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2012-13 SURVEY OF RECREATIONAL FISHING IN TASMANIA

J.M. Lyle, K.E. Stark & S.R. Tracey

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fishwise

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TRANSLATINGNATUREINTOKNOWLEDGE

Institute for Marine and Antarctic Studies, University of Tasmania, Private Bag 49, Hobart TAS 7001

Enquires should be directed to:
Dr Jeremy Lyle
Institute for Marine and Antarctic Studies
University of Tasmania
Private Bag 49, Hobart, Tasmania 7001, Australia
Jeremy.Lyle@utas.edu.au
Ph. (03) 6227 7277
Fax (03) 6227 8035

Executive summary

This study represents the third 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 as a consequence 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 survey.

General

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 general population telephone survey involving 3290 Tasmanian households. This was followed by a telephone-diary survey involving 780 households (2095 persons) for which fishing activity was monitored over a 12 month period. Response rates across all facets of the study were exceptionally high, giving considerable confidence in the data quality.

Fishing participation

In the 12 months prior to October 2012 almost 98,000 Tasmanian residents aged 5 years or older fished at least once in Tasmania, representing an overall participation rate of 22%, or just under one in four Tasmanians. By residence (Australian Bureau of Statistics regions), South East residents had the highest participation rate of 27%, which compared with 21-22% for other Tasmanian regions. Recreational fishing was more popular among males, with a state-wide participation rate of 29%, compared with about 14% for females. Participation rates varied with age, 5-14 year olds having the highest rate of participation (32%) 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 around 23%, declining sharply in the 60 years plus age group to around 12%.

Catch and effort

Recreational fishing activity of responding diarists was monitored in detail between November 2012 and October 2013 and results expanded to represent the Tasmanian population. Almost 92,000 Tasmanians were estimated to have fished in Tasmania during this period, a slight but not statistically significant decline in the number of fishers compared to the previous 12 months. During 2012-13 recreational fishers accounted for about 507,000 person days of effort, with an average of 5.5 days per fisher. At the individual level, the majority fished for relatively few days (< 5 days) whereas a small proportion of particularly keen or avid fishers contributed disproportionately to the total effort (and catch). For instance, just 20% of fishers accounted for over half (55%) of the total fishing effort.

During 2012-13 the vast majority (91%) of recreational fishers fished at least once in saltwater while slightly more than one in four (27%) fished at least once in freshwater. Overall, saltwater fishing represented 79% of the total effort (fisher days) while fishing in freshwater accounted for the remaining 21%. Freshwater fishing in lakes and dams accounted for about three times the effort in rivers while the majority of the saltwater fishing occurred in inshore coastal waters, with estuarine fishing of secondary importance. Offshore fishing (>5 km off the coast) was a comparatively minor component of the fishery.

Line fishing was the dominant activity undertaken, representing 450,000 fisher days (87% of total) or 1.5 million hours of effort. This was followed by pot fishing (9%), dive harvesting (3%) and the use of gillnets (3%). 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 during 2012-13, with an estimated 1.48 million finfish (excluding small baitfish) retained and 1.14 million finfish released or discarded. Flathead (predominantly Southern Sand Flathead) represented 61% of the total finfish catch by number, with an estimated 925,000 kept and 686,000 released. Other finfish species or species groups of significance included Australian Salmon (144,700 kept and 85,000 released), Trout (105,600 kept and 105,000 released), Gurnards (17,000 kept and 56,000 released), Black Bream (19,000 kept and 40,000 released), and Wrasse (7,000 kept and 47,000 released).

Overall, 44% of all finfish captured were released or discarded; with low rates of release (<10%) for species such as Blue Warehou, Atlantic Salmon, Striped Trumpeter, Bastard Trumpeter, Jackass Morwong and Flounder; intermediate rates (10-30%) for Garfish, Redfin and Tunas; moderate rates (31-50%) for Flathead, Trout, Australian Salmon, Mullet, Pike, Leatherjacket and Whiting; and high rates (>50%) for Silver Trevally, Black Bream, Barracouta, River Blackfish, eels, Wrasse, Gurnard, sharks and rays, and Cod. Reasons for release were varied, with size (under legal size or "too small") being an important factor for species such as Flathead, Whiting, Australian Salmon, Silver Trevally and Mullet; poor eating qualities were identified as important factors for release for Cod, Wrasse, Leatherjacket and Gurnard; while catch and release (sport) fishing was important for Black Bream and Trout. Sharks, skates and rays tended to be released or discarded because of poor eating qualities (e.g. Spurdog, Draughtboard Shark, skates and rays) 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 (58,000 kept) and Gould's Squid (43,000 kept), were taken along with Rock Lobster (45,000 kept), Abalone (39,000 kept) and scallops (13,000 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 Flathead was estimated at 236 tonnes, almost six times greater than the commercial Flathead catch taken from state fishing waters. By weight, other species of importance included Australian Salmon (64 tonnes), Southern Calamari (64 tonnes), Barracouta (31 tonnes) and Gould's Squid (21

tonnes). As a contributor to total harvest for key species from Tasmanian waters, the share taken by the recreational sector during 2012-13 was similar to or larger than that taken by the Tasmanian commercial scalefish fishery for Blue Warehou, Flathead, Flounder, Mullet, Cod, Barracouta, Jackass Morwong, Jack Mackerel, Striped Trumpeter, and Southern Calamari. Conversely, the recreational harvest represented a relatively minor component (<20%) of the total catch for species such as Australian Salmon, Whiting, Garfish, Wrasse, Banded Morwong and Gould's Squid.

Catch and effort data for the key species were 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 (South East Coast, Norfolk-Frederick Henry Bay, Derwent Estuary and D'Entrecasteaux Channel) represent a particularly significant area for catches of Flathead, Australian Salmon, Flounder, Black Bream, Tuna, Gould's Squid, Southern Calamari, Rock Lobster and Abalone. These species, with the exception of Flounder, were also important components of the fishery off eastern Tasmania (Central East and East Coast regions). Species of particular significance off northern Tasmania (North East Coast, Tamar and North West Coast regions) included Australian Salmon, Flathead, Mullet, Flounder, Southern Calamari and Abalone, while Rock Lobster, Australian Salmon and Atlantic Salmon were key species on the West Coast. The inland trout fishery was focused in the Central Plateau lakes, especially Arthurs and Great Lake, with catches from rivers of secondary importance.

Expenditure

Recreational fishers were estimated to have spent about $93 million on goods and services relevant to fishing in Tasmania during 2012-13, equivalent to just over $1000 per fisher. In addition to direct expenditure, there is a significant investment in boats, with around 28,000 boats used for fishing in 2012-13, valued at about $439 million.

Fisher motivations, attitudes and awareness

For the majority of Tasmanian recreational fishers, non-catch motives relating to relaxation, socialising and the environment were more important than catching and consuming fish. Consistent with this observation, and in the context of the degree to which fishers value catch related aspects of the fishing experience, there was strong agreement that fishing could be satisfying regardless of whether any fish were caught. That is not to imply that catch related aspects (including consumption) are unimportant, especially since the prospect of catching something is at the core of the activity itself.

Most fishers indicated general satisfaction with the overall quality of their fishing experiences and with the management of the fishery. Regionally, however, fisheries in the D'Entrecasteaux Channel, Great Oyster Bay and Norfolk-Frederick Henry Bay areas were rated as the poorest performing of the marine fisheries while Arthurs Lake was identified as the poorest of the main freshwater fisheries. Fisheries that were identified as having improved over recent years included Georges Bay and Ansons Bay on the east coast and the freshwater fishery in Penstock Lagoon.

In obtaining information about fishing regulations, other fishers/friends emerged as the most commonly cited source of information, followed by government publications,

newspapers and government websites. Apart from recently released smart phone applications, there was a high level of awareness of many of the key information products produced by the relevant government agencies. Overall there was greater level of awareness amongst recreational fishers of many of the traditional information products, including the Fishcare program, than evident in previous surveys.

Opinions on the future management of Flathead and recreational gillnet usage were canvassed. There was strong support amongst recreational fishers for an increase in the minimum size limit for Flathead, the majority also agreeing that the current possession limit of 30 fish per person was too high and that a limit of 20 or less would be reasonable. Opinions on the use of recreational gillnets were more or less evenly divided between those in favour and those against their continued use. Despite the level of opposition to the recreational use of gillnets having risen over the past decade or so, in the current survey less than half of the respondents (43%) indicated opposition.

Fishery since 2000

Since 2000 there have been some notable changes in the 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 98,000 in 2012, a reduction in participation rate from 29% in 2000 to 22% in 2012. Some 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 Tasmanians aged 60 years or older has increased from about 78,000 in 2000 to about 112,000 in 2012, an increase from 18.3 to 24.7% of the population. Significantly, participation rates in this age group are substantially lower (about half) than for the younger age groups. Coupled with this, has also 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 fall in fishing effort; total fisher days have dropped from 0.75 million in 2000-01 to 0.51 million in 2012-13. Effort levels have fallen for both freshwater and saltwater fishing, the decline being more marked for shore-based rather than boat-based fishing activity. Regionally, there has been a steady decline in effort off northern Tasmania, whereas off eastern and south eastern Tasmania, apart from the Derwent and D'Entrecasteaux Channel regions, the magnitude of change has been relatively small.

The overall catch of finfish (numbers kept plus released) in 2012-13 was slightly lower (91%) than that estimated for 2007-08 and about 74% of that for 2000-01. While the catch composition and relative importance of the key species has been reasonably 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. Possibly the most conspicuous development in the recreational fishery over the past decade or so has been the growth in fishery for Southern Calamari, with catches doubling since 2000-01. Much of this growth has been around increased awareness of the species and its eating qualities. Other species for which catches have increased since 2000-01 include Gould's Squid, Barracouta and Tuna; for these species increased catches appear to be linked mainly to their greater availability in Tasmanian waters.

Species for which catches have remained relatively stable over time include Black Bream, Whiting and Garfish, although there has been a marked shift to a greater proportion of catch and release fishing for Black Bream. Species exhibiting substantially lower catches in 2012-13 relative to the earlier years include Australian Salmon, Cod, Trumpeters, Blue Warehou, Leatherjacket, Mullet, Rock Lobster and Abalone. Although the current survey does not represent catches of the latter two species as well as targeted surveys (i.e. biennial surveys of rock lobster and abalone licence holders), the general trend reported here is consistent that reported in the targeted surveys.

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

In the absence of plans to repeat a national survey, the Tasmania government committed to undertake regular statewide surveys of the recreational fishery, the first of which was undertaken in 2007-08 (Lyle *et al*., 2009). That survey used essentially the same methodology developed for the national survey, enabling valid comparisons to be made with information collected in 2000-01. Key findings from the 2007-08 survey included a slight 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, with more than one in four persons fishing at least once a year during 2007. The 2007-08 survey revealed some changes in catch levels for key species compared with 2000-01, with increased catches of trout, tuna and squid and a significant decline in the catch of Australian Salmon. Overall Southern Sand Flathead remained the dominant marine species and Brown Trout the dominant freshwater species caught by recreational fishers.

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 accuracy and 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 several surveys of the rock lobster and abalone fisheries (Forward and Lyle, 2002; Lyle *et al*., 2005; Lyle and Morton, 2004, 2006; Lyle, 2008; Lyle and Tracey, 2010, 2012a, 2014), gillnet fishery (Lyle and Tracey, 2012b), set-line fishery (Lyle and Tracey, 2012c), scallop fishery (Tracey *et al*., 2008), 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 third 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 approach. 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, 2008). 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 survey, 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 period of time. 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.

The screening survey was administered as a structured interview by telephone on a random sample of Tasmanian households. The white pages directory provided the sample frame, with obvious business numbers, non-private dwellings and multiple listings removed. For each telephone number the suburb was also noted enabling the selection to be assigned 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 SA, lower but equal sampling rates were applied for the Launceston and North East and West and North West SAs and the lowest rate was applied for the Hobart SA. 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]. In addition to landline numbers, 9% of selected listings included mobile numbers.

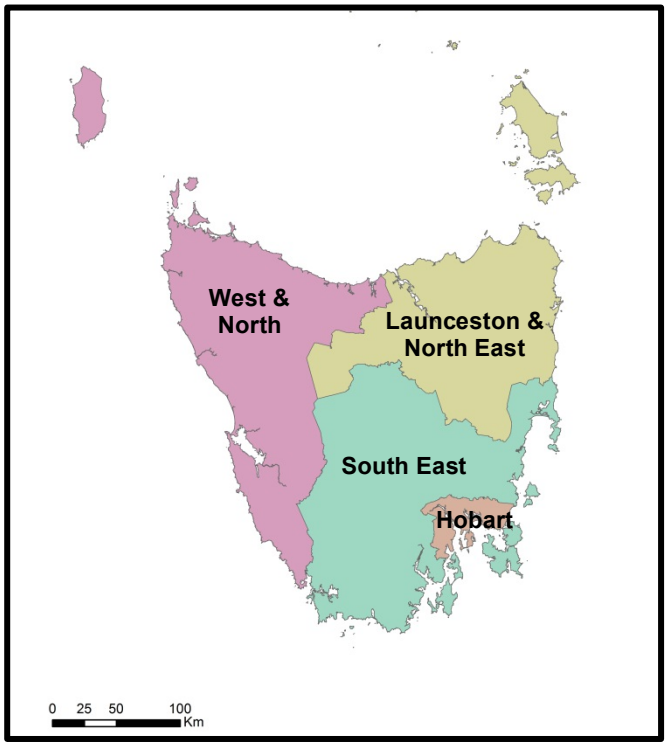


Fig. 1. Map of Tasmania showing ABS Statistical Areas (colour coded) used for sample stratification.

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

The screening survey was conducted during September and October 2012. In order to minimise non-contacts, at least 10 calls were made to each live telephone number. Disconnected numbers, business and facsimile numbers were treated as sample loss and not replaced.

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 accurate measure of prior fishing activity, with fishers 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 second (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 November 2012 and October 2013, 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 on the basis of recall, if at all.

By contrast, the telephone-diary approach, a form of panel survey, 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 a 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 were 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 2013). Whether, in fact, any 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. telephone number re-allocated) 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 as a telephone interview and conducted during November and December 2013.

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 boat ownership and 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 as a validation tool 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 250 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.

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

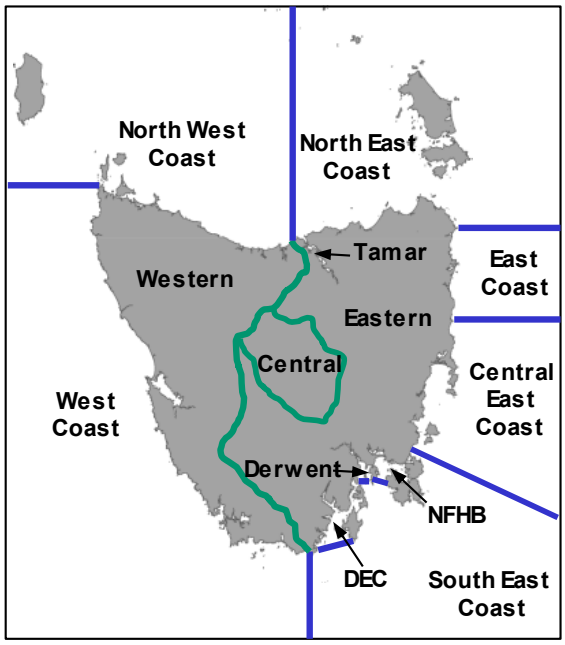


Fig. 2 Map of Tasmania showing analysis regions used for reporting fishing activities. Fishing regions - NFHB Norfolk and Frederick Henry bays; DEC D'Entrecasteaux Channel.

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 to be separate events since the potting effort and any the 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) on the basis of 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 mullet nets); dive collection (includes underwater spearfishing and hand collection on snorkel, scuba or hookah), and other methods (including use of set-lines, surface hand 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 overall there was a minimum of 175 events in each method reporting 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 particular 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. Flathead, Trout, 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 or 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 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 entire 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 or not household members had fished in the previous 12 months. Calibration against ABS estimated resident population (ERP) data for Tasmania as at July 2012 (Catalogue No. 3235.0) and adjusted for the proportion of people in occupied private dwellings (PD) using 2011 Census data (Catalogue No. 2001.0), was implemented taking account of household size and demographics. 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 actually fished during the diary period and these in effect represented unexpected 'drop-outs' from the fishery. In order to take into account 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

As a consequence of surveying a sub-sample rather than the entire population of fishers, all parameter estimates have some statistical uncertainty; that is, 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 2012-13 – 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)

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 2012 (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 net sample was reduced from a gross sample of 4532 to 4035, of which 3290 households (81.5%) fully responded to the screening survey. Response rates were relatively consistent across all sampling strata. Overall, demographic profiling information was collected from 7418 persons aged five years or older.

Non-response was due to refusals (9.8% overall), non-contacts (8.4%) and other non-response (0.3%), such as language or communication difficulties. The refusal group was more or less equally split between partial refusals (where at least the substantive question relating to previous household fishing was answered) and full refusals where no information was provided.

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	85,510	1670	1449	1162	155	129	3	80.2
South East	15,009	536	482	395	40	46	1	82.0
Launceston & North East	57,087	1329	1188	969	113	103	3	81.6
West & North West	45,569	997	916	764	87	61	4	83.4
Total	203,175	4532	4035	3290	395	339	11	81.5

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 (November 2012 to October 2013), almost 80% fully responded to the diary survey. In total, 780 Tasmanian households, representing 2095 persons aged five years and older, completed the diary survey, with response rates consistent across all strata. Fully responding diarists reported a total of 8005 fishing events.

Based on those households which initially agreed to take part in the diary survey (840), the effective diary completion rate was 93.0%. Similar diary completion rates were achieved for the previous two state-wide fishing surveys (Lyle, 2005; Lyle *et al*., 2009).

Table 2. Diary survey response profile by stratum

Statistical area Level 4	Eligible households	Completed diary	% response
Hobart	332	266	80.1
South East	144	114	79.2
Launceston & North East	278	228	82.0
West & North West	226	172	76.1
Total	980	780	79.6

By comparison with other general population surveys and traditional mail-back diary studies, the response rates achieved in all components of this study are exceptionally 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 two-thirds of the 2310 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 taken into account, an overall response rate of about 86% was achieved for this segment of the study, again with consistently high response rates between strata. Within the response group, 11 (< 1%) were established to represent different households to those at the time of screening and thus excluded, and 60 (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	% response
Hobart	552	511	442	48	21	86.5
South East	166	154	135	13	7	87.7
Launceston & North East	462	413	357	40	17	86.4
West & North West	358	323	269	44	10	83.3
Total	1,538	1,402	1,203	145	55	85.8

3.4 Wash-up survey

Out of the 780 diarist households, 718 (92%) completed the wash-up survey, 12 (1.5%) only included fishers under 18 years of age, 21 (2.7%) were non-contacts and 30 (3.8%) 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 surve established that an estimated 97,784 (SE 3496) Tasmanian residents aged five years or older fished in Tasmania at least once in the 12 months prior to October 2012, representing a participation rate (proportion of resident population) of 21.6% (SE 0.8%) (Appendix 2). Inclusion of Tasmanians who only fished in other states of Australia during that period brought the total number of recreational fishers to 99,192 (SE 3524) or 21.9% (SE 0.8%) of the resident population. Unless stated otherwise, subsequent analyses exclude those residents who fished exclusively outside of Tasmania.

About 43% of fishers resided in the Hobart, 27% in the Launceston and North East, 21% in the West and North West and 9% in the South East statistical areas (Fig. 3A). The effective regional participation rates were relatively consistent at 20.5 - 21.9% in each of the regions other than the South East where 27.0% of the population engaged in some form of recreational fishing (Fig. 3B).

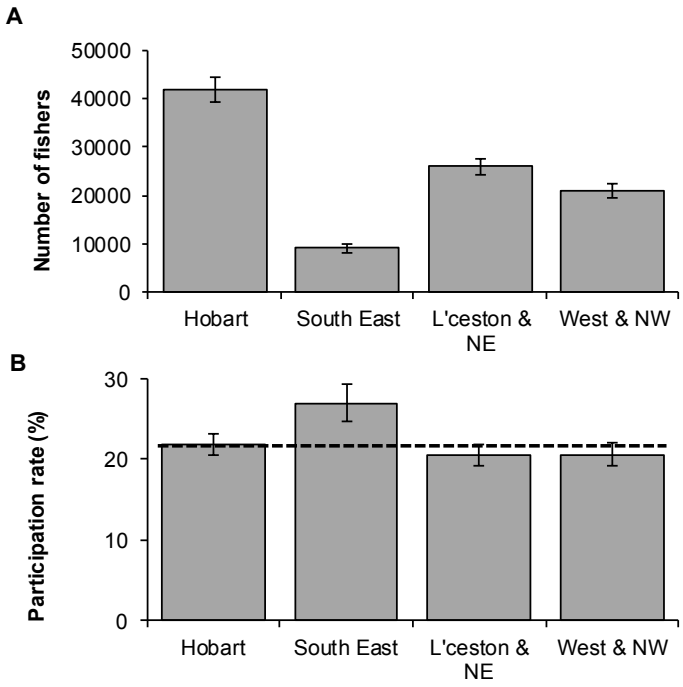


Fig. 3. Recreational fishing participation in Tasmania during the 12 months prior to October 2012 by region of residence for persons aged five years or older: A) Number of persons; and B) proportion of the resident population. Error bars represent one standard error and the dotted line represents the overall participation rate.

4.2 Age and gender

Recreational fishing was more popular among males, with 29.2% (SE 1.0%) of males and 14.1% (SE 0.7%) of females aged five years or older having fished in Tasmania during the 12 months prior to October 2012 (Appendix 3). By numbers, over twice as many males (65,781; SE 2281) than females (32,003; SE 1794) did some form of recreational fishing.

The predominance of males involved in fishing, by number and proportion of population, was evident across all age groups (Fig. 4) and by region of residence (Appendix 3). 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 3). Participation rates, in contrast, were highest for the youngest age group and then relatively stable for the intermediate age groups before falling sharply in the oldest age group, to just 12.2% amongst persons aged 60 years plus (20.5% of males and 4.0% of females) (Fig 4B, Appendix 3). That is even though the greatest number of fishers were in the 45-59 years age group - 23,927 persons (16,112 males and 7815 females) - the highest participation rate occurred in the 5-14 years age group - 31.5% overall (34.1% for males and 28.7% for females).

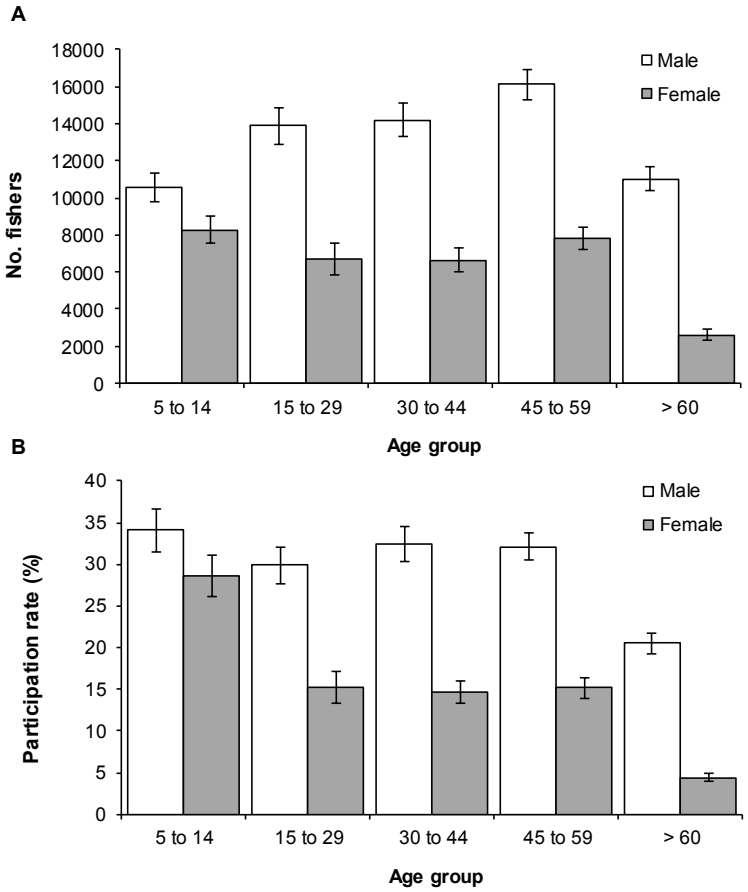


Fig. 4. Fishing participation in the 12 months prior to October 2012 by age group and gender by Tasmanian residents aged five years or older: A) number of persons; and B) proportion (%) of the resident population.

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 on the basis of 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 resident private dwelling population of Tasmania aged five years or older.

Based on reported activity by diarists, with appropriate non-response and drop-in adjustments, it was estimated that 91,874 (SE 3835) Tasmanians fished at least once between November 2012 and October 2013 (Table 4). This represents a slight, but not statistically significant decrease (6%) over the number of persons who fished in the 12 months prior to this period (as determined by the screening survey).

In terms of effort, Tasmanian residents accounted for 506,802 (SE 27,787) fisher days of effort during the 12 month diary period. Overall 26.8% of fishers fished at least once in freshwater while 90.6% fished at least once in saltwater, with 21.4% of the effort (fisher days) involving freshwater fishing and 78.6% 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 2012-13.
SE is standard error

	Freshwater		Saltwater		Total	
Effort	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Persons	24,654	2079	83,214	3746	91,874	3835
Fisher days	108,720	10,528	398,360	24,704	506,802	27,787

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 general observation, just under 70% of all fishers (some 64,000 persons) were estimated to have fished five or fewer days during the 12-month survey period whereas almost 4% (about 3,400 persons)

fished more than 20 days (Fig. 5). The average number of days fished per person was 5.5 days for the survey period.

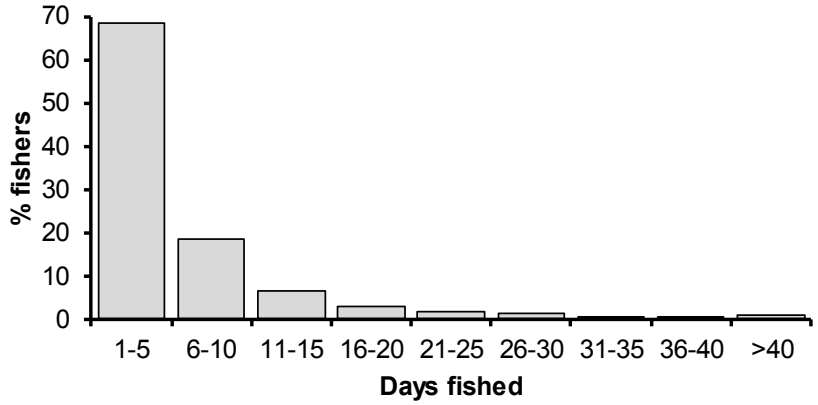


Fig. 5. Distribution of fishing effort by annual days fished for Tasmanian residents aged five years or older fishing in Tasmania during 2012-13.

The impact of individuals on total fishing effort was examined by ranking fishers based on their total fishing effort (days fished) for the year and then calculating the effect of progressively adding a fisher's effort to the total (Fig. 6). From this relationship it was evident that 80% of fishers accounted for just 45% of the total effort or, conversely, 20% of fishers accounted for 55% of the total. This clearly highlights the potential for a relatively small proportion of the recreational fisher population to exert a substantial impact in terms of effort (and catch), suggesting that minor shifts in the dynamics of participation (based on activity levels) at the upper end of the fishery will have significant implications on effort (and catch) levels.

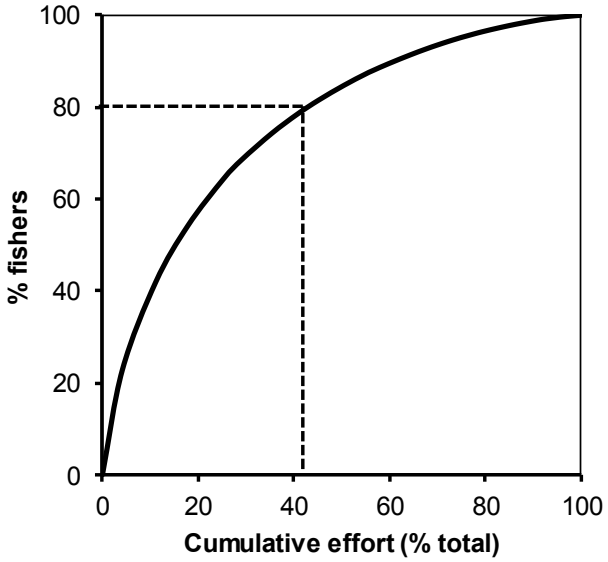


Fig. 6. Relationship between the number of fishers and their cumulative fishing effort (days fished) for Tasmanian residents aged five years or older who fished in Tasmania during 2012-13. Dotted lines indicate that 80% of the total number of fishers accounted for just 45% of the total days fished.

5.2 Water body

An important feature of the Tasmanian fishery was the concentration of fishing effort in inshore coastal (58% fisher days) and estuarine waters (20% fisher days) (Fig. 7, Appendix 6). Comparatively little fishing effort was directed in waters greater than 5 km offshore. Fishing in inland waters represented 21% of the state-wide effort, with almost three times the level of effort directed at lake fishing compared to fishing in rivers.

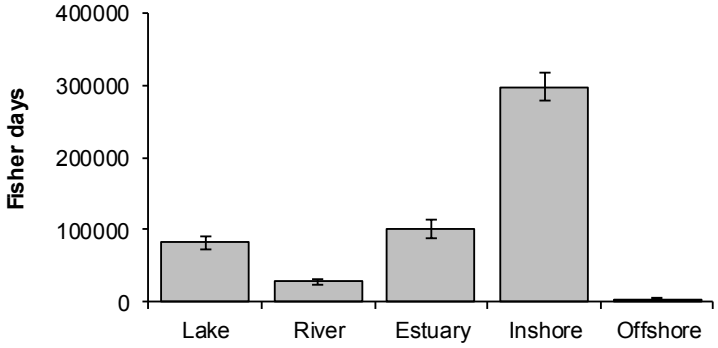


Fig. 7. Fishing effort (fisher days) by water body type for Tasmanian residents aged five years or older who fished in Tasmania during 2012-13. Error bars represent one standard error.

5.3 Fishing method

Line fishing (including the use of bait and/or artificial lures and jigs) was by far the dominant fishing mode, occurring on 89% of all fisher days during 2012-13 (Fig. 8, Appendix 8). Overall, line fishing accounted for over 450,000 fisher days or 1.5 million fisher hours of effort, implying an average of 3.34 hours per line fishing trip. Pot fishing was next in importance, reported on 9% of fisher days, followed by 'other 'methods (3%), gillnet fishing (2.5%) and diving (2.5%).

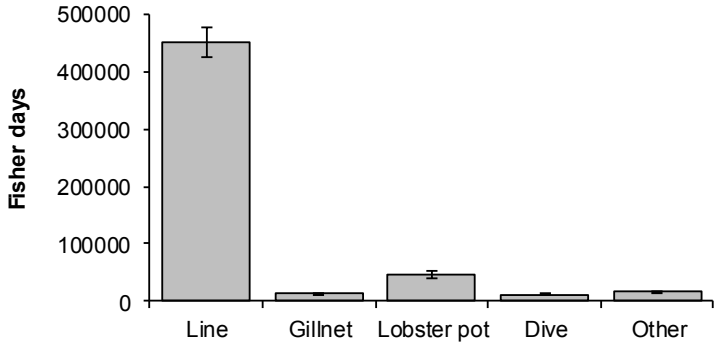


Fig. 8. Fishing effort (fisher days) by fishing method for Tasmanian residents aged five years or older who fished in Tasmania during 2012-13. Error bars represent one standard error.

5.4 Fishing region

Over half (55%) 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 and Norfolk-Frederick Henry Bay regions, collectively accounting for 35% of the state-wide effort (Fig. 9, Appendix 12). Effort was more or less evenly distributed between the Central East (including Great Oyster Bay) and East coast regions. The north coast attracted about 20% of the overall fishing effort, over half of which occurred in the North West Coast region, with the Tamar Estuary also relatively important. By comparison with the other coastal areas, effort on the West Coast was comparatively low (3%). The inland fishery was particularly concentrated in the Central Plateau region (10%), followed by Eastern (7%) and Western regions (5%).

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 (58,500) but also by the number of fishers (18,600) estimated to have fished the region during 2012-13 (Appendix 12). Norfolk-Frederick Henry Bay, the Central East and North West coasts were also popular regions, with over 15,000 persons estimated to have fished in each of them during the diary period.

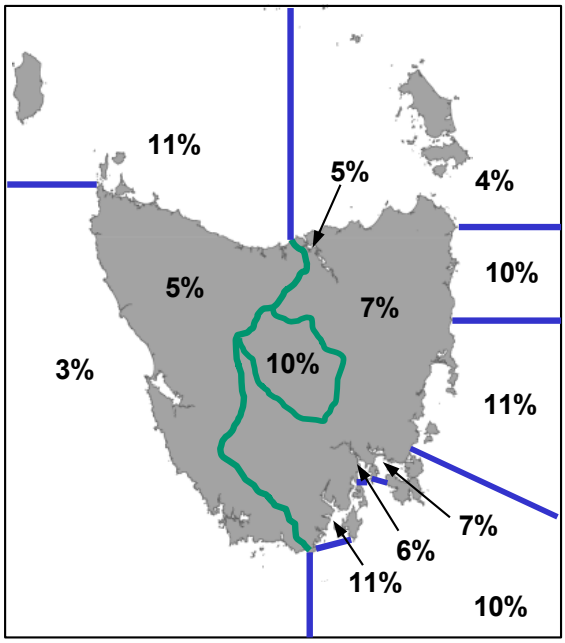


Fig. 9. Regional distribution (percentage) of fishing effort (fisher days) for Tasmanian residents aged five years or older who fished in Tasmania during 2012-13.

5.5 Fishing platform

Boat-based activities dominated the state-wide fishing effort (57% of fisher days), although there were considerable differences in the relative proportion of shore- and boat-based effort by water body (Fig. 10). Shore and boat fishing effort levels were similar in magnitude in the inland lake and dam fisheries whereas river fishing was primarily conducted from the shore. Shore-based effort was over double that from boats in the estuarine fisheries while boat-based effort was over 2.5 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). The majority of fishing events occurred from natural structures: 74% overall; >98% for lakes and rivers; 61% for estuarine; and 64% for coastal fishing. Jetties and wharves represented significant shore-based access points for estuarine (31%) and coastal (29%) 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 and hire boat fishing were reported in the inshore and estuarine fisheries but represented less than 1% of effort. No charter boat events were reported for diarists fishing offshore.

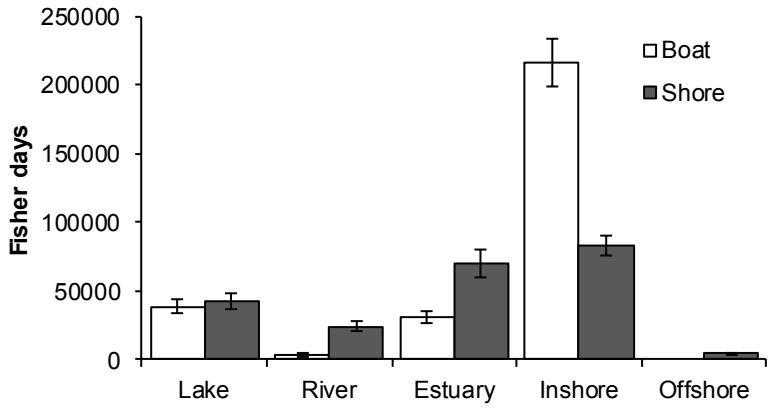


Fig. 10. Fishing effort (fisher days) for Tasmanian residents aged five years or older who fished in Tasmania during 2012-13 by fishing platform and water body type. Error bars represent one standard error.

6. Catch

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 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 2.62 million finfish were caught by Tasmanian recreational fishers during 2012-13, 61% of which (1.61 million) were Flathead (Table 5). Other species of significance in order of descending importance included Australian Salmon (230,000 or 9%), Trout (174,000 or 7%), Barracouta (80,000 or 3%), Gurnards (73,000 or 3%), Black Bream (60,000 or 2%) and Wrasse (55,000 or 2%). While the bulk of the finfish were marine species, freshwater species other than Trout included Atlantic Salmon, Redfin Perch and River Blackfish (Table 5).

Furthermore, around 113,000 cephalopods (squid and octopus) were captured, with Southern Calamari accounting for 56% (63,000) of the total numbers and Gould's Squid 41% (46,000). Other invertebrate species of significance included Rock Lobster (80,000) and Abalone (41,500). A range of other taxa, including crabs, prawns, scallops, oysters, mussels, clams, and urchins were caught by recreational fishers.

In total, 1.48 million finfish (excluding small baitfish) were retained, indicating that just over half (56%) of all finfish caught were harvested (Table 5). Flathead dominated the retained catch (925,000 fish or 62% of total numbers), followed by Australian Salmon (145,000 or 10%), Trout (106,000 or 7%) and Barracouta (33,000 or 2%). Amongst the other key taxa, significant numbers of Southern Calamari (58,000), Rock Lobster (44,500), Gould's Squid (43,000), and Abalone (38,500) were harvested. Catches of small baitfish, especially Whitebait, tended to be reported in terms of weight rather than numbers and using these estimates it was calculated that approximately 1060 kg of Whitebait was harvested from north coast rivers, including the Don, Forth, Montagu, Rubicon and Mersey Rivers.

Overall, 1.14 million finfish were released or discarded; actual release rates varied depending upon species (Table 5). High release rates (>70%) were reported for sharks and rays, gurnards, eels and Wrasse, whereas very low release rates (<5%) were reported for Blue Warehou, Atlantic Salmon, and Flounder. Relatively low release rates were also apparent for Gould's Squid and Southern Calamari. 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).

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 species being considered undesirable, often based on perceived eating qualities. To better understand fisher motivations in relation to releasing or discarding species, respondents were asked to identify the reason(s) for release and the numbers of each species to which the particular reason applied for each fishing event reported. This approach recognised that there may be several reasons for releasing the catch and sought to attribute a reason for each individual fish. 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 and for analysis such responses have been treated as the same as 'too many'). Other reasons for release included poor eating qualities, damaged or poor quality, and prohibited species.

A breakdown of reasons for release for the main species is presented in Fig. 11. Size, partly in response to minimum size limits, was the primary reason for release of Flathead, Whiting, Silver Trevally, Southern Calamari, Mullet, and Australian Salmon, as well as Abalone and Rock Lobster. The only species for which catch and release was identified as a significant motivation were Black Bream, Trout and Barracouta. In the case of Tuna, catches in excess of requirements or bag limits were relatively important motives for releasing catch. A number of species were identified as having poor eating qualities and therefore not retained, these included Marblefish, Cod, Wrasse, Leatherjacket and Gurnard. 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 commonly cited.

Table 5. Estimated annual catch (total, kept and released nos) and proportion released/discarded for key species during 2012-13, 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	174,752	27,119	105,630	15,850	69,121	13,694	39.6
Atlantic Salmon	11,135	3,493	11,084	3,485	+		0.5
Redfin	***3,180***	***1,478***	***2,680***	***1,437***	+		15.7
River Blackfish	***1,495***	***1,036***	+		+		64.8
Australian Salmon	229,700	39,013	144,712	23,928	84,988	18,955	37.0
Barracouta	80,254	19,177	32,954	8,381	47,300	16,116	58.9
Bastard Trumpeter	***8,198***	***3,853***	***7,573***	***3,633***	+		7.6
Black Bream	59,628	12,212	19,153	4,582	40,475	10,303	67.9
Blue Warehou	*10,783*	*4,120*	*10,757*	*4,112*	+		0.2
Cod	25,929	7,671	10,464	4,064	15,465	5,991	59.6
Eel	*1,221*	*385*	+		+		78.7
Flathead	1,611,290	132,822	924,932	82,200	686,357	59,986	42.6
Flounder	*24,812*	*7,635*	*23,238*	*7,454*	***1,574***	***648***	6.3
Garfish	***17,285***	***9,127***	***15,260***	***7,793***	***2,025***	***1,455***	11.7
Gurnard	73,431	14,762	17,367	5,011	56,064	11,041	76.3
Jack Mackerel	***30,907***	***26,025***	***28,798***	***24,950***	***2,109***	***1,154***	6.8
Jackass Morwong	26,024	5,919	23,732	5,657	2,292	732	8.8
Morwong, other	+		+		+		54.6
Leatherjacket	10,179	2,575	5,389	1,791	4,790	1,030	47.1
Mullet	45,143	15,988	26,295	9,726	**18,848**	**8,171**	41.8
Pike	5,705	1,435	3,895	1,213	1,810	677	31.7
Silver Trevally	10,654	3,464	4,826	1,663	**5,828**	**2,742**	54.7
Striped Trumpeter	*3,656*	*961*	*3,476*	*915*	+		4.9
Tuna	*17,068*	*4,705*	*13,209*	*3,890*	*3,859*	*1,443*	22.6
Whiting	15,752	6,202	9,412	3,712	**6,340**	**3,063**	40.2
Wrasse	54,698	10,957	7,223	1,631	47,476	9,811	86.8
Scalefish, other	29,528	7,468	18,020	5,640	11,508	2,788	39.0
Sharks & rays	38,641	5,033	9,299	1,603	29,342	4,039	75.9
Rock Lobster	80,035	13,352	44,517	7,097	35,519	7,736	44.4
Crustaceans, other	***12,457***	***8,918***	***10,742***	***8,891***	*1,715*	*619*	13.8
Southern Calamari	63,405	10,934	57,728	9,954	5,678	2,127	9.0
Gould's Squid	45,980	9,634	42,853	9,361	3,127	1,196	6.8
Cephalopod, other	3,773	1,084	**1,443**	**649**	2,330	662	61.8
Abalone	41,551	9,109	38,541	8,731	3,010	1,181	7.2
Scallop	***13,142***	***8,500***	***12,778***	***8,271***	+		2.8
Bivalve, other	***27,638***	***11,913***	***27,638***	***11,913***	-		-
Other taxa	***1,867***	***1,341***	***1,596***	***1,166***	+		14.5

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 2012-13.

Released → **Kept**

Proportion released				
> 70%	**51-70%**	**31-50%**	**10-30%**	**< 10%**
Sharks & rays	Silver trevally	Pike	Garfish	Blue warehou
Gurnards	Cod	Australian salmon	Redfin	Atlantic salmon
Eels	Barracouta	Whiting	Tuna	Striped trumpeter
Wrasse	River blackfish	Trout		Flounder
	Black bream	Flathead		Gould's squid
		Mullet		Bastard trumpeter
		Rock Lobster		Jack mackerel
		Leatherjacket		Jackass morwong
				Southern calamari

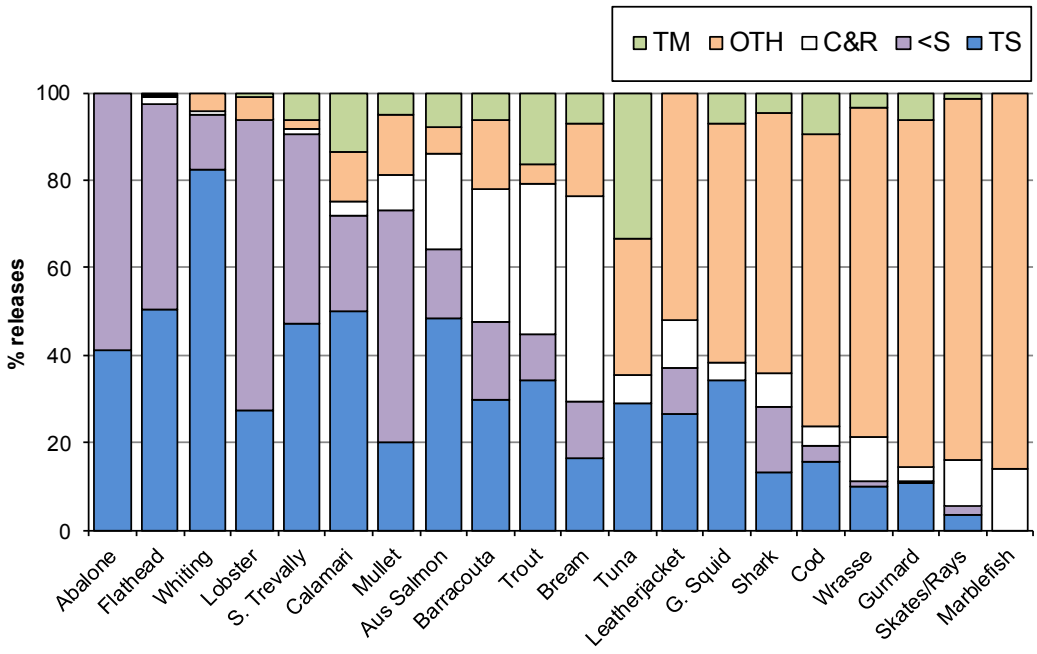


Fig. 11. Relative importance (% total release numbers) of different reasons for release of key species taken by Tasmanian residents aged five years or older who fished in Tasmania during 2012-13. TS too small; <S "undersized"; C&R catch and release; TM too many; OTH other reasons.

6.1.2 Targeted fishing

For each fishing event respondents were asked whether they were fishing for particular species (up to two species could be nominated as targets). This enabled fishing effort to be defined as being 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 26% of all events resulted in no catch (kept or released) and if those situations where target species were not caught are also 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 4 and 5 and the proportion of the catches contributed to by targeted effort is summarised in Table 7. At one end of the continuum, Tuna, Trout, Flounder, Rock Lobster, scallops and Abalone 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 Black Bream (even though most were released), Flathead, Atlantic Salmon, Blue Warehou and squid (Southern Calamari and Gould's Squid), also implying a level of fishery specialisation for these species. Over half of the catch of Australian Salmon, Striped Trumpeter and Bastard Trumpeter was attributed to effort targeted at 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 relatively high retention rates, including Jack Mackerel, were rarely targeted whereas species with high release rates such as Leatherjacket, Wrasse, Gurnard, Cod and Marblefish were rarely if ever targeted and constitute by-catch. As indicated in the previous section, most of the species in this latter group 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 2012-13.

Non-target → **Target**

Proportion of catch targeted				
< 30%	**31 - 50%**	**51 - 70%**	**71 - 90%**	**> 90%**
Morwong	Mullet	Australian salmon	Black bream	Rock lobster
Silver trevally	Shark	Trumpeters	Flathead	Scallop
Other scalefish			Atlantic salmon	Tuna
			Blue warehou	Trout
			Squid	Abalone
				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 particular 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 taken into account 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 of 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 Flathead, Australian Salmon and Southern Calamari each exceeding 60 tonnes. Overall, Flathead were not only the most commonly caught species but dominated catches by weight (236 tonnes), being six times greater than the commercial catch of Flathead taken from Tasmanian waters.

The provision of harvest weights for selected species enabled 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 production from the Tasmanian commercial scalefish fishery for species such as Flathead, Barracouta, Jack Mackerel, Mullet, Jackass Morwong, Flounder, Blue Warehou, Cod, Bastard Trumpeter, Striped Trumpeter and Southern Calamari (Table 8). Conversely, compared with the commercial sector, the recreational harvest represented a minor component (<10%) of the total catch for Whiting, Garfish, Whiting, Wrasse, Banded Morwong 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 species (apart from any Trout by-catch taken in marine waters). Atlantic Salmon are stocked in selected inland waters and escapees from fish farms are targeted in marine waters by recreational fishers and may be taken by commercial fishers, although the latter are not permitted to offer them for sale.

Table 8. Annual harvest (numbers), average weight and estimated harvest weight for key species taken by recreational fishers in Tasmania during 2012-13, based on Tasmanian residents aged five years or older, and compared with commercial production in Tasmania. Commercial finfish catch data are based on General Fishing logbook returns.

Unless indicated otherwise average weights based on Lyle *et al.* (2009); [A] based on research fishing, 2012-14 (unpubl. data); [B] based on research gillnet fishing (Lyle *et al*. 2014), [C] based on Tracey *et al*. (2013), [D] other data sources utilised; na not available

	Recreational					
Species	Harvest (No.)	Av. weight (kg)	Estimated harvest (tonnes)	Commercial catch (tonnes)	Combined catch (tonnes)	% recreational
Flathead	924,932	0.26[A]	235.9	39.9	275.8	85.5
Australian Salmon	144,712	0.44	63.7	270.8	334.5	19.0
Trout	105,630	na		-		
Barracouta	32,954	0.94	31.0	1.1	32.1	96.6
Jack Mackerel	28,798	0.18	5.2	0.2	5.4	96.3
Mullet	26,295	0.27	7.1	7.9	15.0	47.3
Jackass Morwong	23,732	0.68	16.1	2.1	18.2	88.5
Flounder	23,238	0.31	7.2	2.1	9.3	77.7
Black Bream	19,153	0.87	16.7	-		
Gurnard/ Ocean perch	17,367	na		1.1		
Garfish	15,260	0.13	2.0	50.6	52.6	3.8
Tuna	13,209	na		-		
Atlantic Salmon	11,084	na		-		
Blue Warehou	10,757	1.43[B]	15.4	8.8	24.2	63.6
Cod	10,464	0.58	6.1	2.2	8.3	73.4
Whiting	9,412	0.22	2.1	35.8	37.9	5.5
Sharks & rays	9,299	na		12.6		
Blue Mackerel	8,616	na		2.9		
Bastard Trumpeter	7,573	0.99[B]	7.5	9.8	17.3	43.3
Wrasse	7,223	0.88	6.4	65.2	71.6	8.9
Leatherjacket	5,389	0.34	1.8	2.5	4.3	42.3
Silver Trevally	4,826	0.40	1.9	2.8	4.7	40.8
Pike	3,895	na		9.7		
Striped Trumpeter	3,476	4.38[C]	15.2	10.5	25.7	59.2
Banded Morwong	298	1.52[B]	0.5	37.1	37.6	1.2
Southern Calamari	57,728	1.10	63.5	60.2	123.7	51.3
Gould's Squid	42,853	0.50[D]	21.4	1054.7	1076.1	2.0

6.2 Catch by water body

Catch details by water body are provided in Appendices 6 and 7 and the relative importance of the main finfish species (excluding small baitfish) are summarised in Fig. 12. Of the total finfish catch (2.62 million fish) about 6% was taken from lakes and dams, 1% from rivers, 14% from estuarine waters, 78% from inshore coastal waters and 1% from offshore waters.

Trout accounted for the vast majority (>80%) of the freshwater catch, with Atlantic Salmon, Redfin Perch, and River Blackfish of minor importance in the lake/dam fisheries and Black Bream, Mullet and Redfin Perch in the river fisheries (Fig. 12). Flathead and

Australian Salmon dominated catches from estuarine and inshore waters, accounting for 62% of the estuarine and 78% of the inshore finfish catches (Fig. 12). Other species of significance included Black Bream, Barracouta and Cod in the estuarine fishery, and Gurnard, Barracouta 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, followed by Flathead, Gurnard (mainly Ocean Perch), Blue-eye Trevalla and sharks.

Southern Calamari and Gould's Squid were primarily taken from inshore waters, with a minor component of the catch of former also taken from estuarine waters and a small proportion of the catch of the latter species reported from offshore waters. Catches of Rock Lobster, Abalone and scallops were concentrated in inshore coastal waters (Appendices 6 and 7).

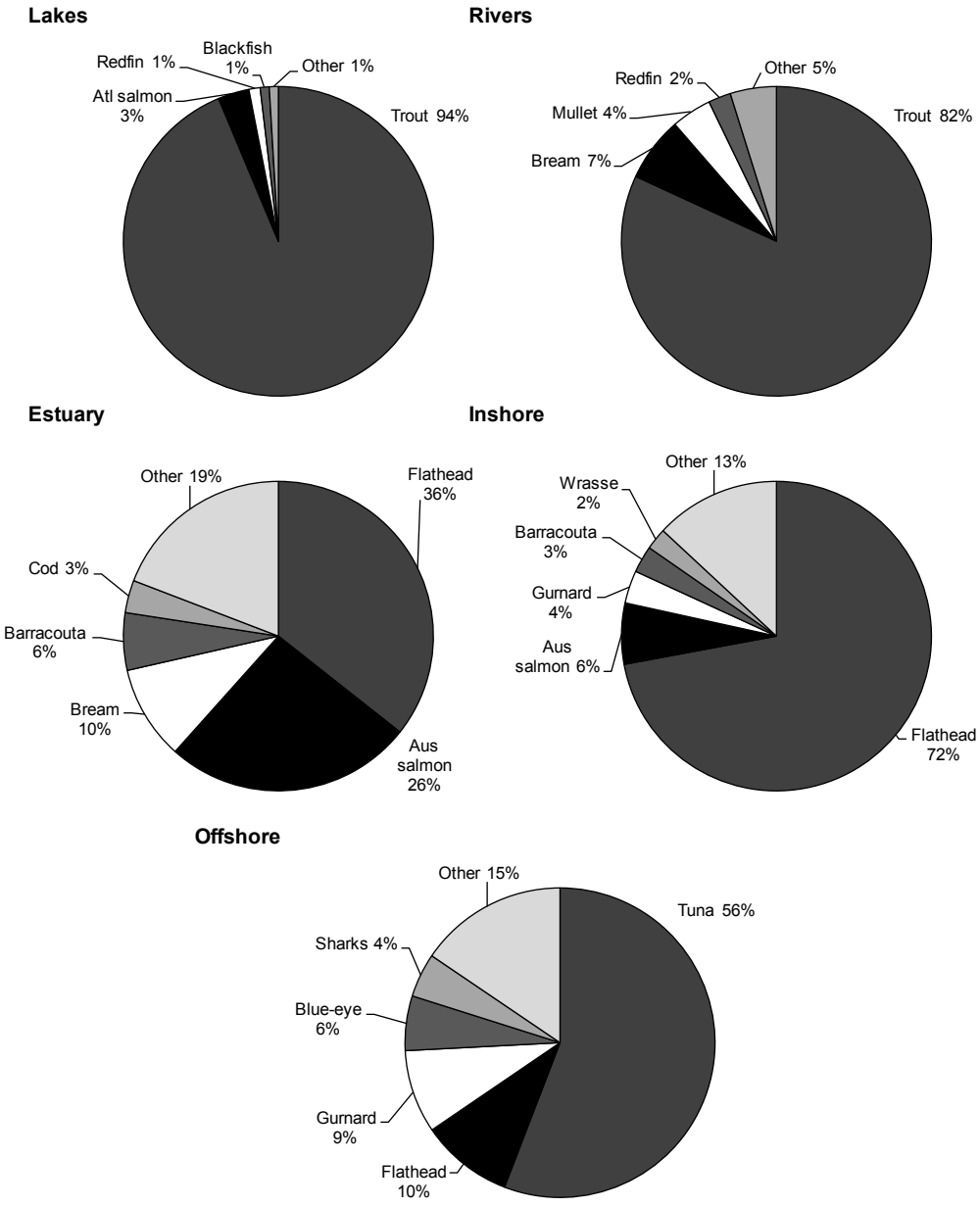


Fig. 12. Percentage composition of the recreational finfish catch (numbers kept and released) by water body for Tasmania during 2012-13.

6.3 Catch by method

Catch details by fishing method are provided in Appendices 8 and 9. Overall, line fishing accounted for 95% of the total finfish numbers (2.49 million fish), with a further 2% (58,000) taken by gillnet. Southern Calamari and Gould's Squid were almost exclusively taken by line fishing. Flathead represented 62% of the line catch, while Australian Salmon, Trout, Barracouta, Gurnard, Southern Calamari and Black Bream were of secondary importance (Fig. 13). The main species taken by gillnet included Blue Warehou, Bastard Trumpeter, Atlantic Salmon, Mullet and Australian Salmon (Fig. 13), while Flounder were mainly taken by spear and to a lesser extent by gillnet. Small baitfish (especially Whitebait) were mostly captured in bait nets or traps.

Rock Lobster was the primary species taken in pots as well as being targeted by divers. Abalone and scallops were more or less exclusively harvested by divers (Appendices 8 and 9).

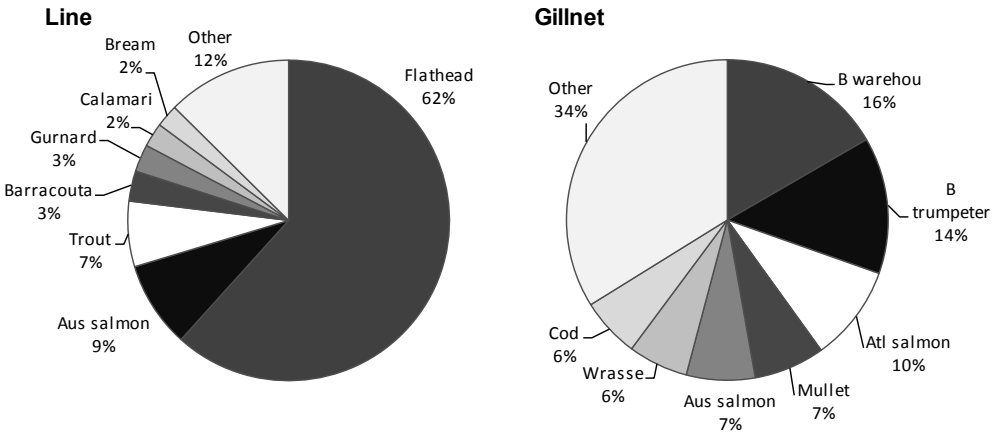


Fig. 13. Percentage composition of the recreational finfish catch (kept and released numbers) by line and gillnet fishing methods for Tasmania during 2012-13.

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 30 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 River Blackfish, Ocean Perch, Cod, Leatherjacket, Whiting and Wrasse at least 80% of the line catch was taken using bait. By contrast, Tuna, Trout, Atlantic Salmon and Australian Salmon along with Southern Calamari and Gould's Squid were primarily targeted using lures or flies. Both bait and lure fishing were significant capture techniques used for Black Bream.

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 2012-13, 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**
River Blackfish	***1,358***	+		90.8	9.2
Whiting	13,820	+	1,331	88.6	2.9
Leatherjacket	7,451	+	+	88.3	2.2
Cod	18,964	+	3,241	84.9	0.5
Ocean Perch	**9,567**	+	**1,373**	81.1	7.3
Wrasse	37,555	4,068	5,299	80.0	8.7
Jackass Morwong	17,849	2,169	5,184	70.8	8.6
Gurnard	41,581	3,081	15,275	69.4	5.1
Flathead	1,080,565	215,127	313,391	67.2	13.4
Shark	12,141	+	5,207	66.6	4.9
Striped Trumpeter	*2,238*	+	+	63.6	17.1
Mullet	12,331	3,600	4,060	61.7	18.0
Silver Trevally	*6,037*	*1,046*	*2,979*	60.0	10.4
Blue Mackerel	***7,340***	***1,174***	***3,747***	59.9	9.6
Garfish	***9,242***	***2,256***	***4,264***	58.6	14.3
Black Bream	32,327	23,800	3,675	54.1	39.8
Australian Salmon	58,805	142,579	24,587	26.0	63.1
Barracouta	19,623	42,766	16,994	24.7	53.9
Jack Mackerel	***6,702***	***1,724***	***21,363***	22.5	5.8
Pike	1,037	3,335	+	20.1	64.7
Gould's Squid	8,887	26,602	10,107	19.5	58.3
Redfin	+	***2,824***		11.2	88.8
Southern Calamari	5,709	39,151	18,335	9.0	62.0
Trout	13,948	147,810	10,189	8.1	86.0
Atlantic Salmon	+	*4,601*	+	6.8	84.0
Tuna	+	*12,971*	*3,712*	2.3	76.0

6.4 Catch by platform

Just over 80% 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 10 and 11).

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, Jackass Morwong, Blue Warehou, Whiting, Gurnard, Bastard Trumpeter and sharks while boat-based effort also produced most of the catch for species such as Trout, Atlantic Salmon, Australian Salmon, Barracouta, Back Bream, Wrasse and Cod. By contrast, shore-based catches dominated for freshwater species such as River Blackfish and eels and estuarine or inshore species such as Flounder, Silver Trevally and Mullet. The vast majority of the Rock Lobster and Gould's Squid were taken by boat fishers. Southern Calamari and Abalone were mainly taken by boat-based effort but shore-based fishing was also relatively important.

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 2012-13.

Shore → **Boat**

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

7. Key species

In the following section, the fisheries for key species are described in terms of regional distribution of the catch (refer Appendix 12), numbers kept and released (Table 5), catch by fishing platform (Appendix 10), method (Appendix 8), water body (Appendix 6) and season. Catch information was provided by fishers during the 12-month diary survey and has been presented as expanded estimates.

7.1 Flathead

Southern Sand Flathead (*Platycephalus bassensis*) and Tiger Flathead (*Neoplatycephalus richardsoni*) were by far the dominant species taken in Tasmanian waters, with Bluespotted Flathead (*Platycephalus caeruleopunctatus*) also reported by diarists. Southern Sand Flathead represented 87% (1,399,184; SE 124,947) and Tiger Flathead 5% (75,568; SE 14,280) of the total Flathead catch (kept and released) by number. The balance of the catch (136,538; SE 23,390) was not specified to species, apart from a very small number of Bluespotted Flathead, but were most likely to have been Southern Sand Flathead.

Just over half of the total catch of 1.61 million Flathead was derived from the south eastern Tasmania, with the D'Entrecasteaux Channel and Norfolk-Frederick Henry Bays particularly significant areas (Fig. 14A). The Central East, including Great Oyster Bay, was also an important region for the fishery, whereas relatively low catches were taken from other areas off the east coast. Catches from northern Tasmania, including the Tamar, were comparatively low while West coast catches were insignificant. Just over 40% of the Flathead caught were released or discarded (Fig. 14B). Boat based fishing accounted for the vast majority (94%) of the catch (Fig. 14C), and virtually all of the catch was taken by line fishing (Fig. 14D), mainly using 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. 14E). The Flathead fishery was highly seasonal, with a strong peak in catches during summer (January-February) and a distinct trough between May and August (Fig. 14F). The main fishing period between November and April accounted for the vast majority (87%) of the annual catch.

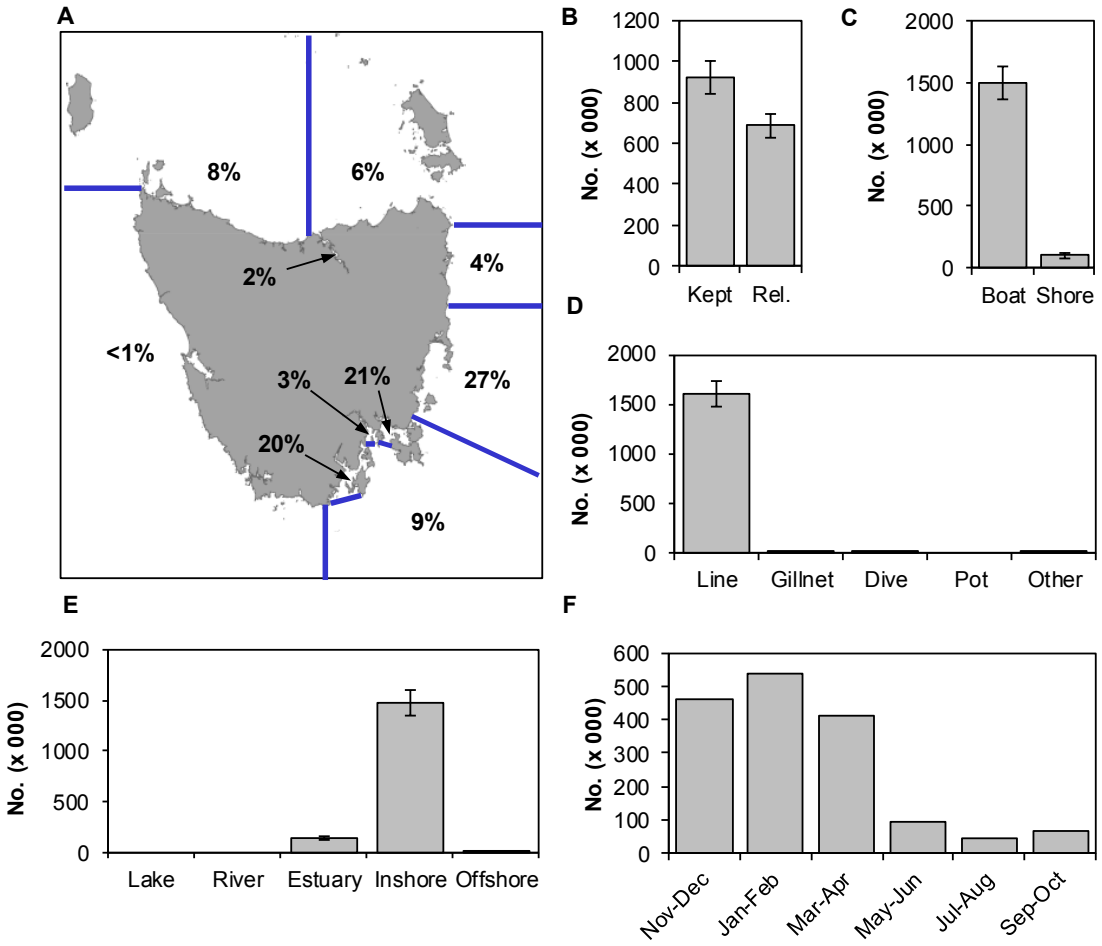


Fig. 14. Characteristics of the recreational fishery for Flathead in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing 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 89% (154,688; SE 25,814) of the catch numbers with Rainbow Trout (*Oncoryhnchus mykiss*) comprising the bulk of the remainder (17,160; SE 3,160). A small proportion of the catch (2,904; SE 1,703) was not identified to species by survey respondents or were reported as Brook Trout (*Salvelinus fontinalis*).

The importance of the Central Plateau region to the trout fishery is clearly evident in Fig. 15A, accounting for over half of the state's catch of 175,000 Trout, with Arthurs Lake and Great Lake together producing 57% the Central Plateau catch. The Western and Eastern inland regions were roughly equivalent in terms of catches (19-21% of total), while catches from other (coastal) regions were insignificant. About 40% of the Trout caught were released (Fig. 15B), the overall catch being taken mainly by boat-based fishers (Fig. 15C). Trout were caught almost exclusively by line fishing (Fig. 15D), with lures/flies the main (>86%) gear used. A minor component of the catch was taken in

gillnets, mainly fished in Macquarie Harbour, western Tasmania. The catch from lakes and dams was over four times greater than that from rivers and very minor quantities of Trout were taken from estuarine and inshore waters (Fig. 15E). Catches peaked during summer and then declined to very low levels during the winter months, corresponding to closure of parts of the fishery, before increasing again in spring (Fig. 15F).

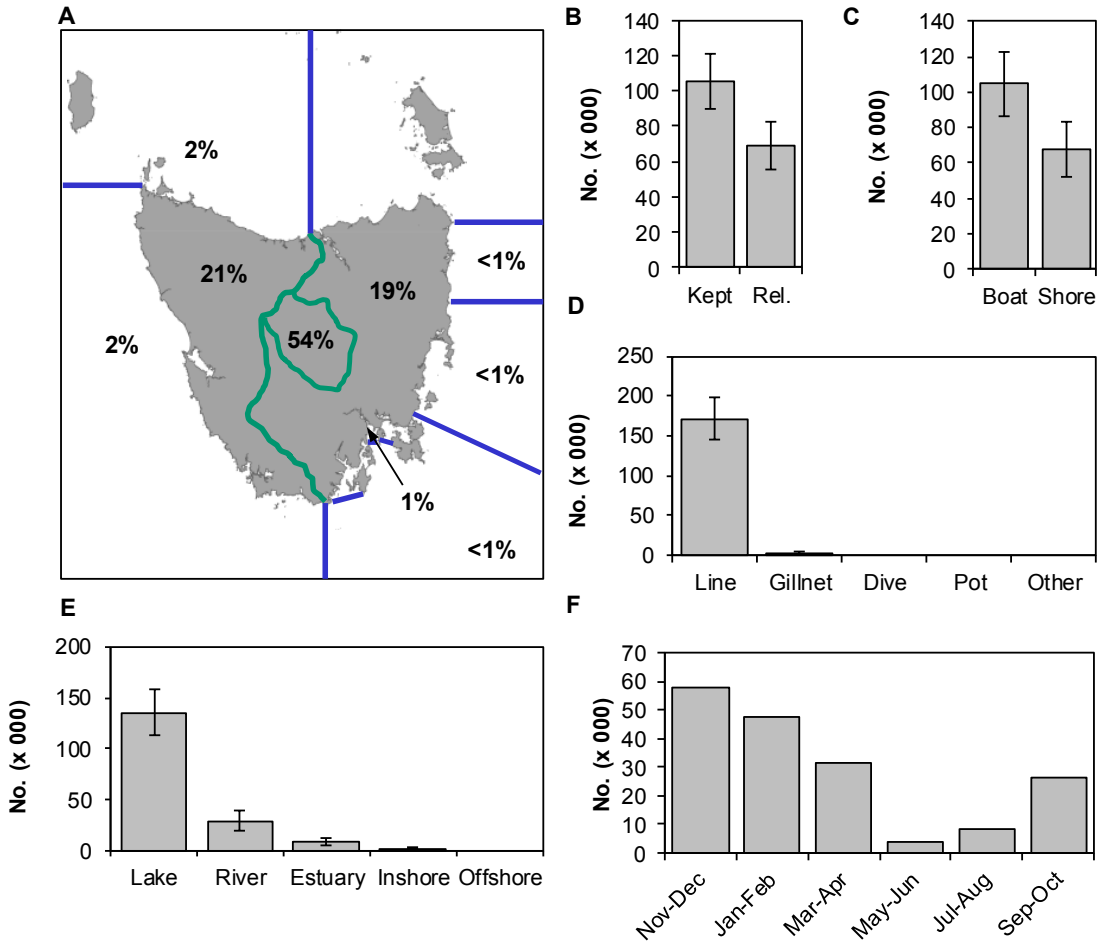


Fig. 15. Characteristics of the recreational fishery for Trout in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; 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 (40% of total), in particular the North West and Tamar regions (Fig. 16A). The South East (including associated waterways) (24%) and East coast (18%) regions were of secondary importance followed by the Central East and West coasts (8-9%). Numerically, Australian Salmon were the second most frequently caught finfish in Tasmania, with just under 40% of the total catch of 230,000 fish released or discarded (Fig. 16B). In addition to boat-based catches, there was a substantial shore-based fishery for the species (Fig. 16C), with line fishing by far the major fishing method (Fig. 16D). Lure fishing represented the most important capture method, accounting for almost two-thirds of the catch. Catches were concentrated in estuarine and inshore coastal waters (Fig. 16E), with evidence of a summer-autumn (November-April) peak in catches (Fig. 16F).

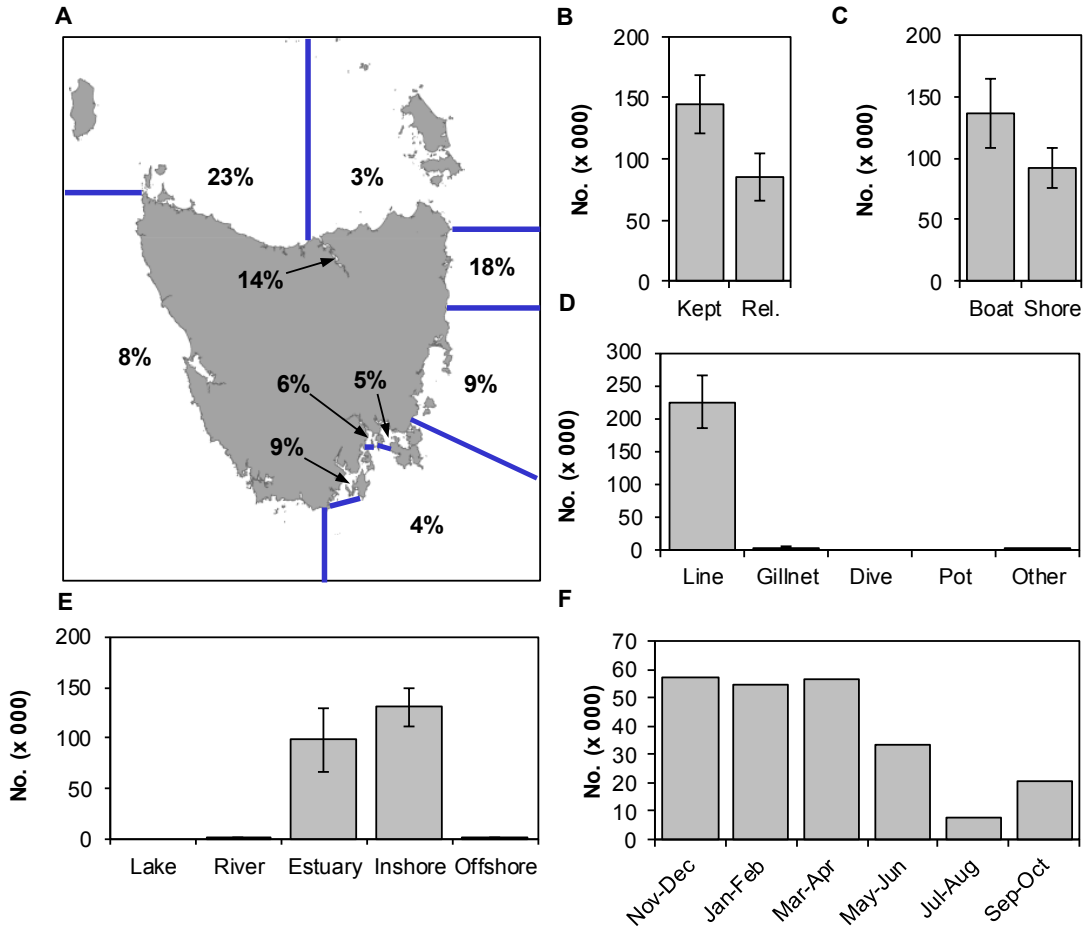


Fig. 16. Characteristics of the recreational fishery for Australian Salmon in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by 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 between species, Yellow-eye Mullet are known to dominate catches. Catches were concentrated in the north coast regions, in particular the North West (Fig. 17A). Apart from the North East and Tamar, catches from all other regions were relatively minor. About 40% of the total catch of 45,000 Mullet was not retained (Fig. 17B), with shore-based fishers accounting for the majority (80%) of the take (Fig. 17C). Mullet were captured mainly by line and seine nets ('Other' in Fig. 17D), with some fish also taken by gillnets (so-called mullet nets) (Fig. 17D). The species was caught mainly in inshore coastal waters (Fig. 17E) and the fishery was characterised by a strong peak in catches during summer, with comparatively low quantities taken at other times of the year (Fig. 17F).

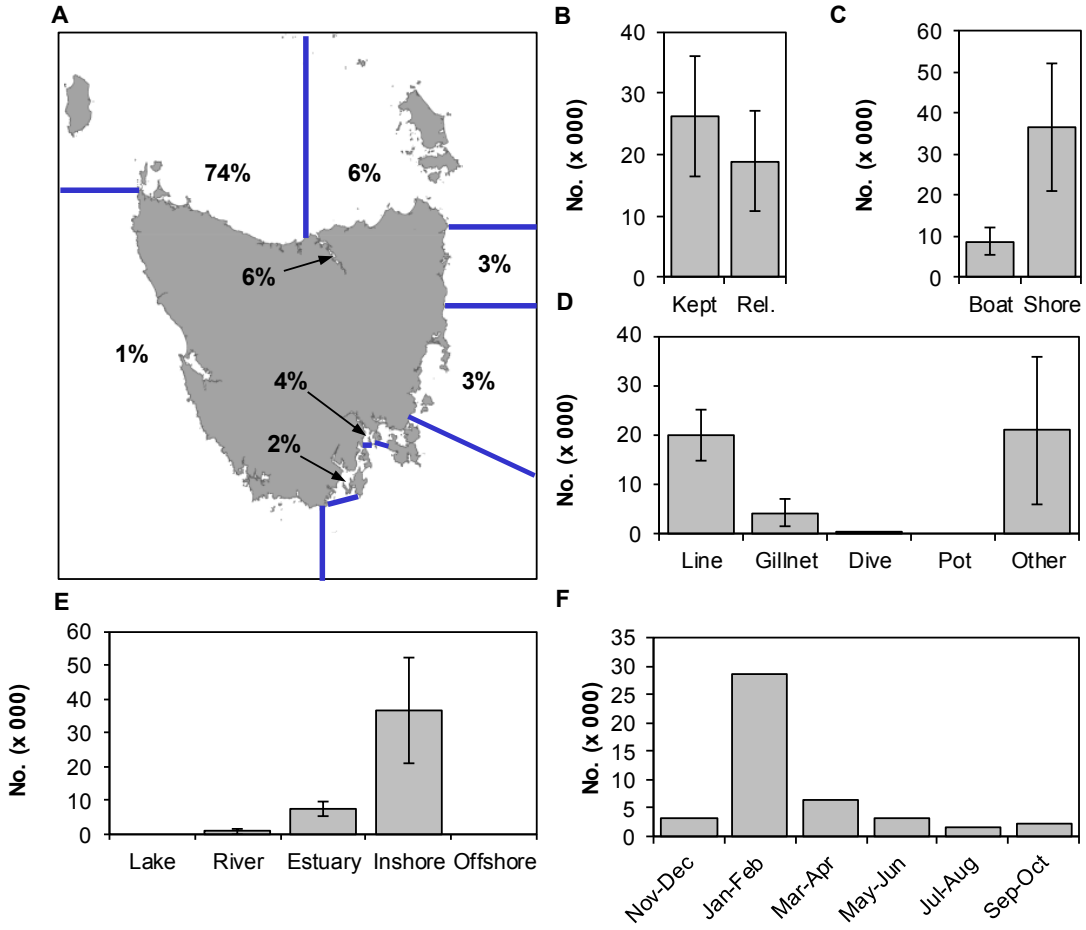


Fig. 17. Characteristics of the recreational fishery for Mullet in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; 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 the Greenback Flounder (*Rhombosolea tapirina*), with the Long-snouted Flounder (*Ammotretis rostratus*) occasionally taken. Survey respondents did not, however, distinguish catches by species.

Flounder were mainly caught in sheltered inshore waters off south eastern Tasmania, in particular Norfolk-Frederick Henry Bay and D'Entrecasteaux Channel, as well as off northern Tasmania, especially the Tamar and North East coast regions (Fig. 18A). The fishery off the West coast, although small, was centred in Macquarie Harbour. The vast majority of the Flounder were retained (Fig. 18B) and shore-based fishing accounted for the bulk of the catch (Fig. 18C). Spearing was the main method of capture ('Other' in Fig. 18D), with small catches taken by line and gillnet (Fig. 18D). Spearing was typically undertaken at night wading in the shallows. As indicated above, Flounder were caught exclusively in inshore coastal and estuarine waters (Fig, 18E). Catches peaked during summer and were lowest in spring (Fig. 18F).

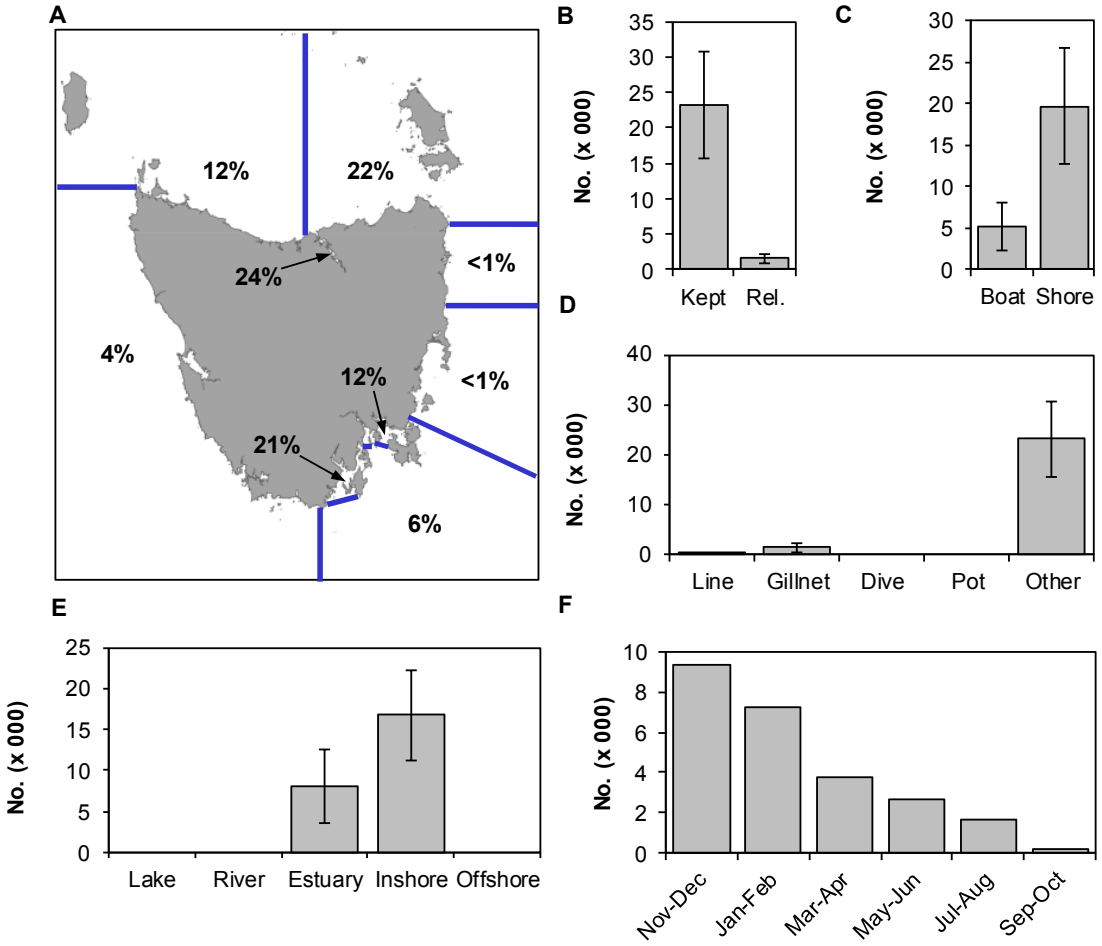


Fig. 18. Characteristics of the recreational fishery for Flounder in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing 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, collectively accounting for over 70% of the total catch (Fig. 19A). The North East (mainly Musselroe area) was of secondary importance with minor catches reported from other areas around Tasmania. The majority of the catch was released (Fig. 19B), reflecting a strong catch and release ethic amongst some fishers (refer Fig. 11). Catches were taken more or less equally by boat and shore-based fishing effort (Fig. 19C), with line fishing, using both bait and lures, accounting for the vast majority of the Black Bream catch (Fig. 19D). Catches were taken primarily from estuarine waters, with inshore coastal waters also important (Fig. 19E). The fishery exhibited a strong peak during the summer months (November-December) with only small quantities of Black Bream taken during winter (Fig. 19F).

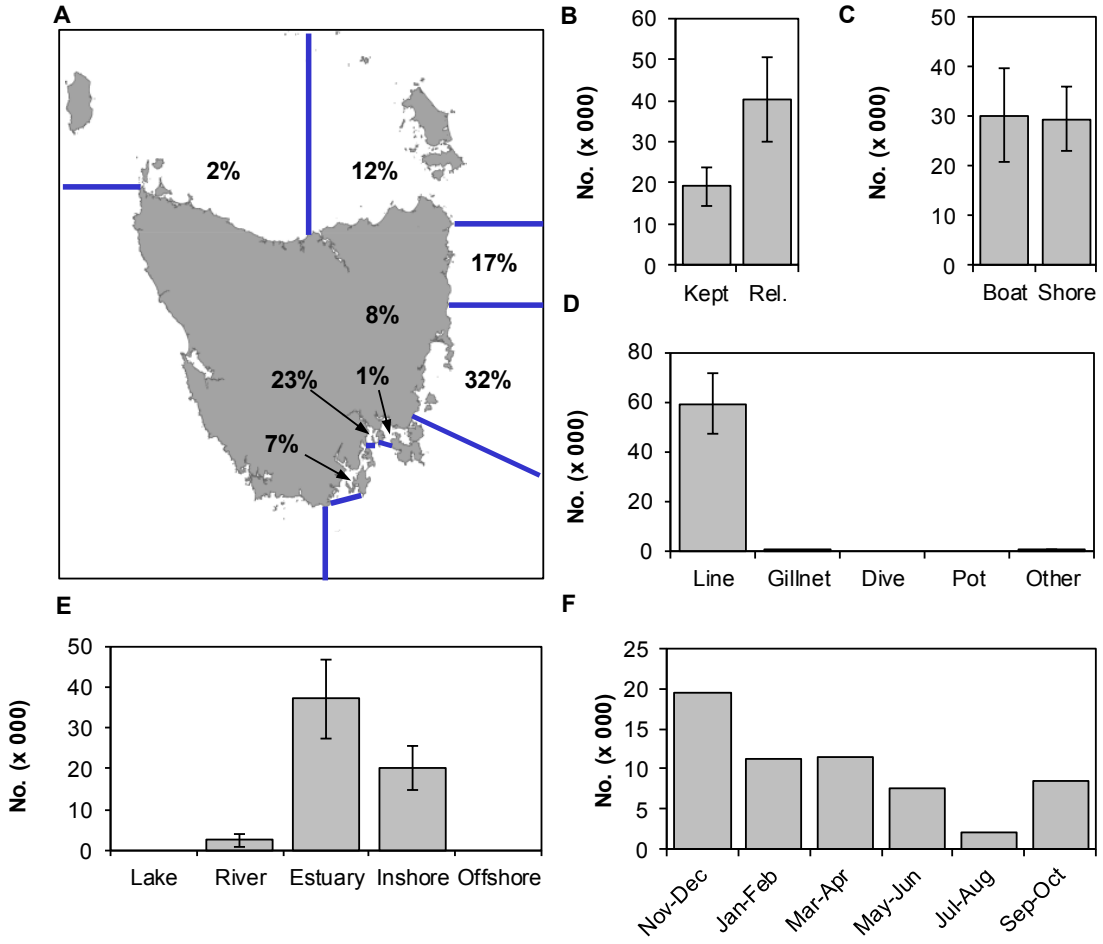


Fig. 19. Characteristics of the recreational fishery for Black Bream in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing 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 62% of catch numbers (10,583; SE 3,454), followed by Skipjack Tuna (*Katsuwonus pelamis*) at 34% (5730; SE 2179), and Southern Bluefin (*T. maccoyii*) and Yellowfin (*T. albacores*) also taken but in relatively low numbers (collectively < 1000 individuals). The highly specialised nature of the game fishing meant that compared with other types of fishing there were relatively few fishing trips reported by diarists and as a result these catch figures should be treated with caution.

The recreational fishery for tuna was effectively restricted to the east coast of Tasmania, in particular the East and South East coast regions (Fig. 20A). Overall about 20% of the Tuna were released (Fig. 20B); the proportions varied between species with over a third of the Skipjack Tuna released compared with a release rate of 18% for Albacore. The tuna fishery was exclusively boat-based (Fig. 20C) and involved the use of rod and line (Fig. 20D) and mainly lures rather than bait. Catches were mainly derived from offshore waters (>5 km from the coast) but were also reported from more inshore waters (Fig. 20E). Tuna catches were restricted to the summer–autumn period, with a marked peak in numbers during March-April (Fig. 20F).

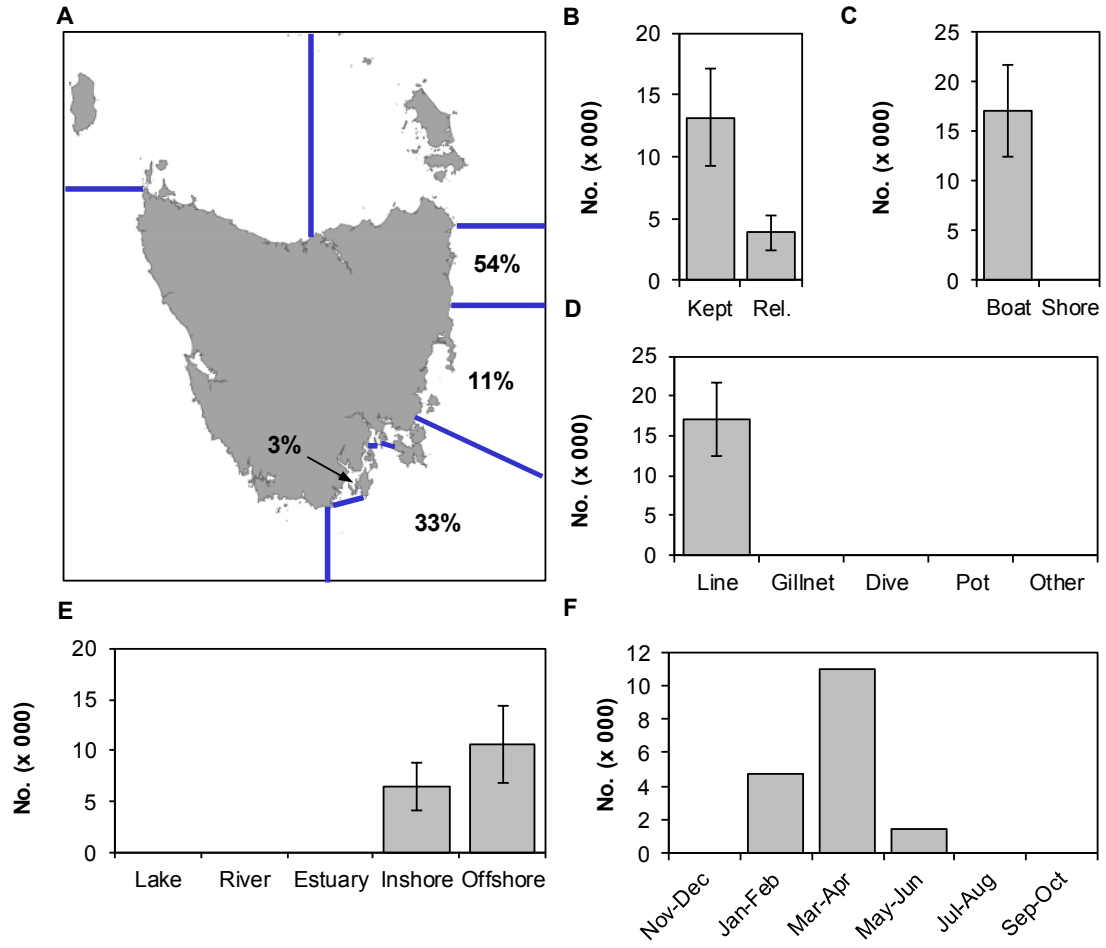


Fig. 20. Characteristics of the recreational fishery for tunas in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; 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 heavily concentrated in the South East and D'Entrecasteaux Channel regions, with the Central East and East coast regions of secondary importance (Fig. 21A). Relatively small numbers were also taken off northern Tasmania. The vast majority of the catch was retained (Fig. 21B), being taken primarily by boat-based fishers (Fig. 21C). Line fishing (mostly using lures) (Fig. 21D) in inshore waters (Fig. 21E) was the predominant fishing method. Catches were largely restricted to summer and early autumn months, with a marked peak during January and February (Fig. 21F).

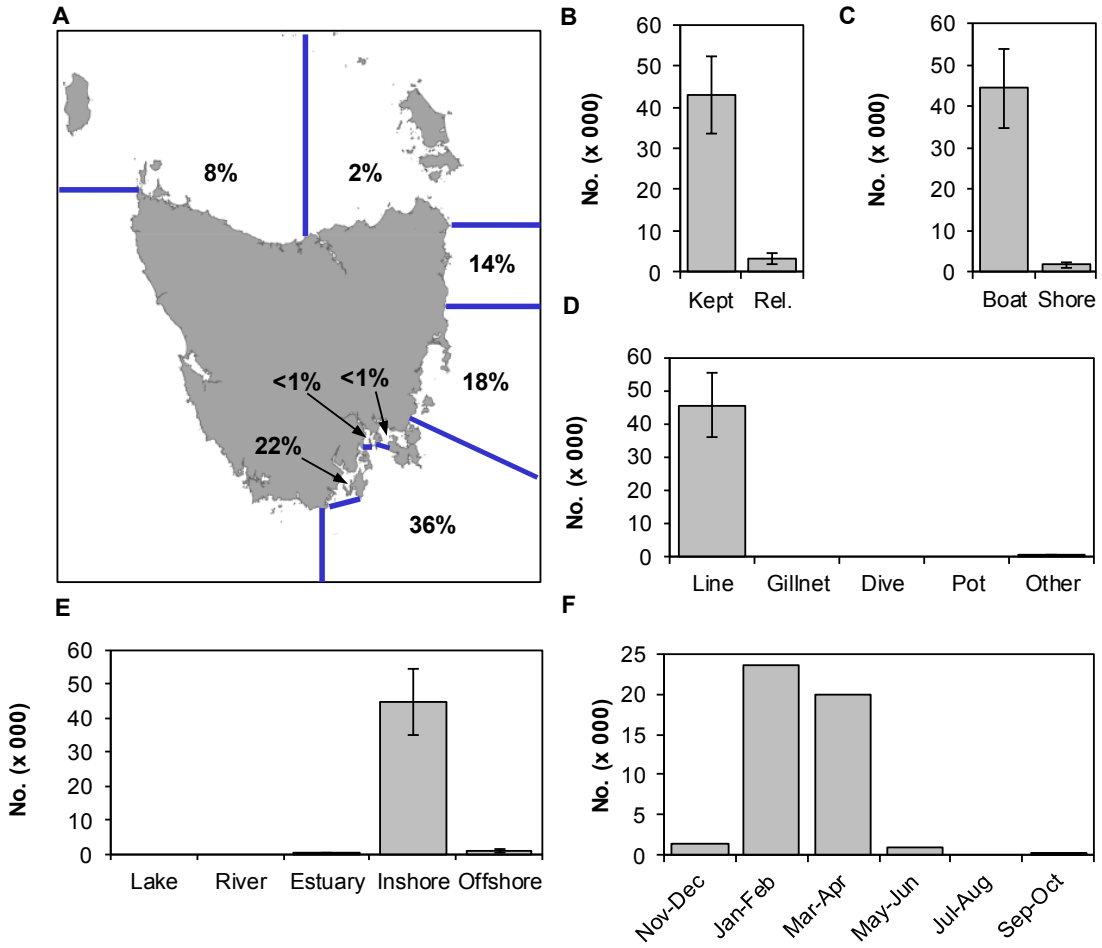


Fig. 21. Characteristics of the recreational fishery for Gould's Squid in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing 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

The Central East, North West, and East coasts were the main fishing regions for Southern Calamari (*Sepioteuthis australis*), with moderate catches also taken in the D'Entrecasteaux Channel, Norfolk-Frederick Henry Bay and Tamar Estuary (Fig. 22A). The vast majority of the catch was retained (Fig. 22B), with boat-based fishers accounting for two-thirds of the total catch (Fig. 22C). Line fishing (primarily using lures/jigs) represented the main capture method but there was also a small quantity taken by spear (typically associated with founder spearing) (Fig. 22D). Most of the Southern Calamari catch was from inshore coastal waters, with moderate quantities reported from estuarine areas (Fig. 22E). Catches were concentrated over the summer–autumn period (November–April); relatively low numbers were taken at other times of the year and especially during winter (Fig. 22F).

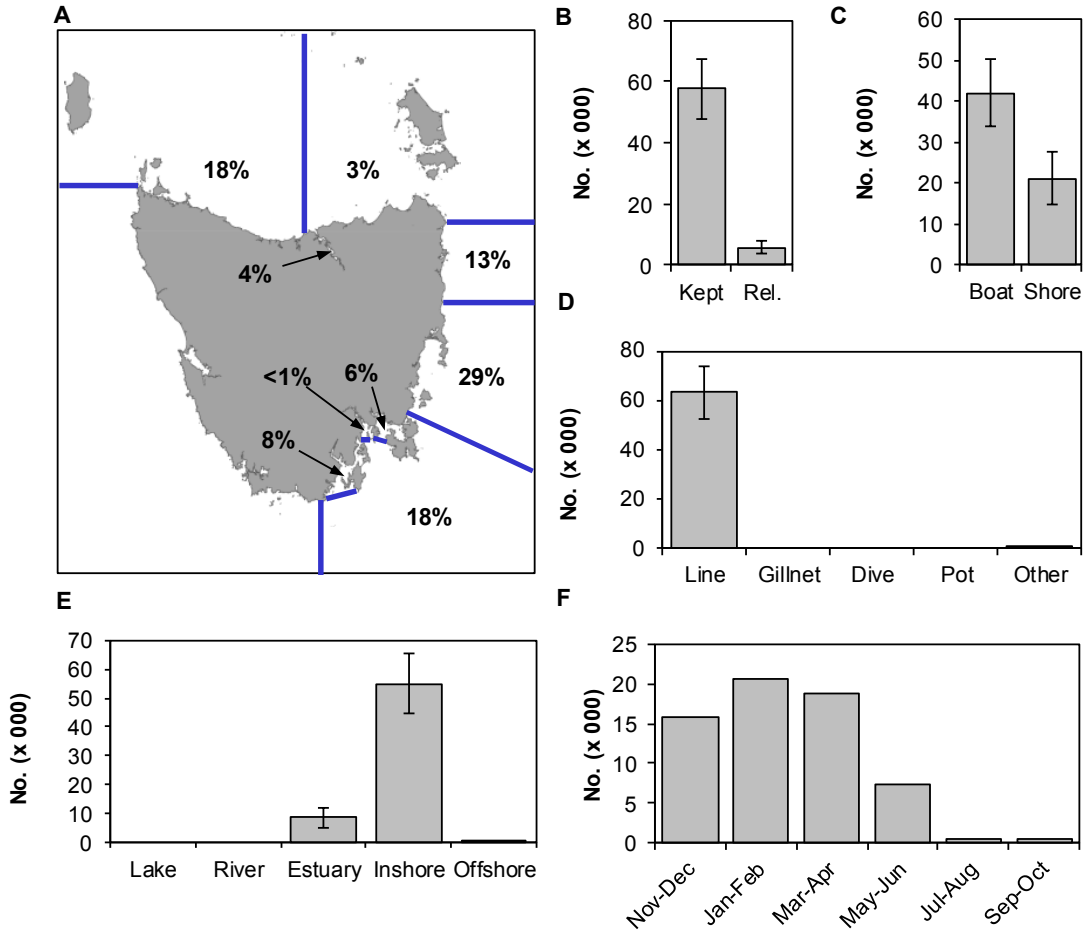


Fig. 22. Characteristics of the recreational fishery for Southern Calamari in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by 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 if not exclusively *Jasus edwardsii*) were concentrated in south eastern Tasmania (including the D'Entrecasteaux Channel) and off the West coast (Fig. 23A). Moderate quantities were also taken from the Central East, East and North West regions. Over half of the lobsters caught were retained (Fig. 23B) with boat-based fishers accounting for the vast majority of the catch (Fig. 23C). Lobster pots accounted for about 80% of the catch (68% of the harvest) and dive collection accounted for the bulk of the remainder (Fig. 23D). Virtually all of the catch was taken from inshore coastal waters (Fig. 23E), primarily between November and February (Fig. 23F). The impact of the fishery closure during September and October was clearly apparent.

The characterisation of the recreational lobster fishery based on fishing region, method and seasonality in this study is consistent with that reported for a targeted survey of lobster licence-holders conducted over the same period (Lyle and Tracey, 2014). The harvest estimate for the current survey (44,517 lobster) is, however, significantly lower than that estimated for the survey of licence-holders (83,722). This discrepancy can be attributed to the use of different bases for data expansion (general population verses licence-holders) and the fact that the current survey provides a 'big-picture' assessment of the recreational fishery and specialised activities, such as use of pots and dive methods to target Rock Lobster, may not be as well represented compared with common activities such as line fishing for key scalefish species. This is highlighted by the fact that just 11% 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 surveys (i.e. Lyle and Tracey, 2014).

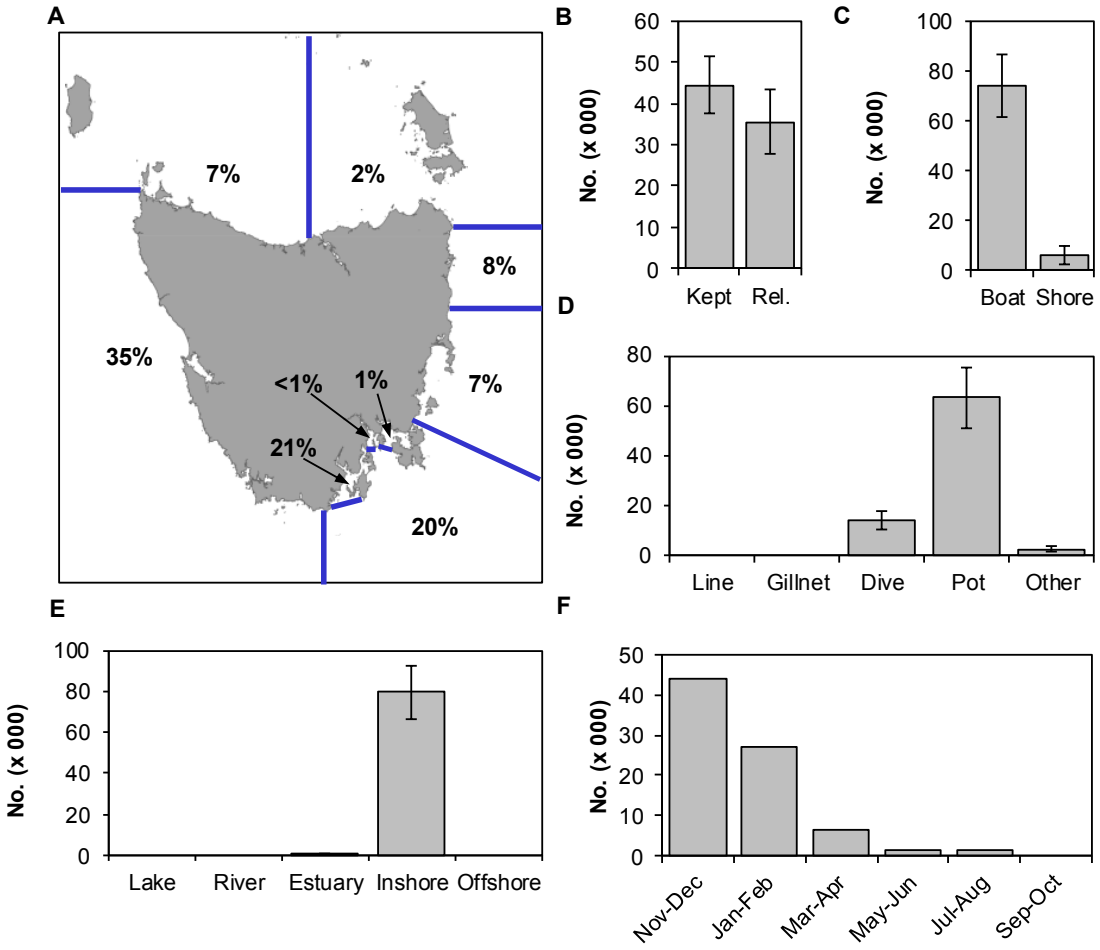


Fig. 23. Characteristics of the recreational fishery for Rock Lobster in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing 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, namely Blacklip Abalone (*Haliotis. rubra*) and Greenlip Abalone (*H. laevigata*). Blacklip Abalone are widely distributed in Tasmanian coastal waters and dominated (84%) the recreational catch (34,814; SE 8,422). Greenlip Abalone have a more restricted distribution to northern Tasmania and represented a minor component (16%) of the catch total (6,736; SE 2,288).

Abalone catches were largely concentrated in the South East and D'Entrecasteaux Channel, with moderate catch levels reported from the East coast region and northern Tasmania (Fig. 24A). Comparatively minor catches were reported from the Central East and West coast regions. The vast majority of the catch was retained (Fig. 24B), taken mainly by boat-based rather than shore-based divers (Fig. 24C&D) operating in inshore coastal waters (Fig. 24E). Catches were highest during summer, with a peak in January-February, and generally low from autumn to early spring (Fig. 24F).

The spatial, temporal and species composition characterisation of the abalone fishery reported here is consistent with that reported for a targeted survey of abalone licence-holders conducted over the same period (Lyle and Tracey, 2014). The harvest estimate for the current survey (38,541 Abalone) is, however, significantly lower than that estimated for the survey of licence-holders (66,438). This discrepancy can be attributed to the same issues outlined for Rock Lobster (Section 7.10), noting that in this instance only 1% of all fishing events reported by diarists in this study were targeted at Abalone.

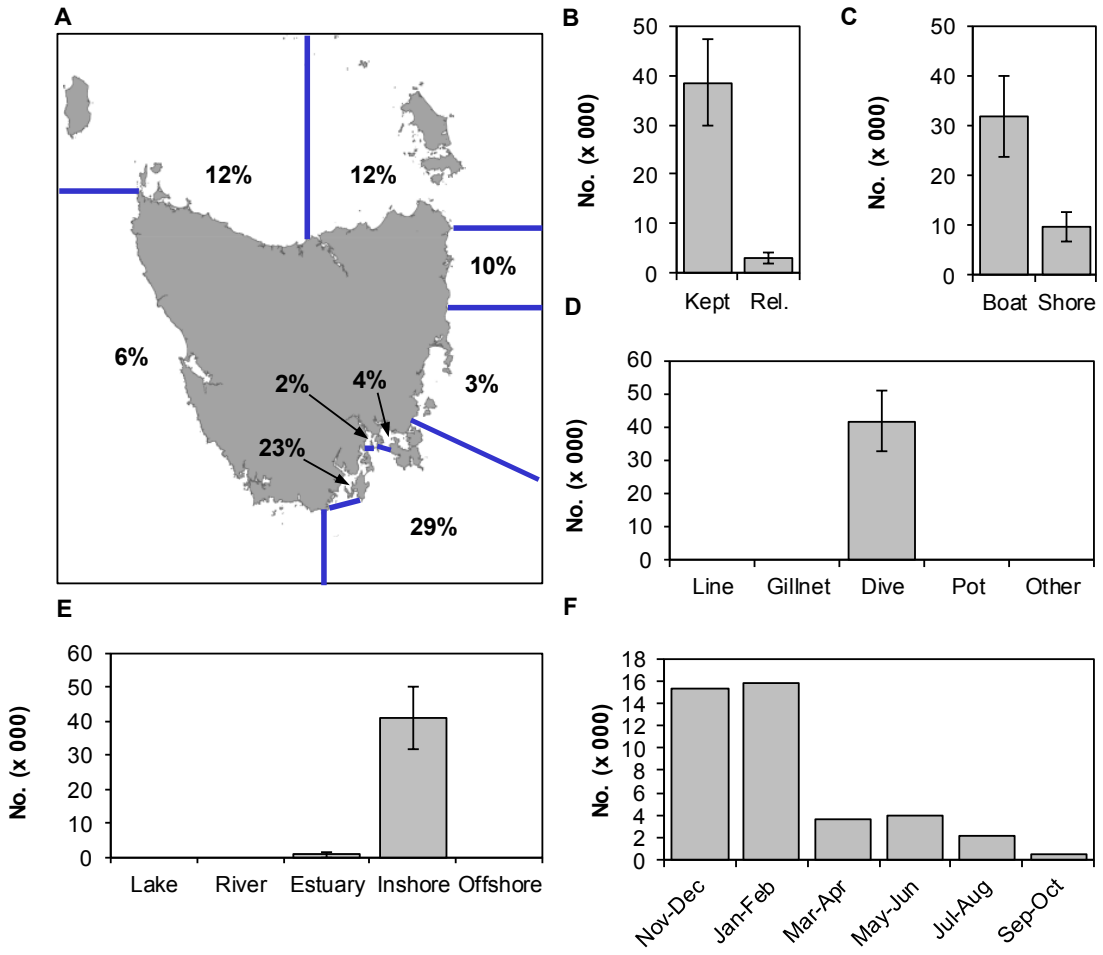


Fig. 24. Characteristics of the recreational fishery for Abalone in Tasmania during 2012-13: A) proportion (%) of the total catch (numbers) by fishing region; B) total numbers kept and released; C) total catch (numbers) by boat and shore based fishing activities; D) total catch (numbers) by fishing method; 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' by residents from outside of the fishing region, 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 and is based on Fig. 1. Detailed information on catch and effort by region is provided in Appendices 12 and 13.

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. 25A). 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 that from residents of adjoining areas, indicating the importance of effort 'imported' from the south of the state (Fig. 25B). Hobart and Launceston and North East residents accounted for the bulk of the fishing effort in the Eastern region with very limited activity from West and North West residents (Fig. 25C).

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. 25D-F). Fishing in lakes and dams accounted for 99% of the effort in the Central Plateau region, compared with 71% and 41% in the Western and Eastern regions, respectively. Reflecting the significance of river fishing in the Eastern region, the bulk of the effort (72%) involved shore-based fishing. Shore-based fishing was also important in the Western region (69%) and accounted for just over half (51%) of Central Plateau fisher days, confirming a significant shore-based component to the lake fisheries in Tasmania.

Trout clearly dominated the finfish catches (excluding small baitfish, principally Whitebait), accounting for over 78% of catch in the Eastern, 89% in the Western and 98% in the Central Plateau regions (Fig. 25G). The balance of the catch was comprised mainly of Black Bream, Redfin Perch and Atlantic Salmon in the Eastern region and Atlantic Salmon and River Blackfish in the Western region and Atlantic Salmon in the Central Plateau region (Fig. 25G).

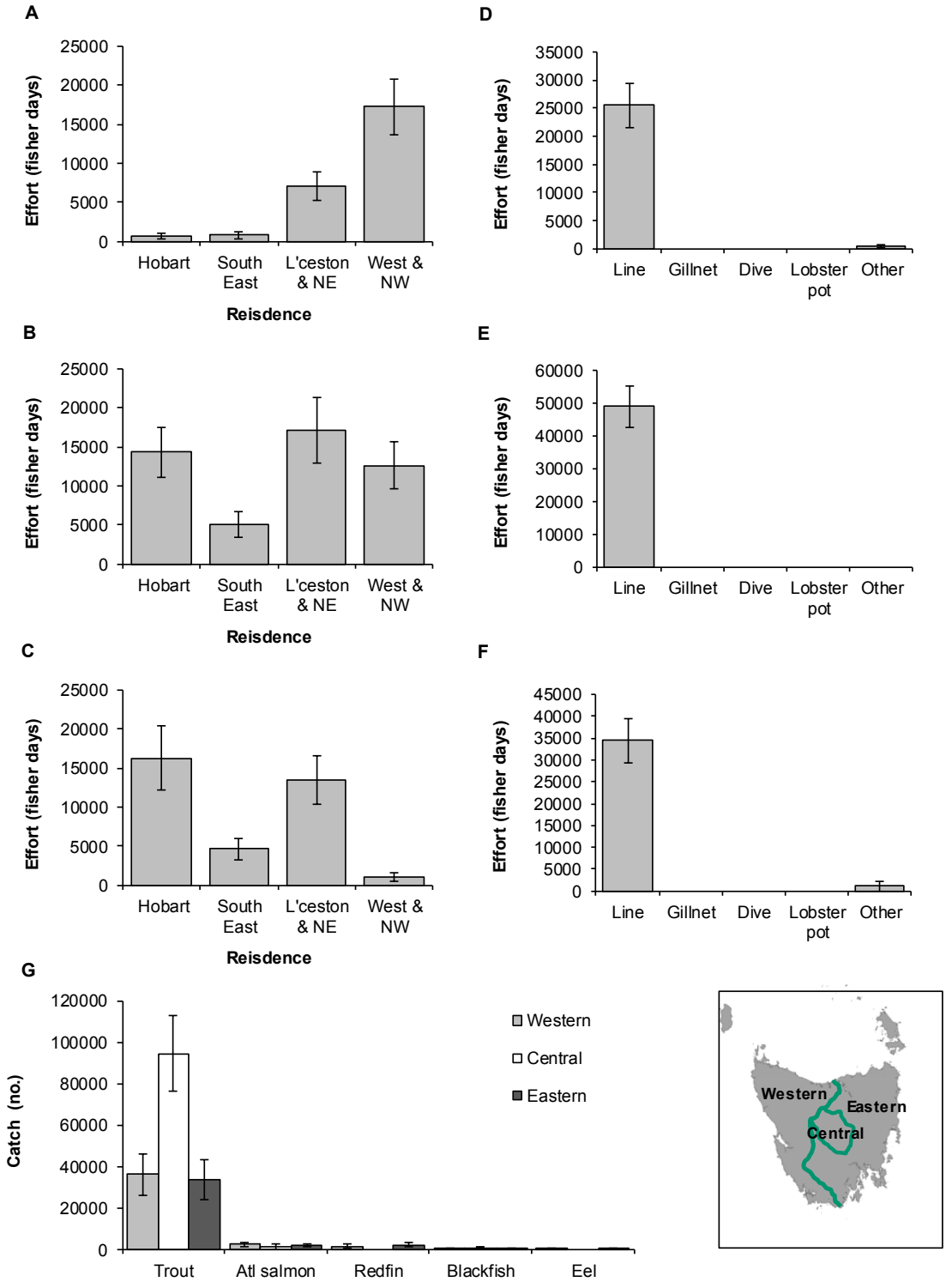


Fig. 25. Characteristics of the inland recreational fishery based on based on 2012-13 activity: A) fishing effort (fisher days) in the Western region; based on region of residence (statistical area) of fishers B) fishing effort in the Central Plateau region, based on region of residence of fishers; C) 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

The vast majority (82%) 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. 26A). A range of methods, including line, lobster pot and gillnet dominated effort in this region (Fig. 26B). Rock Lobster was the most commonly caught species, followed by Australian Salmon, Atlantic Salmon, Cod and Bastard Trumpeter (Fig. 26C).

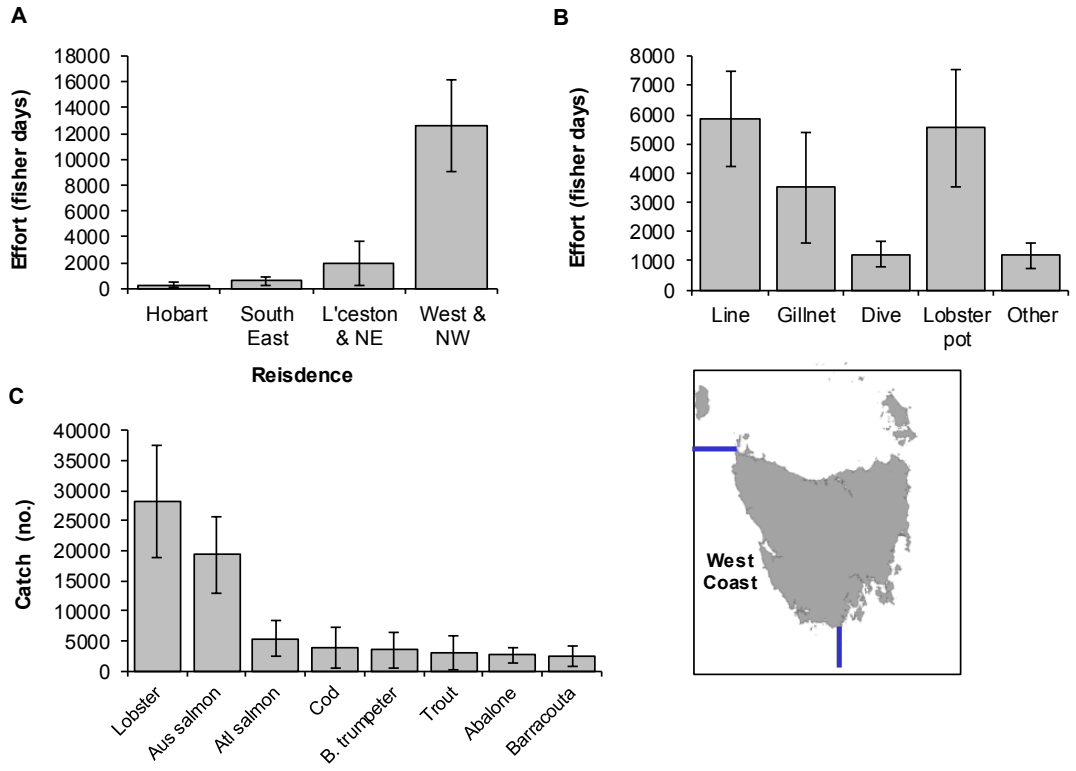


Fig. 26. Characteristics of the west coast recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.3 North West coast

Effort in this region was almost entirely (93%) due to local residents (West and North West) (Fig. 27A). Line fishing was the main method used; the 'other' methods category mainly included set-line and beach seine (Fig. 27B). Flathead, Australian Salmon and Mullet dominated catches, with a range of other finfish of secondary importance (Fig. 27C).

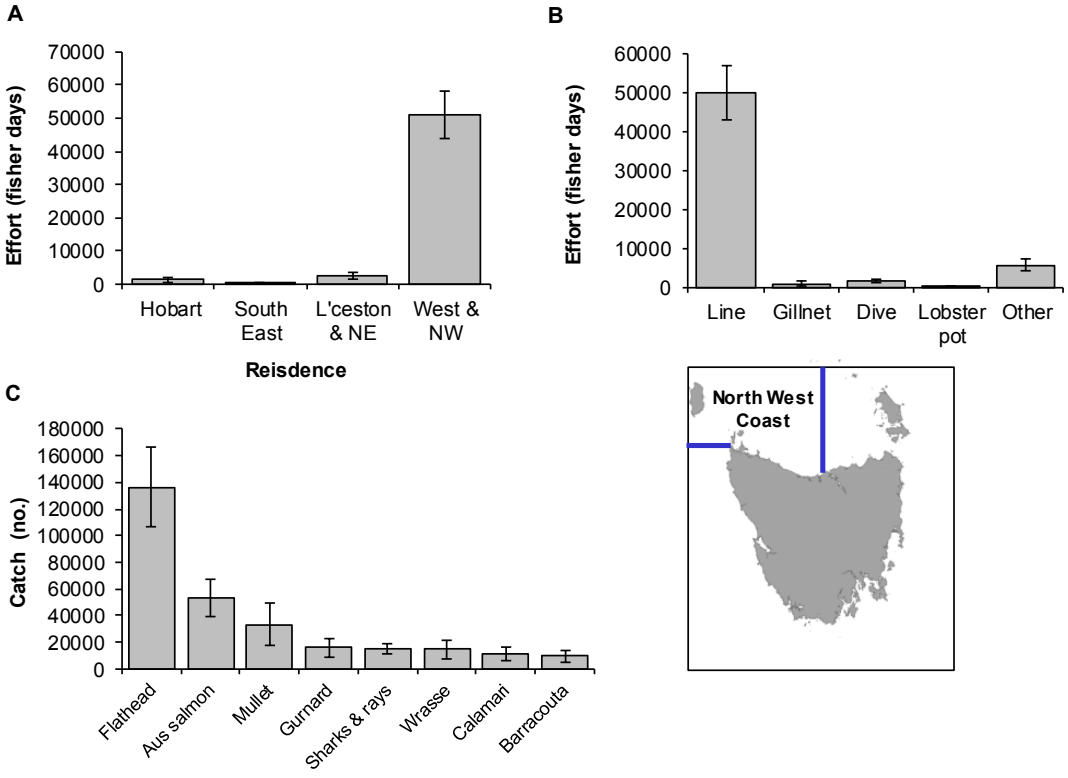


Fig. 27. Characteristics of the North West coast recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by platform; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.4 Tamar Estuary

Residents of the surrounding area (Launceston and North East) accounted for the vast majority (90%) of the fishing activity in the Tamar, with some fishers, mainly from the West and North West, travelling to fish the area (Fig. 28A). Line fishing was by far the most commonly used method in the Tamar (Fig. 28B), with Flathead and Australian Salmon dominating catches, followed in importance by Flounder and Cod and a range of other minor scalefish species (Fig. 28C).

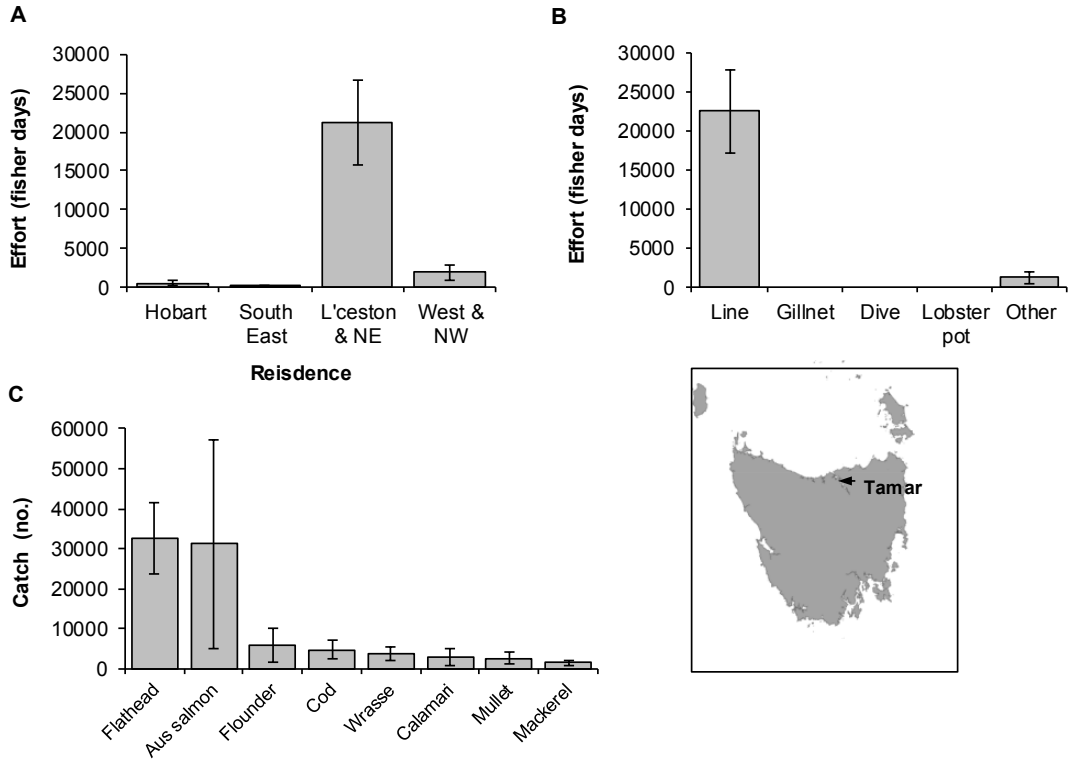


Fig. 28. Characteristics of the recreational fishery in the Tamar Estuary based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.5 North East coast

Locally based fishers (Launceston and North East) accounted for over 80% of the total effort in the North East, with low levels of effort from residents of other parts of the state (Fig. 29A). Line fishing was the main method used, dive and other methods were of secondary importance (Fig. 29B). Flathead were the most commonly caught species, followed by comparatively low catches of a range of other species including Black Bream, Australian Salmon, and Barracouta (Fig. 29C).

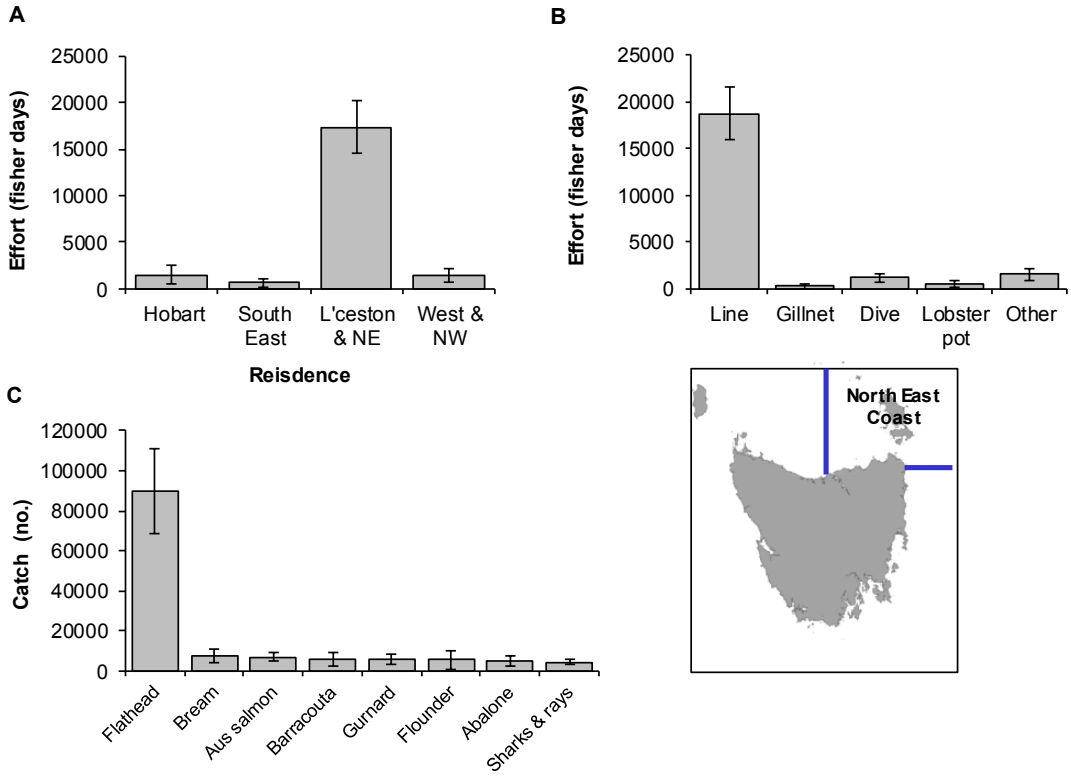


Fig. 29. Characteristics of the recreational fishery in the North East region based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent 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 (71%), with residents travelling from the Hobart and West and North West areas of secondary importance (Fig. 30A). Line fishing followed by pot effort were the main fishing methods (Fig. 30B), and Flathead and Australian Salmon the main species caught(Fig. 30C). Black Bream and tuna and Southern Calamari were also relatively common species.

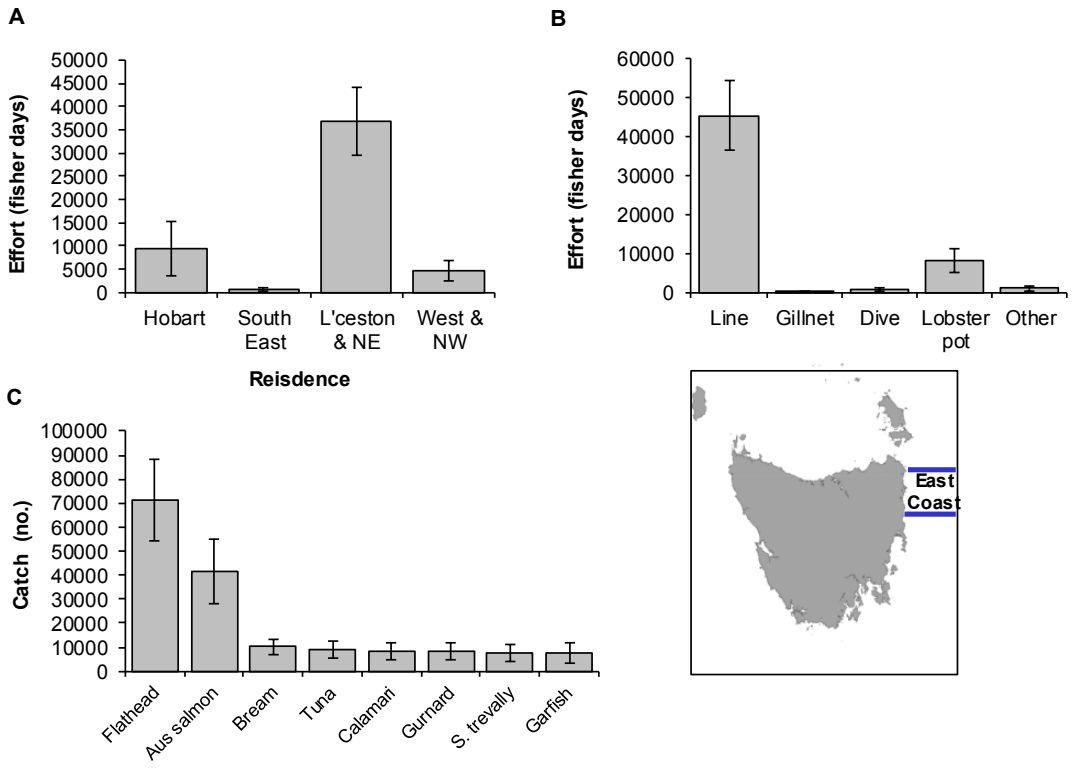


Fig. 30. Characteristics of the East coast recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.7 Central East coast

Although the South East statistical area represented the adjacent region, fishing effort by Hobart (35%) and Launceston and North East (31%) residents exceeded that of locally based residents (23%) (Fig. 31A). Line and pot fishing methods were the main activities in the region (Fig. 31B) with Flathead by far the most commonly caught species (Fig. 31C). A variety of other finfish and shellfish (scallops) also caught but compared with Flathead, numbers were relatively low.

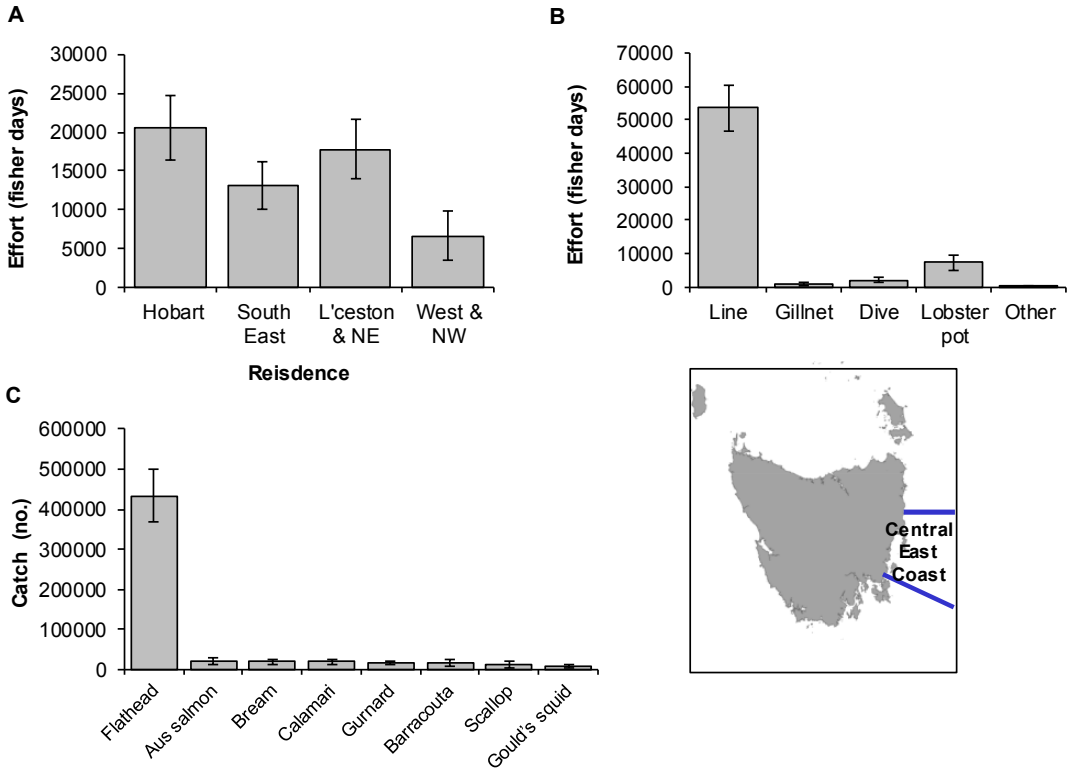


Fig. 31. Characteristics of the Central East coast recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.8 South East coast

The impact of fishers residing in the Hobart area was clearly evident, accounting for 72% of the fisher days of effort in the South East coast, with residents of the surrounding areas representing the bulk of the remaining effort (Fig. 32A). Line and potting were the dominant fishing methods, with gillnet and dive effort of secondary importance (Fig. 32B). Catches were dominated by Flathead, followed by Jack Mackerel, Gurnard, Gould's Squid and Rock Lobster (Fig. 32B).

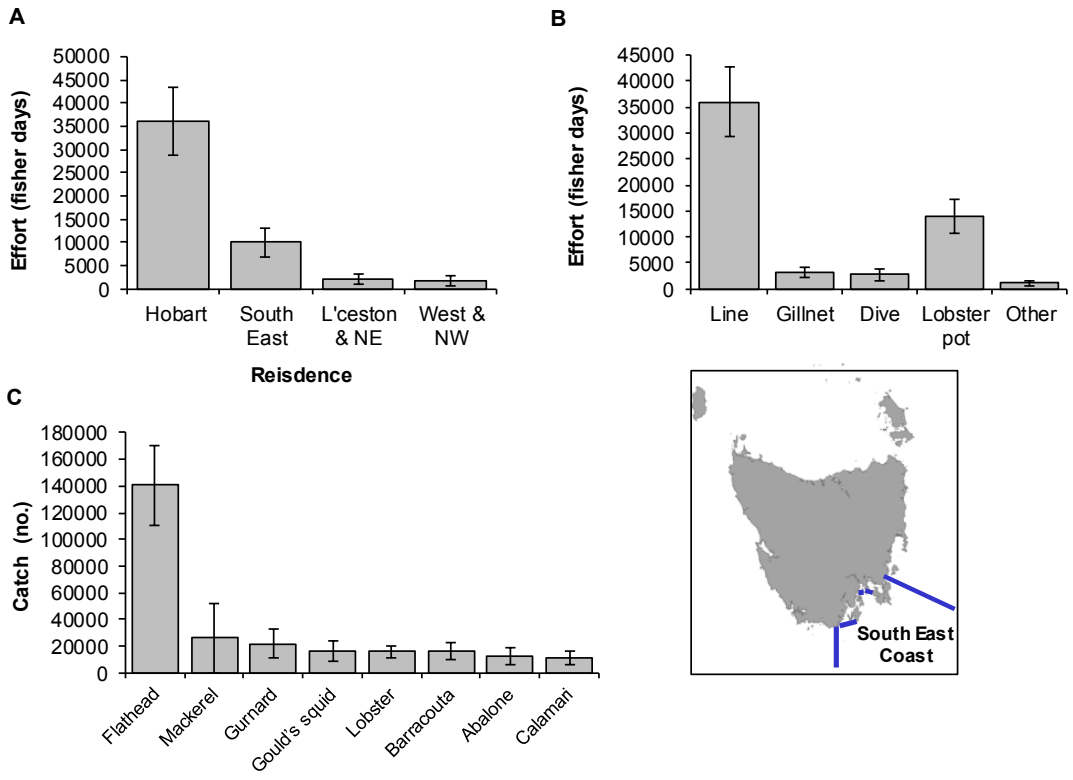


Fig. 32. Characteristics of the South East coast recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.9 Norfolk-Frederick Henry Bay

Fishers from the surrounding regions, Hobart and South East statistical areas accounted for virtually all of the fishing effort in the Norfolk-Frederick Henry Bay region (Fig. 33A). Line fishing was the main fishing method (Fig. 33B) with Flathead accounting for the vast majority of the overall catch, Australian Salmon and Whiting were next in importance (Fig. 33C).

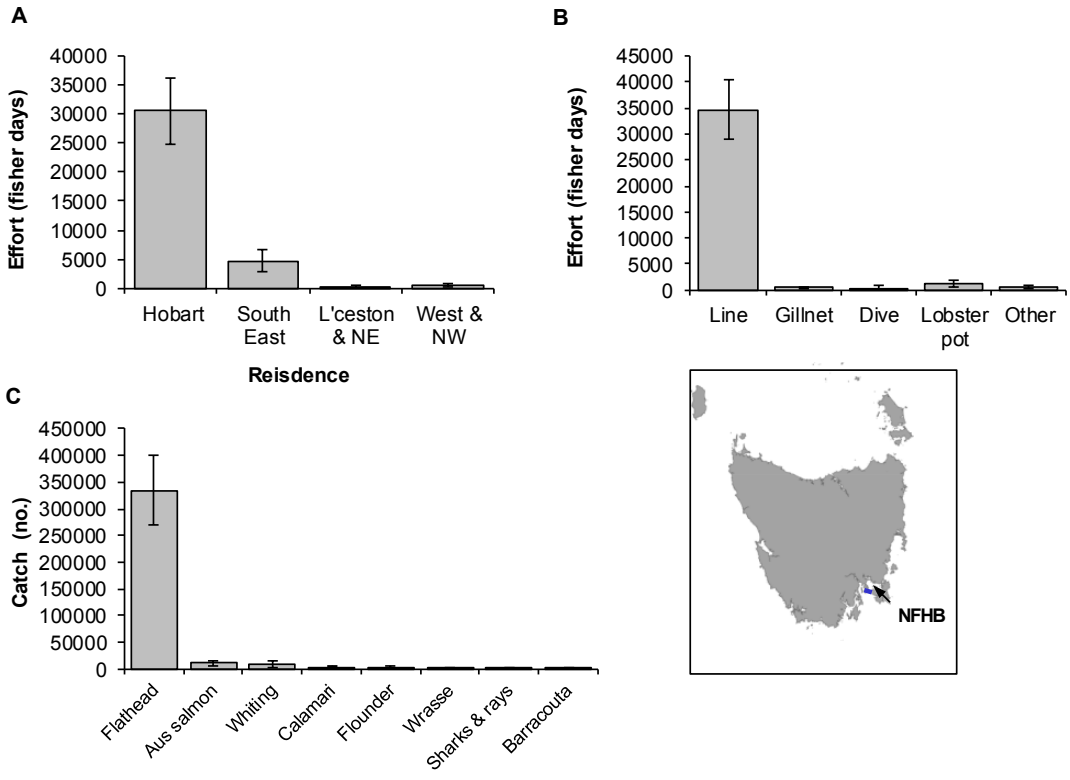


Fig. 33. Characteristics of the Norfolk-Frederick Henry Bay recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

8.10 Derwent Estuary

The vast majority (93%) of the fishing activity in the Derwent Estuary was attributed to locally based fishers (Fig. 34A) and primarily involved line fishing (Fig. 34B). While Flathead dominated catches, Barracouta, Black Bream and Australian Salmon were of secondary importance (Fig. 34C).

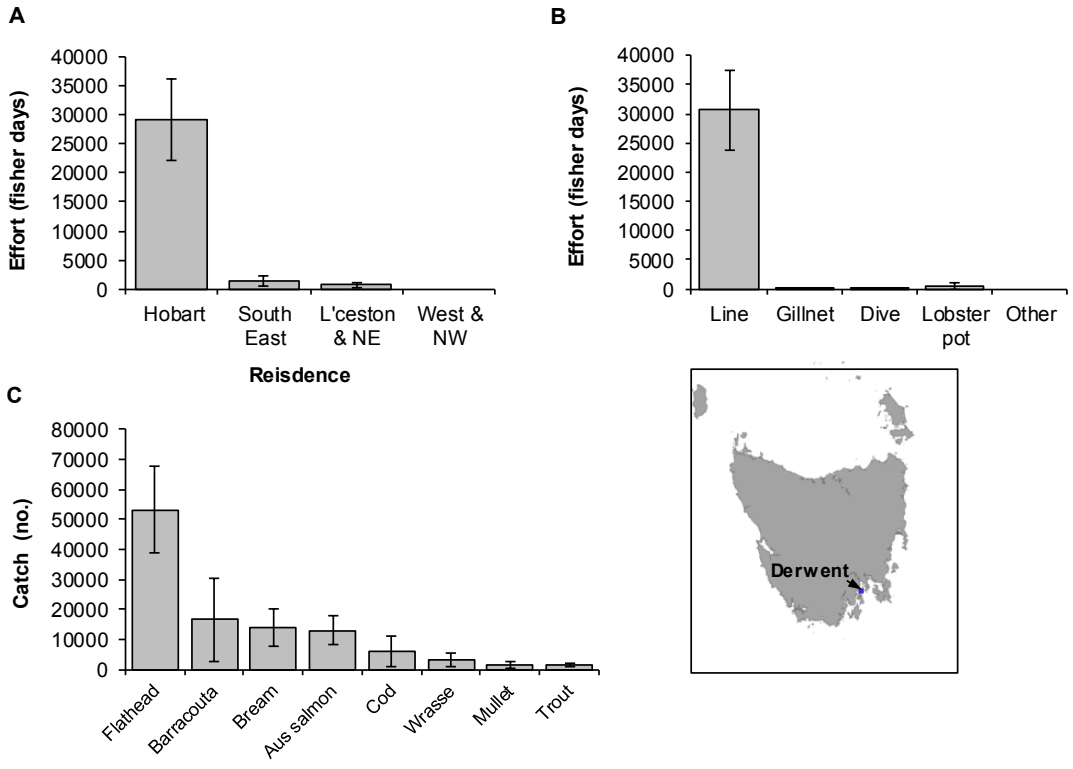


Fig. 34. Characteristics of the Derwent recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

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 12). The Channel was clearly very popular amongst locals, with effort more or less equally attributable to residents of the Hobart (53%) and South East (46%) statistical areas (Fig. 35A). Line fishing accounted for the majority of the fishing activity in this region, with potting of secondary significance (Fig. 35B). Numerically Flathead were the most commonly caught species, species of secondary importance included Australian Salmon, Rock Lobster, Barracouta and Gould's Squid (Fig. 35C). 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).

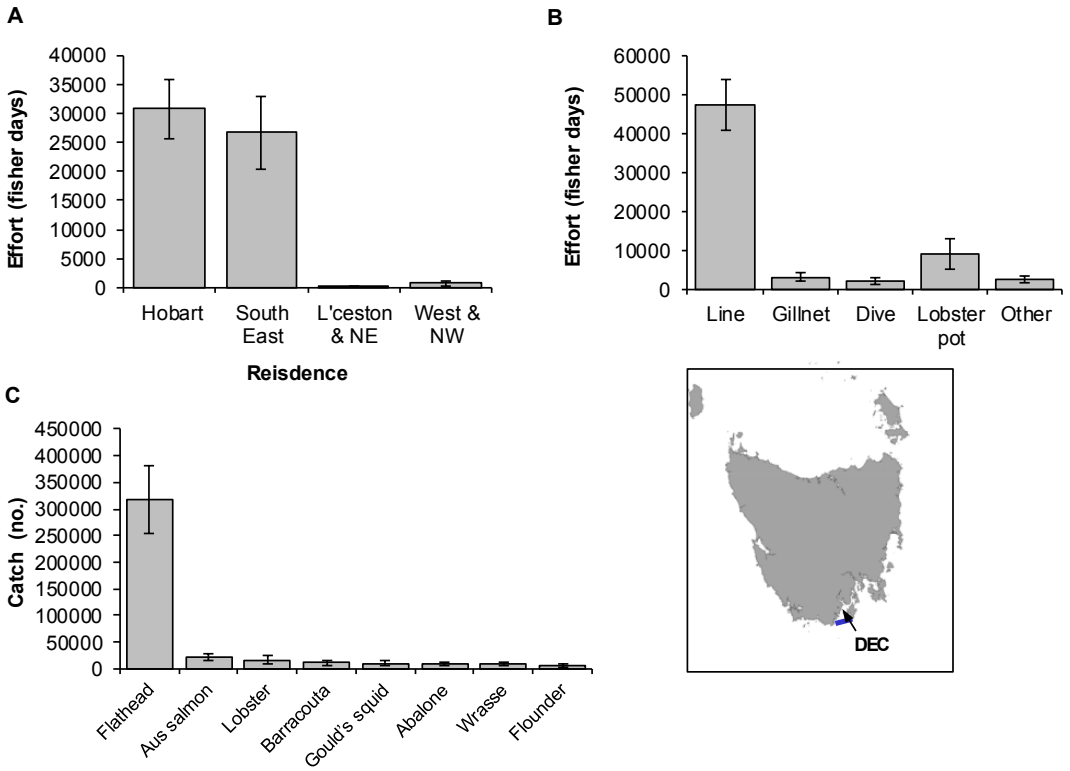


Fig. 35. Characteristics of the D'Entrecasteaux Channel recreational fishery based on 2012-13 activity: A) fishing effort (fisher days) based on the region of residence (statistical area) of fishers; B) effort (fisher days) by method; and C) catch (numbers) for the key species. Error bars represent one standard error.

9. Expenditure and fishing boat ownership and value

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.

9.1 Recreational fishing expenditure

During 2012-13 Tasmanian residents were estimated to have spent almost $93 million on goods and services relevant to recreational fishing in Tasmania, equivalent to an average of $1,840 per fisher household or $1008 per fisher (Table 11). Direct expenditure on boats and trailers accounted for over $52 million (56% of the total), with boat and trailer purchases (capital items) representing about $22 million (24% of the total). Fishing gear purchases and boat running costs (mainly fuel and oil) each represented over $11 million (around 12%) of the total expenditure, with vehicle travel costs (fuel), boat and trailer maintenance and insurance/registration also significant cost items (> $7.5 million each). Other items involving expenditure in excess of $2 million included safety gear, fishing licences and other fees, accommodation (associated with fishing) and boat mooring, marina and storage fees. Reported total expenditure on fishing charters and vessel hire ($67,000) is likely to be a significant underestimate, partly due to the rare occurrence of charter boat fishing reported by survey respondents but also because it does not take account of expenditure by visitors, noting that interstate fishers represent a significant component of the charter boat fishery.

9.2 Boat ownership and market value

An estimated 28,256 (SE 1791) privately owned boats were used for recreational fishing during 2012-13, with a combined estimated replacement (market) value of $439 million (SE $45 million) and an attributed value to fishing, based on the proportion of overall usage represented by recreational fishing, of $359 million (SE $36 million).

Regionally, the number and value of boats used for recreational fishing generally reflected the relative size of the fisher population, with the greatest number and value of boats owned by residents of the Hobart area (Fig. 36). Rates of boat ownership for households that included at least one active fisher during 2012-13 ranged between 42-45% in all areas apart from the South East, where 62% of fishing households owned at least one boat used for recreational fishing.

Attributed values for boats averaged between $11,175 (Hobart) and $14,335 (Launceston and North East) per vessel, with an overall average of $12,708 per boat. These regional differences were particularly influenced by differences in the level of usage attribution to fishing as opposed to stated replacement value of the boats; replacement values averaged between $14,585 and $16,883 per vessel for South East West and North West residents. respectively.

Table 11. Estimated annual expenditure by Tasmanian households for key items directly attributed to recreational fishing for 2012-13.

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)	2,526,331	445,734
Bait/berley/ice	1,560,569	128,616
Boat/trailer purchase or capital items (e.g. motors, electronics)	21,933,313	5,541,884
Boat running costs - fuel/oil	11,018,713	1,522,193
Boat/trailer- maintenance (incl. servicing)	9,778,901	1,558,029
Boat/trailer - insurance/registration	7,517,975	675,329
Boat - mooring/marina/storage fees	2,103,386	808,574
Camping gear (associated with fishing)	6,264,932	2,300,496
Fishing gear/tackle (including dive gear)	11,069,360	1,340,554
Fishing books/magazines	574,406	73,571
Fishing charter/vessel hire	***67,105***	***34,119***
Safety gear (life Jackets, flares etc)	3,026,501	436,177
Specialised clothing (e.g. wet weathers, waders)	1,534,996	187,773
Licences/fees (fishing club membership, competitions)	2,762,800	215,848
Travel costs - vehicle fuel	8,827,691	701,227
Other*	***2,100,457***	***1,143,589***
Total	92,667,438	8,520,635

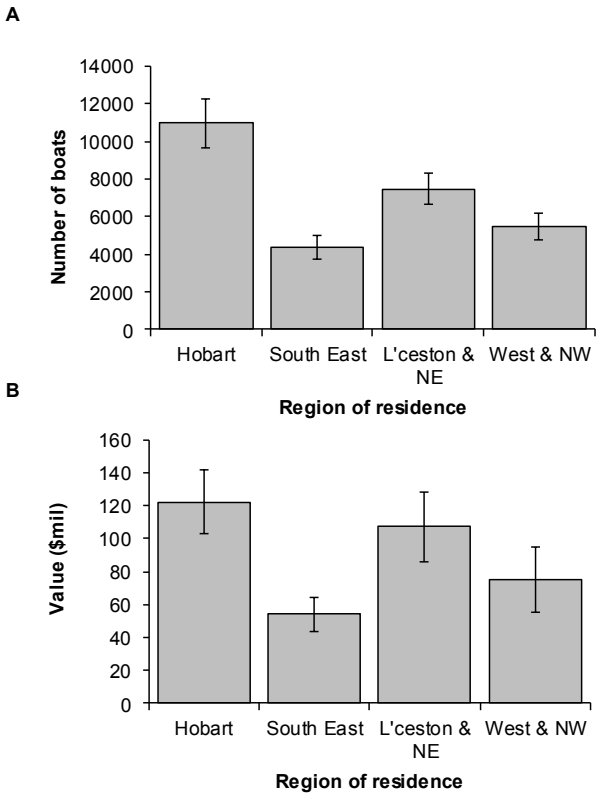


Fig. 36. (A) Estimated number of boats owned by Tasmanian residents and used for recreational fishing during 2012-13; and (B) their attributed replacement value by region of residence (ABS statistical area). Error bars represent one standard error.

9.3 Boat size

The majority (>80%) of the boats used for recreational fishing ranged between 3.0 – 6.9 m in length, with over a third of all vessels in the 4.0-4.9 m size class (Fig. 37). Although the majority (80%) of the vessels were powered with engines, row and paddle boats (including kayaks) accounted for a relatively large component of the fleet (19%), while sail boats were insignificant (1%) in terms of numbers.

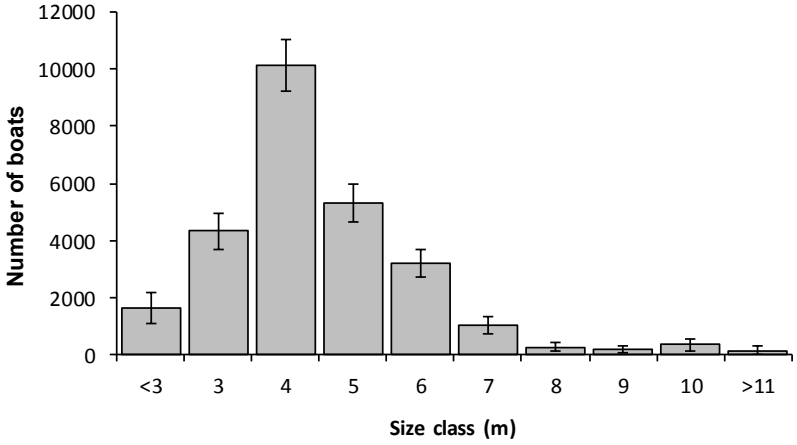


Fig. 37. Estimated number of boats by vessel length (size class) used by Tasmanian residents during 2012-13 for recreational fishing. Error bars represent one standard error.

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 (mean 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. 38). 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 unimportant for the vast majority of 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 and environment emerged as the most important reasons for fishing for over two-thirds of respondents, further highlighting the significance of non-catch motives for recreational fishers (Fig. 39). Consuming and catching fish were the most important motives for about a quarter of the fishers interviewed.

10.1.2 Factors influencing motivation

Of the respondent grouping factors (age group, 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 and relaxation based motives, age was a significant factor for social and selected catch 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 who fished in both fresh and saltwater tended to attribute greater importance to environmental, relaxation and catch motives for fishing than freshwater-only and saltwater-only 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.
- South East statistical area residents attributed higher importance to catching fish and lobsters for food than did residents of the other regions.

10.1.3 Comparison with previous surveys

The results of the present survey are generally consistent with two previous statewide 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") and consumptive ("to catch fresh fish, lobsters, etc. for food") motives (Fig. 38). The overall ranking of the different motives has been relatively stable over the past decade or so, although within several categories there were significant differences between surveys in terms of responses. For instance, there has been a general increase over time in the level of importance that fishers attribute to "… the enjoyment or challenge of catching fish", to the importance of catching "... fresh fish, lobsters, etc. for food" and spending "… time with family" and "… with other friends" (Fig.38).

Motivation items	Survey	Mean	Rank	Response Distribution	χ^2	*P*
to be out doors … in the fresh air … to enjoy nature	2013	3.51	1		0.87	0.648
	2008	3.53	1			
	2001	3.48	1			
to relax or unwind	2013	3.47	2		3.4	0.182
	2008	3.41	2			
	2001	3.41	2			
for the enjoyment or challenge of catching fish	2013	3.27	3		34.48	<0.0001
	2008	3.17	4			
	2001	3.01	3			
to catch fresh fish, lobsters, etc for food	2013	3.16	4		113.99	<0.0001
	2008	3.22	3			
	2001	2.77	6			
to spend time with family	2013	3.05	5		11.24	0.004
	2008	3.15	5			
	2001	3.01	3			
to spend time with other friends	2013	3.04	6		27.55	<0.0001
	2008	3.09	6			
	2001	2.87	5			
to catch fish to share with friends and family	2013	2.96	7			
to be on your own … to get away from people	2013	2.26	8		1.59	0.451
	2008	2.30	7			
	2001	2.26	7			
to catch a trophy-sized fish	2013	1.47	9			
to compete in fishing competitions of any kind	2013	1.19	10		0.12	0.941
	2008	1.19	8			
	2001	1.17	8			

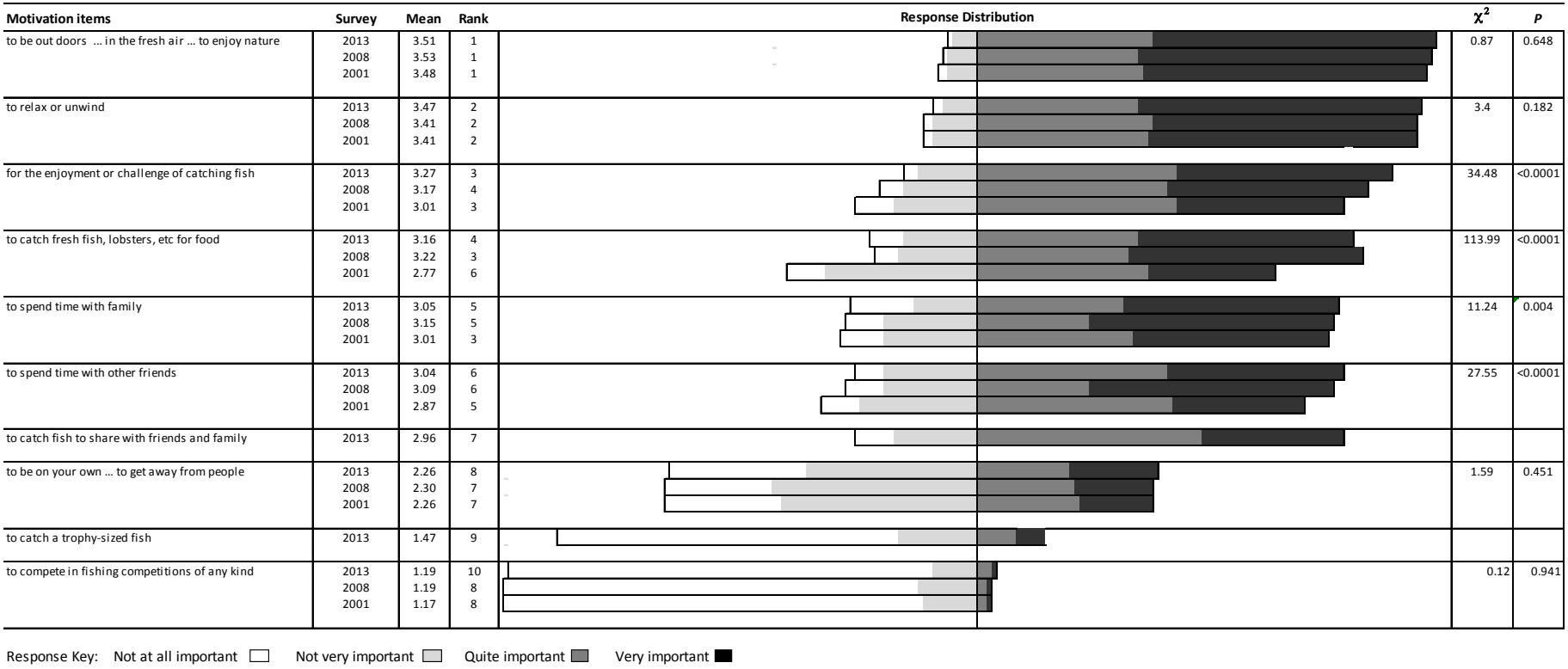


Fig. 38. Mean scores and response distribution for the importance of motivational factors for recreational fishing provided by recreational fishers (2013 survey), compared with results from previous state-wide surveys of recreational fishers (2001 and 2008).
Rankings are based on the overall level of importance given to each statement.

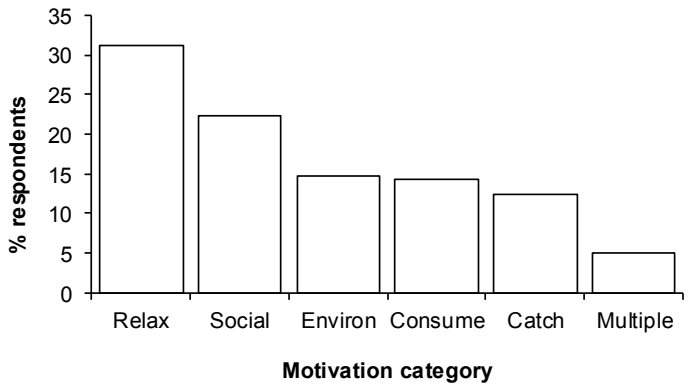


Fig. 39. Main motivational categories identified by recreational fishers (number of respondents = 709).

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**	**χ2**	**df**	***p***	**χ2**	**df**	***p***	**χ2**	**df**	***p***	**χ2**	**df**	***p***
Catch	for the enjoyment or sport of catching fish, Lobsters, etc	5.71	4	ns	3.36	3	ns	17.52	5	0.004	13.37	53	0.004
	to catch a trophy-sized fish	4.38	4	ns	4.26	3	ns	35.15	5	<0.001	41.89	3	<0.001
	to compete in fishing competitions of any kind	11.67	4	0.02	1.01	3	ns	16.72	5	0.005	19.07	3	<0.001
Consumption	to catch fresh fish, Lobsters, etc for food	13.56	4	0.009	11.80	3	0.008	3.31	5	ns	33.81	3	<0.001
	to catch fish to share with friends and family	7.07	4	ns	1.28	3	ns	6.52	5	ns	9.54	3	0.023
Relaxation	to relax or unwind	6.45	4	ns	2.42	3	ns	14.47	5	0.012	24.70	3	<0.001
	to be on your own … to get away from people	4.44	4	ns	2.65	3	ns	19.34	5	0.002	17.26	3	<0.001
Social	to spend time with family	32.85	4	<0.001	1.61	3	ns	7.14	5	ns	3.71	3	ns
	to spend time with other friends	15.15	4	0.004	0.78	3	ns	10.00	5	ns	9.15	3	0.027
Environment	to be outdoors ... in the fresh air … to enjoy nature	2.78	4	ns	3.94	3	ns	6.27	5	ns	16.75	3	<0.001

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 (95%) of respondents agreed that they would still consider a fishing trip successful even if no catch was taken, the majority (79%) also indicated that they would still go fishing even if they thought they would not catch anything, and most (63%) disagreed with the statement that were not satisfied unless they at least caught something (Fig. 40). 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 still remains at the very core of the activity.

There was strong agreement from respondents (91%) with the statement "I usually eat the fish I catch", this statement had the highest mean score (4.57) (Fig. 40). This was followed in level of agreement (88% respondents and mean score 4.47) to the statement "I would rather keep just enough fish for a feed than take the bag limit". Collectively, 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 from fishers (Fig. 40). 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

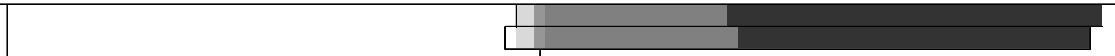
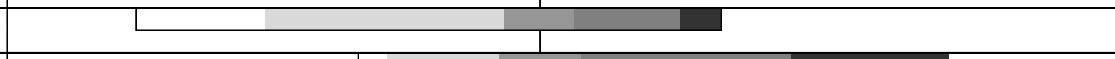
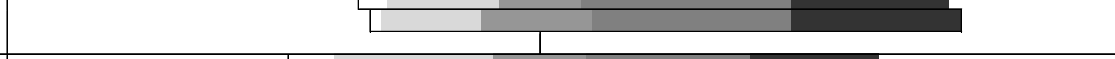
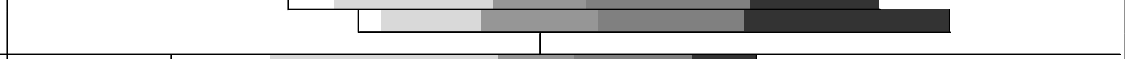
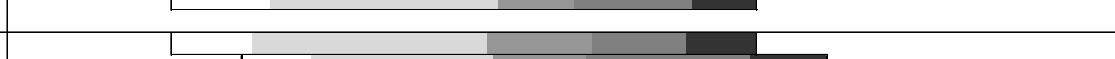
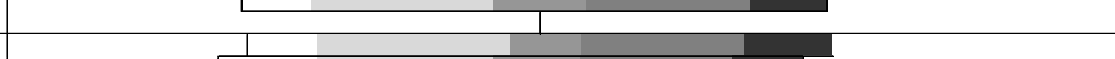
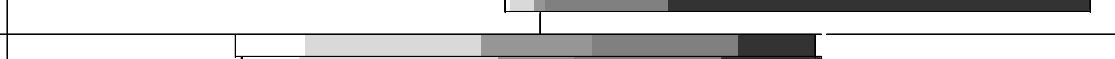
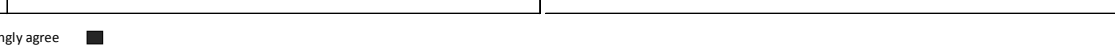
Of the grouping factors, water body fished emerged as the main factor influencing responses to several statements relating to consumptive orientation, avidity was a significant factor in responses relating to satisfaction relating to catching something and catching enough for a feed, residence was a significant factor in the response to statements about releasing catch, and residence and age were significant factors in relation to consumption of the catch (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 agreed more strongly that fishing trips could be successful even if no fish were caught than 'other' fishers;
- freshwater-only fishers were less concerned about fishing in areas there were several kinds of fish to catch than 'other' fishers;
- freshwater-only fishers were less motivated about consuming the catch than 'other' fishers;
- fishers in the oldest age group (60 plus) were more motivated by consumption of the catch than fishers in the 30-44 age group.

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, catch variety and releasing fish were comparable with the 2008 recreational fishing survey (Fig. 40). 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 less concerned about catching large fish. This was offset to some extent by a greater preference for catching more fish by fishers in 2013 compared with 2008, although in both surveys responses to the statement were polarised between agreement and disagreement. Although support was strong in both surveys for the concept of catching enough fish for a feed, fishers in 2008 indicated stronger agreement.

Domain	Consumptive orientation item	Survey	Mean	Rank	Response Distribution	χ^2	*P*
Catching 'something'	A fishing trip can still be sucessful, even if no fish are caught	2013	1.45*	11		2.63	0.105
		2008	1.55*	8			
	If I thought I wouldn't catch any fish on trip, I would still go fishing	2013	2.01*	10		0.61	0.436
		2008	1.96*	7			
	I'm not satisfied unless I catch at least something	2013	3.52*	4			
Catch variety	I like to fish where there are several kinds of fish to catch	2013	3.62	3		0.44	0.508
		2008	3.69	3			
Catching large fish	I'd rather catch one or two bigger fish than ten smaller fish	2013	3.30	5		38.64	<0.0001
		2008	3.70	2			
	The bigger the fish I catch the better the trip	2013	2.69	9			
	I prefer to fish where I know I may catch a very large fish	2013	2.73	8		21.38	<0.0001
		2008	3.03	4			
Catching numbers of fish	The more fish I catch, the happier I am	2013	3.03	6		4.62	0.03
		2008	2.89	6			
Retaining fish	I would rather keep just enough fish for a feed than take the bag limit	2013	4.47	2		4.77	0.03
		2008	4.60	1			
	I like to release most of the fish I catch	2013	3.02*	7		1.22	0.269
		2008	2.94*	5			
Consume catch	I usually eat the fish I catch	2013	4.57	1			

Response Key: Strongly disagree ☐ Mildly disagree ☐ Neutral ▒ Mildly agree ▒ Strongly agree ■

Fig. 40. Mean scores and response distribution to consumptive orientation statements provided by recreational fishers (2013 survey), compared with results from the 2008 state-wide survey 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	2.14	4	ns	0.59	3	ns	5.26	5	ns	14.15	3	0.003
	if I thought I wouldn't catch any fish on a trip, I would still go fishing	3.13	4	ns	0.41	3	ns	5.04	5	ns	7.65	3	ns
	I'm not satisfied unless I catch at least something	4.31	4	ns	4.98	3	ns	11.83	5	0.04	7.66	3	ns
Catch variety	I like to fish where there are several kinds of fish to catch	1.28	4	ns	4.21	3	ns	1.53	5	ns	46.18	3	<0.001
Catching large fish	I'd rather catch one or two bigger fish than ten smaller fish	7.31	4	ns	2.00	3	ns	4.86	5	ns	2.72	3	ns
	the bigger the fish I catch the better the trip	6.03	4	ns	6.89	3	ns	1.65	5	ns	0.86	3	ns
	I prefer to fish where I know I may catch a very large fish	4.57	4	ns	1.94	3	ns	4.46	5	ns	3.47	3	ns
Catching numbers of fish	the more fish I catch the happier I am	5.29	4	ns	5.24	3	ns	5.13	5	ns	2.82	3	ns
Retaining fish	I would rather keep just enough fish for a feed than take the bag limit	1.36	4	ns	1.41	3	ns	19.06	5	0.002	9.80	3	0.02
	I like to release most of the fish I catch	6.69	4	ns	8.19	3	0.04	2.44	5	ns	6.70	3	ns
Consume catch	I usually eat the fish I catch	14.85	4	0.005	15.01	3	0.002	1.67	5	ns	41.78	3	<0.001

10.3 Fisher satisfaction

10.3.1 Satisfaction with fishing

Respondents who had fished during the diary period were asked how satisfied they were with the overall quality of the fishing they had done. The majority (74%) indicated that they were satisfied, this compared with satisfaction ratings of 76% in 2001 and 81% in 2008 (Fig. 41). General dissatisfaction was, however, higher in 2013 at 25% when compared with the previous surveys (18-19%).

There were a number of reasons cited for general dissatisfaction, most (52%) related to poor catch rates mainly attributed to depleted stocks, small size of fish (18%) was next in importance and was followed by impacts of weather conditions (9%) and general lack of opportunity to go fishing (7%). A range of other reasons were cited including competition with commercial fishers, predation (on trout) by cormorants, biotoxin closure (east coast) and impacts of east coast bush fires during the summer of 2012-13.

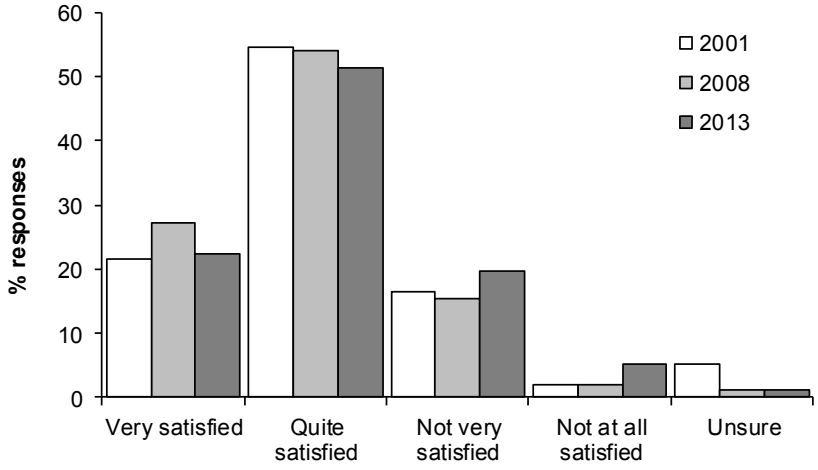


Fig. 41. Response category distribution for overall satisfaction with fishing based on 2001, 2008 and 2013 general fishery surveys (number of 2013 respondents = 561).

10.3.2 Satisfaction with management

Respondents were asked about general satisfaction with the management of recreational fishing in Tasmania, with focus split between management of sea fishing and freshwater fishing depending on the fishery (or fisheries) relevant to the respondent. Overall, the majority of fishers were satisfied with the management of their fishery, 72% for sea fishing and 75% for freshwater fishing, with dissatisfaction rates of 17% for sea fishing and 15% for freshwater fishing (Fig. 42). By comparison, general satisfaction with overall management of recreational fishing[3] was higher in 2008, with 81% of respondents satisfied; general dissatisfaction with management was, however, comparable at about 18% (Frijlink and Lyle 2010).

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

The most commonly cited reason for dissatisfaction with the management of the sea fishery related to overfishing and competition from commercial fishers (33% of dissatisfied fishers), followed by concerns about mismanagement that had allowed overfishing to occur (13%), over-regulation of recreational fishers (13%) and conversely the need for greater restrictions on recreational fishers (6%), and a need for increased policing (6%). Other issues mentioned included need to ban gillnets, prohibition on divers using compressed air to harvest Rock Lobster, and concerns about the potential introduction of factory trawlers ("super trawlers"). In relation to dissatisfaction with the management of freshwater fishing, the need for (increased) stocking of rivers was the most commonly cited reason (21% respondents), whereas overstocking of some lakes was an issue for others (8%). Other issues raised included the high cost of licences (13%), poor management of water levels and flows (10%), and a need for increased policing (8%).

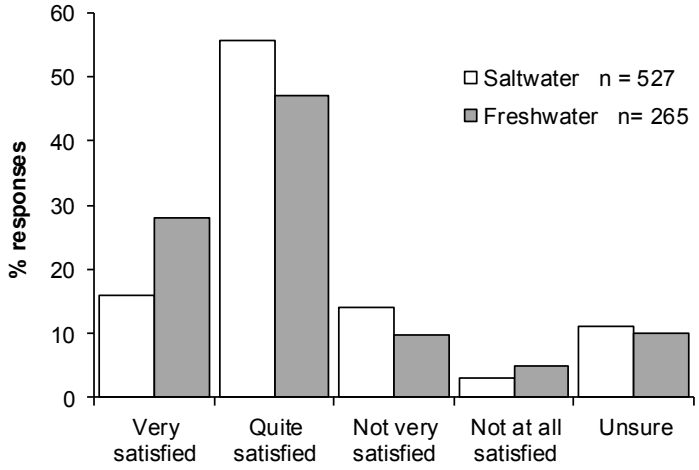


Fig. 42. Response category distribution for satisfaction with management of sea fishing and management of freshwater fishing. n is the number of responses for each fishery.

10.4 Quality of regional fisheries

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

10.4.1 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 (> 67%) of regular fishers in Macquarie Harbour, Duck Bay, Ansons Bay and Georges Bay considered that the quality had remained unchanged or improved in recent years (Table 14). Duck Bay and Georges Bay represent areas in which netting has been prohibited for a number of years and this may have been a contributing factor; in fact Georges Bay

received the strongest level of support (29%) for general fishery improvement of any of the key marine areas. Macquarie Harbour and Ansons Bay are areas with limited commercial fishing activity and this may have contributed to the perceptions. Approximately half of the regular fishers considered that the Port Sorell, Tamar, Bridport and Norfolk-Frederick Henry Bay fisheries were either the same or had improved whereas less than half considered that fisheries in Great Oyster Bay, Mercury Passage/Marion Bay, Tasman Peninsula and D'Entrecasteaux Channel were either about the same or had improved in recent years. The D'Entrecasteaux Channel emerged as the poorest 'performing' fishery, with almost half of the regular fishers suggesting that the quality had declined, which as a recreational-only fishery would indicate that the heavy recreational fishing pressure has impacted the overall quality of fishery. Great Oyster Bay and Norfolk/Frederick Henry Bay also rated poorly with 43-44% of fishers indicating that the quality had declined, both areas along with the D'Entrecasteaux Channel attract substantial recreational fishing pressure. Other areas where >30% of fishers considered that fishing quality had declined included the Tasman Peninsula and Mercury Passage/Marion Bay on the east coast and Bridport and Tamar Estuary on the north coast.

10.4.2 Key freshwater areas

With the exception of Arthurs Lake, the freshwater fisheries rated quite favourably, with at least 62% of respondents considering that the quality had remained the same or improved over time (Table 15). The highest rated areas were Penstock Lagoon, the Western Lakes, Four Springs and south-eastern rivers, with Penstock Lagoon receiving the strongest endorsement (32% of fishers) for improved fishing quality. Improvements (>24% of fishers) were also reported in the key river fisheries other than the north-eastern rivers. Arthurs Lake was the poorest performing fishery, with almost half of the regular fishers suggesting that the overall quality had declined recently. The only other areas where >30% of fishers considered that fishing quality had declined were the north-eastern rivers, Brady/Binney/Tungatinah Lakes, and the north-western rivers.

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	Macquarie Harbour	Duck Bay	Port Sorell	Tamar	Bridport	Ansons Bay	Georges Bay	GOB	Mercury/ Marion	Tasman Peninsula	NFHB	DEC
Improve	0	17	11	18	15	22	29	16	13	16	12	8
Same	67	67	47	37	42	59	40	30	36	29	40	30
Decline	20	0	28	32	33	11	24	43	34	39	44	49
Unsure	13	17	15	13	10	7	7	10	16	17	4	13
No. respondents	15	18	47	71	48	27	55	69	61	101	82	115

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	Four Springs	Penstock Lagoon	Western lakes	Bradys / Binney / Tungatinah lakes	S Esk/ Macquarie/ B O'Day rivers	NW rivers	NE rivers	SE rivers
Improve	17	21	23	32	10	14	24	24	11	29
Same	49	24	48	46	63	52	39	38	53	42
Decline	27	48	18	14	20	32	24	30	37	27
Unsure	7	6	13	8	7	2	12	8	0	2
No. respondents	96	99	40	37	41	44	41	37	19	45

10.5 Fish handling

Respondents were asked to nominate the main species of fish that they usually caught and were then presented with a series of questions relating to this species 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 fishing practices at the species level.

In determining whether Flathead are legal-sized, the vast majority of fishers (81%) indicated that they routinely measured rather than estimated lengths, whereas for the other species 40-50% of respondents indicated that they measured rather than estimated sizes (Fig. 43A). Research fishing of Sand Flathead indicates that many individuals lie within ± 10 mm of the 300 mm limit (Ewing *et al*. 2014) and it is not surprising, therefore, that most fishers rely on measuring this species when uncertain about whether individuals are legal-sized or not.

Interestingly, for each of the key species less than half of the fishers considered that "practically all" of the fish released would survive, the vast majority of respondents (>85%) did, however, expect that at least most would survive after being released (Fig. 43B).

Overall the majority of fishers (> 66%) reported they took special care when intending to release fish so as to promote survival, but this was especially the case amongst Trout fishers (84%) (Fig. 43C). 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, avoidance of treble hooks, use of de-hookers, and cutting the line on deep hooked fish), minimising handling stress (general care in handling, use of wet gloves or wet cloths, prompt return to the water) and assisting recovery of exhausted fish (by "swimming" prior to release). While all approaches were used for each of the species, the main focus for Flathead was on hook removal (especially using a de-hooker) and handling, for Australian Salmon prompt release, careful hook removal and swimming fish were important, for Black Bream careful handling and quick release were important, and for Trout swimming and/or keeping fish in the water along with careful handling emerged as key strategies used by fishers.

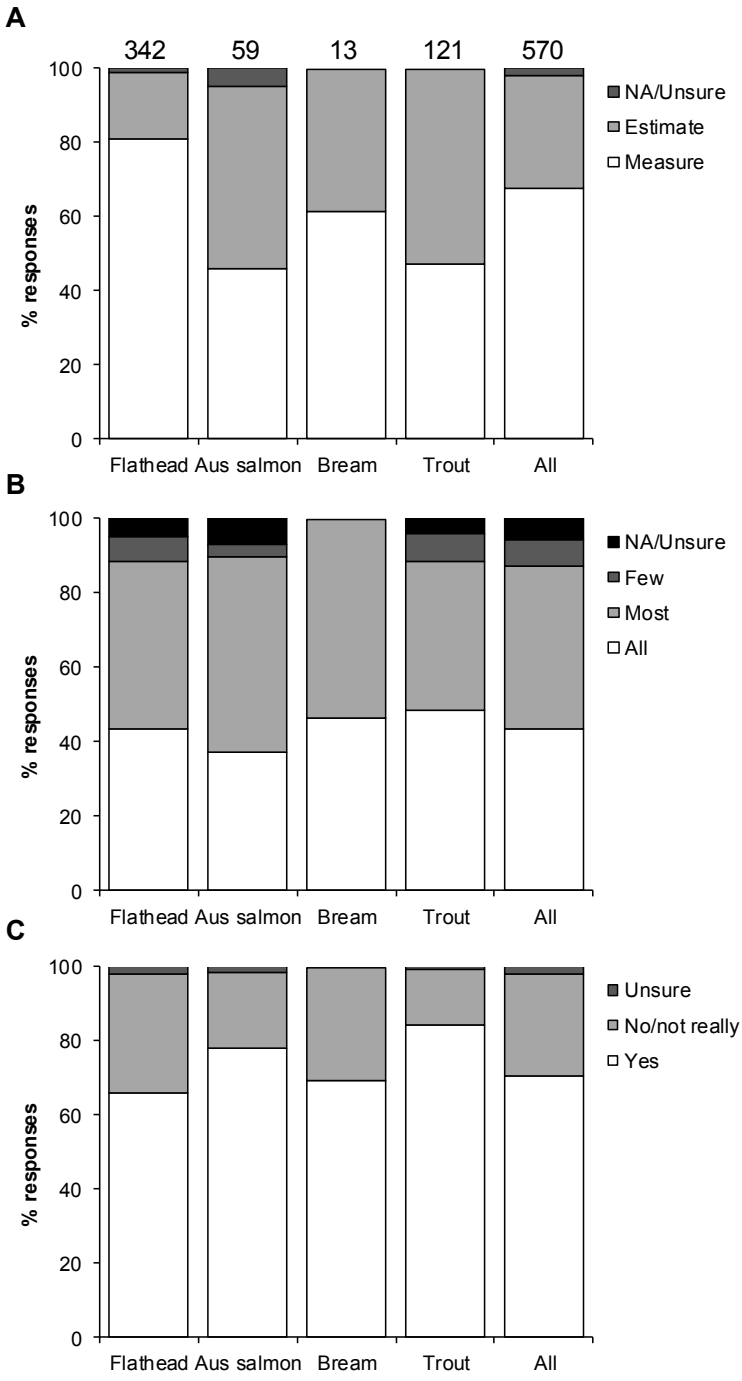


Fig. 43. Approaches to fish handling used by recreational fishers for the main species caught by the respondent. (A) Main approach to determining whether fish are legal-sized (measure or estimate length); (B) perceptions about the proportion of released fish that survive; and (C) use of special handling procedures to promote prospects of survival. Respondent numbers are indicated at the top of the figure.

Table 16. Handling procedures used by recreational fishers to promote prospects of survival for released fish, based on main species caught.
Values represent percentage of responses.

Handling procedures	Flathead	Australian Salmon	Black Bream	Trout
'Swim' fish on release	10.6	19.6	10.0	34.0
Keep fish in water	4.4	-	10.0	14.6
Release quickly	22.1	32.6	20.0	15.5
Handle carefully	31.0	26.1	50.0	29.1
Handle with wet cloth/glove	10.6	-	10.0	1.9
Use landing net to reduce handling	-	-	-	2.9
Remove hook carefully	11.1	17.4	-	1.9
Use de-hooker	20.4	2.2	-	1.0
Cut line for deep hooked fish	0.4	4.3	10.0	3.9
Hook type - circle, barbless, avoid trebles	2.7	6.5	-	8.7
Other	3.5	4.3	30.0	2.9
Number of respondents	226	26	10	120

10.6 Accessing information about fishing

Respondents were asked about the main ways that they found out about fishing regulations and other information to do with recreational fishing in Tasmania, and for each method whether they considered it to be a trusted or reliable source of information. Overall, other fishers/friends (62%), government publications (46%), newspapers (42%) and government websites (29%) were the top four sources of information identified (Table 17). In terms of reliability, government publications and websites scored very highly (around 90%), as did other fishers/friends (85%). As reliable sources of information, fishing magazines were rated lowest (51%), followed by television (55%) and radio (62%). Interestingly, social media (including Facebook and fishing forums), and fishing club/associations were identified as information sources by a small proportion of respondents (8-9%), with greater reliability afforded to the latter.

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 = 572

	% respondents	
Source	**Mentioned**	**Reliable**
Other fishers/friends	62.2	84.6
Government publications	46.5	89.8
Newspaper	42.0	67.1
Government website	29.2	90.4
Television	22.4	54.7
Fishing magazines	20.8	51.3
Tackle shop	20.1	75.7
Radio	16.4	61.7
Government shows/displays	12.2	75.7
Social media (e.g. Facebook, Fishing forums)	8.7	66.0
Fishing club/associations	7.7	79.5
Other	7.0	65.0

10.7 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. Respondents were asked whether or not they had seen or were aware of specific products. Greatest awareness was evident for fish rulers (plastic and stick-on) with over 80% 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). The majority of fishers (72%) were aware of the Recreational Sea Fishing Guide whereas awareness of the Inland Fishing Code was lower overall (53%) but was very high (89%) amongst freshwater fishers. Awareness of smart phone applications for sea fishing and inland fishing was relatively low (around 10%), these products have only been recently developed and awareness and uptake is expected to increase over time.

Just under half (48%) of the respondents indicated that they were aware of the Fishcare Tasmania program (Table 18). Of those respondents who indicated awareness of the program, 55 (21%) reported having had some contact or interaction with the program during 2012-13, with 35% of these interactions occurring at shows or events (including Agfest, Liawenee open day), 20% occurred at fishing sites, 16% knew a volunteer or were personally involved in the program, and 6% of interactions were through school visits by volunteers.

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 2012-13 diary period (note: some respondents fished in both salt and freshwater and their responses are counted against each water body type). Total respondents = 572; Saltwater fishers = 505, Freshwater fishers = 179.

		% respondents	
Information product/program	**Total**	**Saltwater fishers**	**Freshwater fishers**
Recreational Sea Fishing Guide (booklet)	71.7	73.3	63.7
Inland Fishing Code (booklet)	52.6	48.4	89.4
Plastic ruler (for measuring fish)	86.0	88.3	82.7
Stick-on ruler (for measuring fish)	83.2	85.5	82.7
Plastic gauges (Lobster, Abalone & scallops)	54.7	59.1	46.9
Tas Sea Fishing Guide App (smart phone app)	16.4	16.7	19.2
Infish App (smart phone app for inland waters)	8.3	7.2	20.9
Angler Access Program (brochures showing access to inland waters)	11.1	9.9	26.7
Fishcare Tasmania program	48.5	45.3	50.8

General awareness of the Recreational Sea Fishing Guide and the Inland Fishing Code 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. 44). Awareness of the Fishcare program has almost doubled since 2001, with respondents reporting interactions with volunteers increasing by a factor of five since the early days of the program.

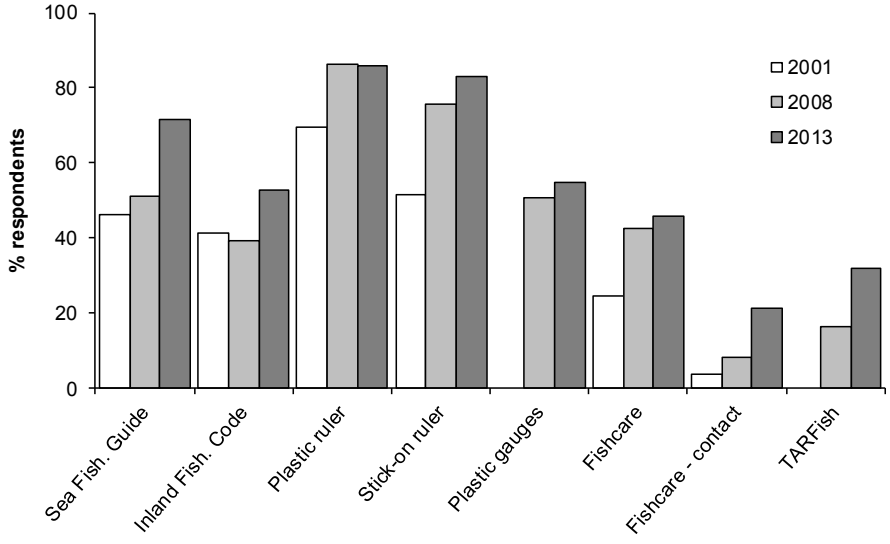


Fig. 44. Percentage of respondents aware of government information products and programs, including interaction with the Fishcare program, and aware of TARFish based on 2001, 2008 and 2013 general fishery surveys.

10.8 Awareness of TARFish

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. Respondents were asked whether they had ever heard of TARFish, 32% indicated some familiarity, about double that compared with the 2008 survey (17% of respondents) (Fig. 44).

10.9 Selected management issues

Opinions relating to the future management of Flathead and gillnetting were canvassed amongst recreational fishers.

10.9.1 Flathead size and possession limits

As part of the review of the Scalefish Management Plan scheduled for 2015, DPIPWE has developed a proposal to increase the minimum size limit and reduce the possession limit for Flathead, the former intended to increase average weight of each retained fish. Respondents were advised that while an increase in the size limit from 300 to 320 mm would increase the yield of flesh, equating to an 25% increase in fish weight, such a management measure would result in lower catch rates for a period of time to allow for growth to the new legal-size. Out of 570 respondents, the vast majority (457 or 80%) indicated that they would be supportive of such an initiative, with 76 (13%) opposed and 37 (7%) unsure.

Respondents were asked whether they considered the current possession limit of 30 fish per person for Flathead was too high or about right. The majority (346 fishers or 61%) indicated that they considered the limit too high, 197 (35%) suggested it was about right, while 4 (1%) suggested it was too low, with a further 24 (4%) respondents unsure. Respondents who indicated that the limit was too high were asked what they thought would be a reasonable limit – 27% suggest limits of 10 or less, 62% suggested limits of 15 or less while the vast majority (97%) considered limits of 20 or less to be reasonable.

In the context of fishing trips in which Flathead were retained, only 3% of trips during 2012-13 resulted in catches (daily bags) exceeding 20 fish per person (Table 19). In fact almost one in five trips resulted in catches of 10 or fewer Flathead per person. By species, daily catches of Tiger Flathead tended to be lower than for Southern Sand Flathead, with less than one in ten trips resulting in daily catches exceeding 10 fish per person. Although daily bag limits are not the same a possession limits, these results suggest that comparatively few fishing trips would have been affected by the imposition of a bag limit lower than the current possession limit.

Table 19 Percentage of fishing trips during 2012-13 in which flathead catches (harvest per person) exceeded specified catch levels.

Catch level (no. per fisher)	Flathead (combined species)	Southern Sand Flathead	Tiger Flathead
> 5	35.9	38.9	19.6
>10	17.2	18.6	9.5
>15	7.5	8.0	3.9
>20	3.0	3.3	0.6

10.9.2 Recreational gillnet usage

In Tasmania recreational fishers are permitted to use gillnets (graball and mullet nets), subject to licensing and other regulations. Respondents were asked whether they supported the continued use of recreational gillnets, with 229 (40%) indicating support, compared with 243 (43%) opposed and 98 (17%) unsure. Not unexpectedly, fishers who used gillnets during 2012-13 were more strongly supportive of the method, with 38 out of 45 (84%) of the gillnet fishers supportive and only 3 (7%) not supportive, the remainder were unsure.

Comparison with responses to similar questioning about gillnet usage in 2001 and 2008 suggests that support for the method has declined slightly over time, from 48% (2001) to 43% (2008) (Frijlink and Lyle 2010) to 40% (2013). While opposition amongst recreational fishers to recreational gillnet usage has risen, from 36% in 2001 to 43% in 2013, it is clear that recreational fishers remain divided on this issue, with neither position clearly dominant.

Respondents who were opposed to the continued use of gillnets were asked for the primary reason for their opposition. The main reasons for opposition to gillnets relate to perceptions surrounding excessive catches, by-catch and wastage, with a minority of respondents indicating that they did not consider gillnets to be an appropriate recreational fishing method (Table 20).

Respondents who supported the continued use of gillnets were presented with a scenario that involved the phasing nets out over time and were asked what they would consider to be a reasonable timeframe should this occur, with 3 years, 5 years, and 10 years offered as options. Out of 192 respondents, 54 (28%) supported a 3 year phase-out, 45 (23%) supported 5 years, 31 (16%) 10 years, while 42 (22%) opposed any timeframe for phasing out gillnets, and 20 (10%) were unsure.

Table 20 Main reasons cited for opposition to the continued use of recreational gillnets in Tasmania.

Reason	No. responses	%
Gillnets catch too many fish, plus issues of wastage	50	20.9
Excessive wastage of catch	17	7.1
High mortality rates associated with method (wastage)	16	6.7
By-catch issues	44	18.4
By-catch, incl. protected species	3	1.3
Indiscriminate, non-selective fishing method (by-catch)	43	18.0
Not a true "recreational fishing" method	31	13.0
Not a sustainable fishing method	16	6.7
Issues of ghost fishing	3	1.3
Other	16	6.7
Total	239	

11. Comparisons with previous surveys

In this section data from the Tasmanian component of the 2000-01 National Recreational Fishing Survey and statewide fishing survey conducted in 2007-08 (Lyle *et al*. 2009) 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 three datasets can be compared validly to identify key trends.

11.1 Fisher characteristics

11.1.1 Participation rates

Between 2000 and 2012 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 118,000 in 2007 and 98,000 in 2012 (Fig. 45A, see also Appendix 2; and Appendix 14). When expressed as proportion of the resident population, this represents a decline from 29.4% in 2000 to 21.6% in 2012 (Fig. 45B).

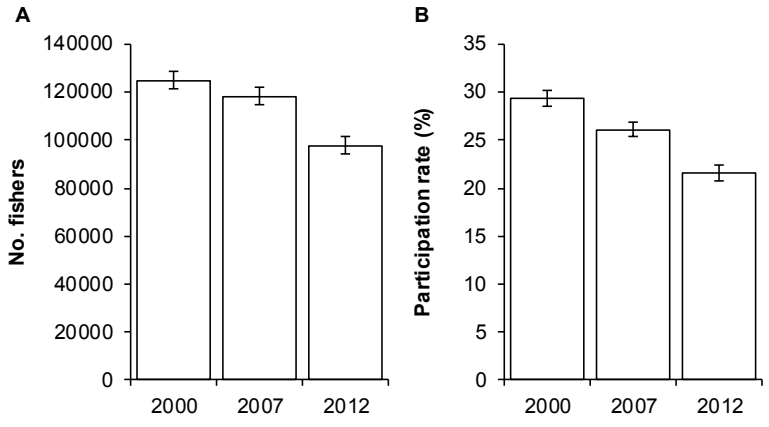


Fig. 45. Fishing participation in the 12 months prior to May 2000, November 2007 and October 2012 by Tasmanian residents aged five years or older. A) number of persons; and B) proportion of the resident population. Error bars represent one standard error.

Compared with previous years, there were fewer fishers during 2012 in each of the regions both in absolute and relative (% population) terms (Fig. 46). Participation rates declined in all regions, the largest proportional decline being amongst South East residents, from 38.9% in 2000 to 27.0% in 2012 (Fig. 46B). Participation rates for the remaining regions declined from 28-30% for 2000 to 20-22% for 2012.

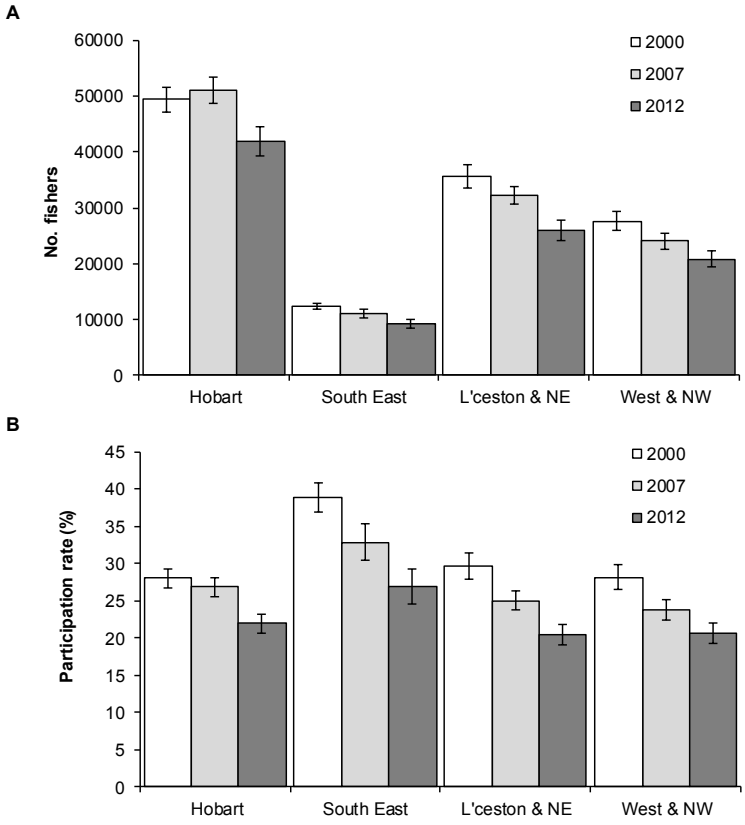


Fig. 46. Fishing participation in the 12 months prior to May 2000, November 2007 and October 2012 by area of residence for persons aged five years or older: A) number of persons; and B) proportion of the resident population. Error bars represent one standard error. *Note*: regional boundaries applied 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 between 2000 and 2012 was more pronounced amongst males, from 83,580 (SE 2267) persons or 40.0% (SE 1.1%) of males in 2000 to 65,781 (SE 2282) or 29.2% (SE 1.0%) in 2012. This compares with the decline for females, from 41,428 (SE 1897) persons or 19.1% (SE 0.9%) of females in 2000 to 32,002 (SE 1704) or 14.1% (SE 0.8%) in 2012. Over the 12 year period, the reduction in the number of males fishing was twice as large as the reduction in the number of females.

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 has remained stable over time and the number of fishers aged 60 years and older has in fact increased

(Fig. 47A). Participation rates have been relatively stable for age groups 45 and older since 2000, but have declined steadily for each of the younger age groups (Fig. 47B).

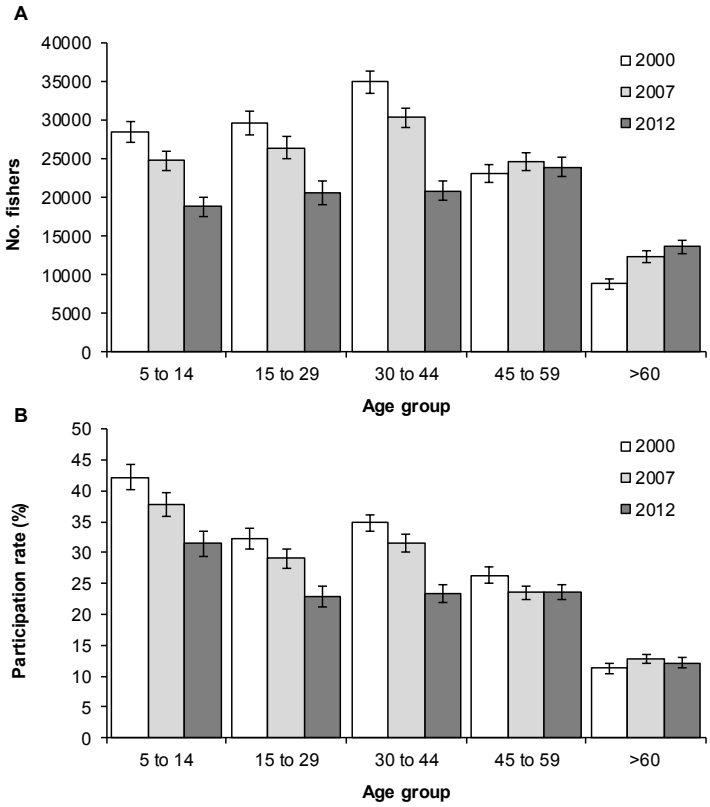


Fig. 47. Fishing participation by age group for Tasmanian residents aged five years or older for 2000, 2007 and 2012: A) number of persons; and B) proportion (%) of the resident population.

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 (rather than recruitment) 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 fishing participation rate amongst 15-29 year olds 9-10% 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[4], 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 there is an active effort to recruit new participants to the fishery and attract 'lapsed' fishers back to the pastime.

[4] 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 October 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%[5]. Using the same age criterion, there were an estimated 96,470 persons in 2000, 93,650 in 2007 and 78,950 in 2012 who fished at least once a year, representing participation rates of 26.9, 24.1 and 20.1%, 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 and 28.5% (55,222 persons) in 2012. 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, and 11.9% (23,723 persons) in 2012.

Thus, in absolute and relative terms there appears to have been a steady and significant decline in recreational fishing participation that has been evident since the early1980s, a pattern consistent with trends observed in Queensland (McInnes 2006, Taylor *et al*. 2012) and overseas (including the USA and Canada).

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. The decline in effort has been evident in both freshwater and marine fisheries (Fig. 48A) and has been more conspicuous in shore-based rather than boat-based effort (Fig. 48B).

By method, line fishing effort has declined by 31% since 2000-01, 23% for lobster pots, 49% for dive effort and an estimated 70% reduction in gillnet effort (Fig 49). The marked change in gillnet effort was undoubtedly 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, and is generally consistent with the findings of specific gillnet surveys (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 magnitude of the statistical uncertainty, i.e. standard errors) (Fig.50). In relation to the inland fishery, effort levels in the Western and Central Plateau regions were similar between 2000-01 and 2007-08 but appear to have declined significantly in 2012-13. In

[5] 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).

contrast, effort had declined sharply between 2000-01 and 2007-08 in the Eastern region but was of a similar magnitude in 2012-13 to that in 2007-08.

As a general rule, effort levels in most of the coastal regions were lower than those estimated for 2000-01, although the magnitude of change has been minor over the past decade or so in areas such as the East, Central East and South East coasts and Norfolk-Frederick Henry Bay (Fig. 50). Effort appears to have declined steadily in each of the north coast regions (North West, Tamar and North East) since 2000-01, whereas there was little difference between 2007-08 and 2012-13 for the West coast and Derwent. Effort in the D'Entrecasteaux Channel showed a sharp rise in 2007-08 (influenced in part by the opening of a Scallop fishery in the area) but declined to about 80% of the 2000-01 level in 2012-13.

Estimated fisher numbers and days fished by region in 2000-01 and 2007-08 are presented in Appendix 15 and can be compared with comparable information for 2012-13 provided in Appendix 12.

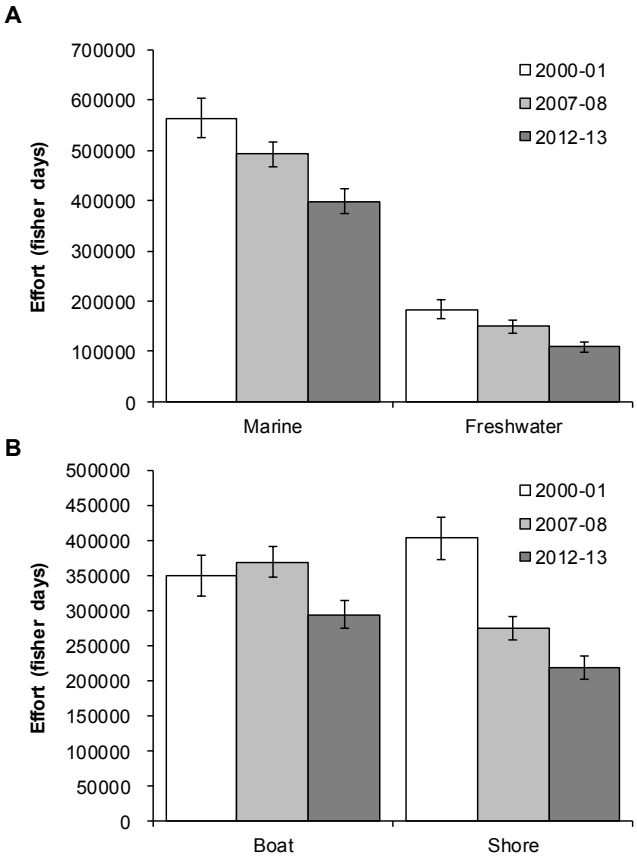


Fig. 48. Comparison of fishing effort (fisher days) for Tasmanian residents aged five years or older who fished in Tasmania during 2000-01, 2007-08 and 2012-13: A) based on marine and freshwater waters; and B) based on fishing platform. Error bars represent one standard error

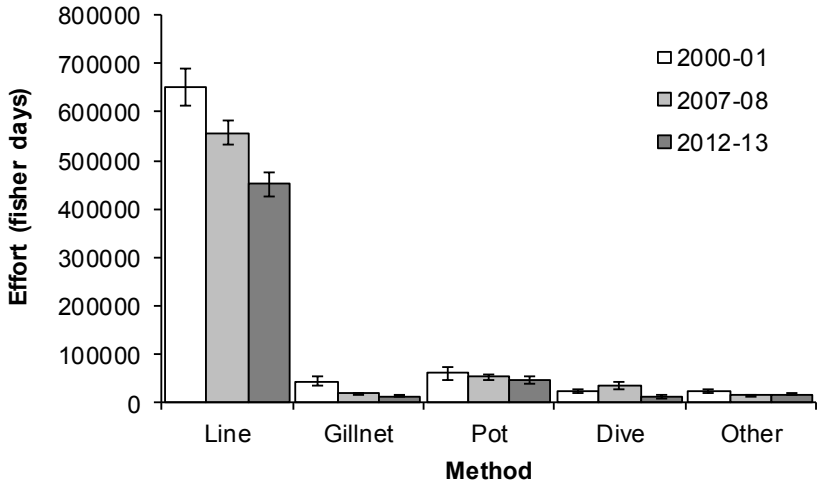


Fig. 49. Comparison of fishing effort (fisher days) by fishing method for Tasmanian residents aged five years or older who fished in Tasmania during 2000-01, 2007-08 and 2012-13. Error bars represent one standard error

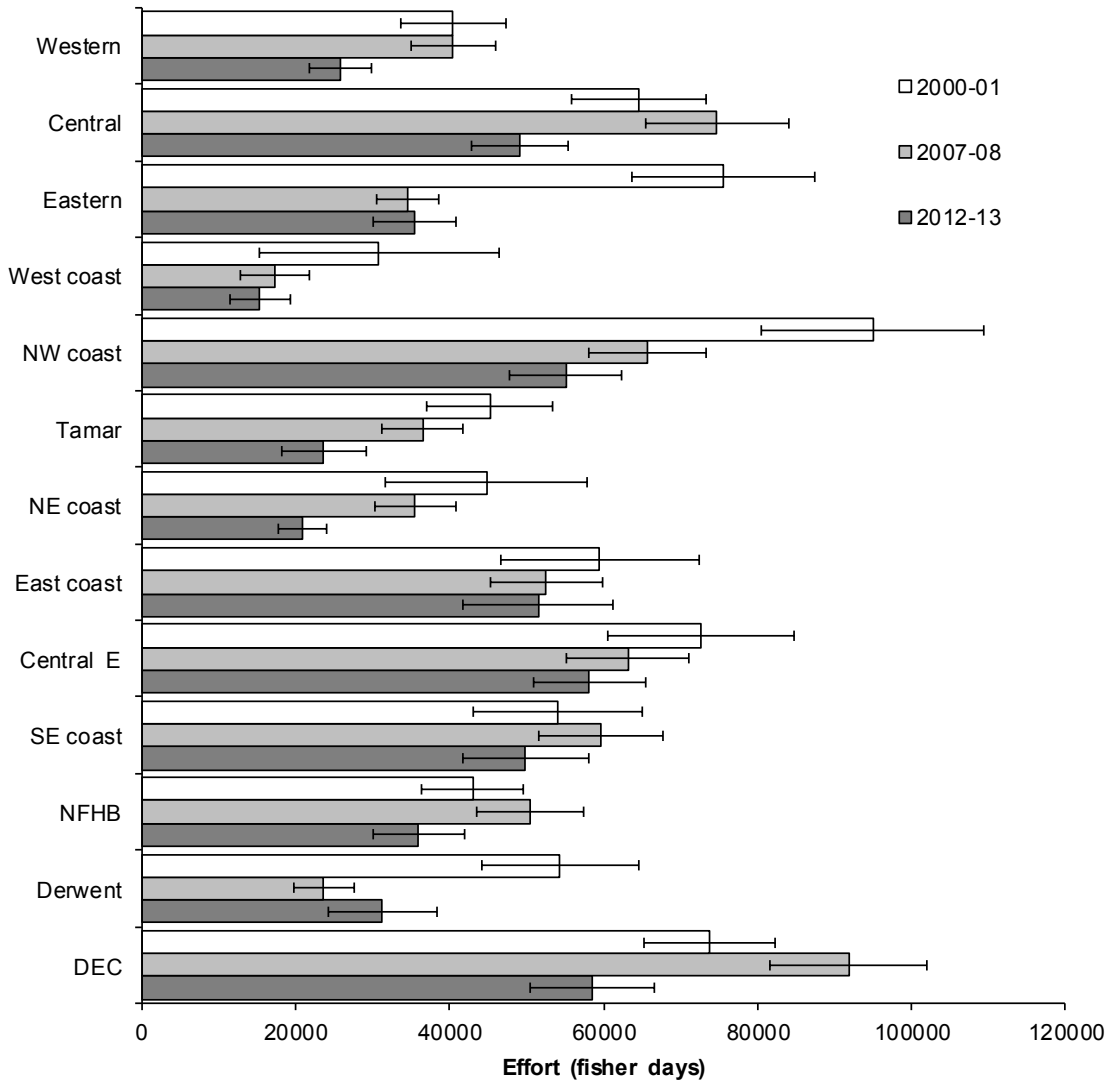


Fig . 50. Comparison of fishing effort (fisher days) by fishing regions and fishing platform for Tasmanian residents aged five years or older who fished in Tasmania during 2000-01, 2007-08 and 2012-13. NFHB is Norfolk-Frederick Henry Bay, DEC is D'Entrecasteaux Channel.

11.3 Catch trends

Catch information for 2000-01, 2007-08 and 2012-13 are provided in Appendices 16 and 17 and compared in Fig. 51. Excluding small baitfish, an estimated 3.52 million finfish were caught (kept plus released) by Tasmanian recreational fishers during 2000-01 compared with 2.86 million in 2007-08 and 2.62 million in 2012-13. 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 can be linked to the general decline in participation and effort over the time period.

Based on harvest numbers, the total retained catch of finfish has declined from 2.29 million in 2000-01 to 1.61 million in 2007-08 and 1.48 million in 2012-13, although overall release and discard numbers have varied very little over time, ranging between 1.22 million fish in 2000-01 to 1.24 million in 2007-08 and 1.14 million in 2012-13. 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 both 2007-08 and 2012-13. 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', but it may also have been influenced by bag and size limits, many of which have been either introduced or become progressively more restrictive in Tasmania since 2001.

Catches of Flathead, Flounder, Rock Lobster and Abalone have gradually declined since 2000-01whereas there was a sharp fall in catches for Australian Salmon and Mullet between 2000-01 and 2007-08, with relative stability since that time. The decline in Mullet catches can, to a large degree, be linked to reduced gillnet (specifically mullet net) effort that has occurred over the past decade. A feature of the lower Australian Salmon and Mullet catches was higher rates of release. Trout catches have fluctuated between years, peaking in 2007-08 but, reflecting higher release rates in the two latter survey periods, there was little difference in harvest levels between 2000-01 and 2007-08. Recreational catches of Black Bream have remained stable through time, although release rates have increased markedly since 2000-01, reflecting the growth of a catch and release sport fishery for the species. Barracouta availability is known to exhibit considerable inter-annual variability as reflected in recreational catches (and commercial catches, refer Andre *et al.* 2014), with significantly higher catches taken in 2012-13 than other years. Related to these higher catches is a marked increase in release rates, reflecting the fact that the species is not highly esteemed for its eating qualities by many fishers. Various species of Tuna are captured by recreational fishers and data suggest that catches have been variable over time, but have generally increased since 2000-01. 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 awareness and hence 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 landings that correspond closely to the pattern observed in recreational catches (refer Andre *et al*., 2014).

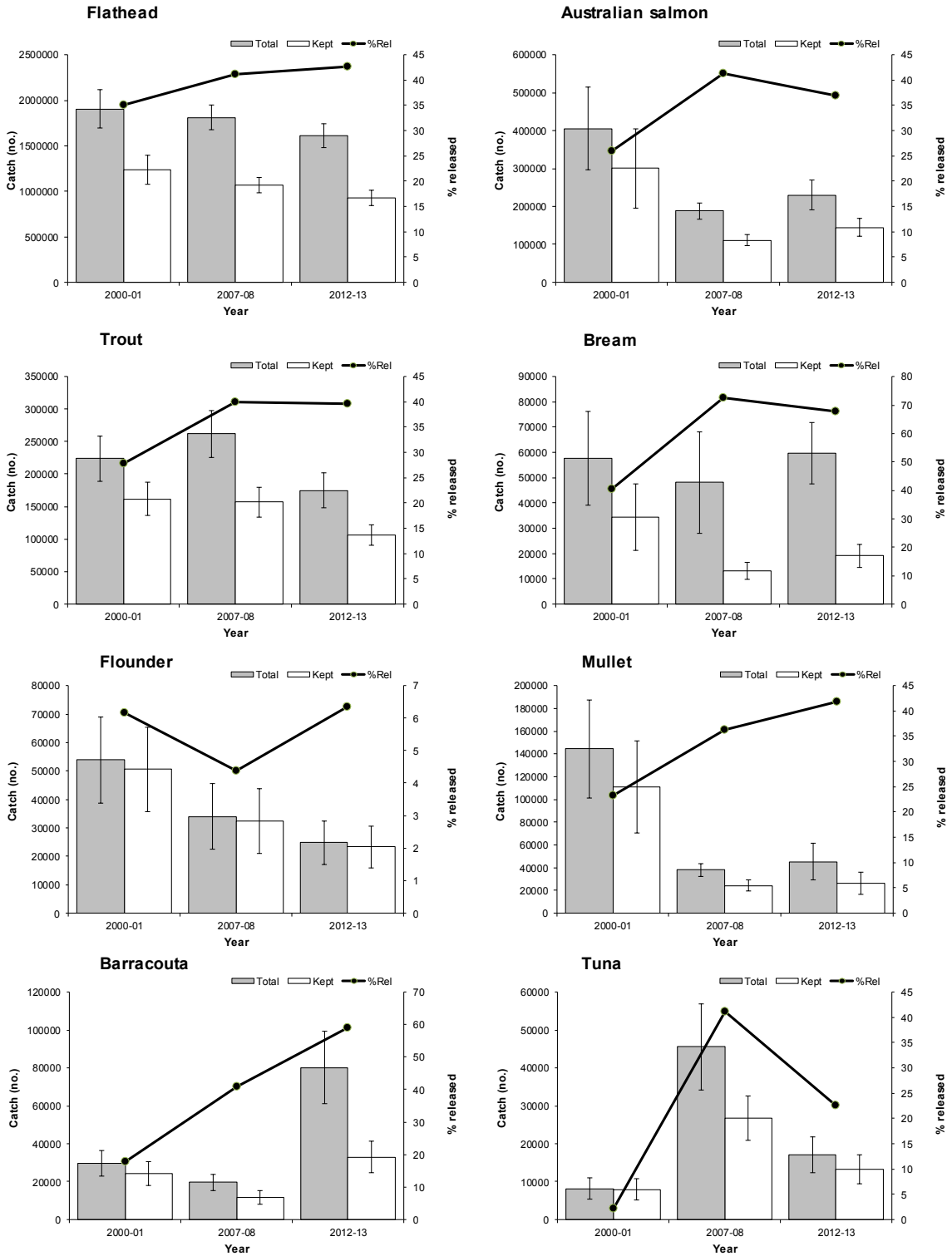


Fig. 51. Total catch numbers (kept and released), numbers kept (harvested) and proportion of the total catch released (%) for key species by survey year for Tasmanian residents aged 5 years or older.

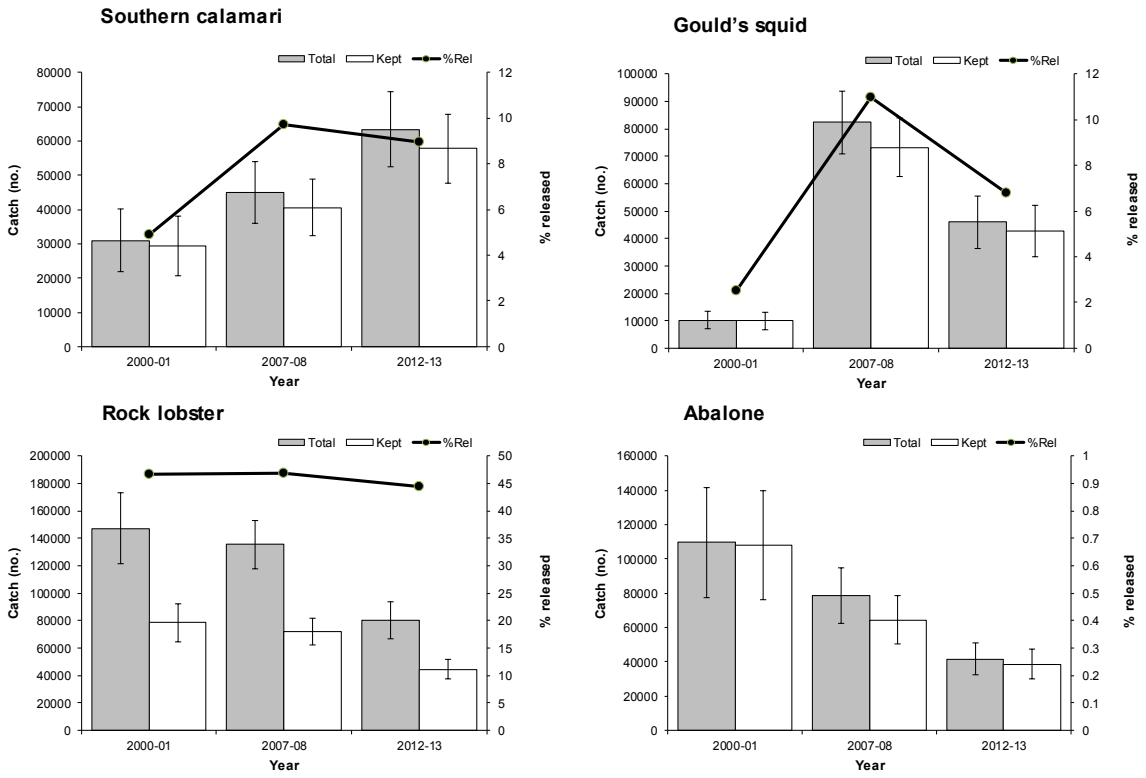


Fig. 51. Continued.

12. Summary and conclusions

12.1 General

This study represents the third 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 and 2007-08 Tasmanian 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 just 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 2012 about 98,000 Tasmanian residents aged 5 years or older fished at least once in Tasmania, representing an overall participation rate of 22%. By region of residence, South East residents had the highest participation rate at 27%, which compared with 21-22% for other Tasmanian regions. Recreational fishing was more popular among males, with a state-wide participation rate of 29%, compared with about 14% for females. Participation rates varied with age, 5-14 year olds having the highest rate of participation (32%) 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 23%, declining sharply in the 60 years plus age group to around 12%.

The estimated number of recreational fishers in Tasmania remained relatively constant between 2000 and 2007 but appears to have declined in 2012. Based on demography, the decline in numbers was 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 growth is taken into account, the overall participation rate has, however, declined from just over 29% in 2000 to 26% in 2007 and to 22% in 2012. Participation rates have fallen across all age groups apart from the 60 years plus group and have been more pronounced amongst males than females. Declines were experienced in all regions of residence.

When broader demographic trends are taken into account, specifically dominance of the ‘baby-boomer’ generation (48-64 year olds in 2012) and the sharp decline in 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. Consistent and significant declines in recreational fishing participation rates have also been observed in Queensland since the mid-1990s, with participation down from 28% (882,000 persons) in 1996 to 17% (703,000 persons) in 2004 (McInnes, 2006; Taylor *et al*., 2012).

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 November 2012 and October 2013. Almost 92,000 Tasmanian residents were estimated to have fished in Tasmania during this period, a slight but not statistically significant decline in the number of active fishers compared to the previous 12 months. During 2012-13 recreational fishers accounted for about 0.51 million fisher days of effort, with an average of 5.5 days per fisher. Individually, effort levels were highly skewed with the majority of persons fishing for relatively few days (< 5 days) and a small proportion of particularly avid fishers who contributed disproportionately to the total fishing effort (and catch); for instance over half of the effort (55%) could be attributed to just 20% of fishers.

Overall, 27% of fishers fished at least once in freshwater while 91% fished at least once in saltwater, implying that 18% of fishers fished at least once in both fresh and saltwater. Freshwater fishing represented 21% of the total effort (fisher days) while fishing in saltwater (including estuaries) accounted for the remainder. Freshwater fishing in lakes and dams accounted for about three times the effort in rivers while the majority 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 minor activity.

Line fishing was the dominant activity undertaken, pursued on 89% of all days fished; that is 0.45 million fisher days or 1.5 million hours of effort. This was followed by pot fishing (9%), dive harvesting (3%) and the use of gillnets (3%). A range of other fishing methods were also reported, including the use of 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 2012-13, with a total of 1.48 million finfish (excluding small baitfish) retained and 1.14 million finfish released or discarded. Flathead (mainly Sand Flathead) represented 61% of the total finfish catch by number, with an estimated 0.92 million kept and 0.69 million released. Other finfish species or species groups of significance included Australian Salmon (144,700 kept and 85,000 released), Trout (105,600 kept and 105,000 released), Gurnard (17,000 kept and 56,000 released), Black Bream (19,000 kept and 40,000 released), and Wrasse (7,000 kept and 47,000 released).

Overall, 44% of all finfish captured were released or discarded; with low rates of release (<10%) for species such as Blue Warehou, Atlantic Salmon, Striped Trumpeter, Bastard Trumpeter, Jackass Morwong and Flounder; intermediate rates (10-30%) for Garfish,

Redfin Perch and Tunas; moderate rates (31-50%) for Flathead, Trout, Australian Salmon, Mullet, Pike, Leatherjacket and Whiting; and high rates (>50%) for Silver Trevally, Black Bream, Barracouta, River Blackfish, Wrasse, Gurnard, Cod, eels, 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, Whiting, Australian Salmon, Silver Trevally and Mullet; poor eating qualities were identified as important factors for release for Cod, Wrasse, Leatherjacket and Gurnard; while catch and release (sport) fishing was important for Black Bream and Trout. 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, Tuna, Rock Lobster, Abalone and scallops, 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 Black Bream, Flathead, Atlantic Salmon, Blue Warehou and squid, also implying a level of fishery specialisation for these species. By contrast, Jackass Morwong, Silver Trevally and a range of other scalefish 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 Southern Calamari (58,000 kept) and Gould's Squid (43,000 kept), were taken along with Rock Lobster (45,000 kept), Abalone (39,000 kept) and scallops (13,000 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 Flathead was estimated at 236 tonnes, almost six times greater than the commercial Flathead catch taken from state fishing waters. By weight, other species of importance included Australian Salmon (64 tonnes), Southern Calamari (64 tonnes), Barracouta (31 tonnes) and Gould's Squid (21 tonnes). As a contributor to total harvest for key species from Tasmanian waters, the share taken by the recreational sector during 2012-13 was similar to or larger than that taken by the Tasmanian commercial scalefish fishery for Blue Warehou, Flathead, Flounder, Mullet, Cod, Barracouta, Jackass Morwong, Jack Mackerel, Striped Trumpeter, and Southern Calamari. Conversely, the recreational harvest represented a relatively minor component (<20%) of the total catch for species such as Australian Salmon, Whiting, Garfish, Wrasse, Banded Morwong and Gould's Squid.

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 (>80%), with Redfin Perch, Atlantic Salmon and River Blackfish of secondary importance in the lake and dam fisheries, and Black Bream, Mullet, and Redfin Perch in the river fisheries. Flathead and Australian Salmon dominated estuarine and inshore coastal catches (collectively >60%), with Black Bream and Barrcouta of secondary importance in the estuarine fisheries, and Gurnard and Barracouta in the inshore coastal fisheries. Tuna accounted for over half of the offshore catch, with Flathead, Gurnard (mostly Ocean Perch) and Blue-eye Trevalla also taken.

By numbers, line catches were dominated by Flathead, followed by Australian Salmon, Trout, Barracouta, Gurnards and a variety of other finfish species. In contrast, Blue Warehou, Bastard Trumpeter, Atlantic Salmon and Mullet were the main catch taken by gillnet, the two former species 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 of south-eastern Tasmania (South East coast, Norfolk-Frederick Henry Bay, Derwent and D'Entrecasteaux Channel regions) 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, with the possible exception of Flounder, were also important components of the fishery off eastern Tasmania (Central East and East coast regions). Species of particular significance off northern Tasmania (North East, Tamar and North West coast regions) included Australian Salmon, Flathead, Mullet, Flounder, Southern Calamari and Abalone, while Rock Lobster, Australian Salmon, and escapee Salmonids were key West coast species. The freshwater Trout fishery was focused largely in the Central Plateau lakes, especially Arthurs Lake and Great Lake, with catches from rivers of secondary importance.

Fisheries for key species such as Flathead, Australian Salmon, Trout, Black Bream, Founder, and Southern Calamari were concentrated between September and April, with peak catches taken during summer or early autumn. Rock Lobster and Abalone catches were heaviest between late spring and summer while Tuna and Gould's Squid catches were largely restricted to the summer-autumn period. Overall, general fishing activity was low during the winter months.

Residents local to specific regions typically accounted for the majority 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 in the Central East and South East coast regions. Freshwater fisheries in the Central Plateau and Eastern regions also attracted considerable effort from fishers residing outside of these regions. These findings highlight the importance of fishers travelling between areas to participate in the recreational fishery, with 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, within the context of the *overall* recreational fishery, activities such as fishing for gamefish, off-shore fishing for Striped Trumpeter or Blue Eye Trevalla, or regional fisheries, such as fishing in Macquarie Harbour or Georges Bay are relatively minor components. 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 these 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 about $93 million of goods and services relevant to fishing in Tasmania during 2012-13, equivalent to just over $1000 per fisher. By comparison, in 2000-01 expenditure attributable to fishing by Tasmanians was estimated at $52 million or $420 per fisher (Henry and Lyle, 2003) which, when adjusted for CPI, represents around $73 million in current terms. Although there are differences between surveys in the way expenditure data was collected, these results suggest that fishing related expenditure has increased in real terms since 2000-01 despite the decline in fisher numbers. In addition to direct expenditure, there is a significant investment in boats, with around 28,000 boats used for fishing during 2012-13, representing an attributed value of about $359 million.

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 the majority of 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 or not any fish were caught. That is not to imply that catch related aspects (including consumption) are unimportant, especially since the prospect of catching something is at the very core of the activity itself. 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.

Most fishers indicated general satisfaction with the overall quality of their fishing experiences and with the management of the fisheries. Regionally, however, fisheries in the D'Entrecasteaux Channel, Great Oyster Bay and Norfolk-Frederick Henry Bay were rated as the poorest performing of the marine fisheries while Arthurs Lake was identified as the poorest of the main freshwater fisheries. Fisheries that were identified as having improved over recent years included Georges Bay and Ansons Bay on the east coast along with the freshwater fishery in Penstock Lagoon.

In obtaining information about fishing regulations, other fishers/friends emerged as the most commonly cited information source, followed by government publications, newspapers and government websites with each, apart from newspapers, being considered to be reliable sources of information. There was a high level of awareness of many of the key information products produced by government agencies with the exception of recently released smart phone applications. It is likely that it will take some time and further promotion of these applications before they are widely recognised and supported. An encouraging finding of the present study was the increased level of awareness amongst recreational fishers of many of the traditional information and education products and initiatives, including the Fishcare program. These trends provide an important metric against which the value of these products and associated promotion campaigns can be assessed.

Opinions on the future management of Flathead and recreational gillnet usage were canvassed. There was strong support amongst recreational fishers for an increase in the minimum size limit for Flathead, the majority also agreeing that the current possession limit of 30 fish per person was too high. The vast majority of respondents who considered the limit too high indicated that a limit of 20 or less would be reasonable. Opinions on the use of recreational gillnets were more or less evenly divided between those in favour and those against their continued use. Despite the level of opposition having risen over the past decade or so, in the current survey less than half of the respondents (43%) indicated opposition. The main reasons for given for opposition included concerns about excessive catches, by-catch and wastage. Faced with a hypothetical scenario whereby recreational gillnets had to be phased out, there was no clear support for what would be a reasonable minimum timeframe over which this should occur.

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 (i.e. percentage of population). Fisher numbers have 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%. Some of this change has been driven by changing demography, in particular the 'aging population' influenced by the large cohort of so-called 'baby boomers'. For instance, the number Tasmanians aged 60 years or older has increased from about 78,000 in 2000 to about 112,000 in 2012, an increase in proportional terms from 18.3 to 24.7% of the population. Although participation rates in this age group have remained stable over time 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 dropped from 0.75 million in 2000-01 to 0.51 million in 2012-13. Effort levels have fallen for both freshwater and saltwater fishing, the decline being more marked for shore-based rather than boat-based fishing activity. Regionally, there has been a steady decline in effort off northern Tasmania (North West, North East and Tamar regions), whereas off eastern and south-eastern Tasmania, apart from the Derwent and D'Entrecasteaux Channel regions, the magnitude of change has been relatively small. While factors contributing to these declines were not solicited, the closure of a large area of the east coast between late November 2012 and early February 2013 to fishing for Rock Lobster (and other shellfish) due to a toxic algal bloom, along with impacts of destructive bush fires during the summer months that affected several coastal communities are likely to have had some impact on fishing activity. In addition, closures of wharf access to recreational fishers, particularly in ports off northern Tasmania, is likely to have had some role in the decline in shore-based fishing activity. The decline in fishing effort in the D'Entrecasteaux Channel can, in part be linked to the closure of the

scallop fishery in that area, noting that the fishery attracted considerable dive effort during 2008 (Lyle *et al*., 2009).

Overall finfish catches (numbers kept plus released) in 2012-13 were slightly lower (91%) than in 2007-08 and about 74% of those in 2000-01. While the catch composition and relative importance of the key species has been reasonably 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. In comparison with 2007-08, catches in 2012-13 for Flathead, Atlantic Salmon, Garfish, Gurnards, sharks and rays were similar in magnitude (within ±10%) while catches of Australian Salmon, Barracouta, Black Bream, Blue Warehou, Jack Mackerel, Jackass Morwong, Mullet, Pike, Wrasse and Southern Calamari were higher (>120%). By contrast, catches in 2012-13 were lower (< 75% of 2007-08) for Trout, Flounder, Leatherjacket, Silver Trevally, Whiting and Gould Squid.

Possibly the most conspicuous development in the recreational fishery over the past decade or so has been the growth in fishery for Southern Calamari, with catches doubling since 2000-01. Much of this growth has been around increased awareness of the species and its eating qualities by recreational fishers. Recreational catches are now comparable in magnitude to those taken in the commercial fishery and also reflect an expansion of the fishery into north coast waters for both sectors. Other species for which catches have increased since 2000-01 include Gould's Squid, Barracouta and tunas; for each species increased catches appear to be linked to their greater availability in waters adjacent to Tasmania. Marked inter-annual variability in the abundance of Gould's Squid and Barracouta in Tasmanian waters is also reflected in variability in commercial production (Andre *et al*., 2014) whereas recent developments in the gamefish fishery, especially for Southern Bluefin Tuna (Tracey *et al*., 2013), are linked to improved recruitment success, favourable oceanographic conditions and expansion of the fished area (especially off southern Tasmania).

Species for which catches have remained relatively stable over time include Black Bream, Whiting and Garfish, although there has been a marked shift to a greater proportion of catch and release fishing for Black Bream. Species exhibiting substantially lower catches in 2012-13 compared with 2000-01 include Australian Salmon, Cod, Trumpeters, Blue Warehou, Leatherjacket, Mullet, Rock Lobster and Abalone. Although the current survey does not represent catches of the latter two species 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 and Tracey, 2014). In relation to Blue Warehou, Bastard Trumpeter, Leatherjacket and Mullet, significant reduction in recreational gillnet effort, along with lower abundances of Blue Warehou and potentially Bastard Trumpeter are likely to be key factors (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 increasingly restrictive size and bag limits. In 2012-13 release rates for most species were typically higher than in 2000-01 but comparable to those in 2007-08. In 2001, there were relatively few restrictions on recreational catches but following several major fishery management reviews, bag limits and revised size limits have been implemented for many finfish species to reduce the impacts on the harvested stocks. 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.

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 significant step towards achieving this goal, providing important information against which future developments and trends can be evaluated.

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Our dedicated and professional team of survey interviewers – Fiona Broadby, Alison Dargue, Sheila Edwards Stephanie Gleeson, Shirley Lines, Frances Lyrmont, and Alison Worthington – ensured that response rates and data quality remained high in all aspects of the survey, achieving benchmarks that are the envy of other researchers.

Finally, the recreational fishers of Tasmania who willingly participated in the study are gratefully acknowledged.

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Appendices

Appendix 1 Species groupings by capture method as reported by recreational fishers in Tasmania during 2012-13.

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*	+++		++						
	Brook Trout	*Salvelinus fontinalis*	+								
	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 caeruleopunctatus*	+								
	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*	+								
	Magpie perch	*Cheilodactylus nigripes*			+						
	Morwong, other	Cheilodactylidae	+								
	Blueeye trevalla	*Hyperoglyphe antarctica*	+	++							
	Blue Mackerel	*Scomber australasicus*	+++		+						
	Boarfish	Pentacerotidae	+		+						
	Dory	Zeidae	+	+	+						
	Herring cale	*Odax cyanomelas*			+						
	Knifejaw	*Oplegnathus woodwardi*	+								
	Latchet	*Pterygotrigla polyommata*	+								
	Ling	*Genypterus* spp	+		+						
	Luderick	*Girella* spp	+		+	+					
	Marblefish	*Aplodactylus arctidens*	+		++						
	Red Mullet	Mullidae	+								
	Sergeant Baker	*Aulopus purpurissatus*	+								
	Snapper	*Pagrus auratus*	+								

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	Stargazer	Uranoscopidae			+						
	Sweep	Scorpididae	+		++						
	Tailor	*Pomatomus saltatrix*	+								
	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	++	++	+			+			
RockLobster	Southern rockLobster	*Jasus edwardsii*				+++	++++			++	
Crustaceans, other	Crab	Brachyura	+		+		+		+		
	Prawns	Penaeidea				+					+++

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									+++
Other taxa	Sea Urchin	Class Echinoidea	+								

Appendix 2 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 2012.

SE is standard error, RSE is relative standard error.

	Population	Recreational fishers			Participation rate	
Statistical Area	**Number**	**Number**	**SE**	**RSE**	**(%)**	**SE**
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

Appendix 3 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 2012.

		Male			Female			Total		
Statistical Area	**Age class**	**Pop'n**	**Fishers**	**% fishers**	**Pop'n**	**Fishers**	**% fishers**	**Pop'n**	**Fishers**	**% fishers**
Hobart										
	5 to 14	12,881	4,817	37.4	11,899	3,596	30.2	24,780	8,413	33.9
	15 to 29	21,308	5,970	28.0	20,034	3,240	16.2	41,342	9,211	22.3
	30 to 44	19,200	6,280	32.7	19,834	3,033	15.3	39,034	9,314	23.9
	45 to 59	20,401	6,596	32.3	21,455	3,321	15.5	41,856	9,917	23.7
	60+	20,478	4,147	20.2	23,662	905	3.8	44,140	5,052	11.4
	Total	**94,268**	**27,810**	**29.5**	**96,884**	**14,096**	**14.5**	**191,152**	**41,906**	**21.9**
South East										
	5 to 14	2,395	969	40.5	2,204	670	30.4	4,599	1,639	35.6
	15 to 29	2,540	1,105	43.5	2,284	565	24.8	4,824	1,671	34.6
	30 to 44	3,254	1,446	44.4	3,171	644	20.3	6,425	2,090	32.5
	45 to 59	4,291	1,488	34.7	4,074	660	16.2	8,365	2,147	25.7
	60+	4,999	993	19.9	4,399	530	12.0	9,398	1,522	16.2
	Total	**17,479**	**6,001**	**34.3**	**16,132**	**3,069**	**19.0**	**33,611**	**9,070**	**27.0**
Launceston & North East	5 to 14	8,561	2,513	29.4	8,099	2,042	25.2	16,660	4,555	27.3
	15 to 29	12,913	4,021	31.1	12,333	1,608	13.0	25,246	5,629	22.3
	30 to 44	11,911	3,388	28.4	12,440	1,667	13.4	24,351	5,056	20.8
	45 to 59	14,047	4,499	32.0	14,297	2,476	17.3	28,344	6,975	24.6
	60+	15,558	3,101	19.9	16,665	655	3.9	32,223	3,756	11.7
	Total	**62,990**	**17,523**	**27.8**	**63,834**	**8,449**	**13.2**	**126,824**	**25,971**	**20.5**
West & North West	5 to 14	7,130	2,257	31.7	6,696	1,972	29.5	13,826	4,229	30.6
	15 to 29	9,639	2,780	28.8	9,202	1,285	14.0	18,841	4,065	21.6
	30 to 44	9,405	3,089	32.8	9,747	1,291	13.2	19,152	4,380	22.9
	45 to 59	11,432	3,529	30.9	11,573	1,359	11.7	23,005	4,888	21.2
	60+	12,656	2,792	22.1	13,471	482	3.6	26,127	3,274	12.5
	Total	**50,262**	**14,447**	**28.7**	**50,689**	**6,390**	**12.6**	**100,951**	**20,836**	**20.6**
Tasmania										
	5 to 14	30,967	10,556	34.1	28,898	8,280	28.7	59,865	18,836	31.5
	15 to 29	46,400	13,877	29.9	43,853	6,699	15.3	90,253	20,576	22.8
	30 to 44	43,770	14,203	32.5	45,192	6,637	14.7	88,962	20,840	23.4
	45 to 59	50,171	16,112	32.1	51,399	7,815	15.2	101,570	23,927	23.6
	60+	53,691	11,032	20.5	58,197	2,572	4.4	111,888	13,604	12.2
	Total	**224,999**	**65,781**	**29.2**	**227,539**	**32,003**	**14.1**	**452,538**	**97,784**	**21.6**

Appendix 4 Annual recreational catch (kept and released numbers) of key species by targeted and non-targeted effort during 2012-13 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	168,990	26,887	**5,761**	**3,044**	96.7
Atlantic Salmon	8,681	2,873	**2,455**	**1,423**	78.0
Australian Salmon	159,030	35,397	70,670	12,337	69.2
Black Bream	51,250	11,863	8,378	2,331	85.9
Blue Warehou	***8,176***	***3,833***	***2,607***	***1,515***	75.8
Flathead	1,301,488	114,082	309,802	51,543	80.8
Flounder	*22,639*	*7,443*	***2,173***	***965***	91.2
Morwong	6,575	2,148	20,305	4,927	24.5
Mullet	**21,984**	**13,814**	23,158	7,989	48.7
Silver Trevally	**1,680**	**742**	8,974	3,385	15.8
Trumpeter	**6,469**	**3,050**	5,385	2,175	54.6
Tuna	*16,600*	*4,599*	+		97.3
Scalefish, other	90,486	32,578	259,079	33,500	25.9
Sharks	14,012	3,263	24,629	3,434	36.3
Rock Lobster	79,796	13,352	+		99.7
Squid	81,196	13,476	28,190	5,543	74.2
Abalone	39,131	8,931	**2,419**	**1,195**	94.2
Scallop	***13,034***	***8,497***	+		99.2

Appendix 5 Annual recreational harvest (kept numbers) of key species by targeted and non-targeted effort during 2012-13 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	101,874	15,590	**3,756**	**2,932**	96.4
Atlantic Salmon	8,629	2,863	**2,455**	**1,423**	77.9
Australian Salmon	104,337	21,186	40,375	8,134	72.1
Black Bream	15,624	4,373	3,529	1,299	81.6
Blue Warehou	***8,176***	***3,833***	***2,581***	***1,494***	76.0
Flathead	769,232	73,492	155,701	26,634	83.2
Flounder	*22,018*	*7,362*	***1,219***	***801***	94.8
Morwong	6,088	2,015	18,032	4,656	25.2
Mullet	**11,977**	**6,358**	**14,318**	**7,292**	45.5
Silver Trevally	**1,148**	**504**	3,678	1,587	23.8
Trumpeter	**6,469**	**3,050**	4,580	1,833	58.5
Tuna	*13,009*	*3,866*	+		98.5
Scalefish, other	**70,154**	**29,510**	82,093	13,510	46.1
Shark	4,727	1,069	4,572	940	50.8
Rock Lobster	44,277	7,097	+		99.5
Squid	76,390	12,756	24,190	5,014	75.9
Abalone	36,245	8,554	**2,295**	**1,190**	94.0
Scallop	***12,778***	***8,271***			100.0

Appendix 6 Annual recreational effort (fisher days and numbers of fishers) and catch (kept and released numbers) of key species by water body type during 2012-13 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										
Fishers	17,912	1,640	11,405	1,516	32,211	2,472	70,803	3,490	2,277	432
Fisher days	81,986	8,857	27,924	4,020	100,963	11,829	297,579	19,444	4,460	1,094
Catch										
Trout	135,693	21,968	28,790	10,064	*8,301*	*2,995*	***1,967***	***1,420***		
Atlantic Salmon	*4,707*	*1,667*	+		***3,019***	***1,901***	**2,838**	**1,932**		
Redfin	*1,701*	*668*	***1,479***	***1,038***						
River Blackfish	***1,356***	***1,030***	+							
Australian Salmon			+		98,102	31,947	130,528	18,811	+	
Bastard Trumpeter							***8,198***	***3,853***		
Barracouta					***22,659***	***14,163***	57,374	12,710	+	
Black Bream			***2,375***	***1,497***	37,155	9,692	20,098	5,348		
Blue Warehou							*10,783*	*4,120*		
Cod					***12,836***	***5,730***	12,799	4,329	+	
Eel	+		+		+		+			
Flathead					134,669	20,885	1,474,793	129,640	***1,828***	***962***
Flounder					***8,026***	***4,498***	*16,785*	*5,510*		
Garfish					***6,749***	***4,412***	***10,535***	***7,939***		
Gurnard					***1,837***	***848***	69,943	14,656	***1,651***	***772***
Jack Mackerel					***1,543***	***647***	***29,364***	***26,016***		
Morwong					+		26,163	5,914	+	
Leatherjacket					***1,845***	***955***	8,334	2,235		
Mullet			+		*7,486*	*2,182*	**36,831**	**15,791**		
Pike					***1,689***	***1,003***	4,016	1,031		
Silver Trevally					***3,163***	***1,402***	*7,491*	*2,839*		
Striped Trumpeter							*3,318*	*922*	+	
Tuna							*6,479*	*2,404*	*10,589*	*3,854*
Whiting					***4,287***	***2,139***	**11,465**	**5,820**		
Wrasse					*8,496*	*3,034*	46,202	10,474		
Scalefish, other					***10,260***	***5,830***	16,945	4,431	***2,323***	***1,229***
Sharks & rays					***5,031***	***1,991***	32,738	4,516	+	
Rock Lobster					+		79,746	13,351		
Crustaceans, other					+		***12,218***	***8,917***		
Southern Calamari					***8,370***	***3,456***	54,954	10,259	+	
Gould's Squid					+		44,665	9,613	+	
Cephalopod, other					+		3,666	1,053		
Abalone					+		40,866	9,087		
Scallop							***13,070***	***8,498***	+	
Bivalve, other					***2,062***	***1,769***	***25,576***	***11,770***		
Other taxa	***1,111***	***1,096***					+			

Appendix 7 Annual recreational harvest (kept numbers) of key species by water body type during 2012-13 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	85,989	13,508	13,539	5,053	***4,241***	***1,827***	***1,860***	***1,416***		
Atlantic Salmon	*4,656*	*1,650*	+		***3,019***	***1,901***	***2,838***	***1,932***		
Redfin	***1,201***	***573***	***1,479***	***1,038***						
River Blackfish	+		+							
Australian Salmon			+		51,021	16,898	92,829	14,405	+	
Bastard Trumpeter							***7,573***	***3,633***		
Barracouta					***2,705***	***1,700***	30,027	8,193	+	
Black Bream					*8,315*	*2,687*	*10,837*	*3,533*		
Blue Warehou							*10,757*	*4,112*		
Cod					***3,856***	***1,834***	*6,349*	*2,552*	+	
Eel			+		+					
Flathead					50,287	8,461	873,428	81,270	***1,217***	***666***
Flounder					***7,994***	***4,498***	*15,244*	*5,285*		
Garfish					***6,124***	***3,978***	***9,136***	***6,640***		
Gurnard					***1,294***	***738***	15,261	4,801	+	
Jack Mackerel					***1,072***	***596***	***27,726***	***24,942***		
Morwong					+		23,625	5,662	+	
Leatherjacket					***1,236***	***681***	*4,153*	*1,552*		
Mullet			+		*3,598*	*1,370*	***22,384***	***9,553***		
Pike					***1,407***	***980***	*2,488*	*720*		
Silver Trevally					+		3,982	1,607		
Striped Trumpeter							3,139	875	+	
Tuna							***5,248***	***2,163***	*7,961*	*3,131*
Whiting					+		**8,504**	**3,688**		
Wrasse					***1,038***	***475***	6,185	1,547		
Scalefish, other					***6,005***	***3,752***	**9,692**	**3,987**	***2,323***	***1,229***
Sharks & rays					+		8,560	1,546	+	
Rock Lobster					+		44,291	7,095		
Crustaceans, other							***10,742***	***8,891***		
Southern Calamari					***7,307***	***3,255***	50,339	9,408	+	
Gould's Squid					+		41,538	9,339	+	
Cephalopod, other							***1,443***	***649***		
Abalone					+		37,856	8,707		
Scallop							***12,778***	***8,271***		
Bivalve, other					***2,062***	***1,769***	***25,576***	***11,770***		
Other taxa	***1,111***	***1,096***					+			

Appendix 8 Annual recreational effort (fisher days and hours) and catch (kept and released numbers) of key species by fishing method during 2012-13, based on Tasmanian residents aged five years or older.

SE is standard error ; *na* is not applicable (passive fishing methods); + 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		Lobster pot		Other	
	Number	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Effort										
Fisher days	450,686	25,672	12,610	2,702	2,303	803	46,416	6,879	16,304	2,580
Hours	1,504,720	93,602	na		18,140	3,363	na		na	
Catch										
Trout	171,677	26,985	***3,074***	***2,917***						
Atlantic Salmon	*5,480*	*1,713*	***5,655***	***3,052***						
Redfin	***3,180***	***1,478***								
River Blackfish	***1,495***	***1,036***								
Australian Salmon	225,459	38,848	***4,036***	***2,010***					+	
Bastard Trumpeter			***8,056***	***3,852***	+					
Barracouta	79,310	19,161	+							
Black Bream	59,194	12,211	+						+	
Blue Warehou	***1,060***	*773*	*9,723*	*3,800*						
Cod	22,324	6,906	***3,501***	***3,301***			+		+	
Eel	*1,090*	*379*					+			
Flathead	1,604,110	131,969	***299***	***128***	+				***6,476***	***3,654***
Flounder	+		***1,512***	***921***					*23,153*	*7,489*
Garfish	***15,761***	***9,042***							***1,523***	***847***
Gurnard	71,815	14,730	+						***1,169***	***689***
Jack Mackerel	***29,789***	***26,009***	***1,118***	***918***						
Morwong	25,191	5,891	*1,422*	*410*	+				+	
Leatherjacket	8,439	2,506	*1,373*	*515*	+		+			
Mullet	19,990	5,181	***4,165***	***2,721***	+				***20,954***	***14,919***
Pike	5,705	1,435								
Silver Trevally	*10,062*	*3,451*	+		+					
Striped Trumpeter	*3,520*	*939*							+	
Tuna	*17,068*	*4,705*								
Whiting	15,602	6,201							+	
Wrasse	50,918	10,887	*3,527*	*984*	+		+			
Scalefish, other	21,659	7,012	***5,861***	***2,393***	+				***1,926***	***866***
Sharks & rays	22,329	3,095	***3,227***	***1,883***			*3,744*	*1,281*	*9,341*	*2,611*
Rock Lobster					*14,250*	*3,739*	63,335	12,232	***2,450***	***1,192***
Crustaceans, other	+		+		+		+		***10,856***	***8,897***
Southern Calamari	63,195	10,934							+	
Gould's Squid	45,597	9,618							+	
Cephalopod, other	*3,681*	*1,082*					+			
Abalone					41,551	9,109				
Scallop	+				***13,034***	***8,497***				
Bivalve, other	***2,988***	***3,090***			+				***24,364***	***10,854***
Other taxa	+								***1,250***	***1,233***

Appendix 9 Annual recreational harvest (kept numbers) of key species by fishing method during 2012-13, 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		Lobster pot		Other	
Species	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**	**Number**	**SE**
Trout	102,556	15,600	***3,074***	***2,917***						
Atlantic Salmon	*5,429*	*1,696*	***5,655***	***3,052***						
Redfin	***2,680***	***1,437***								
River Blackfish	+									
Australian Salmon	140,472	23,649	***4,036***	***2,010***					+	
Bastard Trumpeter			***7,431***	***3,632***	+					
Barracouta	32,010	8,336	+							
Black Bream	18,718	4,578	+						+	
Blue Warehou	***1,060***	*773*	*9,697*	*3,792*						
Cod	6,911	2,293	***3,448***	***3,300***			+		+	
Eel	+									
Flathead	918,448	81,355	+		+				***5,926***	***3,555***
Flounder	+		***1,300***	***837***					21,855	7,335
Garfish	***13,737***	***7,693***							***1,523***	***847***
Gurnard	16,594	4,965	+						+	
Jack Mackerel	***28,013***	***24,938***	+							
Morwong	22,899	5,640	+		+				+	
Leatherjacket	4,967	1,771	+		+					
Mullet	*11,209*	*3,779*	***1,969***	***1,227***	+				***13,084***	***8,901***
Pike	*3,895*	*1,213*								
Silver Trevally	*4,234*	*1,638*	+		+					
Striped Trumpeter	*3,341*	*892*							+	
Tuna	*13,209*	*3,890*								
Whiting	9,262	3,710							+	
Wrasse	6,517	1,611	+		+					
Scalefish, other	13,858	5,160	***2,988***	***2,190***	+				***1,091***	***617***
Sharks & rays	6,214	1,264	+				+		*2,915*	*795*
Rock Lobster					*13,141*	*3,554*	30,259	5,809	***1,117***	***559***
Crustaceans, other	+						+		***10,665***	***8,891***
Southern Calamari	57,517	9,954							+	
Gould's Squid	42,470	9,344							+	
Cephalopod, other	***1,443***	***649***								
Abalone					38,541	8,731				
Scallop					***12,778***	***8,271***				
Bivalve, other	***2,988***	***3,090***			+				***24,364***	***10,854***
Other taxa	+								***1,111***	***1,096***

Appendix 10 Annual recreational catch (kept and released numbers) of key species by fishing platform during 2012-13, 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**	**Boat**
Trout	104,581	18,572	67,695	16,002	2,475	1,331	59.8
Atlantic Salmon	***6,577***	***2,888***	***4,558***	***1,927***			59.1
Redfin	*1,885*	*702*	***1,295***	***1,007***			59.3
River Blackfish			***1,495***	***1,036***			0.0
Australian Salmon	137,055	28,387	92,296	15,994	+		59.7
Bastard Trumpeter	***8,056***	***3,852***	+				98.3
Barracouta	57,350	12,765	***22,905***	***14,405***			71.5
Black Bream	30,139	9,430	29,489	6,632			50.5
Blue Warehou	*10,457*	*4,112*	+				97.0
Cod	14,251	5,067	***11,678***	***5,652***			55.0
Eel	+		*1,009*	*370*			17.4
Flathead	1,504,651	130,963	103,231	22,908	***3,407***	***2,448***	93.4
Flounder	***5,167***	***2,892***	*19,645*	*7,041*			20.8
Garfish	***8,318***	***4,518***	***8,967***	***7,879***			48.1
Gurnard	72,871	14,759	+				99.2
Jack Mackerel	***2,246***	***1,057***	***28,661***	***26,004***			7.3
Morwong	26,644	5,978	+				99.1
Leatherjacket	*5,087*	*1,524*	***5,092***	***2,063***			50.0
Mullet	*8,660*	*3,495*	**36,483**	**15,562**			19.2
Pike	5,089	1,404	+				89.2
Silver Trevally	***3,163***	***1,611***	***7,491***	***3,069***			29.7
Striped Trumpeter	*3,656*	*961*					100.0
Tuna	*17,068*	*4,705*					100.0
Whiting	**14,706**	**6,182**	***1,047***	***449***			93.4
Wrasse	34,595	7,234	20,103	8,042			63.2
Scalefish, other	16,716	4,566	***12,812***	***5,858***			56.6
Sharks & rays	34,195	4,872	4,445	995			88.5
Rock Lobster	74,054	12,506	***5,982***	***4,036***			92.5
Crustaceans, other	***10,251***	***8,836***	***2,207***	***1,181***			82.3
Southern Calamari	42,052	8,374	21,083	6,383	+		66.3
Gould's Squid	44,367	9,619	*1,613*	*530*			96.5
Cephalopod, other	*3,054*	*972*	+				81.0
Abalone	31,940	8,209	*9,611*	*2,952*			76.9
Scallop	***13,142***	***8,500***					100.0
Bivalve, other	***7,248***	***5,012***	***20,390***	***10,141***			26.2
Other taxa	***1,867***	***1,341***					100.0

Appendix 11 Annual recreational harvest (numbers) for key species by fishing platform during 2012-13, 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**	**Boat**
Trout	67,900	12,258	36,411	7,895	***1,319***	***767***	64.3
Atlantic Salmon	***6,577***	***2,888***	***4,507***	***1,912***			59.3
Redfin	***1,432***	***614***	***1,248***	***1,006***			53.4
River Blackfish			+				0.0
Australian Salmon	97,637	20,964	47,075	7,526			67.5
Bastard Trumpeter	***7,431***	***3,632***	+				98.1
Barracouta	28,931	7,956	***4,023***	***2,643***			87.8
Black Bream	*7,584*	*2,994*	*11,568*	*3,037*			39.6
Blue Warehou	*10,431*	*4,104*	+				97.0
Cod	***8,700***	***3,829***	***1,764***	***1,088***			83.1
Eel			+				0.0
Flathead	891,758	81,913	30,965	7,246	***2,210***	***1,901***	96.4
Flounder	***4,890***	***2,811***	*18,347*	*6,877*			21.0
Garfish	***7,692***	***4,095***	***7,568***	***6,568***			50.4
Gurnard	17,223	5,010	+				99.2
Jack Mackerel	***1,805***	***912***	***26,993***	***24,933***			6.3
Morwong	23,885	5,681	+				99.0
Leatherjacket	***2,592***	***1,108***	***2,797***	***1,400***			48.1
Mullet	***4,814***	***2,133***	***21,481***	***9,421***			18.3
Pike	*3,500*	*1,182*	+				89.8
Silver Trevally	***2,609***	***1,517***	*2,217*	*687*			54.1
Striped Trumpeter	*3,476*	*915*					100.0
Tuna	*13,209*	*3,890*					100.0
Whiting	**8,692**	**3,701**	+				92.3
Wrasse	5,058	1,302	***2,164***	***985***			70.0
Scalefish, other	10,935	4,079	***7,085***	***3,827***			60.7
Sharks & rays	8,120	1,502	***1,179***	***516***			87.3
Rock Lobster	40,109	6,429	***4,408***	***2,573***			90.1
Crustaceans, other	***9,023***	***8,819***	***1,719***	***1,121***			84.0
Southern Calamari	38,788	7,931	*18,670*	*5,770*	+		67.2
Gould's Squid	41,554	9,346	*1,299*	*488*			97.0
Cephalopod, other	***1,125***	***568***	+				78.0
Abalone	30,256	8,013	*8,285*	*2,669*			78.5
Scallop	***12,778***	***8,271***					100.0
Bivalve, other	***7,248***	***5,012***	***20,390***	***10,141***			26.2
Other taxa	***1,596***	***1,166***					100.0

Appendix 12. Annual recreational effort (number of fishers and fisher days) and catch (kept and released numbers) for key species by fishing region during 2012-13, 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	7,342	928	12,010	1,323	11,937	1,577	4,700	829	15,151	1,585	8,422	1,370	8,651	1,148
Fisher days	25,850	3,967	49,122	6,303	35,484	5,317	15,355	3,910	55,071	7,243	23,662	5,514	20,866	3,125
Catch														
Trout	36,084	10,263	94,531	18,440	33,868	9,678	***3,074***	***2,917***	***4,328***	***2,379***	+			
Atlantic Salmon	***2,254***	***966***	***1,263***	***1,228***	*1,761*	*670*	***5,417***	***3,049***	+					
Redfin	+		+		***2,102***	***1,111***								
River Blackfish	***1,379***	***1,031***			+									
Australian Salmon					***1,714***	***1,220***	*19,353*	*6,372*	53,647	14,044	***31,134***	***26,277***	*6,792*	*1,970*
Bastard Trumpeter							***3,475***	***2,914***	+	***111***				
Barracouta							***2,559***	***1,666***	***9,815***	***4,418***	***1,439***	***1,410***	***5,697***	***3,676***
Black Bream					***2,619***	***1,516***	+		***1,172***	***599***			***7,428***	***3,438***
Blue Warehou							***2,462***	***2,305***	+					
Cod							***3,831***	***3,383***	***2,343***	***1,439***	***4,718***	***2,221***	+	
Eel	+				+				+				+	
Flathead							***1,254***	***877***	136,517	29,776	32,422	8,920	89,601	21,223
Flounder							+		***2,920***	***1,917***	***5,834***	***4,256***	***5,483***	***4,513***
Garfish							+		***8,044***	***7,853***			+	
Gurnard							+		***16,211***	***7,022***	+		***5,657***	***2,659***
Jack Mackerel							+				***1,482***	***644***	+	
Morwong							+		+					
Leatherjacket							+		***2,753***	***1,601***	+		+	
Mullet	+				+		+		***33,365***	***15,599***	***2,563***	***1,483***	***2,702***	***2,456***
Pike									***1,425***	***649***	***1,415***	***991***	+	
Silver Trevally									+		+		+	
Striped Trumpeter							+						+	
Tuna							+						+	

Appendix 12 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									***2,420***	***1,939***	+		+	
Wrasse							+		***14,377***	***7,526***	***3,645***	***1,723***	*3,575*	*1,223*
Scalefish, other							***1,138***	***738***	*8,893*	*2,941*	***8,827***	***5,737***	*1,506*	*572*
Sharks & rays							***2,433***	***1,864***	14,605	3,683	+		*4,363*	*1,406*
Rock Lobster							*28,221*	*9,440*	***5,411***	***2,328***			***1,651***	***967***
Crustaceans, other							+				+		***1,527***	***1,105***
Southern Calamari									***11,559***	***5,061***	***2,700***	***2,084***	***2,050***	***885***
Gould's Squid							+		*3,530*	*1,373*			+	
Cephalopod, other									***1,319***	***859***			+	
Abalone							***2,692***	***1,281***	***4,877***	***1,976***			***4,811***	***2,388***
Scallop													+	
Bivalve, other									+					
Other taxa	1,111	1,096											+	

Appendix 12 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	10,624	1,579	16,521	1,745	13,391	1,616	16,037	1,850	9,557	1,397	18,611	2,124
Fisher days	51,568	9,744	58,110	7,286	49,898	8,192	35,951	5,981	31,289	6,979	58,455	8,103
Catch												
Trout	+		+		+				*1,612*	*609*		
Atlantic Salmon											+	
Redfin												
River Blackfish												
Australian Salmon	41,523	13,728	***19,721***	***8,385***	*10,314*	*3,849*	*11,431*	*4,318*	*13,157*	*5,008*	*20,915*	*7,125*
Bastard Trumpeter			+		***1,205***	***739***	+		+		***3,049***	***2,395***
Barracouta	+		***15,622***	***6,661***	*15,871*	*6,374*	***1,617***	***786***	***16,761***	***13,924***	***10,391***	***4,601***
Black Bream	*10,285*	*3,222*	*18,814*	*6,243*	+		+		***13,955***	***6,075***	***4,160***	***2,052***
Blue Warehou					***5,032***	***2,737***	+				***2,917***	***1,623***
Cod	+		***2,029***	***1,423***	***3,948***	***3,220***			***6,027***	***5,071***	*2,411*	*850*
Eel					+				+		+	***5***
Flathead	71,324	17,310	434,284	66,034	*140,555*	*29,460*	334,694	65,504	53,355	14,426	317,282	64,505
Flounder	+		+		***1,419***	***1,025***	***2,952***	***2,499***			***5,174***	***2,898***
Garfish	***7,558***	***4,484***	+		+		+				+	
Gurnard	***8,089***	***3,455***	15,912	3,413	***21,923***	***11,393***	+		+		***2,270***	***940***
Jack Mackerel	+		***1,029***	***877***	***26,190***	***25,981***			+		***1,242***	***931***
Morwong	***7,266***	***3,207***	*6,137*	*2,010*	***10,051***	***4,203***	+				***2,533***	***1,820***
Leatherjacket	***3,333***	***1,766***	+		***1,263***	***651***	***1,203***	***511***	+		+	
Mullet	***1,372***	***1,077***	***1,304***	***1,250***					***1,629***	***1,038***	+	
Pike	+		+				+		+		=	
Silver Trevally	***7,768***	***3,381***	***1,089***	***544***	+		+				+	
Striped Trumpeter	+		***1,261***	***589***	***1,060***	***505***					+	
Tuna	*9,138*	*3,368*	***1,823***	***1,762***	*5,580*	*2,202*					+	
Whiting	***1,247***	***574***	+		***1,140***	***483***	***8,365***	***5,771***	+	***434***	+	
Wrasse	***7,434***	***5,121***	***7,847***	***3,317***	*4,356*	*1,514*	***2,019***	***1,052***	***3,322***	***2,426***	*7,607*	*2,932*
Scalefish, other	***5,319***	***3,395***	***1,313***	***620***	+		+		+		***1,287***	***606***
Sharks & rays	***2,597***	***1,090***	4,493	1,226	*4,161*	*969*	*1,725*	*590*	+		***2,921***	***1,207***

Appendix 12 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	*6,191*	*1,984*	*5,297*	*1,479*	*15,998*	*4,538*	+	***450***	+		***16,463***	***7,039***
Crustaceans, other	***9,137***	***8,820***	+		+	+					+	
Southern Calamari	***8,530***	***3,474***	*18,480*	*6,324*	***11,267***	***4,649***	***3,622***	***2,032***	+		***5,025***	***2,349***
Gould's Squid	***6,602***	***2,973***	*8,064*	*2,839*	***16,382***	***7,277***	+		+		***10,160***	***4,136***
Cephalopod, other	+		+		+	+			+		*1,246*	*493*
Abalone	***4,106***	***2,689***	***1,427***	***702***	***11,999***	***6,368***	***1,596***	***1,584***	+		***9,358***	***3,912***
Scallop			***13,034***	***8,497***								
Bivalve, other	***2,061***	***1,766***			***1,317***	***1,315***	+				***23,945***	***11,677***
Other taxa	+		+									

Appendix 13. Annual recreational harvest (numbers) for key species by fishing region during 2012-13, 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	20,448	4,887	57,334	10,712	21,746	7,232	***3,074***	***2,917***	***1,954***	***947***	+			
Atlantic Salmon	***2,203***	***937***	***1,263***	***1,228***	*1,761*	*670*	***5,417***	***3,049***	+					
Redfin	+		+		***2,013***	***1,109***								
River Blackfish	+				+									
Australian Salmon					+		*17,340*	*6,050*	32,340	10,146	***17,541***	***14,175***	*4,999*	*1,475*
Bastard Trumpeter							***3,475***	***2,914***	+					
Barracouta							***2,559***	***1,666***	***5,868***	***3,287***	***1,439***	***1,410***	+	
Black Bream							+		+				***1,832***	***898***
Blue Warehou							***2,462***	***2,305***	+					
Cod							***3,733***	***3,383***	+		***1,917***	***1,108***	+	
Eel					+				+					
Flathead							***1,038***	***770***	70,845	16,857	*10,518*	*2,847*	63,791	16,456
Flounder							+		***2,490***	***1,710***	***5,834***	***4,256***	***5,355***	***4,389***
Garfish							+		***6,720***	***6,537***			+	
Gurnard							+		***1,884***	***1,034***	+		+	
Jack Mackerel											***1,072***	***596***	+	
Morwong							+		+					
Leatherjacket									***1,435***	***1,076***	+		+	
Mullet					+		+		***21,505***	***9,583***	***1,877***	***1,074***	+	
Pike									+		***1,310***	***975***	+	
Silver Trevally									+		+		+	
Striped Trumpeter							+						+	
Tuna							+						+	
Whiting									+		+		+	
Wrasse							+		***1,216***	***787***	+		***1,009***	***633***
Scalefish, other							+		***5,666***	***2,609***	***5,708***	***3,741***	***1,101***	***503***
Sharks & rays							+		*4,526*	*1,297*	+		*1,949*	*636*

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**
Rock Lobster							*14,433*	*4,809*	***5,155***	***2,208***			***1,485***	***890***
Crustaceans, other													***1,527***	***1,105***
Southern Calamari									***10,003***	***4,181***	***2,700***	***2,084***	***2,050***	***885***
Gould's Squid							+		*2,811*	*1,127*			+	
Cephalopod, other									+					
Abalone							***2,692***	***1,281***	***4,877***	***1,976***			***4,200***	***2,263***
Scallop														
Bivalve, other									+					
Other taxa	1,111	1,096												

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**
Trout	+								+			
Atlantic Salmon											+	
Redfin												
River Blackfish												
Australian Salmon	*25,599*	*10,223*	***12,902***	***7,124***	*8,362*	*3,225*	*8,376*	*3,015*	***3,268***	***1,741***	*13,699*	*5,139*
Bastard Trumpeter			+		***1,136***	***695***	+		+		***2,683***	***2,049***
Barracouta	+		***7,541***	***4,083***	*11,226*	*4,517*	+				***3,147***	***2,628***
Black Bream	*3,152*	*1,268*	*9,670*	*3,872*	+		+		***1,204***	***914***	***2,295***	***1,371***
Blue Warehou					***5,032***	***2,737***	+				***2,891***	***1,604***
Cod	+		***1,554***	***1,383***	***1,065***	***722***			+		+	
Eel												
Flathead	45,533	11,843	320,539	50,864	78,635	18,005	173,909	34,838	*20,026*	*6,024*	140,099	32,072
Flounder	+				***1,292***	***1,001***	***2,928***	***2,499***			***4,373***	***2,776***
Garfish	***6,932***	***4,057***			+		+				+	
Gurnard	***3,427***	***2,580***	*2,313*	*895*	***6,298***	***3,764***	+		+		***1,180***	***813***
Jack Mackerel	+		+		***25,112***	***24,911***					***1,111***	***809***
Morwong	***6,456***	***3,015***	*5,472*	*1,766*	***9,423***	***4,144***	+				***1,949***	***1,559***
Leatherjacket	***2,292***	***1,226***			+		+		+		+	
Mullet	***1,077***	***1,052***							+		+	
Pike	+		+				+				+	
Silver Trevally	***2,337***	***1,531***	+		+		+				+	
Striped Trumpeter	+		***1,174***	***563***	+						+	
Tuna	***6,788***	***2,836***	***1,823***	***1,762***	*4,071*	*1,484*					+	
Whiting	+		+		***1,081***	***480***	***5,552***	***3,607***	+		+	
Wrasse	***1,818***	***994***	+		+		+		+		+	
Scalefish, other	***3,361***	***3,046***	+		+		+				+	
Sharks & rays	+		+		+		+		+		+	

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**
Rock Lobster	*3,711*	*1,215*	*3,733*	*1,077*	*8,051*	*2,141*	+				*7,784*	*3,124*
Crustaceans, other	***8,946***	***8,819***			+						+	
Southern Calamari	***8,353***	***3,451***	*17,541*	*6,069*	***10,723***	***4,616***	***3,181***	***1,711***	+		***3,004***	***1,386***
Gould's Squid	***6,385***	***2,944***	*7,250*	*2,752*	***15,869***	***7,251***	+		+		***9,296***	***3,864***
Cephalopod, other	+	***40***	+	+	+						+	
Abalone	***4,106***	***2,689***	***1,303***	***613***	***10,959***	***6,218***	***1,173***	***1,165***	+		***8,546***	***3,485***
Scallop			***12,778***	***8,271***								
Bivalve, other	***2,061***	***1,766***			***1,317***	***1,315***	+				***23,945***	***11,677***
Other taxa	+		+	+								