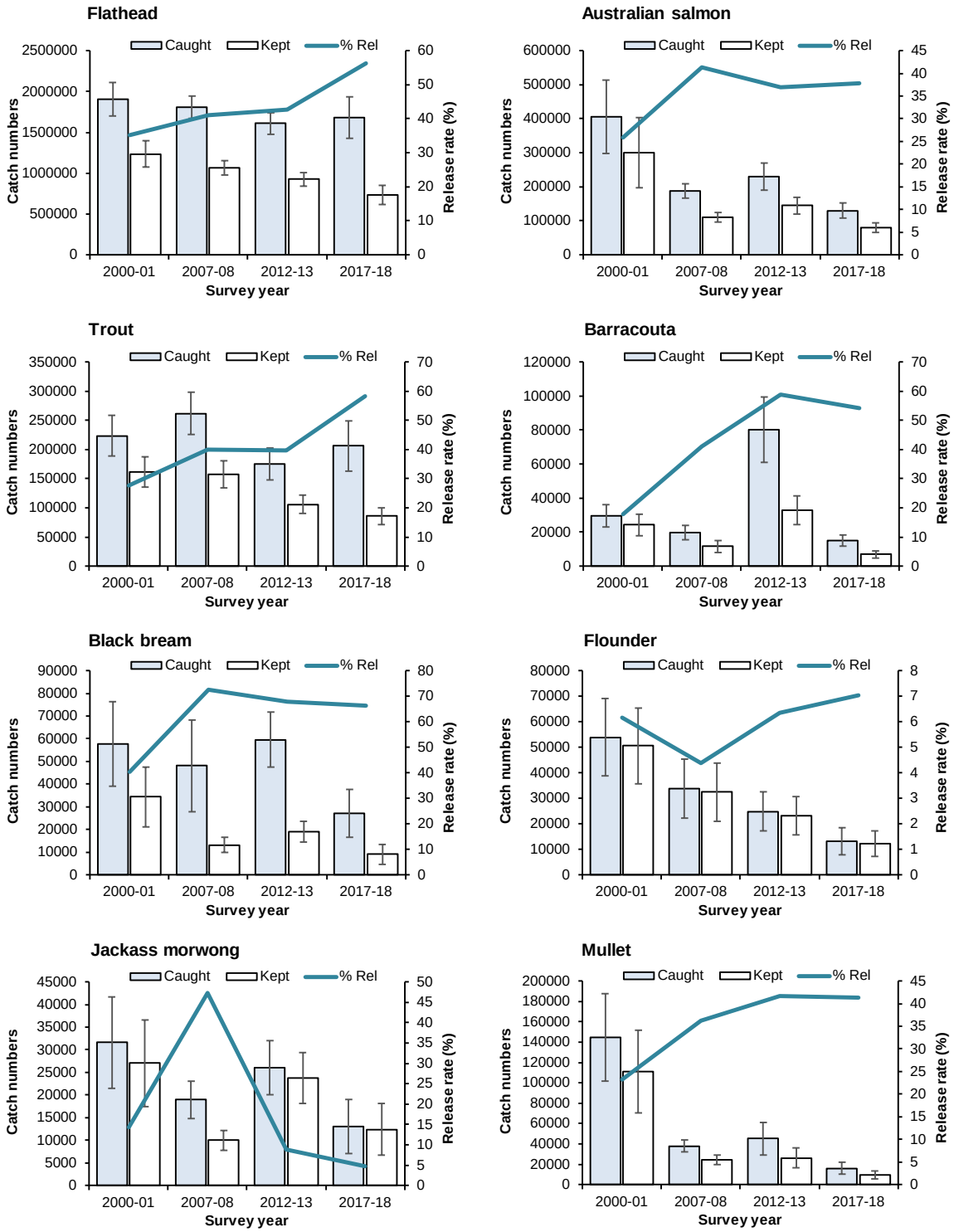


Fig. 47. Total catch numbers (kept and released), numbers kept (harvested) and proportion of the total catch released (%) for key species by survey year for Tasmanian residents aged 5 years or older.

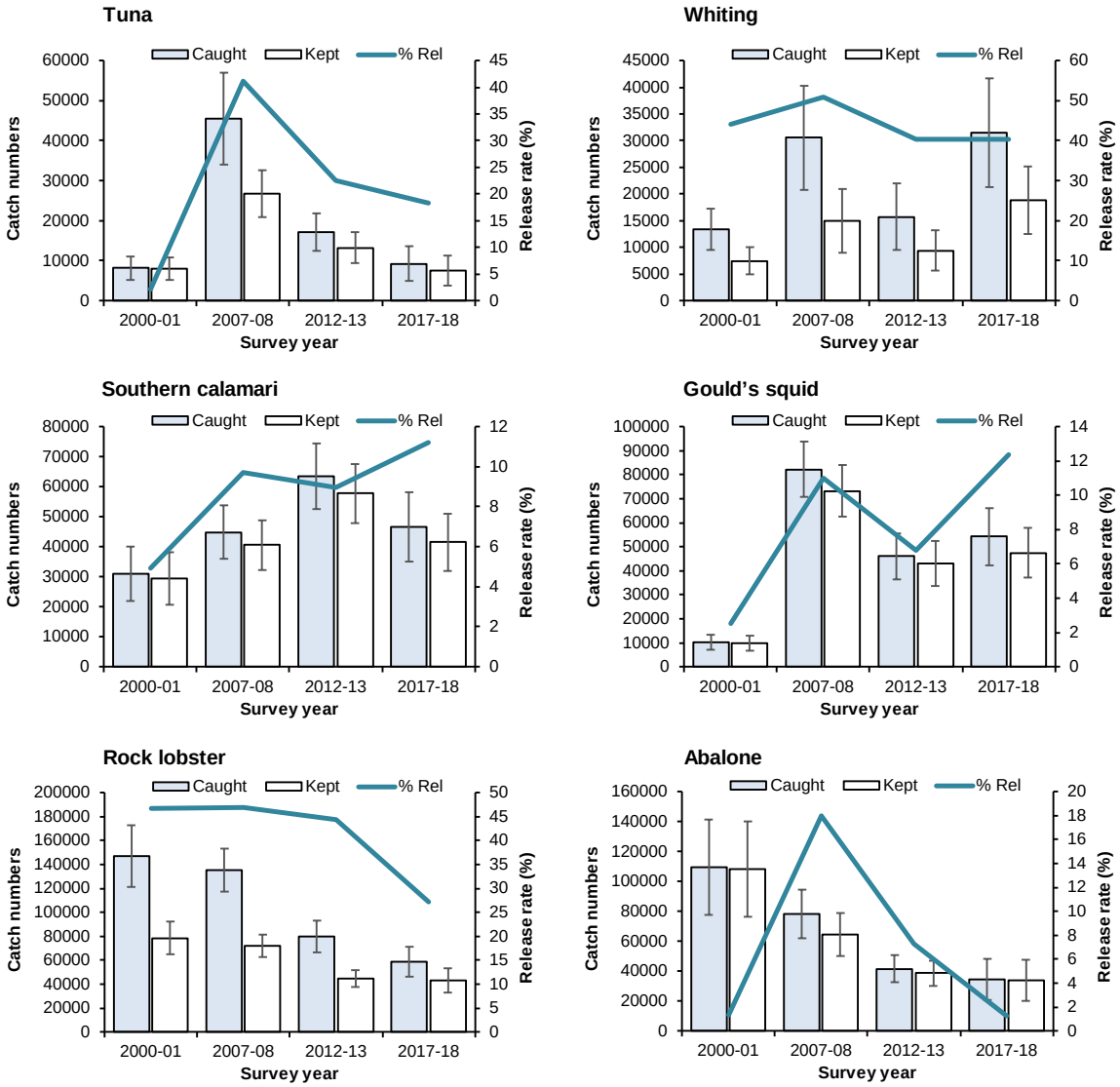


Fig. 47. Continued.

12. SUMMARY AND CONCLUSIONS

12.1 General

This study represents the fourth comprehensive assessment of recreational fishing in Tasmania and complements other more targeted assessments of specific fishing activities. By utilising the same methodological approach applied in the 2000-01 National Recreational Fishing Survey it is possible to make valid comparisons over time. Although not measured, fishing by interstate visitors in Tasmania is unlikely to be significant in the context of the overall fishery given that the National Survey established that non-resident fishers accounted for about 3% of the total effort (fisher days) for Tasmania during 2000-01 (Henry and Lyle, 2003).

12.2 Fishing participation

In the 12 months prior to October 2017 about 106,000 private dwelling residents of Tasmania aged 5 years or older fished at least once in Tasmania, representing an overall participation rate of 23.8%. By region of residence, South East residents had the highest participation rate at 31%, which compared with 22-25% for other Tasmanian regions. Recreational fishing was more popular among males, with a state-wide participation rate of 32.5%, compared with 15.4% for females. Participation rates varied with age, 5-14 year olds having the highest rate of participation (35%) although the greatest numbers of fishers were in the 45-59 years age group. Participation rates for age groups between 15 and 59 years were generally similar at around 26%, declining sharply in the 60 years plus age group to around 15%.

The estimated number of Tasmanian recreational fishers has declined slightly since 2000 despite a small increase in resident population. Based on demography, the decline has been most evident in the age groups less than 44 years; fisher numbers in the 45 to 59 years age group have remained stable since 2000 and have increased in the 60 plus years age group. When population size is considered, the overall participation rate has declined from just over 29% in 2000 to about 24% in 2017. Participation rates have fallen across all age groups apart from the 60 years plus group, this decline being more pronounced amongst males than females. Declines were experienced in all regions of the state.

When broader demographic trends are considered, specifically dominance of the ‘baby-boomer’ generation (53-69 year olds in 2017) and the lower participation rates amongst the 60 plus years age groups, our results suggest that overall participation in recreational fishing in Tasmania is likely to decline further. This trend will continue unless there is growth, or at least maintenance, of involvement in fishing amongst the younger age groups.

While the reasons for the decline are unclear it does highlight the value of on-going assessments to establish trends and the need to identify key factors that influence recreational fishing participation. Such information has application in future management planning and in the identification of potential changes in the socio-economic impacts of recreational fishing. Recent studies in Queensland have focussed on understanding why people cease fishing, with lack of time, loss of interest, and poor fishing quality the most commonly identified reasons (Sutton *et al.*, 2009). Participation alone, however, does not

adequately quantify impacts on the fisheries resources and thus there is a need to consider catch and effort information as well.

12.3 Catch and effort

Recreational fishing activity was monitored in detail between December 2017 and November 2018. Over 90,000 Tasmanian residents were estimated to have fished in Tasmania during this period, statistically fewer *active* fishers than estimated by the screening survey for 2017. There are several factors that may have contributed to this apparent discrepancy. First, the screening survey is based on recalled activity and subject to a number of potential biases. Some respondents may have inadvertently reported participation that occurred prior to the period of interest, a phenomenon known as 'telescoping'. This aspect of recall bias typically results in an over-estimation of the activity of interest. Second, as evident in this and previous studies, not all respondents who indicate an intention to go fishing do so; lack of time or competing interests are often cited as reasons. We have treated this group as 'drop-outs' (reducing the effective participation rate) but recognise that they need to be balanced against persons who did not expect to go fishing but actually did so, 'drop-ins' (the non-intending fisher call-back survey, refer Section 2.2.3). If the number of drop-ins effectively balances the number of drop-outs we would expect the number of fishers to have been comparable between screening and diary surveys. Overall our data suggest that the estimated number of *active* fishers in 2017-18 was 15% lower than in 2017 (based on the screening survey) but was similar to the number of *active* fishers in 2012-13 (91,874, SE 3835) (Lyle et. al, 2014). Interestingly, at the time of the current screening interview an estimated 8% of those Tasmanian's who stated they had fished in 2017 (equivalent to about 8500 persons) rated themselves as unlikely to do any recreational fishing during 2017-18.

During the 12-month survey period recreational fishers accounted for about 0.47 million fisher days of effort, with an average of 5.3 days per fisher. Individually, effort levels were highly skewed with most persons fishing for relatively few days (< 5 days) whereas a small proportion of avid fishers contributed disproportionately to the total fishing effort (and catch). For instance, over half of the effort (55%) was attributed to just 20% of fishers.

Almost 23,000 Tasmanian residents fished at least once in freshwater while over 79,000 fished at least once in saltwater during 2017-18, with about 12,000 persons (13%) fishing at least once in both fresh and saltwater. Fishing in freshwater accounted for 25% of the total effort (fisher days) with saltwater fishing (including estuaries) accounting for the remainder. Freshwater fishing in lakes accounted for more than double the effort in rivers while most of the saltwater fishing occurred in inshore coastal waters, with estuarine fishing of secondary importance. Fishing in offshore waters (>5 km off the coast) was a comparatively rare activity.

Line fishing was the dominant activity undertaken, occurring on 88% of all days fished; representing 0.42 million fisher days or 1.3 million fisher-hours of effort. This was followed by pot fishing (7%) and dive harvesting (4%) in importance. A range of other fishing methods were also reported, including the use of gillnets. spears, seine or bait nets and hand collection but these were of minor importance by comparison.

A wide variety of fish species were caught by recreational fishers during 2017-18, with a total of 1.1 million finfish (excluding small baitfish) retained and 1.35 million finfish released or discarded. Flathead (mainly Southern Sand Flathead) represented 68% of the total finfish catch by number, with an estimated 0.73 million kept and 0.95 million released. Other finfish species of significance included Trout (86,000 kept and 120,000 released), Australian Salmon (80,600 kept and 49,000 released), Gurnard (21,000 kept and 77,800 released), Wrasse (8,000 kept and 32,000 released) and Black Bream (9,000 kept and 18,000 released). The survey also identified emerging species such as Snapper, Yellowtail Kingfish and King George Whiting in the catches, confirming a growing interest from the recreational sector in opportunities posed by climate driven range-extending species.

Overall, 55% of all finfish captured were released or discarded; with low rates of release (<10%) for species such as Flounder, Jackass Morwong and Striped Trumpeter; intermediate rates (10-30%) for Atlantic Salmon, Pike, Redfin Perch and Tuna; moderate rates (31-50%) for Australian Salmon, Cod, Leatherjacket, Mullet, Silver Trevally, and Whiting; and high rates (>50%) for Barracouta, Bastard Trumpeter, Black Bream, Flathead, Gurnard, Trout, Wrasse and sharks and rays. Reasons for release were varied, with size (under legal size or too small) being an important factor for species such as Bastard Trumpeter, Flathead, Whiting, Australian Salmon, Silver Trevally and Mullet; poor eating qualities were identified as important factors for release for Cod, Gurnard; Pike and Wrasse, while catch and release (sport) fishing was important for Trout and Atlantic Salmon. Sharks and rays tended to be released or discarded because of poor eating qualities (e.g. Draughtboard Shark and Spurdog) and/or due to regulations prohibiting the taking of sharks from specified areas (i.e. shark refuge areas).

There was a high level of fishery specialisation for species such as Trout, Flounder, Flathead, Tuna, Rock Lobster and Abalone with these species taken almost exclusively by targeted effort rather than incidental capture. Other species that tended to be caught primarily as a result of targeted effort included Atlantic Salmon, Australian Salmon and squid, also implying a level of fishery specialisation for these species. By contrast, Jackass Morwong, Silver Trevally, Mullet and a range of other finfish species were rarely nominated as target species.

Recreational fishers also caught a variety of shellfish and other invertebrate species. Comparatively high catches of squid, namely Gould's Squid (47,500 kept) and Southern Calamari (41,500 kept) were taken along with Rock Lobster (43,000 kept), Abalone (34,000 kept) and scallops (130,000 kept). Amongst these taxa, rates of release were low for squid, scallops and Abalone and moderate for Rock Lobster (mainly due to adherence to size limits).

By applying average fish weights, it was possible to calculate harvest weights for key species and compare recreational and commercial fisheries production. The annual recreational harvest of Sand Flathead was estimated at 184 tonnes, about fifty times greater than the commercial Sand Flathead catch taken from state fishing waters. By contrast, the catch of Tiger Flathead, estimated at about 15 tonnes, was less than half the size of the Tasmanian commercial catch. By weight, other species of importance included Australian Salmon (35 tonnes), Southern Calamari (31 tonnes), Striped Trumpeter (29 tonnes) and Gould's Squid (24 tonnes). As a contributor to total harvest for key species from Tasmanian waters, the share taken by the recreational sector during

2017-18 was similar to or larger than that taken by the Tasmanian commercial scalefish fishery for Southern Sand Flathead, Barracouta, Bastard Trumpeter, Cod, Flounder, Jackass Morwong, Leatherjacket, Mullet and Striped Trumpeter. Conversely, the recreational harvest represented a relatively minor component (<10%) of the combined catch for species such as Banded Morwong, Blue Warehou, Garfish, Gould's Squid, School Whiting and Wrasse.

Catch composition was influenced by many factors, including the water body fished and fishing method. Trout dominated finfish catches (kept and released numbers) in freshwater (>90%), with Redfin Perch and Atlantic Salmon of secondary importance in the lake fisheries, and Eel and Redfin Perch in the river fisheries. Flathead and Australian Salmon dominated estuarine and inshore coastal catches (collectively >65%), with Black Bream and Whiting of secondary importance in the estuarine fisheries, and Gurnard and squid in the inshore coastal fisheries. Tuna accounted for a quarter of the offshore catch, with Gurnard (mostly Ocean Perch), Jackass Morwong and Striped Trumpeter also taken.

By number, line catches were dominated by Flathead, followed by Trout and Australian Salmon, and a variety of other finfish species. Bastard Trumpeter, Silver Trevally and Wrasse were the main species taken by gillnet, the former being rarely caught by other methods. Flounder were mainly taken by spear, Gould's Squid and Southern Calamari were mostly taken by line methods, Rock Lobster were caught using pots, dive collection and rings, and Abalone and scallops were exclusively harvested by dive collection.

Catch and effort data for the key species were examined in detail (based on region, method, platform, water body and seasonality) and the regional fisheries characterised (effort by where fishers resided and by method and catch composition). The waters off south-eastern Tasmania represent a particularly significant area for recreational catches of Flathead, Australian Salmon, Flounder, Black Bream, Tuna, Gould's Squid, Southern Calamari, Rock Lobster and Abalone. These species, apart from Flounder, were also important components of the fishery off eastern Tasmania. Species of significance off northern Tasmania included Australian Salmon, Flathead, Mullet, Flounder, Gould's Squid, Southern Calamari, Rock Lobster and Abalone, while Australian Salmon and Rock Lobster were key west coast species. The freshwater fishery for Trout was focused largely in the Western and Central Plateau lakes, with catches from rivers of secondary importance.

Fisheries for key species such as Flathead, Founder, Tuna, Gould's Squid, Southern Calamari, Rock Lobster and Abalone were concentrated between December and March, with peak catches taken during the summer months (December/January). Australian Salmon and Trout catches peaked during Spring/Summer (October and January) while fisheries for Black Bream and Mullet were highest in Autumn (April/May). General fishing activity for each of the key target species was low during the winter months.

In general residents local to specific regions typically accounted for most of the fishing effort in those areas. There were, however, notable exceptions where residents from outside the adjoining areas contributed significantly to the effort; this was particularly the case for the Central East (Hobart residents) and South East (Hobart residents) Coast regions. The Trout fishery in the Central Plateau also attracted considerable effort from fishers residing outside of the region (especially Hobart residents). These findings

highlight the importance of fishers travelling between areas to participate in the recreational fishing, with resultant benefits to regional economies.

As this survey was designed to provide a big-picture perspective of the recreational fishery, it is important to recognise that comparatively rare or highly specialised activities may not be well represented. For instance, activities such as fishing for gamefish, off-shore fishing for Striped Trumpeter or Blue Eye Trevalla, or fishing in localised areas, such as Macquarie Harbour or Georges Bay, are relatively minor components in the context of the *overall* recreational fishery. In such instances, estimates of catch and effort tend to be imprecise (high relative standard errors) and alternative, targeted surveys are recommended to provide a more reliable assessment of such activities. For the above reasons, aggregation of some regions and species has been necessary and not all data elements have been reported to the lowest feasible level. This is an important point to consider when interpreting survey findings.

12.4 Expenditure

Recreational fishers were estimated to have spent $161 million on goods and services relevant to fishing in Tasmania during 2017-18, equivalent to almost $1800 per fisher. By comparison, in 2012-13 expenditure attributable to fishing by Tasmanians was estimated at $93 million or $1000 per fisher (Lyle *et al.*, 2014) which, when adjusted for CPI, represents around $104 million in current terms (over $1100 per fisher). Although there is uncertainty associated with the expenditure estimates, the data do suggest that fishing related expenditure has increased in real terms since 2012-13 despite little change in the numbers of *active* fishers.

12.5 Fisher motivations, attitudes and awareness

Motives for recreational fishing are complex and involve both catch and non-catch aspects of the experience. For most surveyed fishers, non-catch motives relating to relaxation, socialising and environment were more important than catching and consuming fish. Consistent with this observation and in the context of the degree to which fishers value the catch related aspects of the fishing experience, there was strong agreement that fishing could be satisfying regardless of whether any fish were caught. This does not imply that catch related aspects (including consumption) are unimportant, but rather that fishers derive benefits from the fishing experience that are unrelated to catching fish. In fact, the strongest agreement amongst respondents related to statements about consuming their catch and retaining just enough for a feed rather than taking the bag limit.

Although most fishers indicated general satisfaction with the management of the recreational fisheries, over the past decade there has been a gradual decrease in satisfaction and increase in the proportion of fishers indicating dissatisfaction with management. Fisher perceptions about the quality of key regional fisheries suggested that those in the north of the state, e.g. Port Sorell and Georges Bay, had either improved over the past 3-5 years or were unchanged whereas several fisheries in the south, in particular in the D'Entrecasteaux Channel, Great Oyster Bay and Norfolk-Frederick Henry Bay were rated as the poorest performing of the marine fisheries. Apart from Arthurs Lake, the quality of the freshwater fisheries were rated quiet favourably, with Penstock Lagoon

and the Brady's/Binney/Tungatinah Lakes complex amongst the best performing fisheries.

In obtaining information about fishing regulations, other fishers/friends emerged as the most commonly cited information source, followed by government publications and websites, with each being considered reliable sources of information. There was a high level of awareness (> 80%) of many of the traditional information products produced by government agencies, with moderate awareness (36-44%) of the smart phone applications. Awareness of these apps was, however, substantially higher than in 2013, indicating growing recognition and support for the platforms.

There was a slight decline in awareness of the Fishcare Program which up until 2013 had been growing, this was accompanied by a fall in the proportion of respondents who had had direct contract with the program. Overall awareness of peak saltwater and freshwater fishing representative bodies was moderate amongst the relevant fisher groups (41-59%), with an underlying trend of increasing awareness over time for TARFish. These trends provide an important metric against which the utility of these products, associated campaigns and awareness of representative bodies can be assessed.

Opinions on the continued use of recreational gillnets were polarised, with 45% of respondents opposed, a third in favour and a quarter of respondents unsure. Although opposition to the method has risen over the past two decades (from 36% in 2001) (Frijlink and Lyle, 2010) there continues to be a reasonable level of support (or uncertainty) from within the sector. The main reasons given for opposition included concerns about excessive catches, by-catch and wastage.

12.6 Trends in the fishery

Since 2000 there have been some notable changes in the recreational fishery in Tasmania. The most conspicuous has been a general decline in participation, both in absolute and relative terms up until 2012. Fisher numbers declined from around 125,000 in 2000 to 98,000 in 2012, a reduction in participation rate (proportion of resident population) from 29 to 22%. The current survey provided evidence for an increase in fisher numbers (106,000 persons) and participation rate (23.8%), but both metrics were still lower than during the early to mid-2000s. Noting limited growth in the size of the private dwelling resident population in Tasmania over the past two decades, much of the change has been driven by changing demography, in particular the 'aging population'. For instance, the number Tasmanians aged 60 years or older has increased from about 78,000 in 2000 to about 122,000 in 2017, an increase in proportional terms from 18.3 to 27.5% of the population. Although participation rates in this age group have remained relatively stable, they are consistently lower (about half) those for the younger age groups. As a consequence, the number of fishers aged 60 years plus has increased but this increase has not been sufficient to offset the fall in participation especially amongst persons younger than 45 years old. Furthermore, participation rates tend to be highest amongst children (5-14 year olds) but fall thereafter indicating an underlying decline in retention (rather than recruitment) of persons to the pastime, and this is also contributing to the falling participation.

Linked to changing participation has been a general decline in fishing effort since 2000-01; total fisher days have fallen from 0.75 million in 2000-01 to 0.47 million in 2017-18.

Effort levels have declined for both freshwater and saltwater fishing, the decline being more marked for shore-based than boat-based fishing activity. Between 2000-01 and 2012-13 there has been a steady decline in effort in most coastal regions. By comparison with 2012-13, effort in 2017-18 was comparable or slightly higher in the north coast regions (apart from the Tamar), the East Coast, D'Entrecasteaux Channel and Norfolk-Frederick Henry Bay regions. The most conspicuous declines have occurred off the West, Central East and South East Coasts and in the two estuarine regions (Tamar and Derwent).

Overall, finfish catches (kept plus released) in 2017-18 were slightly lower (93%) than in 2012-13 and about 70% of 2000-01 levels While the catch composition and relative importance of the key species has been consistent over time, catch levels have varied for many species, linked in part to differences in effort and changes in fishing practices and species availability. Species for which 2017-18 catches were similar to those reported in 2012-13 included Flathead and the Trumpeters, whereas catches for species such as Trout, Leatherjacket, Gurnard, Whiting, Silver Trevally and Gould's Squid were higher in 2017-18. By contrast, Australian Salmon, Barracouta, Black Bream, Cod, Flounder, Mullet, Wrasse and Southern Calamari catches were considerably lower in 2017-18.

One of the more conspicuous developments in the recreational fishery over the past two decades has been the growth in fishery for Southern Calamari. Much of this growth has been around increased awareness of the species by recreational fishers. Despite this, the lower catch taken during 2017-18 is consistent with a sharp decline in catches experienced in the commercial fishery, with commercial landings falling from over 120 tonnes in 2016-17 to 60 tonnes in 2017-18 (Moore *et al*., 2019). Commercial fishers noted a general reduction in the availability of the species, at the time; recent reports indicate that catches have subsequently improved. Nonetheless it is evident that the recreational sector now represents a major component of the fishery for Southern Calamari.

Although the current survey does not represent Rock Lobster and Abalone catches as well as targeted surveys, the general trend of declining catches is consistent with that based on the targeted surveys, and reflects a combination of factors, including changing stock status and recent management changes (Lyle *et al.*, 2019). In relation to Blue Warehou, Bastard Trumpeter, and Mullet, a significant reduction in recreational gillnet effort, along with lower abundances of Blue Warehou and Bastard Trumpeter (both are classified as depleted stocks) represent key factors in the catch decline (refer also Lyle and Tracey, 2012b).

Recreational fishers in Australia and globally are becoming more conscious of the need for resource conservation and ethical fishing practices. Voluntary catch and release fishing is a manifestation of this, as has the implementation (and acceptance) of size and bag limits. Release rates in 2017-18 were typically higher than in 2000-01 but comparable to those reported since 2007-08 for most species. Flathead and Trout are notable exceptions, with substantially higher release rates in 2017-18, the former influenced by a recent (2015) increase in minimum size limit (from 300 to 320 mm) and the latter by growing interest in catch and release fishing. There were relatively few restrictions on recreational catches in the early 2000s. Following several major fishery management reviews, bag limits and revised size limits have been implemented for many finfish species. These measures have been accompanied by education programs aimed at

encouraging fishers to take only what they need for a feed, an attitude strongly endorsed by recreational fishers. It is likely that, in combination, these factors may have contributed to the general increase in release rates.

Finally, this study further highlights the complex and dynamic nature of the recreational fishery and emphasises the need for managers, stakeholders and fisheries scientists to consider management, research and planning issues at appropriate regional and temporal scales. This survey represents a step towards achieving this goal, providing information against which future developments and trends can be evaluated.

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Appendix 1 Species groupings by capture method as reported by recreational fishers in Tasmania during 2017-18.

Capture methods and relative catch (kept & released) numbers are indicated.+ <1000; ++ 1000-9,999; +++ 10,000-49,999; ++++ 50,000-99,999, +++++ 100,000 plus

			Line		Lobster		Other				
Reporting group	**Common name**	**Scientific name(s)**	**Line**	**Set-line**	**Gillnet**	**Dive**	**Pot**	**Seine**	**Spear**	**Ring**	**Other**
Trout	Brown Trout	*Salmo trutta*	+++++								
	Rainbow Trout	*Oncorhynchus mykiss*	+++								
	Trout, unspec.	Salmonidae	+								
Atlantic Salmon	Atlantic Salmon	*Salmo salar*	++		++				+		
River Blackfish	River Blackfish	*Gadopsis marmoratus*	+								
Redfin	Redfin	*Perca fluviatilis*	++								
Australian Salmon	Australian Salmon	*Arripis* spp	+++++		++						++
Barracouta	Barracouta	*Thyrsites atun*	+++								
Black Bream	Black Bream	*Acanthopagrus butcheri*	+++		+						
Blue Warehou	Blue Warehou	*Seriolella brama*	+		+						
Cod	Cod	Moridae	+++		+						
Eel	Eel	*Conger* spp & Anguilliformes	++				+				
Flathead	Southern Sand Flathead	*Platycephalus bassensis*	+++++	+	++	+			+		
	Tiger Flathead	*Neoplatycephalus richardsoni*	++++						+		
	Bluespotted Flathead	*Platycephalus speculator*	+								
	Flathead, unspec.	Platycephalidae	++++								

Appendix 1 continued

			Line				Lobster	Other			
Reporting group	**Common name**	**Scientific name(s)**	**Line**	**Set-line**	**Gillnet**	**Dive**	**Pot**	**Seine**	**Spear**	**Ring**	**Other**
Flounder	Flounder	Bothidae & *Pleuronectidae* spp			+	+			+++		
Garfish	Garfish	*Hyporhamphus melanochir*	++						++		
Gurnard	Gurnard	Triglidae & Scorpaenidae	++++	+	+						
	Ocean Perch	*Helicolenus* spp.	+++		+						
Jack Mackerel	Jack Mackerel	*Trachurus declivis*	++		+						
Leatherjacket	Leatherjacket	Monacanthidae	+++		+	+					
Pike	Pike	*Dinolestes lewin*i & *Sphyraena* spp	+++		+						
Jackass Morwong	Jackass Morwong	*Nemadactylus macropterus*	+++		+						
Mullet	Mullet	Mugilidae (incl *Aldrichetta forsteri* & *Mugil cephalus*)	+++		+			+	+		
Silver Trevally	Silver Trevally	*Pseudocaranx dentex*	+++		++						
Trumpeter	Bastard Trumpeter	*Latridopsis forsteri*	+		++	+					
	Striped Trumpeter	*Latris lineata*	++		+						
Tuna	Albacore	*Thunnus alalunga*	++								
	Skipjack Tuna	*Katsuwonus pelamis*	+								
	Southern Bluefin Tuna	*Thunnus maccoyii*	++								
	Yellowfin Tuna	*Thunnus albacares*	+								
Whiting	School Whiting	*Sillago flindersi*	++								
	King George Whiting	*Sillaginodes punctata*	+++								

Appendix 1 continued

			Line				Lobster	Other			
Reporting group	**Common name**	**Scientific name(s)**	**Line**	**Set-line**	**Gillnet**	**Dive**	**Pot**	**Seine**	**Spear**	**Ring**	**Other**
Wrasse	Wrasse	Labridae (incl *Notolabrus tetricus* & *N. fucicola*)	+++		++		+				
Scalefish, other	Banded Morwong	*Cheilodactylus spectabilis*	++		+						
	Blue grenadier	*Macruronus novaezelandiae*	+								
	Blueeye trevalla	*Hyperoglyphe antarctica*	+								
	Blue Mackerel	*Scomber australasicus*	++		+						
	Boarfish	Pentacerotidae	+		+						
	Dory	Zeidae	+								
	Gemfish	*Rexea solandri*	++								
	Latchet	*Pterygotrigla polyommata*	+								
	Ling	*Genypterus* spp	+								
	Luderick	*Girella* spp	+		+	+					
	Marblefish	*Aplodactylus arctidens*	+		++						
	Red Mullet	Mullidae	+								
	Sergeant Baker	*Aulopus purpurissatus*	++								
	Snapper	*Pagrus auratus*	++		+						
	Sweep	*Scorpididae*			+						
	Tailor	*Pomatomus saltatrix*	++								+

Appendix 1 continued

			Line				Lobster	Other			
Reporting group	**Common name**	**Scientific name(s)**	**Line**	**Set-line**	**Gillnet**	**Dive**	**Pot**	**Seine**	**Spear**	**Ring**	**Other**
Scalefish, other	Toad/pufferfish	Various families	++								
	Yellowtail Kingfish	*Seriola lalandi*	++								
	Other scalefish	Various families	+		+						+
Small baitfish	Small baitfish	Several families			++						+++
	Whitebait	*Lavettia* & *Galaxias* spp.						+++++			+
Sharks & rays	Gummy Shark	*Mustelus antarcticus*	+++	++	+						
	School Shark	*Galeorhinus galeus*	++	+							
	Spurdog	*Squalus* spp	+								
	Draughtboard Shark	*Cephaloscyllium laticeps*	+	+			+				
	Elephantfish	*Callorhinchus milii*			+						
	Shark, other	Various families (incl Alopiidae, Lamnidae, Hexanchidae)	++	+	+		++				
	Shark, unspec.	Various families	+	+	+						
	Skates/Rays	Various families	++	+	+						
Rock Lobster	Southern Rock Lobster	*Jasus edwardsii*				+++	+++			+	
Crustaceans, other	Crab	Brachyura			+		+				
	Prawns	Penaeidea									++
	Yabby	Yabby									+++

Appendix 1 continued

			Line				Lobster	Other			
Reporting group	**Common name**	**Scientific name(s)**	**Line**	**Set-line**	**Gillnet**	**Dive**	**Pot**	**Seine**	**Spear**	**Ring**	**Other**
Gould's Squid	Gould's Squid	*Nototodarus gouldi*	++++						+		
Southern Calamari	Southern Calamari	*Sepioteuthis australis*	+++						+		
Cephalopod, other	Cuttlefish	*Sepia* spp	+								
	Octopus	Octopodidae	+				+				
Abalone	Blacklip Abalone	*Haliotis rubra*				+++					
	Greenlip Abalone	*Haliotis laevigata*				+++					
Scallop	Scallop	Pectinidae	+			+++++					
Bivalve, other	Mussels	*Maccullochella peelii*									++
	Oysters	Ostreidae & *Pteriidae* spp			++						++
	Bivalve, other	Various families									++++

Appendix 2. Estimating ABS Benchmark totals for 2017

Data Available

- Census 2016: #Occupied Private Dwellings (OPDs) by SA4 (2016 Census of Population and Housing, General Community Profile Table G32)
- Census 2016: #Persons in OPDs by SA4 (as above)
- Census 2016: #Persons by Age/Sex Category and SA4 (2016 Census of Population and Housing, General Community Profile Table G04A)
- Estimated Resident Population (ERP): #Households in Hobart vs RestOfState for years 2011-2016 (plus future projections 2021, 2026, 2036) (ABS product 31010 DO001 201709 Australian Demographic Statistics, Sep 2017; Table 17)
- ERP: #Persons by SA4 and Sex/AgeGp for 2016 (ABS product 3235.0)
- ERP: #Persons by Sex/AgeGp only for 2017 (ABS product 3101.0 Table 56)

Household Numbers (Number of Occupied Private Dwellings by SA4)

To get Number of OPDs for 2017 a linear regression is fitted to the available ERP data and predicted the 2017 values for Hobart & Rest of Tasmania (which is the only spatial disaggregation available for ERP data). Since ERP data are for 'Households' not specifically 'OPDs', Census 2016 values and ERP 2016 are used to estimate the proportion of 'Households' that were 'OPDs' and this proportion is applied to adjust 2017 estimates.

The 2017 estimate for RestOfState was split between the three SA4s according to the proportions in the Census 2016 values.

Final estimates of Number of OPDs in 2017 by SA4 are:

SA4	Name	N
601	Hobart	86,580
602	Launceston & North East	54,723
603	South East	14,448
604	West & North West	43,057
Total		198,808

Person Numbers (Number of People in OPD's by Sex, AgeGroup and SA4)

To estimate #Persons (by Sex & AgeGroup) ERP totals for 2017 (whole of State only, ABS product 3101.0 Table 56) was used and the totals proportioned between the four regional strata (SA4's) according to the 2016 ERP distribution (ABS product 3235.0).

These totals were then adjusted to be Persons in OPDs only using the proportion (by SA4) obtained from the Census 2016 data.

Final estimates of Number of Persons in OPDs in 2017 by SA4 are:

SA4	Name	N	N (aged 5 plus)
601	Hobart	206,752	194,368
602	Launceston & North East	129,896	122,616
603	South East	34,217	32,519
604	West & North West	101,844	96,118
Total		472,709	445,621

Appendix 3 Estimated number of persons and proportion of the Tasmanian resident population aged five years or older who fished recreationally in Tasmania during the 12 months prior to October 2017.

SE is standard error, RSE is relative standard error (%).

	Population	Recreational fishers			Participation rate	
Statistical Area	**Number**	**Number**	**SE**	**RSE**	**(%)**	**SE**
Hobart	194,368	42,603	2,819	6.6	21.9	1.5
South East	32,519	10,145	761	7.5	31.2	2.3
Launceston & North East	122,616	29,178	1,964	6.7	23.8	1.6
West & North West	96,118	24,266	1,784	7.4	25.2	1.9
Total	**445,621**	**106,192**	**3,945**	**3.7**	**23.8**	**0.9**

Appendix 4 Estimated number of persons and proportion of the Tasmanian resident population aged five years or older by age, gender and statistical division who fished recreationally in Tasmania during the 12 months prior to October 2017.

Statistical Area	Age class	Male Pop'n	Male Fishers	Male % fishers	Female Pop'n	Female Fishers	Female % fishers	Total Pop'n	Total Fishers	Total % fishers
Hobart										
	5 to 14	13,249	3,742	28.2	12,152	2,960	24.4	25,401	6,702	26.4
	15 to 29	20,577	5,543	26.9	19,437	3,831	19.7	40,014	9,374	23.4
	30 to 44	18,995	6,146	32.4	19,526	3,150	16.1	38,521	9,296	24.1
	45 to 59	20,107	6,916	34.4	20,863	4,032	19.3	40,970	10,948	26.7
	60+	23,314	4,695	20.1	26,148	1,588	6.1	49,462	6,283	12.7
	Total	**96,242**	**27,042**	**28.1**	**98,126**	**15,561**	**15.9**	**194,368**	**42,603**	**21.9**
South East										
	5 to 14	2,150	1,095	50.9	1,968	543	27.6	4,118	1,638	39.8
	15 to 29	2,423	927	38.3	2,170	523	24.1	4,593	1,450	31.6
	30 to 44	2,600	1,268	48.8	2,751	681	24.7	5,351	1,949	36.4
	45 to 59	3,998	1,725	43.2	4,040	839	20.8	8,038	2,564	31.9
	60+	5,460	1,930	35.3	4,959	614	12.4	10,419	2,544	24.4
	Total	**16,631**	**6,945**	**41.8**	**15,888**	**3,199**	**20.1**	**32,519**	**10,145**	**31.2**
Launceston & North East	5 to 14	7,905	3,094	39.1	7,704	2,197	28.5	15,609	5,291	33.9
	15 to 29	12,166	4,414	36.3	11,525	1,718	14.9	23,691	6,133	25.9
	30 to 44	10,339	4,040	39.1	11,336	2,073	18.3	21,675	6,113	28.2
	45 to 59	12,985	4,002	30.8	13,908	2,252	16.2	26,893	6,254	23.3
	60+	16,450	4,309	26.2	18,298	1,078	5.9	34,748	5,387	15.5
	Total	**59,845**	**19,860**	**33.2**	**62,771**	**9,318**	**14.8**	**122,616**	**29,178**	**23.8**
West & North West	5 to 14	6,436	3,365	52.3	6,206	1,413	22.8	12,642	4,778	37.8
	15 to 29	8,727	3,629	41.6	8,612	2,075	24.1	17,339	5,704	32.9
	30 to 44	7,971	3,109	39.0	8,553	1,429	16.7	16,524	4,538	27.5
	45 to 59	10,454	3,834	36.7	11,229	1,531	13.6	21,683	5,364	24.7
	60+	13,294	3,546	26.7	14,636	336	2.3	27,930	3,882	13.9
	Total	**46,882**	**17,483**	**37.3**	**49,236**	**6,783**	**13.8**	**96,118**	**24,266**	**25.2**
Tasmania										
	5 to 14	29,740	11,297	38.0	28,030	7,112	25.4	57,770	18,409	31.9
	15 to 29	43,893	14,514	33.1	41,744	8,147	19.5	85,637	22,661	26.5
	30 to 44	39,905	14,563	36.5	42,166	7,333	17.4	82,071	21,895	26.7
	45 to 59	47,544	16,477	34.7	50,040	8,653	17.3	97,584	25,131	25.8
	60+	58,518	14,480	24.7	64,041	3,617	5.6	122,559	18,096	14.8
	Total	**219,600**	**71,330**	**32.5**	**226,021**	**34,862**	**15.4**	**445,621**	**106,192**	**23.8**

Appendix 5 Annual recreational catch (kept and released numbers) of key species by targeted and non-targeted effort during 2017-18 based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Targeted		Non-targeted		%
Species	**Number**	**SE**	**Number**	**SE**	**targeted**
Trout	203,756	41,921	2,457	1,629	98.8
Atlantic Salmon	***7,057***	***3,051***	***3,126***	***1,560***	69.3
Australian Salmon	65,239	16,253	64,239	11,679	50.4
Black Bream	**13,254**	**6,476**	**13,883**	**7,437**	48.8
Blue Warehou	***457***	***456***	***269***	***187***	62.9
Flathead	1,434,508	232,279	246,791	43,690	85.3
Flounder	***11,809***	***4,743***	***1,392***	***1,346***	89.5
Morwong	*428*	*424*	*17,816*	*6,689*	2.3
Mullet	177	172	15,896	5,670	1.1
Silver Trevally	3,836	1,634	16,572	5,818	18.8
Trumpeter	**5,999**	**2,009**	**7,967**	**4,320**	43.0
Tuna	***8,110***	***4,246***	***1,107***	***488***	88.0
Scalefish, other	55,673	16,881	225,794	34,793	19.8
Sharks	7,738	2,584	19,531	3,136	28.4
Rock Lobster	57,956	12,681	867	495	98.5
Squid	57,580	15,865	43,368	8,964	57.0
Abalone	***30,783***	***13,400***	***3,716***	***1,968***	89.2
Scallop	***129,670***	***65,627***			100.0

Appendix 6 Annual recreational harvest (kept numbers) of key species by targeted and non-targeted effort during 2017-18 based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Targeted		Non-targeted		%
Species	**Number**	**SE**	**Number**	**SE**	**targeted**
Trout	84,740	13,893	1,181	1,046	98.6
Atlantic Salmon	***6,193***	***2,694***	***1,642***	***846***	79.0
Australian Salmon	44,409	10,457	36,200	6,692	55.1
Black Bream	***5,695***	***4,219***	***3,440***	***1,232***	62.3
Blue Warehou	***301***	***300***	***225***	***160***	57.2
Flathead	625,754	100,407	107,735	24,551	85.3
Flounder	***10,919***	***4,591***	***1,352***	***1,345***	89.0
Morwong	***428***	***424***	***13,481***	***5,819***	3.1
Mullet	***177***	***172***	***9,264***	***4,071***	1.9
Silver Trevally	*1,404*	*650*	*9,687*	*3,409*	12.7
Trumpeter	*5,688*	*1,919*	*4,124*	*1,416*	58.0
Tuna	***6,610***	***3,655***	***921***	***453***	87.8
Scalefish, other	26,990	8,225	83,410	14,542	24.4
Sharks	4,194	1,379	4,694	978	47.2
Rock Lobster	42,056	10,070	795	463	98.1
Squid	50,762	12,577	38,203	8,012	57.1
Abalone	***30,359***	***13,387***	***3,716***	***1,968***	89.1
Scallop	***129,670***	***65,627***			100.0

Appendix 7 Annual recreational effort (fisher days and numbers of fishers) and catch (kept and released numbers) of key species by water body type during 2017-18 based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Lake		River		Estuary		Inshore		Offshore	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Effort										
Persons	19,229	2,102	9,938	1,523	31,139	2,921	66,081	4,055	*3,182*	*729*
Fisher days	84,980	12,643	34,903	7,110	70,485	8,189	279,505	27,217	6,976	2,595
Catch										
Trout	132,954	24,868	**71,224**	**33,552**	***2,035***	***1,223***				
Atlantic Salmon	***1,818***	***1,297***	+		***3,996***	***2,223***	***3,958***	***2,257***		
Redfin	*4,348*	*1,648*	***1,488***	***1,026***						
River Blackfish			+		+					
Australian Salmon			+		38,594	9,431	90,759	16,686		
Barracouta					***2,777***	***1,148***	12,132	2,807	+	
Bastard Trumpeter							***7,192***	***4,382***		
Black Bream			+		***25,930***	***10,445***	***1,078***	***499***		
Blue Warehou					+		+			
Cod					***3,122***	***1,355***	***9,749***	***4,061***	***1,978***	***1,082***
Eel	***1,265***	***1,039***	***2,036***	***947***	+		+			
Flathead					218,081	67,204	1,462,115	210,660	***1,103***	***561***
Flounder					***2,791***	***1,520***	***10,409***	***4,865***		
Garfish					+		***3,150***	***1,881***		
Gurnard					***2,369***	***1,585***	92,551	21,580	*4,270*	*1,703*
Jack Mackerel					***3,061***	***1,226***	***3,475***	***2,006***		
Jackass Morwong					+		*13,831*	*5,397*	***4,085***	***2,388***
Leatherjacket					***8,358***	***5,145***	*6,195*	*1,665*		
Mullet					***9,217***	***4,936***	***6,856***	***3,005***		
Pike					***2,130***	***1,241***	***10,982***	***4,698***		
Silver Trevally					***12,304***	***4,935***	*8,104*	*3,182*		
Striped Trumpeter							*3,253*	*1,174*	***3,522***	***1,608***
Tuna							*3,200*	*1,052*	***6,017***	***4,124***
Whiting					***18,748***	***8,880***	*12,802*	*4,706*		
Wrasse					***5,197***	***2,220***	34,785	7,457	+	
Scalefish, other			+		*7,959*	*2,563*	23,349	4,850	***1,192***	***704***
Sharks & rays					*2,312*	*838*	24,626	4,230	+	
Rock Lobster					+		58,654	12,733		
Crustaceans, other	***11,881***	***11,584***			***4,121***	***4,102***	+			
Southern Calamari					*9,101*	*3,080*	37,634	10,381		
Gould's Squid					***7,902***	***3,890***	44,776	9,542	***1,500***	***1,435***
Cephalopod, other							+			
Abalone					+		***34,355***	***13,810***		
Scallop							***129,670***	***65,627***		
Bivalve, other					***5,111***	***3,802***	***804,675***	***773,095***		

Appendix 8 Annual recreational harvest (kept numbers) of key species by water body type during 2017-18 based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Lake		River		Estuary		Inshore		Offshore	
Species	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	69,794	12,444	15,070	4,159	***1,057***	***569***				
Atlantic Salmon	+		+		***3,349***	***1,705***	***3,767***	***2,234***		
Redfin	***2,996***	***1,486***	***1,316***	***1,012***						
River Blackfish			+		+					
Australian Salmon					19,914	6,045	60,695	10,650		
Barracouta					***1,655***	***828***	*5,070*	*1,894*	+	
Bastard Trumpeter							***3,451***	***1,515***		
Black Bream			+		***8,107***	***4,418***	+			
Blue Warehou					+		+			
Cod					+		***7,843***	***3,864***		
Eel	***1,265***	***1,039***	+		+		+			
Flathead					**80,217**	**36,329**	652,263	90,166	***1,009***	***552***
Flounder					***1,902***	***947***	***10,370***	***4,865***		
Garfish					+		***1,985***	***1,220***		
Gurnard					+		*19,639*	*6,756*	***1,729***	***1,152***
Jack Mackerel					***2,527***	***1,142***	***2,334***	***1,104***		
Jackass Morwong					+		***9,660***	***4,505***	***4,085***	***2,388***
Leatherjacket					***3,978***	***3,403***	*3,516*	*1,130*		
Mullet					***5,294***	***3,583***	***4,147***	***2,170***		
Pike					***1,930***	***1,191***	***7,475***	***4,150***		
Silver Trevally					***4,931***	***2,125***	***6,160***	***2,877***		
Striped Trumpeter							*2,900*	*1,046*	***3,460***	***1,606***
Tuna							*2,633*	*898*	***4,898***	***3,550***
Whiting					***11,705***	***5,563***	*7,129*	*2,574*		
Wrasse					+		*7,772*	*2,315*		
Scalefish, other					*4,237*	*1,504*	10,345	2,933	+	
Sharks & rays					+		8,466	1,741	+	
Rock Lobster					+		42,682	10,128		
Crustaceans, other	***11,881***	***11,584***			***4,121***	***4,102***	+			
Southern Calamari					*7,403*	*2,722*	34,095	8,712		
Gould's Squid					***7,524***	***3,586***	38,443	8,017	***1,500***	***1,435***
Cephalopod, other							+			
Abalone					+		***33,931***	***13,797***		
Scallop							***129,670***	***65,627***		
Bivalve, other					***2,410***	***2,044***	***804,675***	***773,095***		

Appendix 9 Annual recreational effort (fishers and fisher days) and catch (kept and released numbers) of key species by fishing method during 2017-18, based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000, values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches.

	Line		Gillnet		Dive		Pot		Other	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Effort										
Fishers	87,558	4,434	*3,419*	*960*	4,574	864	7,507	1,494	5,697	1,241
Fisher days	419,722	30,653	*5,414*	*1,348*	21,046	7,128	35,816	8,455	**18,572**	**8,057**
Catch										
Trout	206,213	42,912								
Atlantic Salmon	***9,051***	***3,966***	***1,047***	***930***					+	
Redfin	*5,836*	*1,946*								
River Blackfish	+									
Australian Salmon	125,879	22,082	***1,153***	***1,029***					***2,447***	***2,422***
Barracouta	15,086	3,102								
Bastard Trumpeter	+		***6,922***	***4,378***	+					
Black Bream	27,058	10,455	+							
Blue Warehou	+		+							
Cod	14,664	4,444	+							
Eel	***3,374***	***1,766***					+			
Flathead	1,677,759	251,958	***1,161***	***1,076***	+				***1,730***	***1,106***
Flounder			+		+				***12,859***	***5,231***
Garfish	***2,745***	***1,758***							***1,026***	***907***
Gurnard	98,384	21,786	+						+	
Jack Mackerel	***6,466***	***2,685***	+							
Jackass Morwong	*17,580*	*6,694*	+							
Leatherjacket	***12,626***	***5,539***	+		+					
Mullet	*15,323*	*5,761*	+						+	
Pike	*13,007*	*5,155*	+							
Silver Trevally	17,594	5,567	***2,814***	***2,690***						
Striped Trumpeter	*5,938*	*2,187*	+							
Tuna	***9,217***	***4,308***								
Whiting	31,550	10,186								
Wrasse	37,730	8,087	***2,206***	***1,480***			+			
Scalefish, other	29,055	5,573	***2,413***	***996***	+				***1,352***	***951***
Sharks & rays	19,246	3,130	+				***2,341***	***1,785***	*4,984*	*1,796*
Rock Lobster					*25,652*	*9,304*	32,860	8,279	+	
Crustaceans, other			+				+		***16,001***	***12,313***
Southern Calamari	45,975	11,464							+	
Gould's Squid	53,627	11,734							+	
Cephalopod, other	+						+			
Abalone					*34,498*	*13,809*				
Scallop					***129,670***	***65,627***				
Bivalve, other			***1,975***	***2,035***					***806,505***	***773,096***

Appendix 10 Annual recreational harvest (kept numbers) of key species by fishing method during 2017-18, based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000, values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Line		Gillnet		Dive		Pot		Other	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Trout	85,921	13,946								
Atlantic Salmon	*6,703*	*2,662*	***1,047***	***930***					+	
Redfin	***4,313***	***1,801***								
River Blackfish	+									
Australian Salmon	77,097	14,004	***1,065***	***924***					***2,447***	***2,422***
Barracouta	*6,902*	*2,180*								
Bastard Trumpeter	+		***3,182***	***1,503***	+					
Black Bream	***9,056***	***4,445***	+							
Blue Warehou	+		+							
Cod	***8,616***	***3,913***	+							
Eel	***2,232***	***1,599***					+			
Flathead	730,699	115,497	+		+				***1,730***	***1,106***
Flounder					+				***11,970***	***5,095***
Garfish	***1,580***	***1,020***							***1,026***	***907***
Gurnard	20,849	6,865	+						+	
Jack Mackerel	*4,792*	*1,555*	+							
Jackass Morwong	***13,664***	***5,830***	+							
Leatherjacket	***6,059***	***3,511***	+		+					
Mullet	***8,691***	***4,156***	+						+	
Pike	***9,299***	***4,614***	+							
Silver Trevally	*8,277*	*2,347*	***2,814***	***2,690***						
Striped Trumpeter	*5,523*	*2,007*	+							
Tuna	***7,531***	***3,703***								
Whiting	*18,834*	*6,255*								
Wrasse	*6,723*	*1,949*	***1,402***	***1,143***						
Scalefish, other	13,367	3,527	+						***1,352***	***951***
Sharks & rays	5,727	1,192					+		*3,025*	*1,192*
Rock Lobster					*24,128*	*9,019*	18,576	4,225	+	
Crustaceans, other							+		***16,001***	***12,313***
Southern Calamari	40,738	9,397							+	
Gould's Squid	46,917	10,174							+	
Cephalopod, other	+						+			
Abalone					***34,075***	***13,797***				
Scallop					***129,670***	***65,627***				
Bivalve, other									***806,505***	***773,096***

Appendix 11 Annual recreational catch (kept and released numbers) of key species by fishing platform during 2017-18, based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Boat		Shore		Both	
Species	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	99,566	22,440	105,832	34,951	+	
Atlantic Salmon	***5,341***	***2,446***	***4,842***	***3,263***		
Redfin	***1,064***	***656***	*4,772*	*1,826*		
River Blackfish	+		+			
Australian Salmon	73,040	13,342	56,438	15,908		
Barracouta	13,544	3,008	***1,542***	***781***		
Bastard Trumpeter	***7,192***	***4,382***				
Black Bream	***21,747***	***10,164***	***5,165***	***2,098***	+	
Blue Warehou	+					
Cod	*13,115*	*4,348*	***1,734***	***886***		
Eel	***1,237***	***745***	***2,288***	***1,606***		
Flathead	1,602,725	250,413	77,479	14,931	***1,096***	***857***
Flounder	***4,424***	***2,468***	***8,777***	***4,465***		
Garfish	***2,855***	***1,761***	+			
Gurnard	98,900	21,869	+			
Jack Mackerel	*2,822*	*975*	***3,714***	***2,527***		
Jackass Morwong	*15,564*	*6,177*	***2,680***	***2,638***		
Leatherjacket	*5,081*	*1,629*	***9,473***	***5,368***		
Mullet	***3,753***	***1,547***	***12,320***	***5,599***		
Pike	***11,597***	***5,045***	***1,515***	***1,078***		
Silver Trevally	***7,246***	***3,181***	***13,162***	***5,311***		
Striped Trumpeter	*6,775*	*2,319*				
Tuna	***9,217***	***4,308***				
Whiting	*25,521*	*9,228*	***6,029***	***2,757***		
Wrasse	31,533	7,411	***7,982***	***3,487***	+	
Scalefish, other	24,944	4,972	7,913	1,917		
Sharks & rays	22,538	4,063	*4,732*	*1,459*		
Rock Lobster	56,748	12,524	***2,075***	***1,277***		
Crustaceans, other	***4,757***	***4,128***	***11,881***	***11,584***		
Southern Calamari	22,309	5,234	***24,426***	***10,232***		
Gould's Squid	44,238	10,556	***9,940***	***4,580***		
Cephalopod, other	+		+			
Abalone	***30,975***	***13,520***	***3,524***	***1,775***		
Scallop	***129,670***	***65,627***				
Bivalve, other	***3,909***	***3,416***	***805,877***	***773,095***		

Appendix 12 Annual recreational harvest (numbers) for key species by fishing platform during 2017-18, based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Boat		Shore		Both	
Species	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	54,819	11,940	30,430	5,529	+	
Atlantic Salmon	***5,150***	***2,425***	***2,685***	***1,445***		
Redfin	+		***4,227***	***1,799***		
River Blackfish			+			
Australian Salmon	50,760	9,029	29,848	10,372		
Barracouta	*6,486*	*2,170*	+			
Bastard Trumpeter	***3,451***	***1,515***				
Black Bream	***7,497***	***4,339***	***1,638***	***969***		
Blue Warehou	+					
Cod	***8,300***	***3,888***	+			
Eel	+		***2,126***	***1,596***		
Flathead	705,328	114,866	28,161	6,290		
Flounder	***4,384***	***2,467***	***7,887***	***4,303***		
Garfish	***1,690***	***1,026***	+			
Gurnard	21,387	6,905	+			
Jack Mackerel	*2,709*	*971*	***2,152***	***1,242***		
Jackass Morwong	***13,909***	***5,833***				
Leatherjacket	*2,446*	*953*	***5,047***	***3,473***		
Mullet	***1,008***	***572***	***8,434***	***4,171***		
Pike	***8,052***	***4,496***	***1,352***	***1,042***		
Silver Trevally	***5,965***	***3,012***	*5,127*	*1,928*		
Striped Trumpeter	*6,360*	*2,150*				
Tuna	***7,531***	***3,703***				
Whiting	*14,283*	*5,438*	***4,550***	***2,388***		
Wrasse	*6,882*	*2,211*	***1,244***	***641***		
Scalefish, other	12,649	3,510	*2,518*	*993*		
Sharks & rays	8,439	1,737	+			
Rock Lobster	40,776	9,901	***2,075***	***1,277***		
Crustaceans, other	***4,160***	***4,102***	***11,881***	***11,584***		
Southern Calamari	*20,254*	*4,749*	*21,245*	*8,181*		
Gould's Squid	40,610	9,797	*6,856*	*2,459*		
Cephalopod, other	+		+			
Abalone	***30,740***	***13,510***	***3,335***	***1,757***		
Scallop	***129,670***	***65,627***				
Bivalve, other	***1,208***	***1,192***	***805,877***	***773,095***		

Appendix 13. Annual recreational effort (number of fishers and fisher days) and catch (kept and released numbers) for key species by fishing region during 2017-18, based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Western		Central		Eastern		West coast		North West coast		Tamar		North East coast	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Effort														
Fishers	9,195	1,421	11,867	1,730	11,571	1,708	*2,689*	*638*	17,242	2,175	9,853	1,857	9,208	1,404
Fisher days	38,878	8,449	52,019	8,882	33,472	5,817	*4,417*	*1,044*	53,349	10,009	16,640	3,392	36,265	7,748
Catch														
Trout	94,415	35,577	85,168	18,451	25,802	6,348	+							
Atlantic Salmon	+				***3,959***	***3,201***	+							
Redfin	***1,182***	***992***	***3,783***	***1,611***	+									
River Blackfish	+				+						+			
Australian Salmon	+				+		***6,162***	***3,266***	28,514	8,496	***8,576***	***5,067***	***15,084***	***7,348***
Barracouta					+		+		*4,531*	*1,666*	***1,624***	***1,006***	***2,300***	***1,595***
Bastard Trumpeter									+					
Black Bream	+				***6,375***	***5,597***			+				+	
Blue Warehou														
Cod					+		+		***3,930***	***3,466***	***1,305***	***846***	***1,589***	***999***
Eel	***2,264***	***1,650***	+		+									
Flathead					***9,143***	***6,896***	+		251,503	88,544	*54,221*	*16,998*	103,129	31,989
Flounder									***5,672***	***4,154***			+	
Garfish									+				+	
Gurnard							***1,164***	***1,096***	*41,750*	*16,365*	***1,982***	***1,560***	*12,621*	*4,840*
Jack Mackerel					+						+			
Jackass Morwong							+		+				***1,429***	***1,326***
Leatherjacket									***1,079***	***726***	+		+	
Mullet									***10,040***	***5,441***	***2,531***	***1,471***	***1,122***	***686***
Pike									***4,564***	***3,464***			***2,504***	***2,078***
Silver Trevally							+		***2,073***	***844***	+		+	
Striped Trumpeter							***2,009***	***1,229***	+				***1,646***	***1,037***
Tuna							+							

Appendix 13 Continued

	Western		Central		Eastern		West coast		North West Coast		Tamar		North East coast	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Whiting							***3,623***	***3,467***	***6,269***	***2,837***	+		+	
Wrasse									***10,895***	***5,016***	***1,765***	***1,060***	***5,943***	***3,391***
Scalefish, other	+				+		***2,359***	***1,279***	*4,467*	*1,420*	***2,777***	***1,134***	***4,307***	***2,204***
Sharks & rays							+		*9,342*	*2,862*	+		*4,730*	*1,498*
Rock Lobster							***2,148***	***1,419***	***3,540***	***1,803***			***9,123***	***5,633***
Crustaceans, other					***11,881***	***11,584***								
Southern Calamari							+		***3,945***	***1,782***	***1,324***	***1,122***	***3,144***	***2,239***
Gould's Squid							+		*11,776*	*4,544*	***1,454***	***850***	***5,289***	***2,699***
Cephalopod, other									+				+	
Abalone							***1,526***	***1,083***	***2,916***	***1,655***			***14,196***	***12,072***
Scallop														
Bivalve, other									+					

Appendix 13 continued

	East coast		Central East coast		South East coast		NFHB		Derwent Estuary		DEC	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Effort												
Fishers	10,759	1,644	14,191	1,761	14,678	2,186	15,311	2,243	6,961	1,395	14,505	2,031
Fisher days	49,828	9,741	39,521	5,955	34,942	5,905	43,597	12,189	15,324	5,011	58,055	12,605
Catch												
Trout	+										+	
Atlantic Salmon					+		***3,397***	***2,167***			+	
Redfin												
River Blackfish												
Australian Salmon	29,625	13,195	*8,041*	*2,675*	***3,842***	***2,319***	***4,344***	***2,281***	***11,839***	***7,770***	*13,094*	*4,374*
Barracouta	***2,004***	***1,010***	+		***1,135***	***679***	+				*2,485*	*990*
Bastard Trumpeter					+		***4,347***	***4,113***			***2,127***	***1,393***
Black Bream	***13,453***	***5,685***	+		+				***5,028***	***4,625***	+	
Blue Warehou	+										+	
Cod	***1,775***	***1,483***	***1,147***	***678***	***1,020***	***703***			***1,088***	***972***	***1,873***	***1,209***
Eel											+	
Flathead	97,649	34,033	254,797	43,695	196,489	54,419	422,492	168,483	*37,418*	*12,810*	253,658	71,850
Flounder	***1,706***	***1,318***					***2,569***	***1,641***	+		***2,144***	***1,165***
Garfish	+				***1,646***	***1,607***	+					
Gurnard	***13,127***	***8,321***	***11,807***	***5,117***	***13,878***	***7,746***	+		+		***1,863***	***998***
Jack Mackerel	***1,913***	***911***	***2,722***	***2,408***	+				+		+	
Jackass Morwong	***7,145***	***4,260***	***5,245***	***3,008***	***2,603***	***1,309***			+		+	
Leatherjacket	***5,005***	***2,250***	***6,522***	***5,030***	+		+				+	
Mullet	***1,111***	***567***			+		+		+		+	
Pike	***3,635***	***2,266***	+		+		+		+		***1,183***	***1,029***
Silver Trevally	*13,549*	*5,108*	+		+		+				***2,814***	***2,690***
Striped Trumpeter	+		***1,750***	***895***	+							
Tuna	***1,329***	***770***	+		***7,348***	***4,174***					+	

Appendix 13 continued

	East coast		Central East coast		South East coast		NFHB		Derwent Estuary		DEC	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Whiting	***18,161***	***8,965***	+		+		***1,020***	***531***	+		+	
Wrasse	***7,544***	***3,139***	*2,936*	*1,040*	*6,066*	*2,110*	+		***1,642***	***1,615***	***3,023***	***1,353***
Scalefish, other	*7,612*	*2,754*	***3,586***	***1,448***	***1,906***	***1,019***	+		***2,134***	***2,099***	*2,896*	*1,084*
Sharks & rays	*1,291*	*487*	*5,623*	*2,200*	***1,615***	***934***	***2,938***	***1,208***	+		+	
Rock Lobster	***3,226***	***1,540***	***4,067***	***1,739***	*7,147*	*2,149*	***10,986***	***6,378***	***2,572***	***1,744***	*16,013*	*5,658*
Crustaceans, other	***4,401***	***4,111***									+	
Southern Calamari	***5,890***	***2,838***	***7,810***	***5,846***	***10,382***	***5,425***	***1,722***	***1,126***	***3,330***	***2,669***	***8,596***	***3,785***
Gould's Squid	***7,961***	***3,762***	***4,955***	***2,599***	***9,619***	***3,995***	***4,530***	***4,385***	***3,426***	***3,290***	***4,780***	***2,008***
Cephalopod, other			+				+				+	
Abalone	+		***3,967***	***3,543***	***5,410***	***2,567***	***1,246***	***891***	+		***3,522***	***1,463***
Scallop			***129,670***	***65,627***								
Bivalve, other					***4,182***	***4,106***	***5,391***	***4,124***			***798,475***	***773,170***

Appendix 14. Annual recreational harvest (numbers) for key species by fishing region during 2017-18, based on Tasmanian residents aged five years or older.
SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	Western		Central		Eastern		West coast		North West coast		Tamar		North East coast	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	28,865	9,693	42,376	8,285	13,851	3,299	+							
Atlantic Salmon	+				***1,802***	***1,296***	+							
Redfin	***1,010***	***977***	***2,928***	***1,485***	+									
River Blackfish	+													
Australian Salmon							***5,340***	***3,097***	19,490	6,012	***3,390***	***2,225***	***6,125***	***2,055***
Barracouta					+		+		***2,002***	***979***	+		***1,846***	***1,555***
Bastard Trumpeter									+					
Black Bream	+				***4,461***	***4,147***			+				+	
Blue Warehou														
Cod							+		***3,894***	***3,466***	+		+	
Eel	***1,617***	***1,563***	+		+									
Flathead					***2,831***	***2,500***	+		116,124	37,850	*12,228*	*4,375*	63,765	20,473
Flounder									***5,672***	***4,154***			+	
Garfish									+				+	
Gurnard							***1,164***	***1,096***	***4,918***	***4,292***	+		+	
Jack Mackerel											+			
Jackass Morwong							+		+				***1,429***	***1,326***
Leatherjacket									+				+	
Mullet									***7,057***	***4,027***	***1,160***	***832***		
Pike									***4,564***	***3,464***			***2,221***	***2,057***
Silver Trevally							+		***1,841***	***828***	+		+	
Striped Trumpeter							***2,009***	***1,229***	+				***1,646***	***1,037***
Tuna							+							
Whiting							+		***4,630***	***2,223***	+		+	
Wrasse									***2,774***	***1,637***			+	
Scalefish, other							***1,170***	***793***	***2,010***	***843***	***1,389***	***915***	+	
Sharks & rays							+		*4,246*	*1,446*			*2,546*	*804*

Appendix 14 continued.

	Western		Central		Eastern		West coast		North West coast		Tamar		North East coast	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Rock Lobster							***2,091***	***1,385***	***2,965***	***1,661***			***8,263***	***5,491***
Crustaceans, other					***11,881***	***11,584***								
Southern Calamari							+		***3,082***	***1,513***	***1,324***	***1,122***	***2,383***	***1,549***
Gould's Squid							+		*11,128*	*4,434*	***1,454***	***850***	***3,557***	***1,502***
Cephalopod, other														
Abalone							***1,526***	***1,083***	***2,916***	***1,655***			***14,007***	***12,070***
Scallop														
Bivalve, other									+					

Appendix 14 continued.

	East coast		Central East coast		South East coast		NFHB		Derwent Estuary		DEC	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	+										+	
Atlantic Salmon					+		***3,397***	***2,167***			+	
Redfin												
River Blackfish												
Australian Salmon	19,134	9,646	*4,135*	*1,603*	***3,445***	***2,137***	***3,165***	***1,523***	***5,974***	***4,258***	*10,410*	*3,566*
Barracouta	+				+		+				+	
Bastard Trumpeter					+		+				***1,784***	***1,153***
Black Bream	***2,954***	***1,223***	+		+						+	
Blue Warehou	+										+	
Cod	***1,637***	***1,348***	+		+						+	
Eel											+	
Flathead	55,814	20,365	135,988	23,803	91,586	24,822	179,538	78,506	*7,319*	*2,469*	67,977	16,791
Flounder	+						***2,569***	***1,641***	+		***2,105***	***1,164***
Garfish	+				+		+					
Gurnard	***5,098***	***3,257***	***2,813***	***1,963***	***5,083***	***3,294***	+				***1,345***	***783***
Jack Mackerel	***1,913***	***911***	***1,160***	***968***	+				+		+	
Jackass Morwong	***6,716***	***4,172***	***1,923***	***1,085***	***2,603***	***1,309***			+		+	
Leatherjacket	***1,694***	***710***	***4,289***	***3,443***	+		+				+	
Mullet	+				+		+		+		+	
Pike	+		+		+				+		***1,104***	***1,026***
Silver Trevally	***4,883***	***2,102***	+		+		+				***2,814***	***2,690***
Striped Trumpeter	+		***1,634***	***852***	+							
Tuna	+		+		***6,321***	***3,610***					+	
Whiting	***11,154***	***5,670***	+		+		+		+		+	
Wrasse	***1,241***	***610***	+		***2,207***	***1,343***	+				+	
Scalefish, other	*2,724*	*1,047*	***1,675***	***621***	***1,227***	***833***	+		***2,134***	***2,099***	***1,639***	***808***
Sharks & rays	+		+		+		+		+		+	

Appendix 14 continued.

	East coast		Central East coast		South East coast		NFHB		Derwent Estuary		DEC	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Rock Lobster	***2,436***	***1,179***	***3,458***	***1,564***	*5,667*	*1,897*	***4,414***	***2,264***	***1,916***	***1,175***	*11,642*	*4,546*
Crustaceans, other	***4,121***	***4,102***									+	
Southern Calamari	***4,721***	***2,169***	***5,390***	***3,717***	***10,357***	***5,421***	***1,722***	***1,126***	***3,330***	***2,669***	***8,596***	***3,785***
Gould's Squid	***6,395***	***3,258***	***3,057***	***1,474***	***9,536***	***3,992***	***4,152***	***4,020***	***3,020***	***2,924***	***4,780***	***2,008***
Cephalopod, other							+				+	
Abalone	+		***3,967***	***3,543***	***5,410***	***2,567***	***1,045***	***732***	+		***3,489***	***1,458***
Scallop			***129,670***	***65,627***								
Bivalve, other					***4,182***	***4,106***	***5,391***	***4,124***			***796,500***	***773,178***

Appendix 15 Estimated number of persons and proportion of the Tasmanian resident population aged five years or older who fished recreationally in the 12 months prior to May 2000, prior to November 2007, prior to October 2012 and prior to October 2017.

SE is standard error, RSE is relative standard error.* Statistical regions were based on the Australian Standard Geographical Classification (ASGC) for 2000 and 2007 surveys; in 2012 the Australian Statistical Geography Standard (ASGS) was applied for regional demographic reporting.

	Population	Recreational fishers			Participation rate	
Statistical regions*	**Number**	**Number**	**SE**	**RSE**	**(%)**	**SE**
2000						
Greater Hobart	176,120	49,448	2,280	4.6	28.1	1.3
Southern	31,617	12,307	626	5.1	38.9	2.0
Northern	119,985	35,629	2,129	6.0	29.7	1.8
Mersey-Lyell	98,071	27,635	1,607	5.8	28.2	1.6
Total	**425,793**	**125,018**	**3,565**	**2.9**	**29.4**	**0.8**
2007						
Greater Hobart	190,122	51,071	2,430	4.8	26.9	1.3
Southern	33,514	11,012	815	7.4	32.9	2.4
Northern	128,871	32,239	1,664	5.2	25.0	1.3
Mersey-Lyell	101,436	24,078	1,405	5.8	23.7	1.4
Total	**453,943**	**118,399**	**3,363**	**2.8**	**26.1**	**0.7**
2012						
Hobart	191,152	41,906	2,545	6.1	21.9	1.3
South East	33,611	9,070	784	8.6	27.0	2.3
Launceston & North East	126,824	25,971	1,739	6.7	20.5	1.4
West & North West	100,951	20,836	1,450	7.0	20.6	1.4
Total	**452,538**	**97,784**	**3,496**	**3.6**	**21.6**	**0.8**
2017						
Hobart	194,368	42,603	2,819	6.6	21.9	1.5
South East	32,519	10,145	761	7.5	31.2	2.3
Launceston & North East	122,616	29,178	1,964	6.7	23.8	1.6
West & North West	96,118	24,266	1,784	7.4	25.2	1.9
Total	**445,621**	**106,192**	**3,945**	**3.7**	**23.8**	**0.9**

Appendix 16. Annual recreational effort (number of fishers) by fishing region by survey, based on Tasmanian residents aged five years or older.

SE is standard error.

	2000-01		2007-08		2012-13		2017-18	
Fishing region	**Fishers**	**SE**	**Fishers**	**SE**	**Fishers**	**SE**	**Fishers**	**SE**
Western	13,989	1,718	13,570	1,536	7,342	928	9,195	1,421
Central	13,089	1,672	15,484	1,508	12,010	1,323	11,867	1,730
Eastern	19,609	2,130	13,275	1,305	11,937	1,577	11,571	1,708
West coast	3,959	897	5,905	1,023	4,700	829	*2,689*	*638*
North West coast	21,724	2,149	18,939	1,616	15,151	1,585	17,242	2,175
Tamar	14,523	2,010	14,329	1,608	8,422	1,370	9,853	1,857
North East coast	12,884	1,940	13,595	1,433	8,651	1,148	9,208	1,404
East coast	13,345	1,789	14,885	1,693	10,624	1,579	10,759	1,644
Central East coast	21,395	2,483	20,138	1,933	16,521	1,745	14,191	1,761
South East coast	13,747	1,737	19,061	1,787	13,391	1,616	14,678	2,186
NFHB	18,153	2,001	19,838	2,013	16,037	1,850	15,311	2,243
Derwent	19,787	2,282	11,000	1,545	9,557	1,397	6,961	1,395
DEC	22,883	2,216	31,093	2,489	18,611	2,124	14,505	2,031

Appendix 17. Annual recreational effort (fisher days) by fishing region by survey, based on Tasmanian residents aged five years or older.

SE is standard error.

	2000-01		2007-08		2012-13		2017-18	
Fishing region	**Fisher days**	**SE**	**Fisher days**	**SE**	**Fisher days**	**SE**	**Fisher days**	**SE**
Western	40,416	6,815	40,436	5,456	25,850	3,967	38,878	8,449
Central	64,532	8,704	74,771	9,206	49,122	6,303	52,019	8,882
Eastern	75,534	11,959	34,627	4,004	35,484	5,317	33,472	5,817
West coast	30,820	15,643	17,281	4,438	15,355	3,910	*4,417*	*1,044*
North West coast	94,990	14,469	65,719	7,551	55,071	7,243	53,349	10,009
Tamar	45,301	8,172	36,562	5,263	23,662	5,514	16,640	3,392
North East coast	44,755	13,024	35,471	5,279	20,866	3,125	36,265	7,748
East coast	59,499	12,890	52,525	7,296	51,568	9,744	49,828	9,741
Central East coast	72,665	12,067	63,165	7,950	58,110	7,286	39,521	5,955
South East coast	54,069	10,959	59,590	8,074	49,898	8,192	34,942	5,905
NFHB	42,993	6,546	50,552	6,924	35,951	5,981	43,597	12,189
Derwent	54,361	10,168	23,611	3,908	31,289	6,979	15,324	5,011
DEC	73,815	8,556	91,867	10,256	58,455	8,103	58,055	12,605

Appendix 18. Annual recreational catch (total numbers kept plus released) for key species by survey year, based on Tasmanian residents aged five years or older.

SE is standard error; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	2000-01		2007-08		2012-13		2017-18	
Species	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	223,715	34,554	261,935	35,827	174,752	27,119	206,213	42,912
Atlantic Salmon	15,181	4,580	10,298	2,798	11,135	3,493	*10,183*	*4,073*
Redfin	***19,375***	***9,536***	15,788	4,549	***3,180***	***1,478***	*5,836*	*1,946*
River Blackfish	*8,485*	*2,381*	*8,076*	*3,101*	***1,495***	***1,036***	+	
Australian Salmon	405,685	108,123	188,227	21,280	229,700	39,013	129,479	22,284
Barracouta	29,560	6,699	19,608	4,231	80,254	19,177	15,086	3,102
Black Bream	57,622	18,650	**48,070**	**20,148**	59,628	12,212	27,137	10,455
Blue Warehou	*17,192*	*5,611*	*8,814*	*3,330*	*10,783*	*4,120*	+	
Cod	100,363	25,344	31,866	5,156	25,929	7,671	14,849	4,445
Eel	9,144	2,163	5,188	1,189	*1,221*	*385*	***3,525***	***1,777***
Flathead	1,905,232	207,900	1,811,233	138,077	1,611,290	132,822	1,681,299	251,980
Flounder	53,908	15,138	33,924	11,547	*24,812*	*7,635*	*13,201*	*5,239*
Garfish	*18,176*	*5,248*	*16,353*	*6,065*	***17,285***	***9,127***	***3,770***	***1,978***
Gurnard	96,876	27,631	80,228	12,290	73,431	14,762	99,189	21,870
Jack Mackerel	24,102	6,543	***6,944***	***2,971***	***30,907***	***26,025***	***6,536***	***2,689***
Jackass Morwong	31,581	10,146	18,964	4,096	26,024	5,919	***13,000***	***6,013***
Leatherjacket	41,993	13,399	19,046	4,659	10,179	2,575	14,554	5,604
Mullet	144,612	43,082	37,856	5,641	45,143	15,988	16,073	5,806
Pike	11,389	3,688	*3,792*	*1,021*	5,705	1,435	*13,112*	*5,156*
Silver Trevally	42,347	12,912	21,288	4,350	10,654	3,464	20,408	6,183
Trumpeter	48,095	13,862	19,867	4,326	11,854	4,814	**12,436**	**7,218**
Tuna	*8,141*	*2,866*	45,538	11,405	*17,068*	*4,705*	***9,217***	***4,308***
Whiting	13,379	3,905	30,565	9,777	15,752	6,202	31,550	10,186
Wrasse	77,172	14,745	45,043	6,612	54,698	10,957	40,081	8,249
Scalefish, other	65,916	19,720	29,509	4,518	30,384	7,468	32,857	5,742
Sharks & rays	47,067	10,444	40,899	5,999	38,641	5,033	27,269	4,311
Rock Lobster	147,157	25,873	135,284	17,835	80,035	13,352	58,823	12,752
Crustaceans, other	18,377	6,874	*13,684*	*4,207*	***12,457***	***8,918***	***16,637***	***12,320***
Southern Calamari	30,997	9,107	44,889	9,052	63,405	10,934	46,735	11,561
Gould's Squid	10,158	3,163	82,269	11,517	45,980	9,634	54,177	11,826
Cephalopod, other	***6,264***	***2,624***	*5,605*	*1,843*	3,773	1,084	+	
Abalone	109,559	32,023	78,505	16,271	41,551	9,109	***34,498***	***13,809***
Scallop	0		401,864	93,617	***13,142***	***8,500***	***129,670***	***65,627***
Bivalve, other	***128,191***	***52,937***	***73,270***	***31,435***	***27,638***	***11,913***	***808,479***	***773,087***

Appendix 19. Annual recreational harvest (total numbers kept) for key species by survey year, based on Tasmanian residents aged five years or older.

SE is standard error; + indicates value <1000; values in bold indicate relative standard error >40%, values in italics indicate that fewer than 30 households recorded catches of the species/species group.

	2000-01		2007-08		2012-13		2017-18	
Species	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	161,575	25,671	157,284	22,910	105,630	15,850	85,921	13,946
Atlantic Salmon	14,402	4,542	8,399	2,070	11,084	3,485	*7,835*	*2,818*
Redfin	***10,543***	***8,486***	9,890	3,109	***2,680***	***1,437***	***4,313***	***1,801***
River Blackfish	*6,149*	*1,882*	***5,618***	***2,343***	+		+	
Australian Salmon	300,456	103,878	110,312	14,373	144,712	23,928	80,608	14,315
Barracouta	24,320	6,314	11,577	3,691	32,954	8,381	6,902	2,180
Black Bream	34,336	13,149	13,134	3,404	19,153	4,582	**9,135**	**4,445**
Blue Warehou	*16,359*	*5,297*	*8,723*	*3,326*	*10,757*	*4,112*	+	
Cod	65,115	22,806	14,263	2,990	10,464	4,064	**8,801**	**3,913**
Eel	6,601	1,845	2,601	843	+		***2,304***	***1,607***
Flathead	1,236,675	161,591	1,066,293	83,612	924,932	82,200	733,489	115,525
Flounder	50,582	14,851	32,436	11,471	*23,238*	*7,454*	***12,272***	***5,103***
Garfish	*15,669*	*4,835*	*14,568*	*5,573*	***15,260***	***7,793***	***2,605***	***1,365***
Gurnard	**32,182**	**13,123**	13,186	3,313	17,367	5,011	21,409	6,905
Jack Mackerel	15,770	3,953	***5,216***	***2,847***	***28,798***	***24,950***	*4,862*	*1,563*
Jackass Morwong	27,041	9,580	9,979	2,222	23,732	5,657	***12,387***	***5,744***
Leatherjacket	18,706	6,233	7,619	2,674	5,389	1,791	**7,493**	**3,599**
Mullet	111,025	40,746	24,152	4,672	26,295	9,726	**9,441**	**4,210**
Pike	10,109	3,625	*1,626*	*582*	3,895	1,213	***9,404***	***4,615***
Silver Trevally	16,812	3,987	10,636	2,411	4,826	1,663	11,091	3,571
Trumpeter	42,580	11,759	17,321	3,823	11,049	4,548	9,811	3,665
Tuna	*7,964*	*2,832*	26,805	5,891	*13,209*	*3,890*	***7,531***	***3,703***
Whiting	7,480	2,498	**14,992**	**6,004**	9,412	3,712	18,834	6,255
Wrasse	23,083	5,405	11,640	2,530	7,223	1,631	8,125	2,340
Scalefish, other	27,037	12,677	13,760	3,090	18,408	5,640	15,167	3,666
Sharks & rays	10,245	5,241	8,993	1,779	9,299	1,603	8,888	1,775
Rock Lobster	78,563	13,867	71,965	9,471	44,517	7,097	42,851	10,152
Crustaceans, other	**12,474**	**6,509**	***5,956***	***3,053***	***10,742***	***8,891***	***16,041***	***12,313***
Southern Calamari	29,473	8,684	40,525	8,271	57,728	9,954	41,498	9,515
Gould's Squid	9,903	3,156	73,236	10,697	42,853	9,361	47,467	10,279
Cephalopod, other	+		***1,149***	***489***	**1,443**	**649**	+	
Abalone	108,059	31,935	64,421	14,219	38,541	8,731	***34,075***	***13,797***
Scallop	-		396,685	92,996	***12,778***	***8,271***	***129,670***	***65,627***
Bivalve, other	***126,511***	***52,521***	***73,079***	***31,428***	***27,638***	***11,913***	***806,505***	***773,096***