

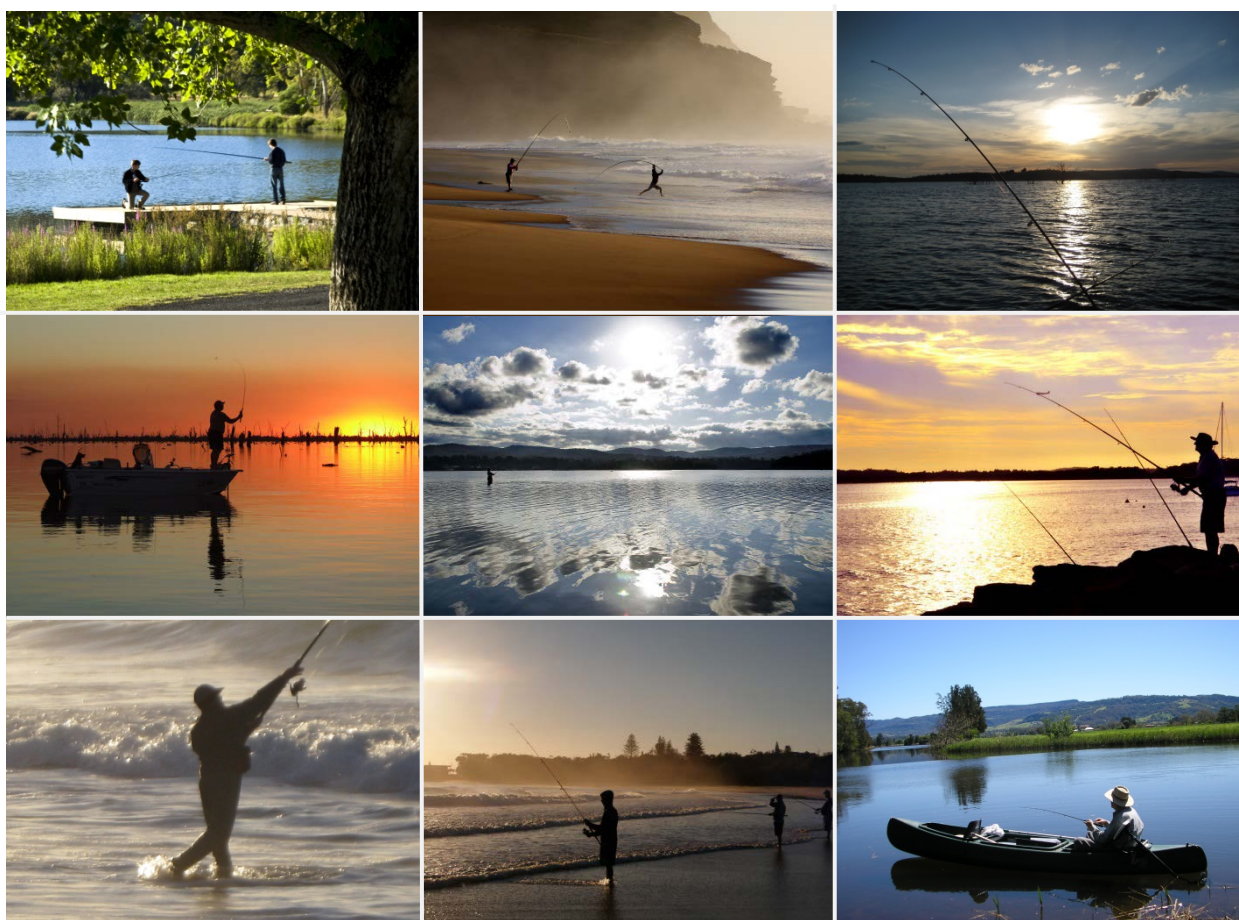


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Survey of Recreational Fishing in New South Wales and the ACT, 2013/14

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**Department of
Primary Industries**

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- finally and *most importantly*, the many thousands of residents who so willingly participated in the various surveys – especially, the fishers in the Diary Survey for their interest and continued co-operation over the 12 month period.

Non-technical summary

Survey of Recreational Fishing in New South Wales and the ACT, 2013/14

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Objectives

To provide detailed 'big picture' information for recreational fishing in NSW and ACT waters, by residents aged five years and older. Data elements included:

- fishing participation levels – by age, gender and residential region;
- detailed annual catch and effort information – by fishing method, platform (boat or shore), water body type (e.g. ocean waters, estuaries, rivers and lakes/dams) and for nine defined fishing zones;
- boat ownership levels and profiling of the recreational fishing 'fleet'; and
- the opinions of recreational fishers and other attitudinal information.

Also, optimum comparability was required with the National Recreational Fishing Survey (NRFS, 2000/01), thereby enabling direct comparison of key survey results between the two periods.

Key words

Recreational fishing, Telephone/diary survey

Summary

Background and Development Work

The NRFS was the first comprehensive assessment of recreational fishing in Australia and provided a range of 'big picture' information (as noted above) for each state and territory (Henry and Lyle, 2003). Since then, various jurisdictions have conducted state/territory-wide surveys to provide comparable information to the NRFS. In each of these studies, the main survey instrument (an 'off-site' telephone/diary survey) has been the same – with stratified random sampling from 'White Pages' telephone listings and expansion of all survey results to Australian Bureau of Statistics (ABS) estimates of the resident population for the state/territory concerned. Analysis of these surveys has been conducted using a customised analysis package (*RecSurvey*; Lyle *et al.*, 2009a).

Since the NRFS, Fisheries NSW has conducted a number of 'on-site' surveys, including several with large spatial and temporal scales, e.g. the Recreational Fishing Surveys in the Greater Sydney Region (Steffe *et al.*, 2011). Also, in the lead-up to the present survey, extensive

development work was undertaken to optimise data quality and utility for telephone/diary surveys – a key feature of which, has been the development and application of ‘dual-frame/hybrid’ sampling.

In the current survey, White Pages sampling comprised the ‘core’ sample frame and has provided direct comparability with NRFS data for NSW and the ACT, as for telephone/diary surveys in other jurisdictions. Also, as an integral part of the hybrid survey design, supplementary sampling was undertaken of licence holders from the NSW Recreational Fishing Fee (RFF) database. However by design, the results from this component are the subject of separate analysis and reporting. Therefore, all substantive survey results in this report refer to the White Pages sample frame for NSW/ACT residents, together with comparable data from the NRFS.

Survey Methods

In the present survey, participation rates and the demographic profiles of resident recreational fishers were assessed through a regionally-stratified, random telephone survey of over 9,400 NSW/ACT households – comprising over 22,000 residents aged five years and older. This Screening Survey also identified households with an intention to fish in the coming 12 months and in the subsequent Diary Survey, the fishing activities of nearly 1,700 households were monitored in detail between June 2013 and May 2014. All survey information was recorded by specialist interviewers through regular telephone contact with diarists and over 11,800 person-based fishing events were reported by more than 2,000 recreational fishers. Note: as for many state/territory-wide surveys since the NRFS, fishing-related expenditure information was not collected in the survey.

A Wash-up/Attitudinal Survey was conducted as the final contact with diarists to collect boat ownership details and examine fishers’ opinions and attitudes to various fishing-related matters. Also, a sample of households from the original Screening Survey that reported no intention to fish was re-contacted at the end of the diary period to identify and account for any unexpected fishing (the Non-intending Fisher Follow-up Survey). Response rates across all survey components were exceptionally high (often in excess of 90%) – confirming both the high levels of interest and co-operation by recreational fishers and the performance standards of the survey instrument. By calibrating against ABS population benchmarks (as at June 2013) and applying non-response adjustments, all survey results (including participation, effort, catch and boat ownership) have been expanded to represent the resident population of NSW and the ACT, aged five years and older.

Key Results

Fishing Participation

An estimated 849,249 (SE 27,639) NSW/ACT residents aged five years and older fished at least once in Australian waters in the twelve months prior to June 2013, representing a participation rate of 11.9% (SE 0.4%). The vast majority (98.5%) of these residents fished in NSW or ACT waters during this time (836,632 residents; SE 27,456) representing a participation rate of 11.7% (SE 0.4%).

This report focuses on the latter group, namely residents who fished in NSW or ACT waters. While close to half (45%) of all recreational fishers resided in the Sydney region, this also represented the lowest participation rate (8.6%). The highest participation rate (20.7%) occurred in the south-east of the state. Males accounted for well over two-thirds of the recreational fishers with a participation rate of 16.9%, compared with 6.6% for females. Although the highest number of fishers was in the 30-44 years age group (217,639 persons), children (5-14 years) had the highest participation rate (19.6%). Persons in the 60 years plus age group had the lowest rate of participation (6.7%).

Fishing Effort

During the 12 months between June 2013 and May 2014, resident fishers aged 5 years and older accounted for an estimated 3,181,035 fisher days in NSW or ACT waters – or an average of 4.3 days per fisher. However, as with most recreational fisheries, the distribution of fishing effort was highly skewed, with a relatively small number of fishers (20%) accounting for a high proportion (almost 60%) of total fisher days.

The majority (79%) of all recreational fishing activity occurred in saltwater – primarily estuaries, followed by inshore and offshore waters. Over half of all freshwater fishing occurred in rivers, as opposed to lakes and dams. Shore-based fishing accounted for 59% of all fisher days and line fishing (whether with bait or lures) was the dominant fishing method at 93% of the total effort. The use of pots or traps was relatively minor, along with nets, diving and other methods (e.g. digging and hand-collecting).

Regionally, the six coastal fishing zones accounted for the vast majority (84%) of all fisher days, with the Mid South Coast (22%) and Sydney (19%) having the highest activity levels. The three inland zones accounted for 16% of total fisher days, with the majority (10%) in the Murray/South West zone. In terms of seasonality, the summer period accounted for a third (33%) of total fisher days, followed by autumn (25%), spring (23%) and winter (19%).

Catch

Resident recreational fishers captured a diverse range of scalefish, elasmobranchs (sharks and rays), crustaceans, molluscs and other taxa, with an estimated 14,059,634 organisms caught during the 12 month survey period. Of the total catch, 7,843,644 (56%) were retained and the remaining 6,215,990 (44%) were released. Fish (scalefish and elasmobranchs) accounted for 75% of the total catch by numbers, followed by crustaceans (21%), worms (2%), cephalopods and molluscs (at 1% each).

In terms of saltwater fish, bream was the most common species group caught (an estimated 2,205,656), followed by the various flathead species (2,103,835), Snapper (755,350) and the whiting species group (733,620). Among the freshwater fish, European Carp (500,164) was the main species caught, followed by Australian Bass (195,802), Murray Cod (165,557) and trout (Brown and Rainbow – a total of 157,975).

The smaller crustacean species dominated the remainder of the total catch (by numbers) – saltwater nippers (1,415,852), followed by saltwater prawns (728,843) and freshwater shrimp (409,711). Freshwater yabbies (275,108) accounted for the majority of the larger crustaceans, followed by Blue Swimmer Crab (73,501), Mud Crab (48,634) and rock lobster (26,507).

Overall, 44% of all species caught were released (or discarded), with the highest rates of release (>75%) for species such as Australian Bass, Mulloway, Murray Cod, Red Rock Cod, sharks and rays, Snapper and wrasse/groper. By contrast, the lowest release rates (<25%) occurred for species such as European Carp, Blue Mackerel, Trumpeter Whiting, tunas and various crustaceans. In terms of reasons for release, 'small size' was the primary release reason for over two-thirds of all species groups and especially for major 'table' species, such as bream, flathead, whiting, key freshwater finfish, the various crustaceans and squid. Large catches ('too many' or 'over bag limit') were the primary release reason for Freshwater Shrimp and various small bait species. 'Catch and release' emerged as the primary release reason for Australian Salmon and Australian Bass, with 'un-wanted' the main reason for Red Rock Cod, sharks and rays and various other scalefish.

Total recreational harvest weights were estimated for 10 key species and compared with commercial fisheries data. Recreational catches exceeded commercial landings for 5 of the 10 species – namely: 71% of the total harvest of Dusky Flathead; 67% for Sand Flathead; 63% for both Mulloway and Tailor; and 52% for Yellowtail Kingfish. The recreational catches of bream,

Sand Whiting and Snapper were slightly lower than commercial landings (ranging from 40-49% of the total harvest), whereas the recreational catch of Australian Salmon and Silver Trevally were substantially smaller than the commercial harvest (both at 14% of the overall total).

Catch and effort data for some 23 key species have been examined in detail, based on fishing zone, fishing method, fishing platform, water body type and seasonality. All such results are also available for many other key species/groups in various tables and appendices throughout the report. The characteristics of regional fisheries (fishing zones) have also been examined in detail, namely the levels of fishing effort by where fishers resided, fishing platform, water body type and total catch estimates for the key species in each area.

Boat Ownership

In the Screening Survey, boat ownership was broadly assessed with 11% of all NSW/ACT households reporting ownership of at least one boat, as at June 2013. Substantially higher ownership levels (38%) emerged among households with any fishing activity in the previous 12 months, compared with 6% for non-fishing households.

Boat ownership and profiling information was also assessed in the Wash-up/Attitudinal Survey for those households with any fishing activity during the diary period. In response, an estimated 180,622 (or 44% of) fishing households reported ownership of at least one boat, for a total of 230,118 boats – or close to 1.3 boats per household. Over three-quarters (76%) of these boats were used for fishing during the diary period, resulting in an estimated recreational fishing ‘fleet’ of 173,895 boats. Most of these boats were powered/trailer boats, with two-thirds (66%) less than 5 metres in length. Echo sounders were reported in a majority (56%) of the fleet and 39% with GPS units. The estimated total market value of the recreational fishing fleet as at May 2014 was over \$1.534 billion – an average of \$8,826 per boat.

Recreational Fishing Motivations, Satisfaction and Final Questions

In the Wash-up/Attitudinal Survey, membership of a “fishing or diving club ... or association” was assessed, with close to 6% of all fishers aged 5 years and older reporting current membership. Fishers were also asked to rate the importance of eight motivational factors in relation to recreational fishing. The highest general importance rating (95% with at least ‘quite important’) emerged for *“to be outdoors, in the fresh air ... to enjoy nature”*, followed by *“to relax or unwind”* (92%) and *“the enjoyment or sport of catching fish, crabs etc”* (85%). Social factors also scored highly, with *“to spend time with your family”* and *“to spend time with your friends”*, both around 80%. Lower ratings emerged for *“to catch fresh fish/crabs etc. for food”* (58%), followed by *“to be on your own ... to get away from people”* (41%) and *“to compete in fishing competitions of any kind”* (less than 5%).

Respondents were also asked to rate their satisfaction with the overall quality of their fishing during the diary period. In response, three-quarters (76%) of fishers reported being at least quite satisfied, with similar general satisfaction rates across the residential strata and age groups. All respondents reporting general dissatisfaction (24%) with their fishing were asked their reasons and in many cases, low catch rates were cited as the main reason.

Comparison of Results – 2000/01 and 2013/14

As noted earlier, a key objective of the present survey was to optimise comparability with results from the NRFS and to identify any changes or developments in the recreational fishery that might have occurred over the thirteen year period. However, despite the fundamental comparability and robust nature of the two studies, the issue of *inter-annual variability* between the two surveys is a critical factor when interpreting any differences e.g. natural changes in abundance of individual species. Other factors should also be considered, such as changes over time in terms of: fishing practices (e.g. increased usage of lures); targeting preferences; technology (e.g. GPS availability); and regulations, such as size and bag/possession limits.

The final results section in this report ('Comparison of Key Survey Results – 2000/01 and 2013/14', Page 84) provides detailed analysis of results from the two surveys and due to the volume and complexity of this information, readers should routinely refer to this section for any comparison or review purposes. However, several key findings have been noted below.

Firstly, participation rates for recreational fishing in NSW/ACT waters decreased from 16.6% of the resident population aged five years and older in 2000 to 11.7% in 2013. Importantly, decreased participation rates have also occurred in other states, territories and overseas. In fact, based on results from various state/territory-wide surveys since the NRFS, the level of decrease has been higher in most other jurisdictions. For example, in the same 13 year period, the participation rate in Queensland decreased from 23.5% to 15.1% (Webley *et al.*, in press). Note: This report contains discussion of various contributing factors, e.g. the 'ageing' of the population and also provides comparative information for levels of fishing effort (fisher days) and total catch for key species (including harvest/kept and released components).

To assist with this comparative work, a broad *catch rate* analysis for line fishing was conducted for 'desirable' key finfish species (both freshwater and saltwater), i.e. those fish generally regarded as good 'table' quality or sportfish species. Among the 'desirable' fish species/groups, the overall catch rates *increased* between the two surveys for various species (e.g. Yellowtail Kingfish, Australian Salmon, Murray Cod and Mulloway), with relatively stable catch rates for other species (e.g. bream, Snapper and the various flathead species) and *decreased* catch rates in several cases (e.g. Tailor, Golden Perch, leatherjackets and the various whiting species).

However, when analysed more simply as the proportion of 'zero' catch versus 'successful' line fishing days (i.e. at least some catch), little difference emerged – namely, 'zero' catch days comprised 31% and 33% (respectively) of all line fishing days in the two periods.

Very similar boat ownership rates were assessed for NSW/ACT resident households between the two periods (around one in ten households in both cases), with consistently higher ownership rates among fishing households (34% and 38%, respectively), than for non-fishing households (4% and 6%, respectively). Also, among the recreational fishing 'fleet', substantial increases occurred in terms of the proportion of: kayaks and other 'paddle' craft (a doubling between the two surveys); boats with echo sounder availability (over 50% more); and GPS availability (more than triple).

The proportion of recreational fishers who were identified as being a member of a "fishing or diving club ... or association" was very similar in the two surveys (6.1% and 5.7%, respectively). Also, virtually no changes occurred in terms of the relative importance of eight motivational factors for recreational fishing, as rated by respondents. For example, two non-catch related factors scored the highest ratings in both surveys, firstly: "*to be outdoors, in the fresh air ... to enjoy nature*" – where over 94% of fishers rated this factor as at least quite important in both cases; then secondly "*to relax or unwind*", with 92% reporting at least quite important in both surveys. The third highest rating factor was catch-related, namely "*for the enjoyment or sport of catching fish, crabs, etc*" with over 81% in both cases.

Respondents were also asked how satisfied they were with the overall quality of their fishing during the 12 month diary period in both surveys – with 61% reporting being at least quite satisfied in 2001, compared with a substantial increase to 76% in 2014.

Finally, the project has achieved all its goals and objectives, with an extensive range of data available for NSW/ACT recreational fisheries. In addition to this report, a substantial database has been established to support management and ongoing sustainability of fisheries resources.

Introduction

Background

Catch and effort data are essential for effective research and management of both commercial and recreational fisheries. Participation assessments, along with attitudinal and economic information are also important. Typically, core monitoring data are more easily obtained for the commercial fisheries sector, due to the smaller number of participants and the existence of mandatory reporting requirements.

Over the years, the comparatively high cost of recreational fisheries research has led to a lack of detailed information for this sector and particularly, on a state/territory-wide basis. Recognising this need, in 1993 the Northern Territory government commissioned Kewagama Research to develop and implement a survey methodology to collect this information – *Fishcount* (Coleman, 1998). This was the first study of its kind in Australia to provide detailed estimates of recreational fishing on a jurisdiction-wide basis, including participation, catch, effort and fishing-related expenditure.

Around that time, similar concerns in other jurisdictions led to the development of a national policy for recreational fishing 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.

Following extensive consultation and development, the Commonwealth, state and territory fisheries agencies implemented the National Recreational Fishing Survey (NRFS) in 2000. The key 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 assess 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/territory-wide surveys using a common methodology, providing comparable information on an Australia-wide basis and including the activity of visiting interstate fishers. In addition to nationally aggregated information, Henry and Lyle (2003) provided summary statistics for each of the states and territories. Also, as an integral part of the NRFS project, a separate survey of indigenous fishing activity was conducted in coastal communities across northern Australia (WA, NT and QLD) and the results were included in Henry and Lyle (2003).

In the absence of plans to repeat the national survey, in 2007/08 Tasmania and South Australia successfully conducted state-wide surveys to provide up-to-date ‘big-picture’ information on recreational fishing. These surveys employed the same methodology as the NRFS – namely, a telephone/diary survey of households that were randomly sampled from White Pages telephone directories. However by design, the fishing activity of interstate or overseas visitors was excluded in these surveys. Also, in most of these surveys, fishing-related expenditure information was not collected in the diary phase. Similar state/territory-wide surveys have since been conducted in other jurisdictions, along with large-scale surveys of recreational fishing licence holders in Victoria and Western Australia.

In the 20 years prior to the NRFS, Fisheries NSW completed some 27 recreational fisheries assessments, with the majority being on-site (or ‘creel’) surveys at various spatial and temporal scales. These studies were focused on particular segments of the recreational fishery, with most conducted at the individual estuary level, for example: Henry (1984); Scanes (1988); Williams *et al.* (1993); and West and Gordon (1994). Several other studies were conducted on larger spatial scales, including assessments of: the state-wide trailer-boat fishery in marine

waters (Steffe *et al.*, 1996a); estuarine fishing effort and shore-based marine fishing on the North Coast (Coffs Harbour to Tweed Heads; Steffe *et al.*, 1996b); the state-wide charter fishing industry (Steffe *et al.*, 1999). The temporal scales of these research projects ranged from a few months to annual studies (and longer).

The NRFS in 2000/01 was the first assessment of the entire recreational fishery in NSW and enabled comparisons of the various components of marine, estuarine and freshwater fisheries.

In the period since the NRFS, Fisheries NSW has conducted a variety of on-site surveys (a total of 13 projects), including: an assessment of Recreational Fishing Havens (Steffe, 2005a; Steffe *et al.*, 2005b); a survey of Sydney Harbour (Ghosn *et al.*, 2010); and a major two-year study of two estuaries (Hawkesbury River and Port Hacking) and marine boat-fishing in the Greater Sydney Region, i.e. from Newcastle to Shellharbour (Steffe and Murphy 2011). In addition to the above research, several biological studies have been conducted in terms of various species of importance to recreational fishing (Stewart *et al.*, 2010; and Hughes *et al.*, 2011). The impact of 'catch and release' practices in recreational fishing has also been assessed (Broadhurst *et al.*, 2012; and Butcher *et al.*, 2012).

Developments since the NRFS

Developments in other Jurisdictions

After detailed analysis and assessment of NRFS data, several improvements have been made to subsequent state/territory-wide surveys. Firstly, to reduce respondent burden and optimise response rates, certain question areas were deferred from the initial screening survey (see 'Screening Survey', Page 7) until later in the study, e.g. detailed boat profiling information is now routinely collected in the Wash-up/Attitudinal Survey for the recreational fishing 'fleet' (see 'Wash-up/Attitudinal Survey', Page 9). However, other data elements have been totally excluded, e.g. profiling the labour force status and educational qualifications of fishers. By contrast, additional question areas have been included, e.g. routine assessment of the reasons for releasing fish and other species during the 12 month diary phase. Another feature of these surveys is the routine collection of detailed 'fishing site' information during the diary period (see further discussion in 'Fishing Zones', Page 11).

Since the NRFS, major improvements in statistical analyses have also become available through development of a customised analysis package, known as *RecSurvey* (Lyle *et al.*, 2009a). This analysis package has been employed in the analysis of all state/territory-wide, general population surveys since the NRFS – including the current survey and all re-analyses of comparable NRFS data.

Recent Development Work by Fisheries NSW

In addition to the extensive on-site surveys discussed in 'Background' (Page 1), Fisheries NSW recognised the need for updated state-wide data (as per the NRFS) and in 2010/11 undertook a major development project to identify data needs and evaluate various options for this research. The project also focused on independent validation and 'future-proofing' of the NRFS survey methodology and this early groundwork has been acknowledged in a recent development project for the design and conduct of regular national surveys. This latter project is being co-ordinated by the federal government (ABARES), with inputs from all state/territory agencies and specialist consultant staff (Georgeson *et al.*, in press).

At the time of the NRFS, over 80% of all resident households in Australia had a White Pages listed home telephone. However since then, the proportion of White Pages listed households is believed to have continually declined and although no current data are available, anecdotal information suggests a current national coverage level of less than 70%.

In the 2010/11 NSW development project, a dual-frame (or 'hybrid') survey design was identified as a cost-effective solution to this coverage issue. By employing two sampling frames, namely

White Pages directories and the NSW Recreational Fishing Fee (RFF) database, broader coverage would be provided in terms of licensed vs. exempt fishers and White Pages listed vs. unlisted fishers (i.e. through the White Pages and RFF frames, respectively). Other benefits of this approach include improved overall data precision and significantly lower total costs (primarily diarist recruitment costs), due to naturally higher fishing participation rates in the RFF vs. White Pages sample frames. It was therefore decided to further develop the hybrid survey methodology for use in the current survey, on the basis that the White Pages directories would provide the 'core' sample frame and therefore direct comparability with NRFS data for NSW. It was also decided to include residents of the Australian Capital Territory (ACT), to provide cost-effective coverage of their fishing activity in both NSW and ACT waters.

The secondary sample frame for the hybrid survey was identified as the NSW RFF database. However to optimise cost-effectiveness, this was confined to long-term (i.e. 1 or 3 year) licence holders residing in NSW or the ACT. Note: after extensive analysis of NRFS data, it emerged that resident households containing at least one long-term licence holder, were assessed as accounting for: 59% of all recreational fishers in NSW; 71% of annual days fished; 79% of the total catch of all species; and 82% of the total harvest.

Further analysis of NRFS data showed that significant levels of fishing activity in NSW waters were attributable to Victorian residents – including a majority of the total catch and effort in the River Murray, e.g. for Murray cod and other key species. Accordingly, to provide important supplementary information in this regard, a third sample frame was included in the current survey, namely Victorian residents with a long-term (1 or 3 year) licence from the NSW RFF database.

As detailed in 'Sample and Response Profiles' (Page 15), various performance indicators (e.g. sample sizes and response rates) clearly demonstrate the success of the various survey components of these three sample frames.

However by design, virtually all results contained in this report refer to the 'core' White Pages sample frame – primarily to facilitate analysis and review of comparable NRFS data. That is, results from the hybrid survey component for NSW/ACT residents are the subject of separate analysis and reporting. In fact, the scope of final development work for this analysis is likely to be broadened to include other forms of dual-frame/hybrid surveys (e.g. the use of boat registration databases in certain jurisdictions). This extension has arisen as part of the current ABARES development project and various aspects of this work are currently being discussed. Finally, analysis and reporting of results from the third sample frame (Victorian resident/licence holders) will also be undertaken separately.

Important development work has also been undertaken by Fisheries NSW staff in terms of GIS coding of the location of each fishing activity/event as recorded in these telephone/diary surveys, i.e. to achieve high resolution data, namely the latitude and longitude for each fishing event. This work and its successful application in the current survey are further discussed in 'Fishing Zones' (Page 11).

Essentially the same telephone/diary methodology developed for the NRFS has been employed for the current survey, thereby optimising comparability with information collected in 2000/01. This information includes: state/territory-wide participation rates and demographic profiles of recreational fishers; catch and effort estimates for key methods, regions and species; fishing boat profiles; and fisher attitudes and opinions. Note: as for many other state/territory-wide surveys since the NRFS, fishing-related expenditure information was not collected in the survey.

Important Notes to the Reader

The remainder of this report comprises detailed discussion of: study scope, definitions and other methodological issues (see 'Survey Methods and Analysis', Page 6); sampling issues and response (see 'Sample and Response Profiles', Page 15); with substantive survey results in

'Fisher Characteristics' (Page 19) and all subsequent sections of the report. In reviewing these results, the following important aspects should be considered:

- firstly, as discussed in 'Recent Development Work by Fisheries NSW' (Page 2), virtually all results contained in this report refer to the 'core' White Pages sample frame to provide optimum comparability with NRFS data. That is, results from parallel sampling of the NSW RFF database will be analysed and reported separately;
- also, the scope of this report is confined to the resident population of NSW and the ACT (aged five years and older) and the survey results are predominantly focused on fishing activities in NSW/ACT waters (as further defined in 'Survey Scope', Page 6). However, interstate fishing activity by NSW/ACT residents was also assessed and relevant results have been included where appropriate, e.g. participation levels and days fished on an Australia-wide basis;
- in accordance with the agreed reporting structure, the survey results have generally been presented without interpretation or commentary – unless such information refers to important definitions or methodological issues;
- the study findings are often presented as detailed tabulations of 'expanded' data – i.e. estimates based on relevant Australian Bureau of Statistics (ABS) benchmark data (households, persons) and in turn, related fishing effort and catch. However where appropriate, some results are presented in graphic form (namely, histograms/bar charts) and in all such cases, relevant data tabulations have been included as appendices;
- within the various tables and appendices in the report, individual results have routinely been rounded to whole integers and therefore, some row or column totals may not add exactly (usually +/- 1). Also, in the text of the report, proportional results have generally been reported as rounded/whole percentages (e.g. 24% of the total catch – as opposed to 23.7%). Therefore, in some cases, the total reported percentages may not equal 100% (due to rounding). However, in all tables and appendices, percentages have been reported at the single, decimal point level;
- in terms of 'non-sample error' (e.g. non-response and reporting biases), optimum data quality has been achieved through a range of measures/outcomes in the study, including excellent response rates in all survey components (see 'Sample and Response Profiles', Page 15). Despite this, minor adjustments/calibrations have been applied through the RecSurvey analysis package, in accordance with routine procedures detailed in Lyle et al. (2009a);
- in any sample survey, estimate precision is affected by 'sample error' – due to the fact that sampling was employed, as opposed to a total enumeration (or census) of the population concerned. To account for this, standard errors (SEs) have been calculated through the analysis package and included in all substantive figures, data tabulations and appendices. Also, in cases where the significance of a particular result or change has been reported, 95% confidence limits have been routinely applied (i.e. the SE x 1.96);
- however, where high levels of variability occur or small sub-samples are involved, these SEs can be quite large in relation to the estimates concerned. To highlight these, cases where the relative standard error (RSE) is greater than 40% of the estimate have been routinely shown in bold text. Similarly, estimates derived from less than 30 households (in the raw data) have been italicised. Further details on this issue are discussed in 'Statistical Uncertainty' (Page 14);
- for completeness, all survey estimates from the analyses have been included in the data tabulations and appendices, including some very small estimates. Also, 'zero' estimates can commonly occur in these tables and importantly, this does not imply no such

occurrence in the population overall – rather, that none was detected within the limits of the survey sample. Therefore, readers should routinely interpret such results as ‘nil or negligible’; and

- a large number of data tabulations, figures and appendices have been included in this report – along with substantially more analyses which have been provided separately, in anticipation of requests for more detailed data. Also, the various survey databases are an output requirement of the project and, subject to error tolerances, considerable further interrogation can be undertaken.

Report Structure Acknowledgment

The current survey employed an almost identical methodology to all telephone/diary surveys (using White Pages sampling) conducted in other jurisdictions since the NRFS. These studies were also analysed using the *RecSurvey* analysis package and much of the content and structure of the first Tasmanian report (Lyle *et al.*, 2009b) has been applied to subsequent reports in South Australia (Jones 2009) and the Northern Territory (West *et al.*, 2012), by agreement with the authors and with appropriate acknowledgment. Similarly, the content and structure of this report has been largely adapted from the original Tasmanian report and especially in terms of the presentation of survey results in ‘Fisher Characteristics’ (Page 19) and all subsequent sections of the report. The contribution of our co-authors in this respect (and many others) is very much appreciated.

Survey Methods and Analysis

Data collection for the survey was based on a telephone/diary approach – an off-site methodology developed to provide cost-effective data over large spatial scales, such as an 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.* (2009a) and have been undertaken using the statistical computing language R (R Core Team, 2013). An overview of the survey methodology and data analysis is provided below.

Survey Scope

The telephone-diary survey encompassed the private dwelling (PD), resident population of NSW and the ACT, aged five years and older, and their recreational fishing activity. Note: PD residents account for over 98% of the total resident population and by definition, non-private dwellings (NPD) include: hotels, motels, hospitals, nursing homes, military barracks and gaols. Recreational fishing was broadly defined as the capture (or attempted capture) of aquatic animals in Australian waters (freshwater, estuarine and marine), other than for commercial purposes. Also, traditional fishing was excluded from the scope. However, any recreational fishing by indigenous residents or commercial fishers was included. All recreational fishing techniques and harvesting activities were considered in-scope, including dive and hand collection, the use of pots, nets and spears, as well as various forms of line fishing.

As for most state/territory-wide surveys since the NRFS, the activities of interstate residents in NSW/ACT waters were considered out-of-scope. By contrast, the current survey has been the first such study since the NRFS to collect detailed participation, effort and catch data for interstate fishing activity by in-scope (i.e. NSW/ACT) residents. However, as noted in 'Important Notes to the Reader' (Page 3), the results in this report are predominantly focused on fishing activities in NSW/ACT waters.

Survey Methods

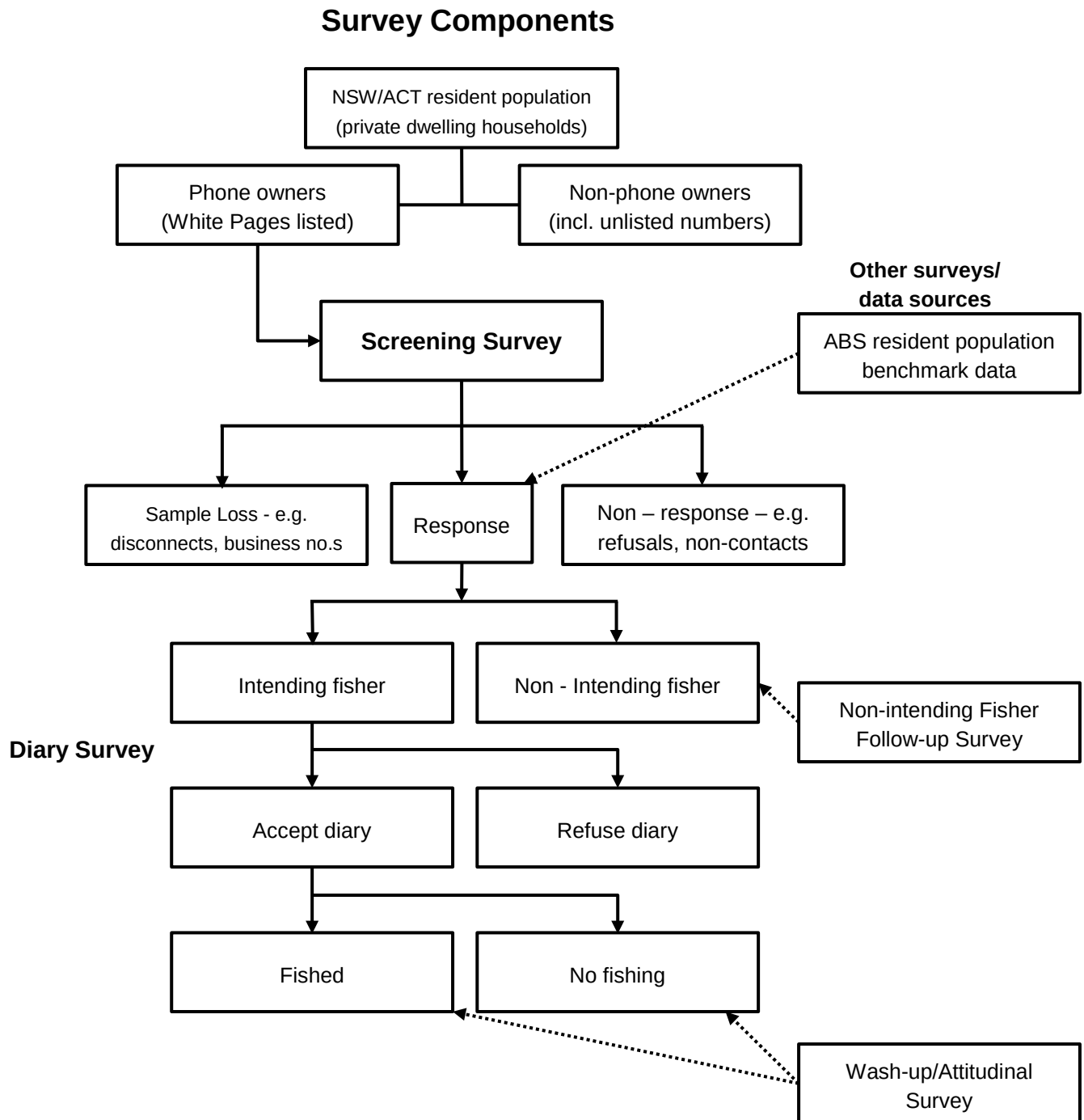
Survey Overview

The telephone-diary methodology involved a two-phase survey design, the principal components being an initial screening phase to gather profiling information from a sample of the resident population and a subsequent, intensive phase, in which respondents provided detailed catch and effort information over a 12 month period. In this second phase, effectively a longitudinal panel survey, respondents were encouraged to use a simple 'diary card' to record key fishing data. Respondents were then contacted regularly by survey interviewers who were responsible for collecting this information. The underlying design philosophy is focused on minimising respondent burden and maximising response rates and data quality.

Additional survey components included a non-intending fisher follow-up survey and a wash-up/attitudinal survey. The non-intending fisher 'call-backs' involved a sample of households that had indicated at screening that no 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. Finally, the opinions and attitudes of diarists to fishing-related matters were assessed at the end of the diary period in a 'Wash-up' survey, along with detailed boat-profiling information.

Consultant staff of Kewagama Research had primary responsibility for the design, conduct, processing and analysis of all survey components, along with ultimate reporting for the study. However, effective liaison was maintained with Fisheries NSW staff throughout the project and especially in terms of various technical and biological issues.

Figure 1 Survey components diagram - Survey of Recreational Fishing in NSW/ACT, 2013/14



Screening Survey

The primary role of the screening interview was to collect profiling information for all household members (e.g. sex and age group), as well as establishing eligibility to participate in the following 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 with a random sample of NSW/ACT households. The White Pages telephone directories provided the sample frame, with obvious business numbers, non-private dwellings and multiple listings removed. For each selected listing/telephone number, the suburb was also noted enabling the selection to be assigned to a Statistical Area, Level 4 (SA4) – an ABS classification used to define 10 residential strata for the survey (see 'Sampling Strata', Page 9). Stratified random sampling was

undertaken with a higher sampling rate for those strata with smaller resident populations (e.g. the North West stratum) and lower sampling rates for the larger strata (e.g. Sydney). Within each stratum, care was taken to ensure that the proportional breakdown of the sample at the SA3 level (within each SA4) aligned with the known proportion of private dwellings based on ABS data. Note: in addition to landline numbers, 5% of selected listings included mobile numbers. In order to minimise non-contacts, at least 15 calls were made to each 'live' telephone number. Disconnected numbers, business and facsimile numbers were treated as sample loss and not replaced. The Screening Survey was conducted from March to May 2013.

Within each responding household, the demographic profiles (age group and gender) of all usual residents were obtained. For residents aged five years and older, involvement in recreational fishing over the previous 12 months and likelihood (expectation) of doing any recreational fishing in the following 12 months was established. All respondents who had fished during the 12 months prior to interview were asked whether they had fished interstate and to estimate how many days they had fished in the previous 12 months, by category (< 5 days, 5-9 days, 10-14 days, 15-19 days and 20 days or more). This latter detail was used as an index of avidity, rather than a direct or accurate measure of prior fishing activity, which allowed fishers to be broadly classified as (e.g.) infrequent, occasional or frequent fishers. 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.

Diary Survey

All households identified as eligible for the Diary Survey were invited to participate in this phase of the study. Fishing activity of all household members aged five years and older was monitored between 1 June 2013 and 31 May 2014. The approach taken in this survey differed to conventional angler diary surveys in two important ways: first the diary was employed more as a 'memory jogger' than a logbook; and second, responsibility for data collection rested with the survey interviewers and not the diarists. Typically, response rates from other forms of diary survey (e.g. mail-back surveys) are low and data quality can suffer in terms of completeness, accuracy and consistency. Also, 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 employed in the current study (a form of panel survey), effectively transferred the burden of data collection from the respondent to the survey interviewer. Data collection was undertaken by brief telephone interview in which trained interviewers recorded details of any fishing that had occurred since the last contact. The level of fishing activity determined the frequency of such contact, but as a general rule, respondents were called at least once a month, even if no fishing was planned.

All diarists were sent a survey kit, which included the diary card, a colour species identification guide and an official covering letter for the survey. After receiving this, data requirements were then explained to respondents in a brief telephone interview and the next contact arranged. Respondents were encouraged to record basic information in their diaries, such as date, location, start and finish times, and catch and release numbers. More detailed data, such as target species, fishing method, platform (boat or shore), water body type (river, lake, estuary, coastal, or offshore), and reasons for releasing any part of the catch, were collected for each individual fishing event and recorded during the telephone interview. In the early stages of the diary period, interviews were completed very soon after any planned fishing activity to optimise respondents understanding of survey requirements. Then, 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, this approach enabled interviewers to immediately clarify any ambiguities and ensure completeness of information. This in turn, provided for greater data utility, where for example, fishing effort could be apportioned between target fisheries, methods, fishing platform, and so on.

Non-intending Fisher Follow-up Survey

The objective of this 'call-back' survey 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 – namely, those diarists who did no fishing during the diary period, despite intending to do so.

A random sample was drawn from all households (at screening) that had indicated no intention to go fishing during the diary period and these were re-contacted shortly after the Diary Survey. Whether any fishing had occurred during the diary period was established in a brief telephone interview, with particular care to identify whether there had been a change in the household (e.g. telephone number re-allocated) and also that household members were the same as those at screening. Respondents who were identified as not being residents of the household at the time of screening were excluded from the analysis.

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 NSW/ACT waters and/or interstate, the number of days fished during the 12 months of the diary period (by 'avidity' category). Boat ownership and usage for recreational fishing during the diary period were also assessed.

Wash-up/Attitudinal Survey

This survey was conducted with diarists at the end of the diary period and was designed to assess a range of information, including confirmation of the completeness of the diary data for each household member (whether they had reported fishing or not). Although boat ownership was generally assessed for all households in the Screening Survey, detailed boat profiling information (e.g. length, main propulsion method, usage for fishing and current market value) was collected in the Wash-up Survey for boats owned by households reporting any fishing activity during the diary period – to provide an assessment of the recreational fishing 'fleet'.

The opinions and attitudes of diarists were also obtained in terms of various fishing-related matters, from the main/key fisher in each household, aged 15 years and older. Several 'structured' question sequences from the NRFS were included here (e.g. assessment of satisfaction with fishing in the diary period), along with a series of 'un-structured' questions to gather respondents' opinions on a variety of fishing-related issues (see further details in 'Other Results: Wash Up/Attitudinal Survey', Page 80).

Regions

Sampling Strata

Initial household selection (i.e. telephone listing/number) was based on a stratified random sample design using the ten residential strata, aligning to ABS Statistical Areas (SA4 level) in the Australian Standard Geography Standard, (ASGS) (Pink 2011), as follows:

- 1) Sydney: comprising fifteen SA4 codes: 102, plus 115 through to 128 (inclusive);
- 2) Hunter: SA4 codes 106 and 111;
- 3) Illawarra: SA4 codes 107 and 114;
- 4) Richmond/Tweed: SA4 code 112;
- 5) Mid North Coast: SA4 codes 104 and 108;

- 6) Central West/North: SA4 codes 103 and 110;
- 7) North West: SA4 code 105;
- 8) South East: SA4 code 101;
- 9) South West: SA4 codes 109 and 113;
- 10) ACT: SA4 code 801.

In most cases, these residential strata align exactly with the strata employed in the NRFS. However, due to changes in some ABS boundaries since then, minor differences have occurred in boundaries between the Hunter and Mid North Coast strata, resulting in approximately 16,000 resident households (or 6% of the Hunter) now classified as Mid North Coast (i.e. formerly the northern Hunter area, now the southern Mid North Coast). A similar boundary change occurred between the North West and Central West/North strata, with approximately 8,000 households (15%) from the North West (eastern side), now classified as the Central West/North stratum. Importantly, due to the contiguous and homogeneous nature of the households involved in these two boundary changes, no significant differences have been assessed in terms of various survey results, i.e. when comparing NRFS data (using the 'old' geography) to 2013/14 data using either the 'old' or the 'new' geography.

A map of residential strata for the current survey is shown in Figure 2 and all survey results referring to area of residence have been expanded to population benchmarks and analysed on this basis. Note: two detached areas comprise residential stratum 6, namely 6a Central West and 6b North.

Figure 2 Map of NSW and the ACT, showing ABS-based, residential survey strata used for sample stratification and population benchmarks.



Fishing Zones

During the Diary Survey, interviewers collected detailed information about each fishing activity (event) to enable classification of the fishing site using a GIS coding system (i.e. latitude and longitude). Depending on the types of fishing location, different information was obtained by interviewers, e.g. (i) for offshore fishing, a reef name or the distance and direction offshore from a coastal town or feature; (ii) for estuarine fishing, the fishing site and estuary name (e.g. ABC Point in XYZ Lake); and (iii) for major rivers, the nearest town and river name.

As discussed in 'Recent Development Work by Fisheries NSW' (Page 2), all related procedures and coding systems were primarily developed by staff from Fisheries NSW. After extensive testing and refinement, the methodology has now been successfully applied to the many thousands of fishing events in the 2013/14 survey database for NSW/ACT waters.

The primary objective of this high-resolution, spatial classification system is to *optimise flexibility* in regional coding for surveys of this kind. In fact, whereas regional analysis of the current survey has been conducted on a comparable basis to the NRFS, major separate research work has already been conducted using different regional coding (i.e. five coastal Bio-regions in NSW). Importantly, due to the 'big-picture' nature of these surveys, this coding system should not be used to focus in on any small areas – unless a relatively large amount of fishing activity took place there and adequate data precision was achieved.

Although detailed catch and effort information can be provided from the current survey for all NRFS fishing regions, major estuaries and rivers – for practical purposes, the results in this report have been confined to nine* fishing zones (which are directly comparable with the NRFS zones):

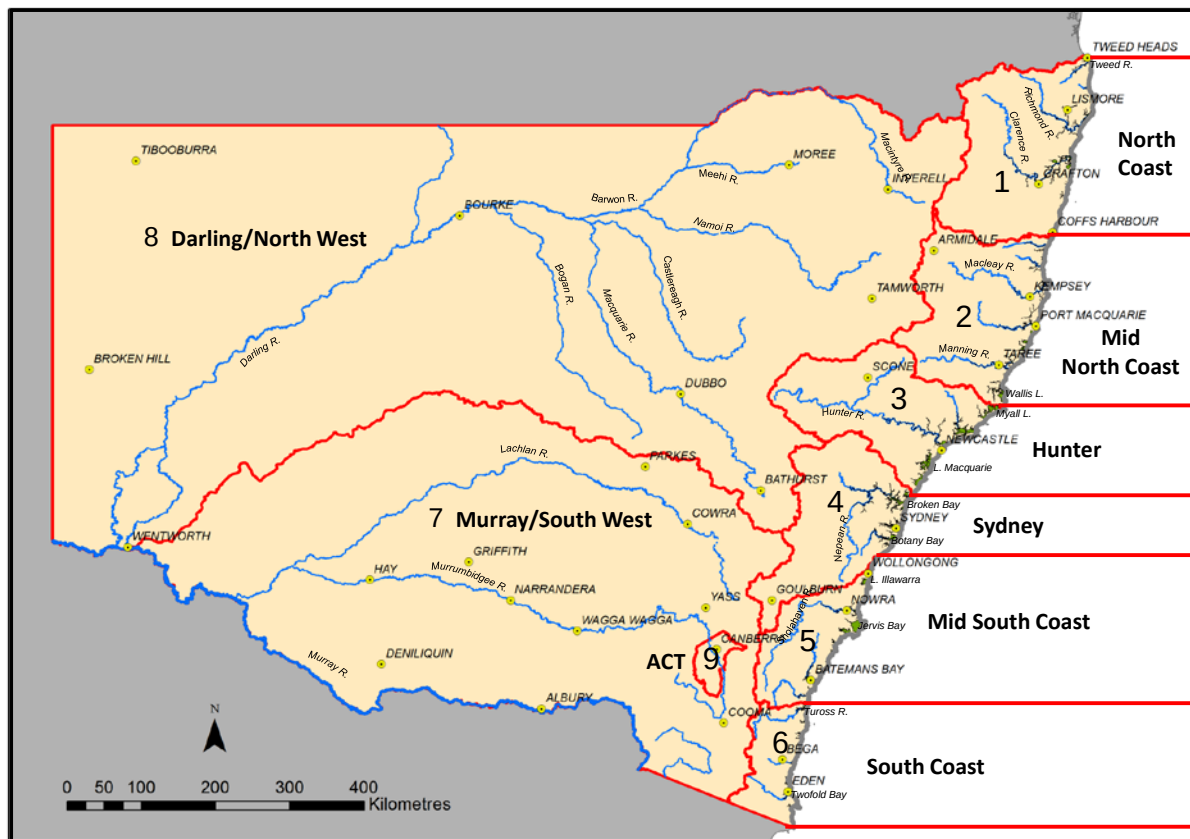
- 1) North Coast;
- 2) Mid North Coast;
- 3) Hunter;
- 4) Sydney;
- 5) Mid South Coast;
- 6) South Coast;
- 7) Murray/South West;
- 8) Darling/North West;
- 9) ACT.

* Note: Lord Howe Island comprises fishing zone 10. Although no fishing activity was reported for this area by diarists in the White Pages sampling frame, several fishing events were reported by diarists in the licence frame (RFF) component.

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.

A map of the nine fishing zones is shown in Figure 3 and all results from the diary phase of the survey have been routinely analysed on this basis.

Figure 3 Map of NSW and the ACT showing fishing zones used for reporting fishing activities.



Fishing Effort

Fishing information was collected on an 'event' basis, where an event was defined as a discrete fishing episode and the actual household member(s) involved in the event were recorded. Separate fishing events were defined where there was a change in fishing region or water body type, target species and/or fishing method. As a result, a day's fishing trip could comprise more than one event; e.g. fishers may gather bait prior to line fishing for flathead. Both the gathering of bait and the subsequent fishing were considered to be separate events since the effort expended in the capture of bait cannot be attributed to the capture of any flathead and vice versa. Similarly, the use of passive fishing gear (such as crab pots) at the same time as line fishing, were recorded as separate fishing events. 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, four measures of effort have been applied, namely the number of fishers, fisher days (i.e. separate days on which some form of fishing was undertaken by a fisher), fishing events and hours fished. However, fisher days has been used as the primary measure of fishing effort in this report.

It should also be noted that person-based effort has been routinely calculated and included in this report for all fishing methods. However, for passive fishing methods, the numbers of pots/traps and nets were also recorded in the Diary Survey and this information is available in the database for more detailed analysis of related fishing effort as required, e.g. the number of pot/person days of effort.

Fishing Methods

A variety of fishing/harvesting methods were reported by diarists, but for most analysis purposes, the following reporting categories have been defined: line fishing (bait and/or

lure/jig/fly lines); pot/trap (baited, passive use); net (including scoop and drag/seine nets); dive collection (underwater spearfishing and hand collection by snorkel, scuba or hookah); and other methods (e.g. other hand collection and the use of pumps and spades).

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, from a lowest-common-denominator perspective. Although excellent reporting accuracy 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 Species Identification Guide. For example, iconic species such as Snapper were readily recognisable, whereas identification to the species level for bream or leatherjackets was not always achievable. On the other hand, three key species of flathead (Dusky, Sand and Tiger) were shown to be readily identified by diarists, with the aid of the Species Identification Guide – where differences in the tail colours/patterns were clearly depicted.

For the purpose of reporting catches, individual species (e.g. Dusky Flathead and Sand Whiting) have been used in many cases, with species groups in other cases (e.g. bream and leatherjackets) and broad taxonomic groupings required in some instances (e.g. sharks and rays). However, certain species or species groups were represented by very few records, making it necessary to pool these into broader taxonomic categories for analysis (principally, 'Scalefish, other'). Complete details of all taxa reported in catches and the relevant catch analysis groupings are provided in Appendix 2.

Catches were reported as numbers of individuals kept or harvested and numbers released or discarded by species. In some cases (mainly prawns and shrimp), respondents reported catches in units of weight or volume and these were converted to numbers by application of mean weight estimates for these species.

Data Expansion and Analysis

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, an integrated approach was applied that adjusted for non-response and calibrated against population benchmarks (Lyle *et al.*, 2009a).

Adjustment for non-response at screening was partly based on fishing propensity determined amongst households that refused to complete the screening interview, but at least answered the question about whether or not household members had fished in the previous 12 months. However, no such adjustment was required for the non-contact group, for which no significant differences have been assessed in terms of fishing propensity. This was achieved through analysis of the response group and the number of calls required to complete the interview, i.e. participation rates did not change as the number of required calls increased (up to 15). Previous non-response assessments and follow-up surveys have also confirmed these findings.

Calibration against ABS-based benchmark data as at June 2013 was implemented for residents in each stratum, taking account of household and person-based demographics. The population benchmarks required for the various state/territory-wide surveys since the NRFS were not routinely published (nor available from ABS) and were constructed by consultant staff, using data provided by ABS in various forms – namely for the current survey:

- 1) household and person estimates (by age group and sex) at the SA4 level for private dwelling residents of NSW and the ACT, as at June 2011 (from customised tables provided by ABS, based on the 2011 Census);
- 2) projected numbers of households as at June 2013 by state/territory and capital city components from ABS publication, Catalogue No: 3236.0 (based on 2011 Census data and published in March 2015);
- 3) changes in Estimated Resident Population (ERP) counts of persons (by age group and sex) at the SA4 level for residents of NSW and the ACT, between June 2011 and June 2013 from ABS publications, Catalogue No's: 3235.0 and 3101.0 (published in August 2014 and December 2014, respectively).

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 a member of the household determined at screening) and residential stratum.

Not all eligible fishers actually fished during the diary period and in the survey design these are referred to as the unexpected 'drop-outs' from the fishery. In order to take account of unexpected 'drop-ins' to the fishery, an additional adjustment was necessary and was based on the Non-intending Fisher Follow-up Survey. This adjustment was made sensitive to the avidity index reported for 'drop-ins' and residential stratum. A full account of the analytical process is provided by Lyle *et al.* (2009a).

A final non-response adjustment was applied to expansion of results for the Wash-up/Attitudinal Survey – despite very high response rates achieved among households completing the diary phase. In the survey database and related outputs, this procedure has been referred to as the Phase 3 calibration, with the screening and diary survey calibrations being Phases 1 and 2, respectively.

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

Statistical Uncertainty

As discussed in 'Important Notes to the Reader' (Page 3), all parameter estimates have some statistical uncertainty and this 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 and sampling of the population. 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) naturally increase and there may become a point where the disaggregated estimates become unreliable.

In 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 around $\pm 80\%$ or higher) have been highlighted in the various tables and are regarded as imprecise. As a further precaution, estimates derived from records involving fewer than 30 households have been highlighted, since they may be particularly influenced by the activities of very few fishers.

Sample and Response Profiles

Screening Survey

Table 1 provides a summary of the numbers of private-dwelling households in NSW and the ACT as at June 2013 (based on customised ABS Census and ERP data), along with sampling details and response profiles relating to the Screening Survey. Since sampling was undertaken without replacement for sample loss (e.g. disconnected numbers, non-private dwellings, etc), the net sample was reduced from a gross sample of 14,908 to 12,461 – of which 9,412 households (75.5%) fully responded to the Screening Survey. Response rates were generally lower in the more densely populated strata. Overall, information on recreational fishing and demographic profiling was collected for 22,041 residents aged five years and older.

Among the 2,447 cases of sample loss (Table 1), the vast majority (1,993 or 81%) referred to disconnected telephone numbers, i.e. numbers that remained disconnected for the three month period of the Screening Survey. Other forms of sample loss were: 117 business-only numbers; 35 non-private private dwellings or holiday homes; 173 permanent fax/email lines; and 129 non-functioning/'dead' telephone lines.

Non-responding households (3,049 in Table 1) accounted for 24.5% of the net sample and are dissected as follows: 523 full refusals (4.2%); 1,064 part refusals (8.5%); 1,267 full non-contacts (10.2%); 191 language/communication difficulties (1.5%); and 4 others (<1%). As noted in 'Data Expansion' (Page 13), any uncertainty in terms of recreational fishing participation is limited to a minority of the non-response group and predominantly, the full refusals where the participation rates of the part refusals were applied by stratum, in the analysis.

Table 1 NSW/ACT private dwelling population (number of households) as at June 2013, sample size and sample loss/response profiles for the Screening Survey, by stratum.

Residential stratum ¹	Total households	Initial sample	Sample loss	Net sample	Non-response	Full response	Response rate
Sydney	1,713,988	4,746	800	3,946	1,294	2,652	67.2%
Hunter	242,864	1,448	193	1,255	252	1,003	79.9%
Illawarra	170,498	1,188	189	999	235	764	76.5%
Richmond/Tweed	98,349	1,059	187	872	169	703	80.6%
Mid North Coast	143,945	1,009	154	855	121	734	85.8%
Central West/North	154,988	1,210	229	981	208	773	78.8%
North West	46,963	1,053	197	856	154	702	82.0%
South East	88,608	836	125	711	149	562	79.0%
South West	107,975	1,080	186	894	173	721	80.6%
ACT	145,347	1,279	187	1,092	294	798	73.1%
Total	2,913,525	14,908	2,447	12,461	3,049	9,412	75.5%

Note: 1 Defined according to ABS Statistical Areas (SA4 level) - see 'Sampling Strata' (Page 9) and Figure 2

Although sampling of the *NSW Licence Frame (RFF)* is the subject of separate analysis and reporting (as discussed in 'Recent Development Work by Fisheries NSW', Page 2), sampling and response profiles for the Screening Survey of NSW/ACT residents are summarised as follows: an initial sample of 1,634 households; 204 sample loss; 1,430 net sample; 149 non-

response; 1,281 full response; representing a response rate of 90%. Almost identical results were achieved for the third sampling frame (i.e. Victorian residents in the *NSW RFF*) as follows: an initial sample of 519 households; 67 sample loss; 452 net sample; 47 non-response; 405 full response; representing a response rate of 90%.

Diary Survey

Table 2 summarises response profiles for the Diary Survey, with 2,008 households (21% of the full response group at screening) identified as having at least one resident (aged five years and older) with an intention to do some recreational fishing anywhere in Australia during the diary period (June 2013 to May 2014). Of these eligible households, 1,802 (89.7%) agreed to take part in the Diary Survey and among these, 1,681 (93.3%, or 83.7% among eligibles) fully responded. Importantly, of the 121 households failing to complete the Diary Survey, only 11 declined to continue, 62 were ongoing non-contacts and the remaining 48 were disconnected numbers or untraceable cases of re-locations.

In total, 1,681 NSW/ACT households, representing 4,433 residents aged five years and older, completed the Diary Survey, with consistent response rates across all strata. Some 1,174 of these households (70%) reported fishing activity during the diary period, comprising 2,028 fishers and a total of 11,801 person-based fishing events.

Overall, 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 provide an important performance indicator in terms of the efficacy of the survey instrument.

Table 2 Household response profiles for the Diary Survey, by stratum.

Residential stratum	Full response at screening	Eligible for the diary survey	Diary survey uptake	Diary survey completed	Uptake rate (among eligibles)	Completion rate (among uptake)	Completion rate (among eligibles)
Sydney	2,652	376	325	298	86.4%	91.7%	79.3%
Hunter	1,003	221	197	192	89.1%	97.5%	86.9%
Illawarra	764	201	182	173	90.5%	95.1%	86.1%
Richmond/Tweed	703	164	150	137	91.5%	91.3%	83.5%
Mid North Coast	734	187	172	164	92.0%	95.3%	87.7%
Cent. West/North	773	175	162	152	92.6%	93.8%	86.9%
North West	702	172	152	139	88.4%	91.4%	80.8%
South East	562	159	145	140	91.2%	96.6%	88.1%
South West	721	190	176	159	92.6%	90.3%	83.7%
ACT	798	163	141	127	86.5%	90.1%	77.9%
Total	9,412	2,008	1,802	1,681	89.7%	93.3%	83.7%

Comparable response profiles for sampling of the *NSW Licence Frame (RFF)* for the Diary Survey of NSW/ACT residents are summarised as follows: 1,148 eligible households (90% of 1,281 fully responding at screening); 1,100 Diary Survey uptake; 1,019 Diary Survey completion; representing a completion rate of 93% among the uptake group and 89% among eligible households. A total of 810 households (79%) fished in the period, comprising 1,348 fishers aged 5 years or more and a total of 10,497 person-based fishing events.

Equivalent results for the third sampling frame (i.e. Victorian residents in the *NSW RFF*) are as follows: 373 eligible households (92% of 405 fully responding at screening); 345 Diary Survey uptake; 310 Diary Survey completion; representing a completion rate of 90% among the uptake

group and 83% among eligible households. A total of 262 households (85%) fished in the period, comprising 452 fishers aged 5 years or more and a total of 3,965 person-based fishing events.

Non-intending Fisher Follow-up Survey

Response rates for this 'call-back' survey are presented in Table 3. Close to one third of the 7,404 households that indicated no intention to do any recreational fishing during the diary period were selected at random and were followed up at the end of the diary period, to ascertain whether any unexpected fishing had occurred. When sample loss (disconnected numbers, different households, etc) is taken into account, an overall response rate of 84.9% was achieved for this component of the study, again with consistently high response rates across residential strata. Non-responding households (330 in Table 3) accounted for 15.1% of the net sample and are dissected as follows: 50 full refusals (2.3%); 94 part refusals (4.3%); 167 full or part non-contacts (7.7%); and 19 others (0.9%, mainly language/ communication difficulties). Within the response group, 57 households (around 3%) were established as being different households to those at the time of screening and were therefore excluded from the analysis. Among the remainder, 80 households (4%) reported that at least one member had done some ('unexpected') fishing during the diary period.

Table 3 Sample size (households) and sample loss/response profiles for the non-intending fisher follow-up survey, by stratum.

Residential stratum	Initial sample	Sample loss	Net sample	Non-response	Full response	Response rate
Sydney	728	72	656	121	535	81.6%
Hunter	257	19	238	34	204	85.7%
Illawarra	186	15	171	21	150	87.7%
Richmond/Tweed	173	15	158	18	140	88.6%
Mid North Coast	182	23	159	28	131	82.4%
Central West/North	197	18	179	20	159	88.8%
North West	175	24	151	18	133	88.1%
South East	133	16	117	13	104	88.9%
South West	177	14	163	19	144	88.3%
ACT	207	18	189	38	151	79.9%
Total	2,415	234	2,181	330	1,851	84.9%

Non-intending Fisher Follow-up Surveys were also conducted for Screening Survey respondents from both *NSW RFF* sampling frames, i.e. for NSW/ACT residents and Victorian residents. However, the total number of non-intending fisher households from these frames was just 165 (<10% of full response at screening) and this is typical of licence frame sampling, where naturally high levels of 'intention to fish' occur. Nevertheless, a stratified random sample of 70 such households was selected, with 55 fully-responding – representing a response rate of 83%, after exclusion of sample loss (4 households).

Wash-up/Attitudinal Survey

By design, all 1,681 households completing the Diary Survey were included in the sample. No sample loss was encountered and 1,607 households fully responded to the survey (95.6%). Consistent response rates were achieved by stratum, but with slightly higher response rates for fisher households (96.2%) than for non-fisher households (94.3%).

Non-response (74 households, 4.4%) is dissected as follows: 14 full or part refusals (0.8%); 38 full or part non-contacts, incl. several who had moved permanently overseas (2.3%); and 22 others (1.3%, mainly illness-related).

Very high response rates were also achieved for Wash-up/Attitudinal Surveys conducted among diarists who completed the Diary Survey from both *NSW RFF* sampling frames – for NSW/ACT residents, 98.1% of 1,019 diarist households and for Victorian residents, 97.1% of 310 households. Among the 28 non-responding households: 4 were full or part refusals; 16 were full or part non-contacts and the remainder were mainly illness-related.

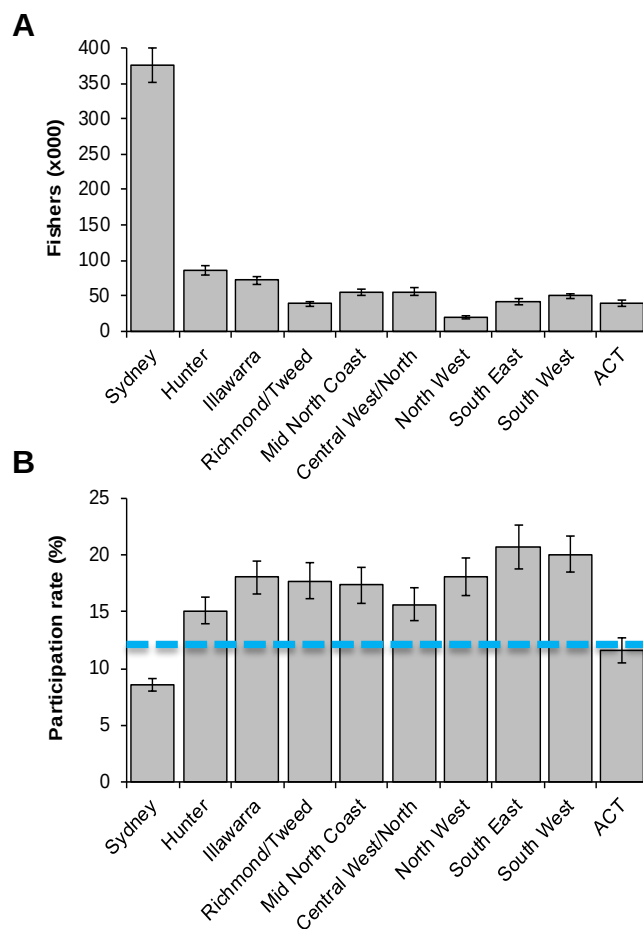
Fisher Characteristics

Information presented in this section is based on the Screening Survey and is reported as expanded estimates, adjusted for non-response (after Lyle *et al.*, 2009a) to represent the resident population of NSW and the ACT aged five years and older, as at June 2013. Detailed information about recreational fishing participation by age, gender and residential stratum is provided in Appendix 1. Also, participation rates are provided in this report, i.e. where the number of fishers is expressed as a percentage of the relevant population.

Fishing Participation

An estimated 849,249 (SE 27,639) NSW/ACT residents aged five years and older fished at least once in Australian waters in the twelve months prior to June 2013, representing a participation rate of 11.9% (SE 0.4%). The vast majority (98.5%) of these residents fished in NSW or ACT waters during this time (836,632 residents; SE 27,456) representing a participation rate of 11.7% (SE 0.4%). The remainder of this section focuses on this latter group, namely residents who fished in NSW or ACT waters. While close to half (45%) of all recreational fishers resided in the Sydney residential stratum, this also represented the lowest participation rate (8.6%; SE 0.5%) (Figure 4). Participation rates in other strata ranged from 11.6% (SE 1.1%) in the ACT up to 20.7% (SE 1.9%) in the South East.

Figure 4 Estimated number (A) and proportion (B) of the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT in the 12 months prior to June 2013 by stratum. Error bars represent one standard error and the dotted line represents the participation rate for NSW/ACT as a whole.

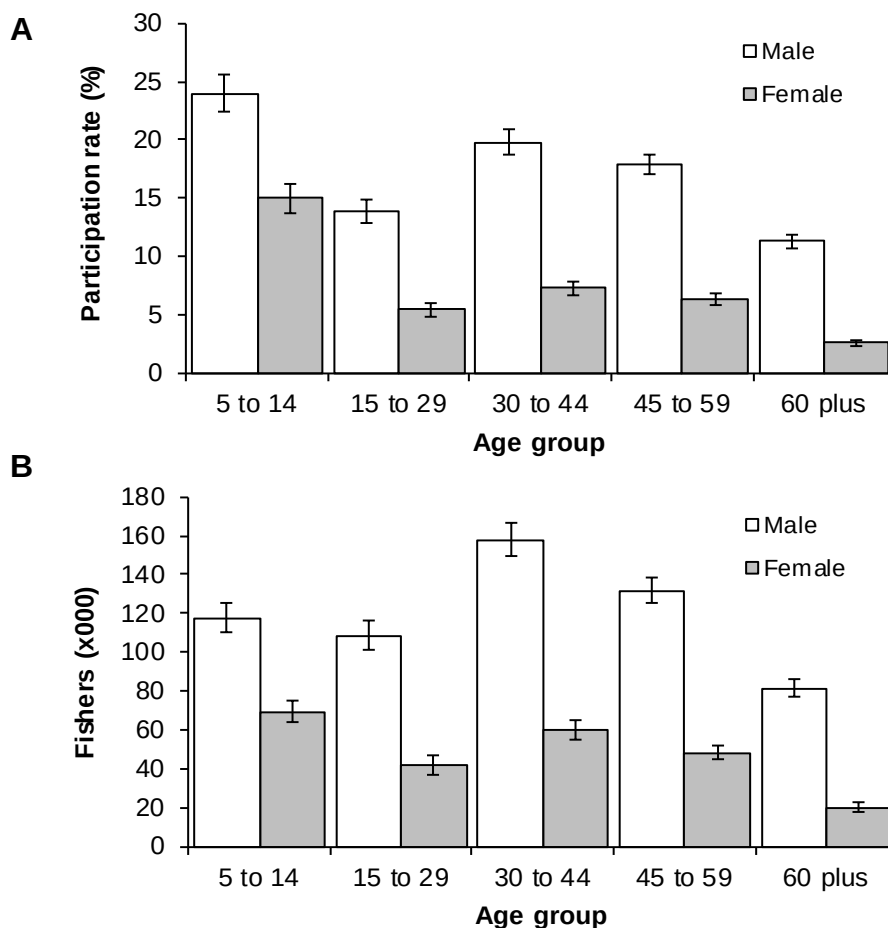


Age and Gender

Recreational fishing was more popular among males, with a participation rate of 16.9% (SE 0.5%) compared with 6.6% (SE 0.3%) for females who fished in NSW or the ACT during the 12 months prior to June 2013 (Appendix 1). By numbers, 2.5 times as many males (597,270; SE 19,265) than females (239,361; SE 11,880) fished during that time. The predominance of males involved in fishing, by number and participation rate, was evident across all age groups (Figure 5) and also by region of residence (Appendix 1).

In terms of age groups, the highest number of recreational fishers occurred in the 30-44 years age group (217,639 persons; SE 11,493), with the lowest number in the 60 years plus age group (101,659 persons; SE 5,386). The highest participation rate occurred in the 5-14 years age group (19.6%; SE 1.1%), with the lowest rate in the 60 years plus age group (6.7%; SE 0.4%). Also, when age group and gender are considered, the highest participation rate occurred among males in the 5-14 years age group (24.0%; SE 1.5%), with the lowest rate among females in the 60 years plus age group (2.5%; SE 0.3%)

Figure 5 Estimated number (A) and proportion (B) of the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT in the 12 months prior to June 2013 by age group and gender. Error bars represent one standard error.



Fishing Effort

In this section, the fishing activities of respondents during the Diary Survey have been reported as expanded estimates, adjusted for non-response (after Lyle *et al.*, 2009a) to represent the resident population of NSW and the ACT aged five years and older (as at June 2013) and their fishing activities during the period June 2013 to May 2014.

Fishing effort can be expressed in various ways, including: the number of persons who fished at least once; the total number of person days spent fishing (fisher days); actual time spent fishing (fisher hours); or as fishing events (as defined in 'Fishing Effort', Page 12). However, 'fisher days' has been the primary metric used in this section and various analyses have been included in terms of fishing location (zone and water body type), fishing method, fishing platform and seasonality.

Overview

An estimated 758,716 (SE 32,027) NSW/ACT residents aged five years and older fished at least once in Australian waters during the 12 month diary period, representing a participation rate of 10.6% (SE 0.4%). The vast majority (97.3%) of these residents fished in NSW or ACT waters during this time (738,447 residents; SE 31,494) representing a participation rate of 10.3% (SE 0.4%). Note: these estimates are based on resident population benchmarks as at June 2013 (as for the Screening Survey), but are not directly comparable with results in 'Fisher Characteristics' (Page 19) for several reasons. For example, population changes have not been accounted for during the diary period and different reporting methods for fishing activity applied in the Screening Survey (i.e. a recall basis), as opposed to the Diary Survey (i.e. longitudinal/diary data).

The remainder of this section focuses on the fishing activities of residents who fished in NSW or ACT waters during the diary period. However, comparable database information for interstate fishing activities by NSW/ACT residents is also available for other jurisdictions (subject of course, to standard error tolerances).

The estimated 738,447 NSW/ACT residents aged five years and older fished a total of 3,181,035 days during the 12 month period, at an average of 4.3 days per fisher. Overall, 27% of fishers fished at least once in freshwater, while 84% fished at least once in saltwater – with 21% of the effort (fisher days) in freshwater and 79% in saltwater (Table 4).

Table 4 Estimated number of persons and days fished by NSW/ACT residents aged five years and older who fished in freshwater or saltwater in NSW or the ACT during 2013/14. SE is standard error.

Effort	Freshwater		Saltwater		Total	
	Number	SE	Number	SE	Number	SE
Persons	200,705	12,772	618,934	30,511	738,447	31,494
Fisher days	656,831	50,208	2,525,499	156,151	3,181,035	169,699

The majority (79%) of fishers reported fishing on 5 or less days in NSW/ACT waters during the diary period (2013/14), with a further 13% fishing 6-10 days, 4% reporting 11-15 days and slightly more than 1% reporting 16-20 days (Figure 6). Only 2% of fishers reported more than 20 days of fishing in the period. The highly skewed nature of fishing activity is further emphasised when individual fishers are ranked in order of their annual fishing effort (fisher days) and the cumulative effect of adding each fisher's effort to the progressive total is assessed (Figure 7).

This analysis revealed that 20% of fishers accounted for almost 60% of the total fishing effort. Such a relationship is very common in other recreational fisheries and highlights the fact that a relatively small number of recreational fishers have a disproportionately large impact in terms of total effort and catch. Thus, minor shifts in the dynamics of participation (based on activity levels) at the upper end of the fishery can be expected to have significant implications on effort (and catch) levels on a state/territory-wide basis.

Figure 6 Distribution of fishing effort by annual days fished for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14.

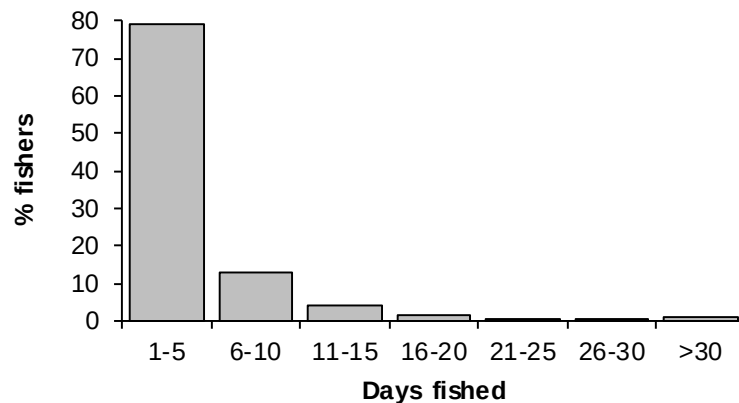
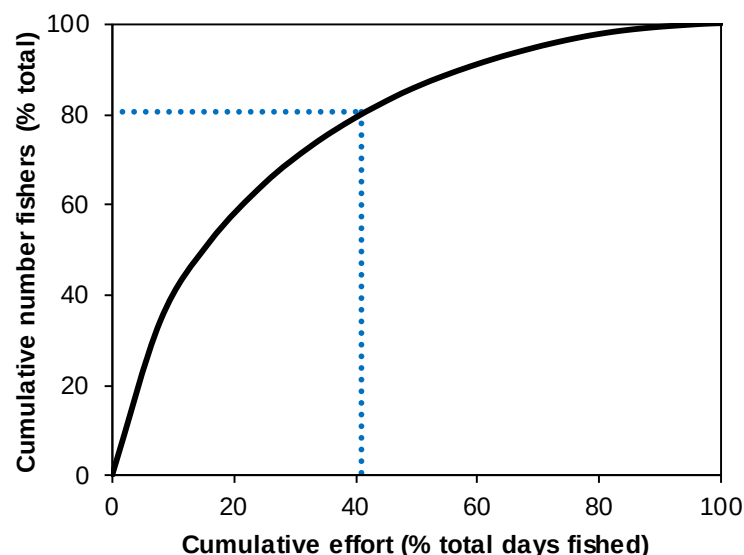


Figure 7 Relationship between the number of fishers and their cumulative fishing effort (days fished) for NSW/ACT residents aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Dotted lines indicate that 80% of the fishers accounted for just over 40% of the total days fished.

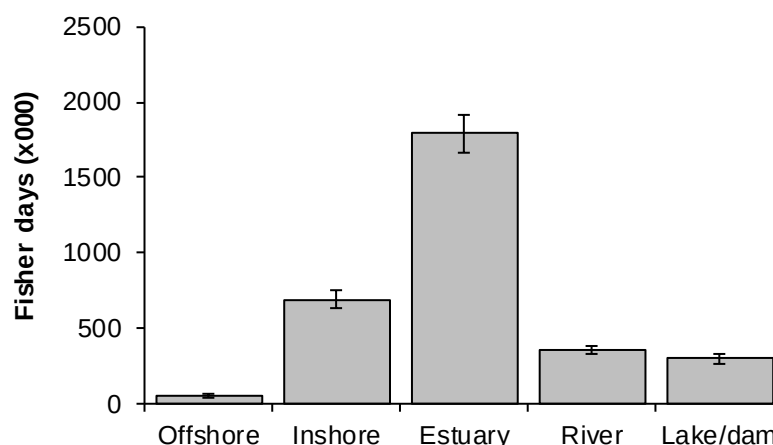


Water Body

The vast majority (79%) of recreational fishing activity in NSW and the ACT was concentrated in marine waters – with estuaries accounting for over half (56% or 1,795,958 fisher days) of the total effort, followed by inshore waters (< 5km from the coastline – 22% or 695,542 fisher days) and offshore waters (> 5km – <2% or 54,773 fisher days) (Figure 8, Appendix 6). Fishing in freshwater represented around 21% of total fishing effort (660,623 fisher days) – of which, more than half occurred in rivers (359,490 fisher days), as opposed to lakes and dams (300,533 fisher days).

Note: estuaries within NSW waters were defined according to Roy *et al.* (2001). This classification system includes several large ocean embayments or semi-enclosed bays that are characterized by marine waters with little fresh water inflow, e.g. Botany Bay, Jervis Bay, Batemans Bay and Twofold Bay. Also estuaries such as the Hawkesbury River, Port Jackson and Port Hacking have large entrances and tidal ranges making conditions in these areas similar to the open ocean. There are strong links between the fauna of estuaries and inshore marine waters, hence many apparently ‘marine’ species are commonly found within NSW estuaries.

Figure 8 Fishing effort (fisher days) by water body type for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Error bars represent one standard error.



Fishing Platform

Overall, the majority (75%) of recreational fishers fished at least once from the shore during the diary period, accounting for 59% of total fisher days during 2013/14 (Appendix 10) – with shore-based fishing dissected as follows: estuaries at 31% of total effort, followed by inshore waters (14%), then freshwater areas (12% in total) (Figure 9).

Shore-based fishing was also classified in terms of natural structures (e.g. beach, rocks and river banks) and man-made structures (e.g. jetties, bridges, dam walls and breakwaters). A majority of shore-based effort in the diary period occurred from natural shore areas (79%) as opposed to man-made structures (21%) (Figure 10) – with very high proportions of natural shore fishing in freshwater areas (98%) and ocean waters (93%), as opposed to estuarine waters (65%) where man-made platforms are generally more common. Also, a further dissection of all natural shore-based activity for ocean waters showed that a majority occurred on ocean beaches (294,144 fisher days; SE 25,972), as opposed to rock fishing (135,045 fisher days; SE 25,972).

Over half (53%) of recreational fishers also fished at least once from a boat during the diary period, accounting for 43% of total fisher days during 2013/14 (Appendix 10) – with boat-based fishing dissected as follows: estuaries at 25% of total effort, followed by ocean waters (offshore and inshore, 9% in total), then freshwater areas (8% in total) (Figure 9). Privately-owned boats accounted for the vast majority (92%) of all boat-based fishing effort (fisher days), with hire boats over 5% and charter boats 2%.

Figure 9 Fishing effort (fisher days) by water body type and fishing platform for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Error bars represent one standard error.

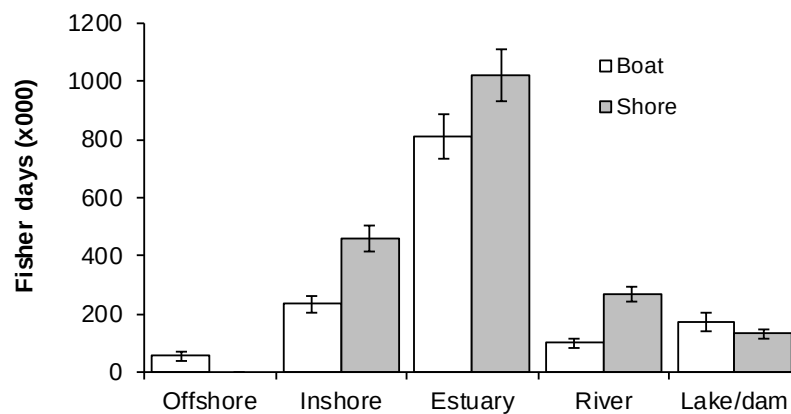
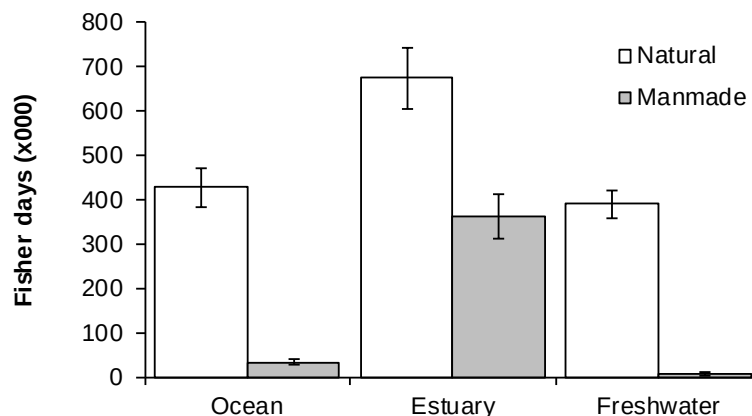


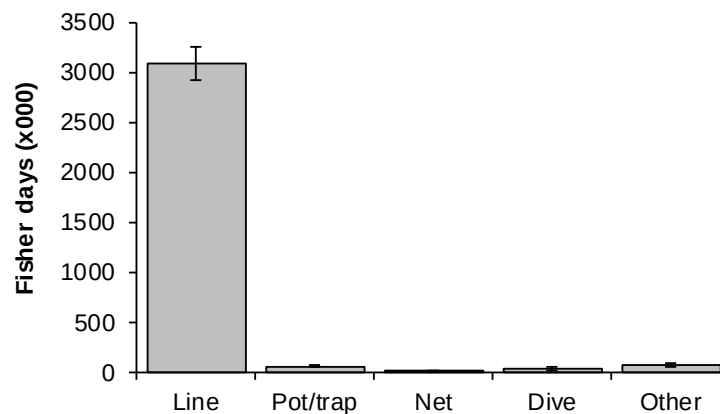
Figure 10 Shore-based fishing effort (fisher days) by water body and shore type (natural or man-made) for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Error bars represent one standard error.



Fishing Method

Line fishing was by far the most common method used, with 99% of all NSW/ACT fishers using lines (bait and/or artificial lures and jigs) at least once during 2013/14, accounting for 93% of all fisher days (Figure 11, Appendix 8). Line fishing with bait accounted for a majority (71%) of all fisher days, with lure and jig fishing at 22% of the total. Of the remainder, other/hand-collecting methods accounted for 3% of all fisher days, followed by pot/trap fishing (2%), diving methods (1%) and various types of net (mainly scoop nets) (1%).

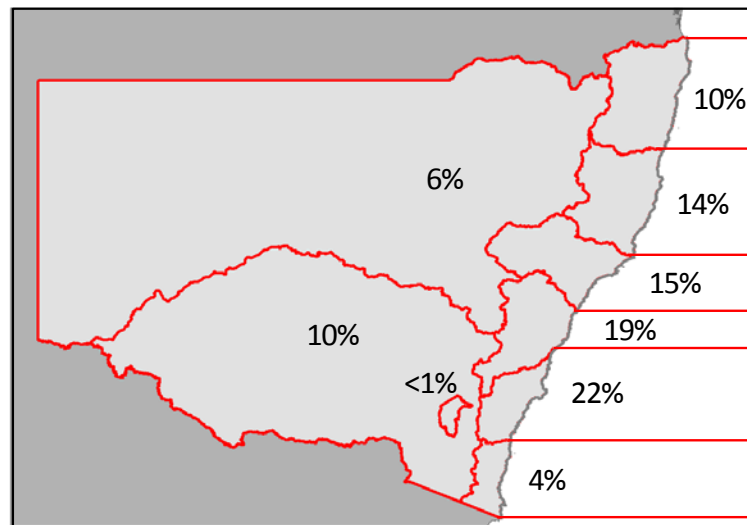
Figure 11 Fishing effort (fisher days) by fishing method for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Error bars represent one standard error.



Fishing Zones

The vast majority of fishing effort (84% of total fisher days) occurred in the six coastal fishing zones, each of which ranges from the EEZ boundary in ocean waters through to estuarine and freshwater catchments on the eastern side of the Great Dividing Range (Figure 12 and Appendix 13). Among these zones, the Mid South Coast accounted for the highest proportion (22%) of total fisher days, followed by Sydney (19%), the Hunter (15%), Mid North Coast (14%), North Coast (10%) and South Coast (4%). Among the inland fishing zones, the Murray/South West accounted for 10% of total fisher days, followed by the Darling/North West (6%) and the much smaller ACT (<1%). Note: these areas are defined in 'Fishing Zones' (Page 11), along with a detailed map in Figure 3.

Figure 12 Fishing effort (fisher days) by fishing zone for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Standard errors (SEs) are provided in Appendix 13.



Seasonality of Fishing Activity

The summer period (December 2013 to February 2014) accounted for a third (33%) of total fishing days in the diary period, followed by autumn (March to May 2014 – 25%), spring (September to November 2013 – 23%) and winter (June to August 2013 – 19%) (Figure 13, Appendix 12). Also, holiday periods within each season had a notable impact, where 48% of all fisher days in summer occurred in January, 49% of autumn fisher days in April, but to a lesser extent in spring and winter (37% for both September and July, respectively) (Figure 14).

Figure 13 Fishing effort (fisher days) by season for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Error bars represent one standard error.

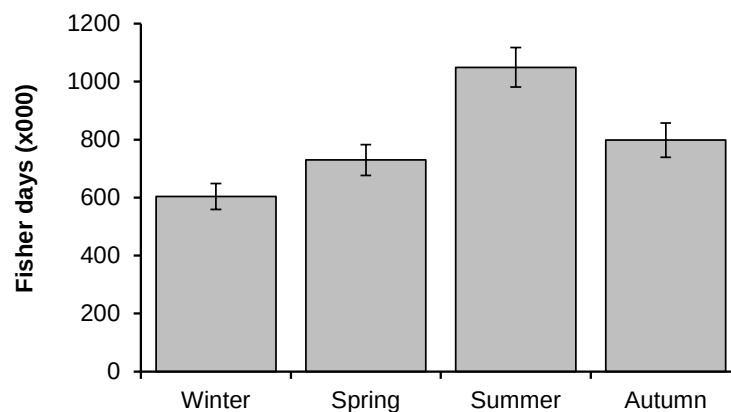
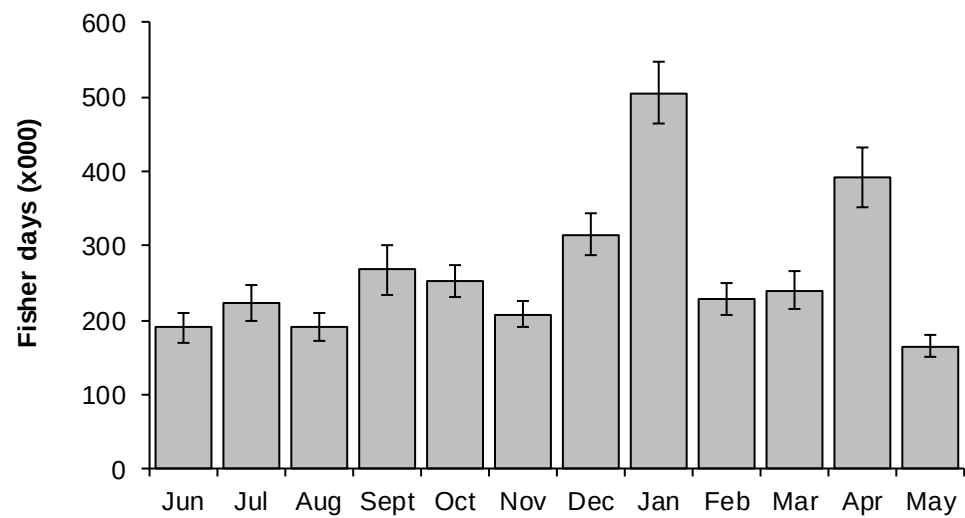


Figure 14 Fishing effort (fisher days) by month for the NSW/ACT resident population aged five years and older who fished recreationally in NSW or the ACT during 2013/14. Error bars represent one standard error.



Catch

In this section, catches by respondents during the Diary Survey are reported as expanded estimates, adjusted for non-response (after Lyle *et al.*, 2009a) of the numbers of aquatic organisms taken by the resident population of NSW and ACT aged five years and older (as at June 2013), from their recreational fishing activity during the period June 2013 to May 2014.

Catches have been analysed in terms of: the numbers kept and released; the reasons for release; species targeting; the location of the fishing activity (water body type); fishing method and fishing platform. Also, some 23 species/groups have been separately assessed in 'Key Species' (Page 40), with details for the various fishing zones provided in 'Regional Fisheries' (Page 64).

Recreational fishers captured a diverse range of scalefish, elasmobranchs (sharks and rays), crustaceans, molluscs, and other taxa. A detailed listing of some 132 species and species groupings is provided in Appendix 2. However, for effective analysis and reporting, some species have been grouped (typically at the family level) – in recognition that fishers could not reasonably be expected to delineate to the species level due to taxonomic similarities, and also in cases where particular species were rarely reported. For practical purposes, most analyses in this section refer to 45 key species/groups and a listing of the taxa that comprise each of these groups is provided in Appendix 2.

Total Catch, Harvest and Release

For recreational fisheries assessment, total catch is generally divided into the component that is kept or harvested (i.e. not returned to the water) and that which is released (i.e. returned to the water whether alive or not). The harvested component may be used for a variety of purposes, most commonly for consumption or for use as bait. The reasons for releasing or discarding catch may include adherence to regulations (e.g. size and bag limits), ethical reasons (e.g. catch and release fishing) or undesirability (e.g. poor eating quality, damaged or diseased). Catch estimates are provided in detail in Appendix 2 and for the key species/groups in Table 5. Note: a standard format for catch results has been applied throughout this report, namely where the total catch (kept and released) is reported first, followed by the harvest/kept component, then the released component (see Table 5).

All catch estimates in this report refer to fishing activity by residents in NSW and ACT waters during the diary period. However, comparable database information for interstate fishing activities by NSW/ACT residents is available for other jurisdictions (subject of course, to standard error tolerances).

Overall, an estimated total catch of 14,059,634 organisms occurred in NSW/ACT waters, where more than half (7,843,644) were retained and the remainder (6,215,990) were released or discarded. Fish (scalefish, sharks and rays) dominated the catch, accounting for 75% of the total numbers (10,562,697), followed by crustaceans (2,988,026), worms (262,178) cephalopods (136,363), molluscs (109,295) and other taxa (1,074).

Among the saltwater finfish species, bream was the most common species group caught by NSW/ACT recreational fishers, with an estimated total catch of 2,205,656. Flathead species, (Dusky, Sand and Tiger) accounted for a similar total (2,103,835), followed by Snapper (755,350), the whiting species (Sand, School and Trumpeter – 733,620), Luderick (428,213) and Tailor (363,147). Apart from 'Other small baitfish', the estimated total catch for every other saltwater finfish species/group did not exceed 200,000 for the 12 month period (Table 5).

In terms of freshwater finfish species, European Carp (500,164) dominated the total catch, followed by Australian Bass (195,802), Murray Cod (165,557), trout (Brown and Rainbow – 157,975), with Golden Perch and Redfin Perch at slightly lower levels (Table 5).

The non-fish species component of the total catch was dominated by crustaceans and in particular, the smaller species such as saltwater nippers (a popular bait – 1,415,852), followed by saltwater prawns (728,843) and freshwater shrimp (409,711). Among the larger crustaceans, freshwater yabbies (275,108) dominated the catch, followed by Blue Swimmer Crabs (73,501), Mud Crabs (48,634) and rock lobsters (26,507). Excluding key bait species, such as Pipis and worms, the remainder of the non-fish species catch was mainly the various squid species (111,799) (Table 5).

In total, 4,629,189 finfish were retained, indicating a harvest rate of less than half (44%) of the total catch. Among saltwater finfish, the flathead group dominated the retained catch (961,344), followed by bream (614,434), the whiting species (376,044), 'Other small baitfish' (313,551), Luderick (250,074), Tailor (189,614) and Snapper (185,590). European Carp (498,735) dominated the retained catch of freshwater finfish, followed by trout (107,819) and Golden Perch (76,529) (Table 5).

Among other key taxa, significant numbers of freshwater yabbies (239,938) were harvested, followed by squid (105,308), Blue Swimmer Crabs (50,637), Mud Crabs (30,052), rock lobsters (23,216) and abalone (18,423). Among the smaller species, such as nippers, prawns, shrimp and worms, substantial numbers were harvested during the 12 month period (Table 5).

Overall, 5,933,508 finfish were released, representing a majority (56%) of the total catch, with varying release rates depending upon species (Table 5). The highest rates of release (>75%) were evident for species such as Australian Bass, Mulloway, Murray Cod, Red Rock Cod, sharks and rays, Snapper and wrasse/groper (Table 6). The lowest rates of release (<25%) occurred for Blue Mackerel, European Carp, tunas, Trumpeter Whiting, rock lobster, prawns, shrimp, freshwater yabbies, squid and abalone (Table 6).

Note: in Table 5 overleaf, the 45 key species/groups have been presented in order of: (i) key saltwater finfish species/groups, including sharks and rays; then (ii) other saltwater finfish predominantly used as bait; (iii) key freshwater finfish species; (iv) scalefish, other – all other saltwater and freshwater finfish species (see Appendix 2); (v) crustaceans; (vi) cephalopods; (vii) molluscs; (viii) worms; and (ix) other taxa.

Table 5 Annual catch (total, kept and released numbers) and proportion released of key species in NSW/ACT waters during 2013/14, by residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Total		Kept		Released		% released
	Number	SE	Number	SE	Number	SE	
Bream	2,205,656	299,714	614,434	107,686	1,591,221	246,909	72.1
Flathead, Dusky	1,058,613	132,768	481,164	63,864	577,448	82,707	54.5
Flathead, Sand	962,892	181,433	440,763	98,777	522,129	89,480	54.2
Flathead, Tiger	82,330	31,558	39,417	14,738	42,913	19,117	52.1
Leatherjacket	116,622	26,752	71,269	21,133	45,353	11,091	38.9
Luderick	428,213	186,579	250,074	102,050	178,139	90,456	41.6
Mulloway	111,573	35,512	21,361	4,481	90,211	34,588	80.9
Red Rock Cod	151,531	34,435	6,430	3,022	145,100	33,952	95.8
Salmon, Australian	144,706	27,036	73,535	17,779	71,171	17,321	49.2
Sharks and rays	108,938	19,326	5,282	<i>1,464</i>	103,656	18,959	95.2
Silver Trevally	87,501	23,509	49,081	17,410	38,420	8,952	43.9
Snapper	755,350	144,387	185,590	29,943	569,760	135,449	75.4
Swallowtail Dart	118,935	39,889	43,275	18,872	75,661	25,676	63.6
Tailor	363,147	59,901	189,614	40,826	173,533	32,817	47.8
Tunas	57,047	28,585	46,333	24,191	10,714	4,953	18.8
Whiting, Sand	568,827	111,478	247,470	56,795	321,357	68,607	56.5
Whiting, School	<i>11,807</i>	<i>4,278</i>	4,995	2,078	<i>6,813</i>	<i>2,645</i>	57.7
Whiting, Trumpeter	152,986	104,916	123,580	100,107	29,406	18,174	19.2
Wrasse/groper	111,800	34,111	19,303	6,674	92,497	32,607	82.7
Yellowtail Kingfish	96,115	29,791	35,134	13,720	60,981	22,968	63.4
Blue Mackerel	137,119	37,988	125,129	37,285	<i>11,990</i>	<i>3,785</i>	8.7
Mullet	98,859	26,572	71,725	21,899	27,134	11,388	27.4
Yellowtail Scad	143,230	41,272	90,182	33,361	<i>53,048</i>	<i>19,684</i>	37.0
Other small baitfish	318,010	150,408	313,551	150,072	4,459	3,320	1.4
Australian Bass	195,802	62,660	<i>11,305</i>	<i>3,690</i>	184,497	60,569	94.2
European Carp	500,164	84,945	498,735	84,914	1,428	1,074	0.3
Golden Perch	142,601	18,752	76,529	11,117	66,072	10,703	46.3
Murray Cod	165,557	29,865	20,816	4,383	144,741	28,013	87.4
Redfin Perch	136,279	52,588	44,426	14,649	91,853	47,557	67.4
Trout	157,975	38,760	107,819	32,450	50,156	10,846	31.7
Scalefish, other	872,515	108,496	320,868	52,788	551,647	70,964	63.2
Blue Swimmer Crab	73,501	20,944	50,637	14,220	22,864	<i>9,014</i>	31.1
Mud Crab	48,634	14,075	30,052	8,865	18,582	6,325	38.2
Rock lobster	26,507	14,273	23,216	12,501	3,291	2,798	12.4
Prawns (saltwater)	728,843	426,343	724,756	426,343	4,087	2,861	0.6
Shrimp (freshwater)	409,711	148,424	330,025	108,398	79,686	62,268	19.4
Nippers (saltwater)	1,415,852	403,605	1,319,066	367,909	96,787	71,069	6.8
Yabbies (freshwater)	275,108	92,992	239,838	89,047	35,270	18,012	12.8
Crustaceans, other	9,870	6,616	9,048	6,576	821	587	8.3
Squids	111,799	53,498	105,308	51,757	6,491	4,737	5.8
Cephalopods, other	24,564	14,173	13,136	9,871	11,428	4,889	46.5
Abalone	18,843	11,735	18,423	11,718	421	413	2.2
Pipis	90,452	31,719	87,760	31,272	2,692	2,653	3.0
Worms	262,178	94,992	262,178	94,992			0.0
Other taxa	1,074	1,004	1,013	1,002	62	61	5.7

Table 6 Comparative summary of the proportion of the total catch of key species in NSW/ACT waters during 2013/14 that was released by residents aged five years and older.

Proportion released			
> 75%	51-75%	25-50%	< 25%
Australian Bass	Bream	Golden Perch	Blue Mackerel
Mulloway	Flathead, Dusky	Leatherjacket	European Carp
Murray Cod	Flathead, Sand	Luderick	Tunas
Red Rock Cod	Flathead, Tiger	Mullet	Whiting, Trumpeter
Sharks and rays	Redfin Perch	Salmon, Australian	Rock lobster
Snapper	Swallowtail Dart	Silver Trevally	Prawns (saltwater)
Wrasse/groper	Whiting, Sand	Tailor	Shrimp (freshwater)
	Whiting, School	Trout	Yabbies (freshwater)
	Yellowtail Kingfish	Yellowtail Scad	Abalone
		Blue Swimmer Crab	Squids
		Mud Crab	

Reasons for Release

The reasons why fish and other species are released cover a range of factors and motivations. To assess this issue, respondents were asked (through careful, 'neutral' questioning) their reasons for release and the numbers of each species, to which the particular reason applied for each fishing event. This approach recognised that different reasons can apply to the numbers released of a given species in a fishing event. Based on terminology used by the respondent, the following release categories were identified and applied: 'too small' – that is, too small to be retained (but not necessarily due to size limit regulations); 'undersized' – implying some knowledge and adherence to size limit regulations; 'too many' – that is, in excess of personal needs (but not necessarily due to bag limits); 'over bag limit' – implying some knowledge and adherence to bag/possession limit regulations; 'catch and release' – a voluntary release ethic associated with sportfishing (with no inference about fish size); 'berried female' – any egg-bearing female crabs or other crustaceans; 'unwanted' – cases where the species was considered by the respondent to be poor eating quality, including toxic/poisonous species (e.g. toads and pufferfish). 'Other' reasons for release include: damaged; personal conservation of certain species; and 'too few' – cases where the respondent was not catching enough (to keep any at all). Note: by definition, any release of prohibited or threatened species was routinely classified as 'over the bag limit' (i.e. a bag limit of zero).

Analysis of reasons for release for key species groups is presented in Table 7. Small size (either 'too small' or 'under-sized'), was the primary reason for release for over two-thirds of all species groups and especially for major 'table' species, such as bream, flathead, whiting, key freshwater finfish, various crustaceans and squid. Large catches ('too many' or 'over bag limit') were the primary release reason for freshwater shrimp and various small bait species. 'Catch and release' emerged as the primary release reason for Australian Salmon, and Australian Bass, with 'un-wanted' the main reason for Red Rock Cod, sharks and rays and various other scalefish.

Table 7 Reasons for release - proportions (%) of total numbers of key species released in NSW/ACT waters during 2013/14, by residents aged five years and older. Values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Total number released	Reason for release (%)							
		Too small	Under-sized	Too many	Over bag limit	Catch & release	Berried female	Un-wanted	Other
Bream	1,591,221	40.0	42.0	2.3		14.3		1.3	0.1
Flathead, Dusky	577,448	33.9	44.2	4.3	3.7	11.2		1.8	0.8
Flathead, Sand	522,129	35.7	58.4	1.5	0.3	3.8		0.3	0.1
Flathead, Tiger	42,913	15.1	70.6	13.0		1.3			
Leatherjacket	45,353	29.9	31.9	1.2		1.9		35.2	
Luderick	178,139	14.6	68.1	14.6		2.1		0.5	
Mulloway	90,211	34.6	46.7	5.4		12.0		1.1	
Red Rock Cod	145,100	9.8	12.2	0.0		2.4		75.6	
Salmon, Australian	71,171	4.9	21.7	12.3	2.0	40.2		18.7	0.2
Sharks and rays	103,656	7.8	0.9	0.9	0.2	18.1		72.2	
Silver Trevally	38,420	14.5	35.8	17.4	5.2	10.1		17.0	
Snapper	569,760	43.1	52.0	2.3	0.2	2.1		0.2	
Swallowtail Dart	75,661	35.3	13.6	22.2		0.6		28.3	
Tailor	173,533	33.2	40.8	8.1	1.3	13.8		2.7	0.1
Tunas	10,714	3.5	45.8	33.6		8.8		8.3	
Whiting, Sand	321,357	31.4	53.2	1.6		13.2		0.3	0.2
Whiting, School	6,813	32.3	67.7						
Whiting, Trumpeter	29,406	48.5	50.6			0.9			
Wrasse/gropers	92,497	5.3	37.0	4.0	0.3	11.7		41.7	
Yellowtail Kingfish	60,981	29.1	68.8	0.3		1.2		0.5	
Blue Mackerel	11,990	9.9	11.2	42.2		7.9		28.8	
Mullet	27,134	1.0	66.2	20.8		10.6		1.4	
Yellowtail Scad	53,048	4.6	30.8	18.5	6.3	22.9		16.8	
Other small baitfish	4,459			72.2				27.8	
Australian Bass	184,497	3.1	5.7	4.1		85.4		1.8	
European Carp	1,428							31.2	68.8
Golden Perch	66,072	30.5	27.8	12.0		29.4		0.4	
Murray Cod	144,741	9.4	49.7	2.5		28.9		9.4	0.1
Redfin Perch	91,853	14.1	6.7	6.9		66.1		6.2	
Trout	50,156	27.9	37.1	6.6		28.1		0.3	
Scalefish, other	551,647	16.3	26.6	6.4	0.8	5.8		44.1	0.0
Blue Swimmer Crab	22,864	61.8	14.1	2.0			20.7		1.5
Mud Crab	18,582	29.0	48.8	10.4			11.7		
Rock lobster	3,291	15.6	84.4						
Prawns (saltwater)	4,087	100.0							
Shrimp (freshwater)	79,686	2.7		87.4	7.2	2.7			
Nippers (saltwater)	96,787	71.1	1.9	27.0					
Yabbies (freshwater)	35,270	48.2		26.5		3.4	21.9		
Crustaceans, other	821	32.7					67.3		
Squids	6,491	78.4				4.1		17.5	
Cephalopods, other	11,428		36.3			27.4		36.3	
Abalone	421		100.0						
Pipis	2,692			100.0					
Worms	62							100.0	

Targeted Fishing

Respondents were routinely asked whether they were fishing for particular species or not, thereby enabling the effort and catch for each fishing event to be classified as being either targeted or non-targeted. Respondents were asked to nominate up to two target species for each event and thus, any resultant catch could be classified as targeted and non-targeted components. However, in many cases, more general targets were reported, e.g. 'reef fishing' or in the case of spearfishing and other diving, opportunistic catches were fairly common. An understanding of targeted fishing behaviour provides insight into the level of specialisation and value that recreational fishers attribute to particular species, as well as providing meaningful measures of fishing success.

Targeted and non-targeted catch estimates by species are provided in Appendices 3 and 4 and the proportion of the total catch attributed to targeted effort is summarised in Table 8 for key species/groups. Overall, 62% of the total catch of all species was attributed to targeted fishing effort. Of the key recreational species, the vast majority (>90%) of the Mud Crab and trout catches were derived from targeted fishing effort, along with close to 100% for prawns, shrimp and freshwater yabbies (Table 8; Appendix 3). By contrast, species such as European Carp, Red Rock Cod and sharks/rays were quite rarely targeted (<20%) implying that catches of these species were mostly incidental. However, for the majority of all key species, greater than half of the total catch was attributed to targeted fishing effort (Table 8).

Table 8 Comparative summary of the proportion of the recreational catch (kept and released) of key species that was taken by targeted effort in NSW/ACT waters during 2013/14, by residents aged five years and older.

Proportion of the total catch targeted				
< 20%	21-50%	51-70%	71-90%	> 90%
European Carp	Abalone	Bream	Australian Bass	Mud Crab
Leatherjacket	Blue Mackerel	Flathead, Dusky	Blue Swimmer Crab	Trout
Red Rock Cod	Mullet	Flathead, Sand	Golden Perch	Prawns (saltwater)
Sharks and rays	Salmon, Australian	Flathead, Tiger	Luderick	Shrimp (freshwater)
Silver Trevally	Snapper	Mulloway	Murray Cod	Yabbies (freshwater)
Whiting, School	Swallowtail Dart	Rock lobster	Redfin Perch	
Wrasse/groppers	Tailor	Whiting, Sand	Squids	
	Yellowtail Scad	Yellowtail Kingfish	Tunas	
			Whiting, Trumpeter	

Harvest Weights

Catch information reported during the Diary Survey was based on the numbers of fish kept or released, rather than the weight of fish caught, since this information tends to be less reliable when self-reported by recreational fishers. However, the weight of the recreational harvest is of particular interest to resource managers, scientists and the various stakeholder groups. From a stock assessment perspective, estimates of recreational harvest weights enable comparison with the commercial sector, for which production is routinely reported by weight.

Recreational harvest weight estimates can be obtained for a given species by multiplying the number of individual fish caught (and kept) by the average weight of an individual, using size data from various fisheries datasets. However, individual species can vary by size over a range of temporal and spatial scales. Fishing methods and skills can also have an impact here, as well as size-selectivity differences between commercial and recreational fisheries. Ideally all of these

factors should be taken into account when calculating average species weights. However, this is rarely the case and the application of an average individual weight introduces additional uncertainty to recreational harvest weight estimates, i.e. additional to the standard errors already provided for harvest numbers. Furthermore, any grouping of species for reporting purposes can confound this issue, due to variations in size among the species within the group.

This uncertainty can be reduced if 'off-site' diary surveys are supplemented by parallel 'on-site' monitoring programmes to collect accurate length data from recreational fishers – from a range of locations and with strong temporal coverage. However, this was beyond the scope of the 2013/14 survey and in the absence of such data, it was decided to access a range of existing data sources to approximate the average size of key species retained by recreational fishers. These data sources were restricted to more recent on-site surveys within NSW for both estuarine and marine environments (Murray-Jones and Steffe, 2000; Reid and Montgomery, 2005; Steffe and Murphy, 2011; Ochwada-Doyle *et al.*, 2014).

As detailed in Appendix 5, separate calculations (mean weights) were applied to species caught within estuaries and marine waters, due to the different size structures that can occur in each case. Where recreational data were available, length/weight relationships have been used to derive mean weights and these have been applied to survey harvest numbers to estimate total harvest weights. Weight estimates for the commercial sector were obtained from reported landings by NSW commercial fisheries. However, in cases where inadequate recreational length data were available, mean weights were applied from the commercial fisheries data. Table 9 presents ten selected species for weight comparisons between the recreational and commercial fishery sectors. This list is restricted to species of key interest to commercial and recreational fisheries management and also where harvest estimates from the survey were considered sufficiently robust, i.e. the state-wide estimate for the kept component of the catch had an RSE <40% and a minimum of 30 households reported the catch (refer Table 5).

*For all the above reasons, it is strongly recommended that the recreational harvest weights in this report be regarded as **indicative** only.*

The results in Table 9 show that a majority of the total harvest weight in 2013/14 was attributable to recreational fishing for five of the ten species – with over 71% of the total harvest for Dusky Flathead, followed by Sand Flathead (> 67%), Mulloway and Tailor (both > 63%) and Yellowtail Kingfish (> 52%). Bream, Sand Whiting and Snapper comprised less than half the total catch (ranging from 49% down to 40%, respectively – with substantially lower proportions for Australian Salmon (15%) and Silver Trevally (14%).

Table 9 Harvest of key species in NSW waters by NSW/ACT residents, aged five years and older - indicative estimates of the total weight (tonnes), compared with estimates for the commercial fisheries sector during 2013/14.

Species/group	Total (tonnes)		Total	% recreational
	Recreational	Commercial		
Bream	330	343	672	49.1
Flathead, Dusky	288	115	404	71.4
Flathead, Sand	210	101	311	67.5
Mulloway	103	59	162	63.5
Salmon, Australian	182	1,112	1,294	14.1
Silver Trevally	27	168	195	13.9
Snapper	148	220	368	40.2
Tailor	107	62	169	63.5
Whiting, Sand	69	79	148	46.5
Yellowtail Kingfish	120	109	229	52.5

Catch by Water Body

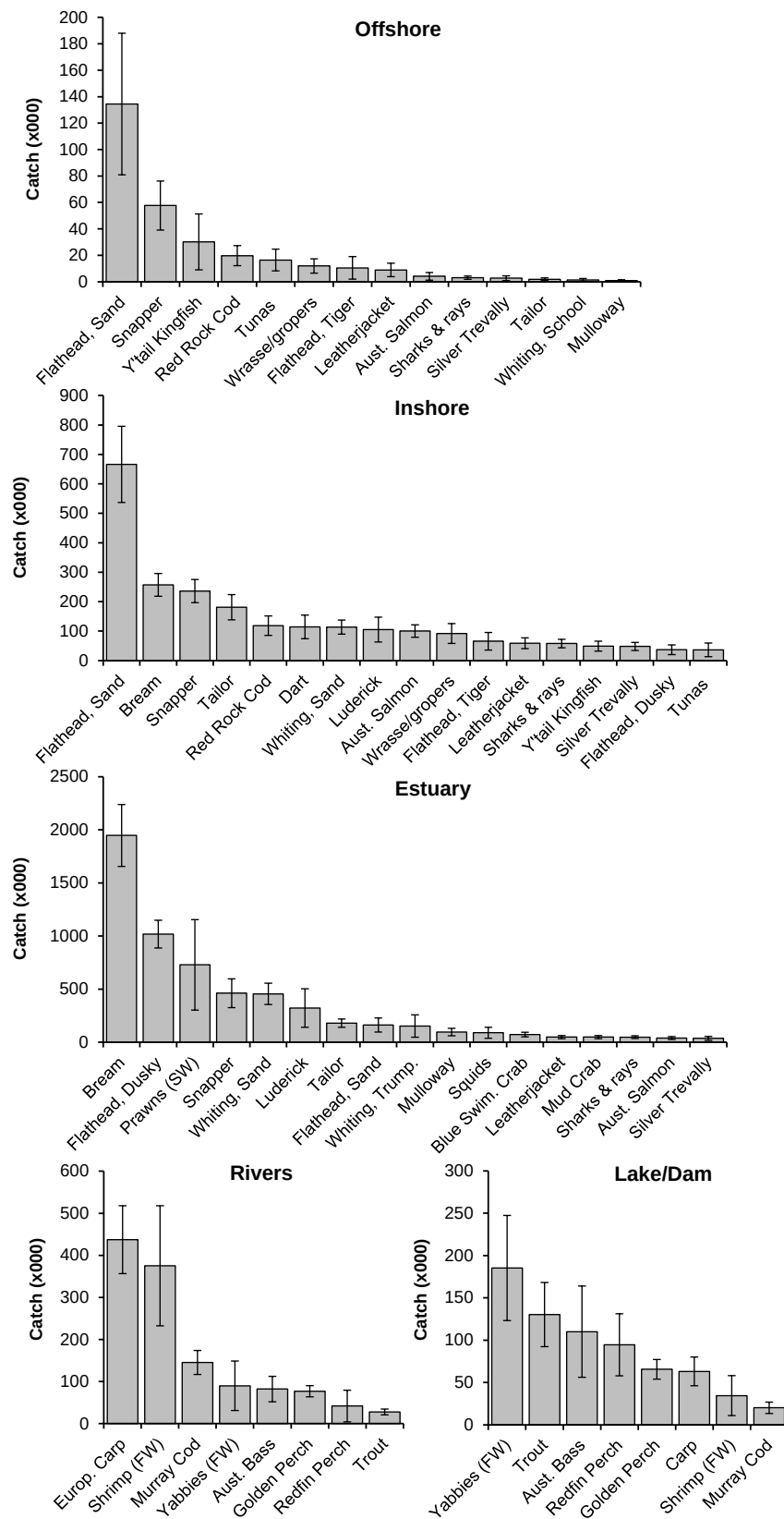
Catch details by water body type are provided in Appendices 6 and 7 and summarised for key fish species in Figure 15. Of the total catch (kept and released) of all organisms taken by NSW/ACT recreational fishers during 2013/14, a majority (59%) occurred in estuarine waters, followed by inshore coastal waters (< 5 km; 23%), rivers (10%), lakes/dams (5%), and offshore waters (3%).

In offshore waters (> 5 km), sand flathead were the main species caught and comprised 32% of the total catch in that water body, followed by Snapper (14%), Yellowtail Kingfish (7%), Red Rock Cod (5%) and a range of other species (at < 3% in each case) (Figure 15). Sand Flathead were also the main species caught (20%) in inshore waters (< 5km), followed by bream (8%), Snapper (7%), Tailor (6%) and a range of others species (at < 4% in each case).

In estuarine waters, bream were the main species caught (24%), followed by Dusky Flathead (12%), prawns (9%, by numbers), Snapper (6%), Sand Whiting (6%) and a range of other species (at < 4% in each case) (Fig 15). *Note:* refer earlier discussion in 'Water Body' (Page 23), regarding definitions of estuaries and the inclusion of large open bays, e.g. Batemans Bay and Jervis Bay.

In freshwater rivers, European Carp (32%) was the main species caught, followed by shrimp (27%, by numbers), Murray Cod (11%), yabbies (7%), Australian Bass and Golden Perch (at 6% each) and all species at 3% or less (Fig 15). In freshwater lakes and dams, yabbies (25%) were the main species caught, followed by trout (18%), Australian Bass (15%), Redfin Perch (13%), Golden Perch and European Carp (at 9% each) and all other species at less than 5% each (Figure 15).

Figure 15 Catch estimates (kept and released) of key species by residents aged five years and older in NSW/ACT waters during 2013/14, by water body. Error bars represent one standard error.

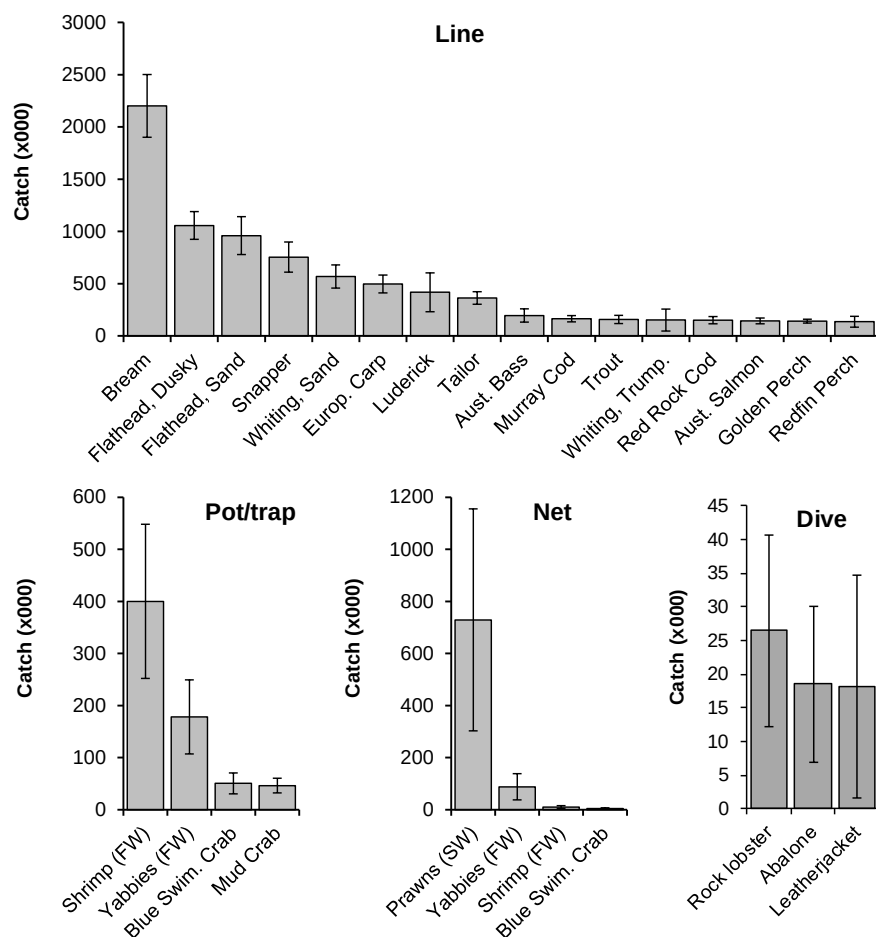


Catch by Method

Catch details by fishing method are provided in Appendices 8 and 9 and summarised for key species in Figure 16. Overall, line fishing accounted for a majority (76%) of the total catch (kept and released) of all organisms taken by NSW/ACT recreational fishers during 2013/14. Other methods (primarily hand collecting, digging and pumping for small bait species) contributed a further 13%, followed by nets (6%), pots and traps (5%) and diving (1%).

Fish accounted for the vast majority of the line catch, with bream (21%) the main species caught by that method (Figure 16). Other species of significance included Dusky Flathead, (10%), Sand Flathead (9%), Snapper (7%), Sand Whiting (5%) and a range of others species (at < 4% in each case). Smaller crustacean species dominated the catch (by numbers) taken by pots and traps (i.e. shrimp and yabbies), also by nets (mainly prawns) (Figure 16). In terms of diving, rock lobster and abalone are prime targets and dominated the catch (Figure 16).

Figure 16 Catch estimates (kept and released) of key species by residents aged five years and older in NSW/ACT waters during 2013/14, by fishing method. Error bars represent one standard error.



Line Fishing

Line fishing is practised using either baited hooks, artificial lures (hard body lures and soft plastics) or flies and each line fishing event in the Diary Survey was further defined in terms of whether bait or lures/flyes were used. However, because some fishing events involved the use of both modes, separate catch details were often not achievable – hence a third code ('both') was applied. The relative importance of either bait or lure/fly fishing for many key fish species has been assessed in Table 10. Bait fishing represented the primary capture mode for the vast majority (over 80%) of these species, whereas lure/fly fishing was the main method for only five species/groups: Australian Bass, Redfin Perch, trout, tunas and 'other small baitfish'. However, the popularity of lure/fly fishing has increased over the years, as has its significance in terms of total catch (see further discussion in 'Fishing Effort', Page 88).

Table 10 Annual recreational catch (kept and released numbers) of key fish species in NSW/ACT waters by line fishing mode during 2013/14 and proportions taken by bait or lure/fly, by residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Bait		Lure/fly		Both		% Bait only	% Lure only
	Number	SE	Number	SE	Number	SE		
Bream	1,907,047	287,850	144,869	46,651	150,290	32,011	86.6	6.6
Flathead, Dusky	630,192	79,632	326,404	88,642	100,792	21,102	59.6	30.9
Flathead, Sand	817,156	172,937	15,895	8,007	126,961	35,205	85.1	1.7
Flathead, Tiger	70,044	30,222			12,285	8,735	85.1	0.0
Leatherjacket	93,656	19,322	309	284	4,532	1,974	95.1	0.3
Luderick	405,420	186,178	2,763	1,836	10,090	5,469	96.9	0.7
Mulloway	94,255	34,833	12,361	4,594	4,957	1,907	84.5	11.1
Red Rock Cod	115,624	31,314	3,674	2,567	32,234	9,101	76.3	2.4
Salmon, Australian	103,880	21,545	29,401	11,784	11,236	5,281	71.9	20.3
Sharks and rays	89,565	17,221	5,507	2,208	13,840	8,306	82.2	5.1
Silver Trevally	66,672	18,807	4,771	2,294	15,963	6,910	76.3	5.5
Snapper	549,410	94,831	23,980	12,258	181,405	96,843	72.8	3.2
Swallowtail Dart	117,825	39,873			1,111	1,101	99.1	0.0
Tailor	244,642	46,230	83,712	28,319	34,537	10,450	67.4	23.1
Tunas	17,262	6,024	35,091	23,646	4,695	1,568	30.3	61.5
Whiting, Sand	509,007	101,816	35,332	17,483	24,368	8,723	89.5	6.2
Whiting, School	11,018	4,240	287	283	502	495	93.3	2.4
Whiting, Trumpeter	84,819	49,682	35,621	35,660	32,546	25,305	55.4	23.3
Wrasse/groper	75,370	20,108	14,462	13,337	21,386	14,065	67.8	13.0
Yellowtail Kingfish	59,453	20,544	20,162	9,124	16,309	8,481	62.0	21.0
Blue Mackerel	109,195	34,721	9,209	4,547	18,716	9,641	79.6	6.7
Mullet	67,936	21,508	5,375	3,946	7,896	4,920	83.7	6.6
Yellowtail Scad	99,102	30,032	9,500	4,276	34,628	22,952	69.2	6.6
Other small baitfish	115,390	66,350	159,967	99,803	42,654	32,719	36.3	50.3
Australian Bass	50,468	27,559	139,826	52,980	5,507	5,446	25.8	71.4
European Carp	377,459	73,963	12,367	5,158	108,218	31,488	75.8	2.5
Golden Perch	87,360	13,561	34,260	9,276	20,863	5,513	61.3	24.0
Murray Cod	106,908	20,992	25,232	7,261	33,358	13,006	64.6	15.2
Redfin Perch	59,949	38,333	61,683	35,193	14,647	6,708	44.0	45.3
Trout	12,223	4,502	128,580	36,821	17,173	6,139	7.7	81.4
Scalefish, other	693,209	90,417	42,261	11,057	110,468	23,662	81.9	5.0

Catch by Fishing Platform

Catch details by fishing platform are provided in Appendices 10 and 11 and summarised in Table 11. Overall, boat-based and shore-based fishing accounted for equal proportions (50% each) of the total catch (kept and released) of all organisms taken by NSW/ACT recreational fishers during 2013/14. However, the proportions varied considerably between species (Appendix 10) and a summary assessment of key species for boat-based fishing is provided below (Table 11).

Table 11 Comparative summary of the proportion of the total recreational catch (kept and released) of key species taken in NSW/ACT waters by boat-based fishing during 2013/14, by residents aged five years and older.

Proportion of catch - boat-based				
< 30%	31-50%	51-70%	71-90%	> 90%
Salmon, Australian	Bream	Leatherjacket	Flathead, Dusky	Flathead, Tiger
Swallowtail Dart	Luderick	Sharks and rays	Flathead, Sand	Whiting, Trumpeter
Mullet	Tailor	Silver Trevally	Mulloway	Yellowtail Kingfish
European Carp	Whiting, Sand	Tunas	Red Rock Cod	Blue Mackerel
Rock lobster	Mud Crab	Whiting, School	Snapper	
Shrimp (freshwater)	Prawns (saltwater)	Wrasse/groper	Yellowtail Scad	
Yabbies (freshwater)		Golden Perch	Australian Bass	
Abalone		Murray Cod	Redfin Perch	
		Trout	Squids	
		Blue Swimmer Crab		

Key Species

In the following section, some 23 key species/groups have been described in terms of: the regional distribution of the total catch by fishing zone (Appendix 13); numbers kept and released (Table 5); then total catch by fishing platform (Appendix 10), water body type (Appendix 6), fishing method (Appendix 8, and Table 10) and season (Appendix 12).

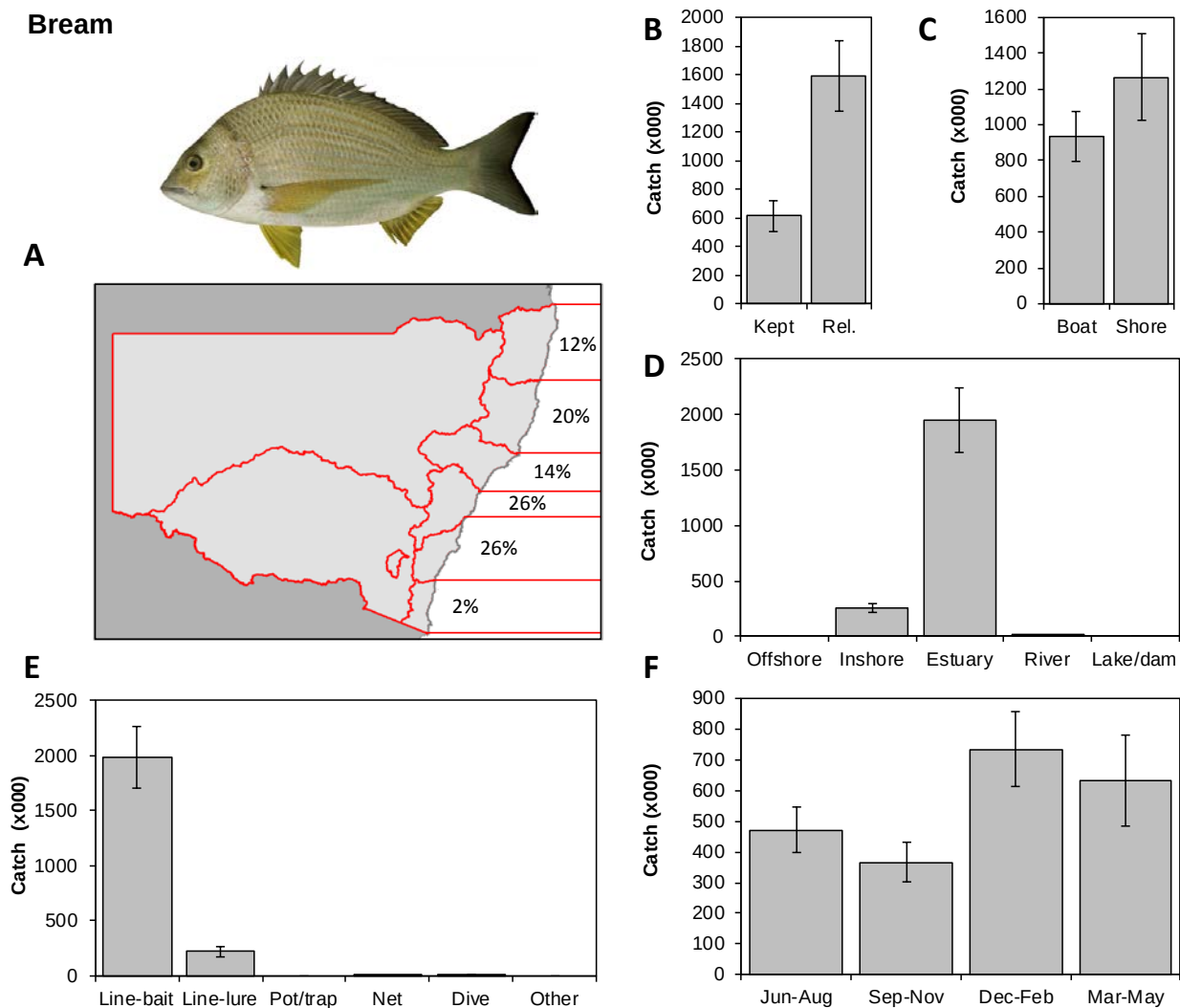
Catch information was provided by fishers during the Diary Survey and is presented as expanded estimates of the total catch by the resident population of NSW and the ACT aged five years and older (as at June 2013) and their recreational fishing activity during the period June 2013 to May 2014.

Note: the species/groups included in this section refer to those with relatively large total catch estimates for the period. However, species have routinely been excluded from this analysis, where the RSE for the total catch estimate is greater than 40% or where the results were provided by less than 30 households (refer Table 5). For example, the total catch estimate for Luderick was quite large (428,213) and a relatively large number of households provided the data. However among these, a small number of diarists reported very high annual/raw data catches resulting in a greater than 40% RSE for the total catch. Similarly, the total catch estimate for Trumpeter Whiting was 152,986, however the RSE was greater than 40% and less than 30 households provided the data.

Bream

Over half (52%) of the total recreational catch of bream (*Acanthopagrus spp.*) was taken in the Sydney and Mid South Coast fishing zones (26% each), followed by the Mid North Coast (20%), Hunter (14%), North Coast (12%) and South Coast (2%) (Figure 17A). The majority (72%) of all bream caught were released (Figure 17B) and shore-based fishing (57%) accounted for over half of the catch (Figure 17C). The vast majority of the catch was taken in estuarine waters (88%), followed by inshore coastal waters (12%) and freshwater rivers (<1%) (Figure 17D). Virtually all of the catch was taken by line fishing – primarily using bait (90%) as opposed to lures (10%), with a small component (<1%) taken by other methods (net and diving) (Figure 17E). The summer season (Dec-Feb) accounted for a third (33%) of the catch, followed by autumn (29%), winter (21%) and spring (17%) (Figure 17F).

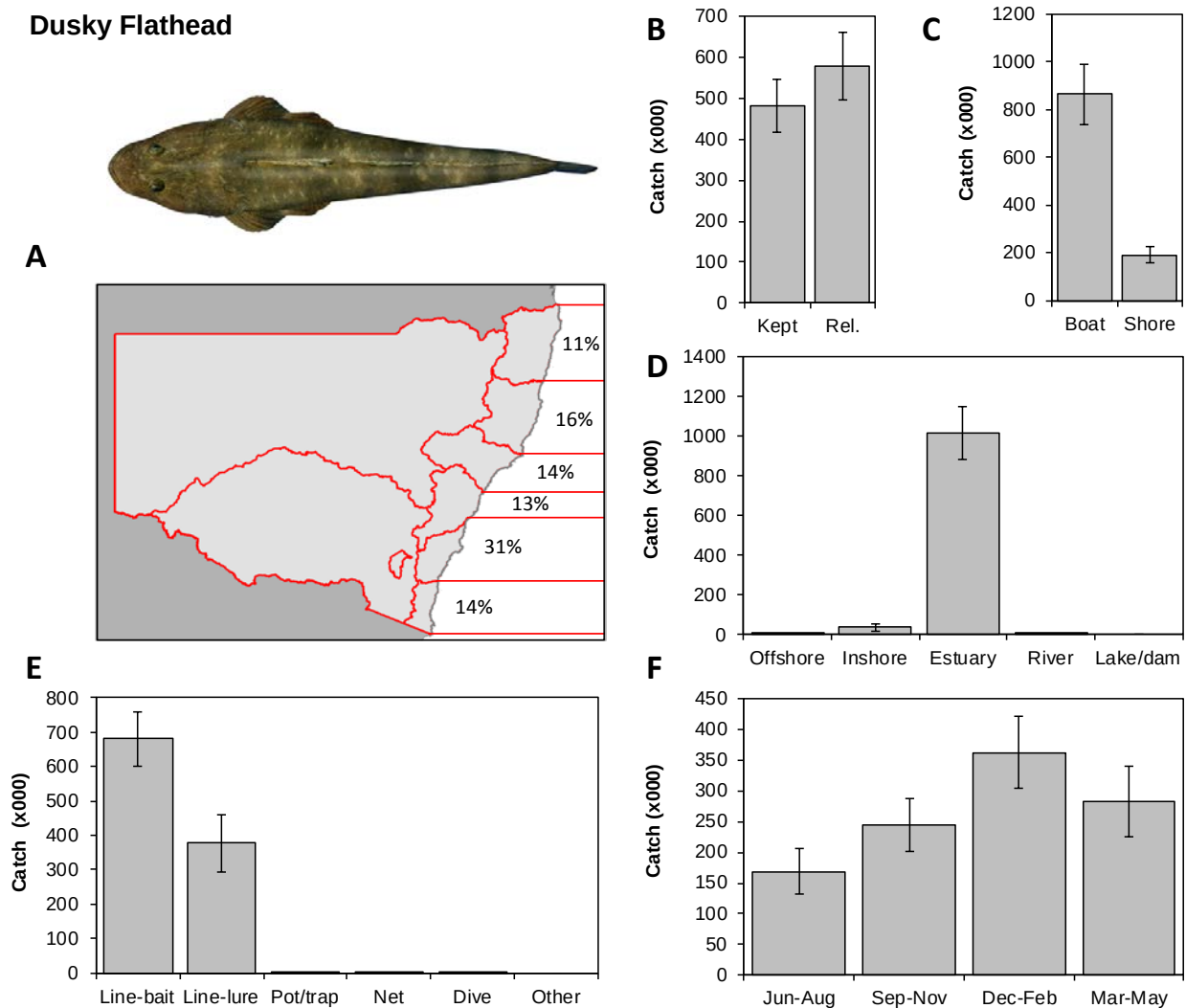
Figure 17 Characteristics of the recreational fishery for bream in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Dusky Flathead

Close to one third (31%) of the total recreational catch of dusky flathead (*Platycephalus fuscus*) was taken in the Mid South Coast fishing zone – with the remaining catch distributed quite evenly across the other five coastal zones (ranging from 16% down to 11%) (Figure 18A). Over half (55%) of all dusky flathead caught were released (Figure 18B) and boat-based fishing (82%) accounted for the vast majority of the catch (Figure 18C). Estuarine waters dominated the total catch (96%), with the remainder in inshore coastal waters (3%) and other water body types (<1%) (Figure 18D). Virtually all of the catch was taken by line fishing – mainly using bait (64%) as opposed to lures (36%), with a small component (<1%) taken by other methods (pot/trap, net and diving) (Figure 18E). The summer season (Dec-Feb) accounted for just over a third (34%) of the catch, followed by autumn (27%), spring (23%) and winter (16%) (Figure 18F).

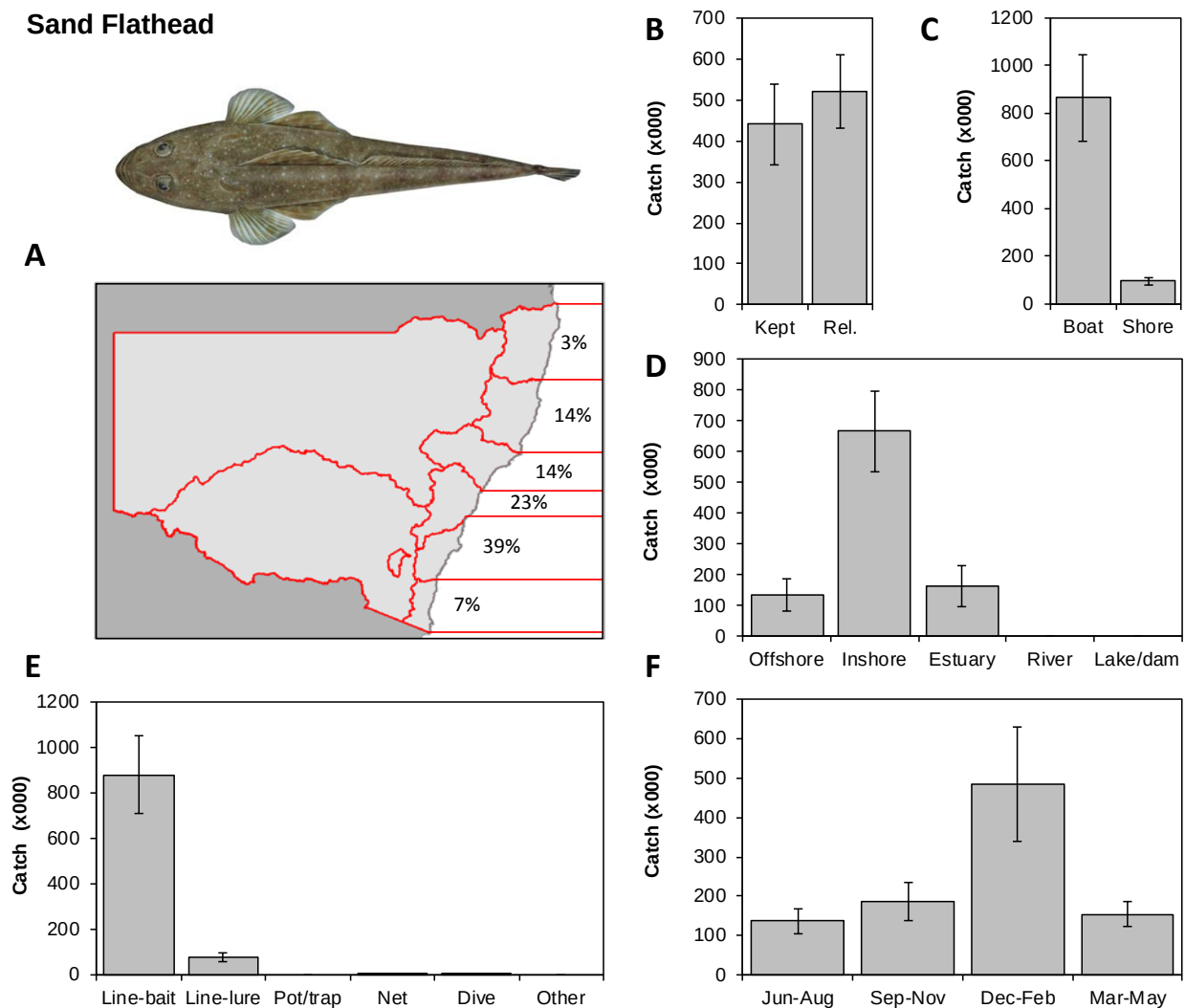
Figure 18 Characteristics of the recreational fishery for Dusky Flathead in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Sand Flathead

The Mid South Coast fishing zone accounted for 39% of the total recreational catch of Sand Flathead (several *Platycephalidae* species, but dominated by *Platycephalus caeruleopunctatus* & *bassensis*), followed by Sydney (23%), then the Mid North Coast and Hunter (at 14% each), South Coast (7%) and North Coast (3%) (Figure 19A). Over half (54%) of all sand flathead caught were released (Figure 19B) and boat-based fishing (90%) accounted for the vast majority of the catch (Figure 19C). Inshore coastal waters dominated the total catch (69%), with the remainder in estuaries (17%) and offshore waters (14%) (Figure 19D). Virtually all of the catch was taken by line fishing – the majority using bait (91%) as opposed to lures (8%), with a small component (<1%) taken by other methods (net and diving) (Figure 19E). The summer season (Dec-Feb) accounted for half (50%) of the total catch, with the remainder being distributed across the other seasons – spring (19%), autumn (16%) and winter (14%) (Figure 19F).

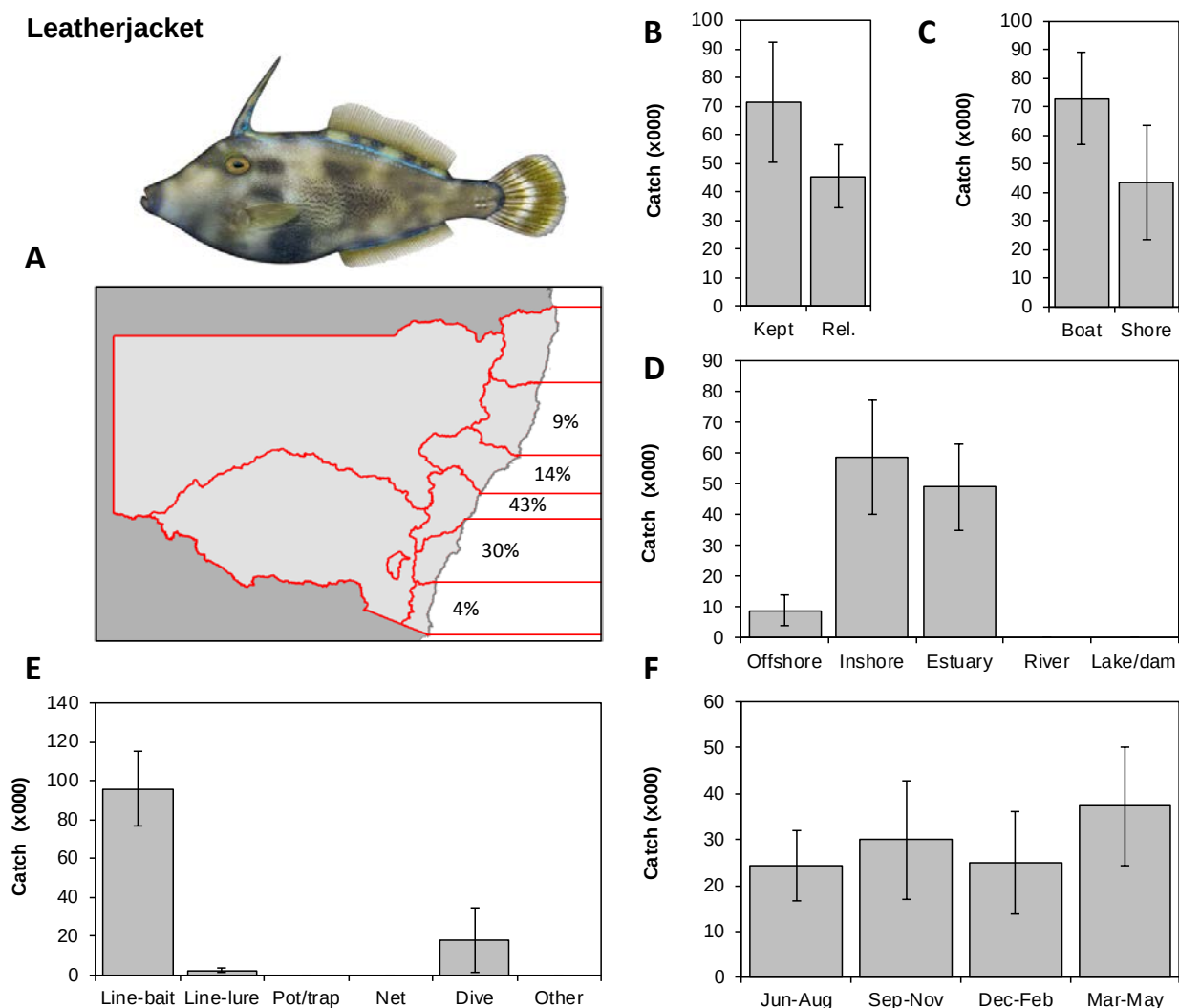
Figure 19 Characteristics of the recreational fishery for Sand Flathead in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Leatherjacket

The Sydney fishing zone accounted for 43% of the total catch of leatherjacket species (*Balistidae* & *Monacanthidae*), followed by the Mid South Coast (30%), Hunter (13%), Mid North Coast (9%) and South Coast (4%) (Figure 20A). A majority (61%) of the leatherjacket catch was kept (Figure 20B) and boat-based fishing (63%) accounted for a similar majority of the catch (Figure 20C). Half of the catch (50%) was taken in inshore coastal waters, followed closely by estuarine waters (42%), then offshore (8%) (Figure 20D). The vast majority of the catch was taken by line fishing (84%) – primarily using bait (82%) as opposed to lures (2%). Diving accounted for 16% of the catch (Figure 20E). Almost one third (32%) of the catch occurred during the autumn season (Mar-May), followed by spring (26%), then summer and winter (at 21% each) (Figure 20F).

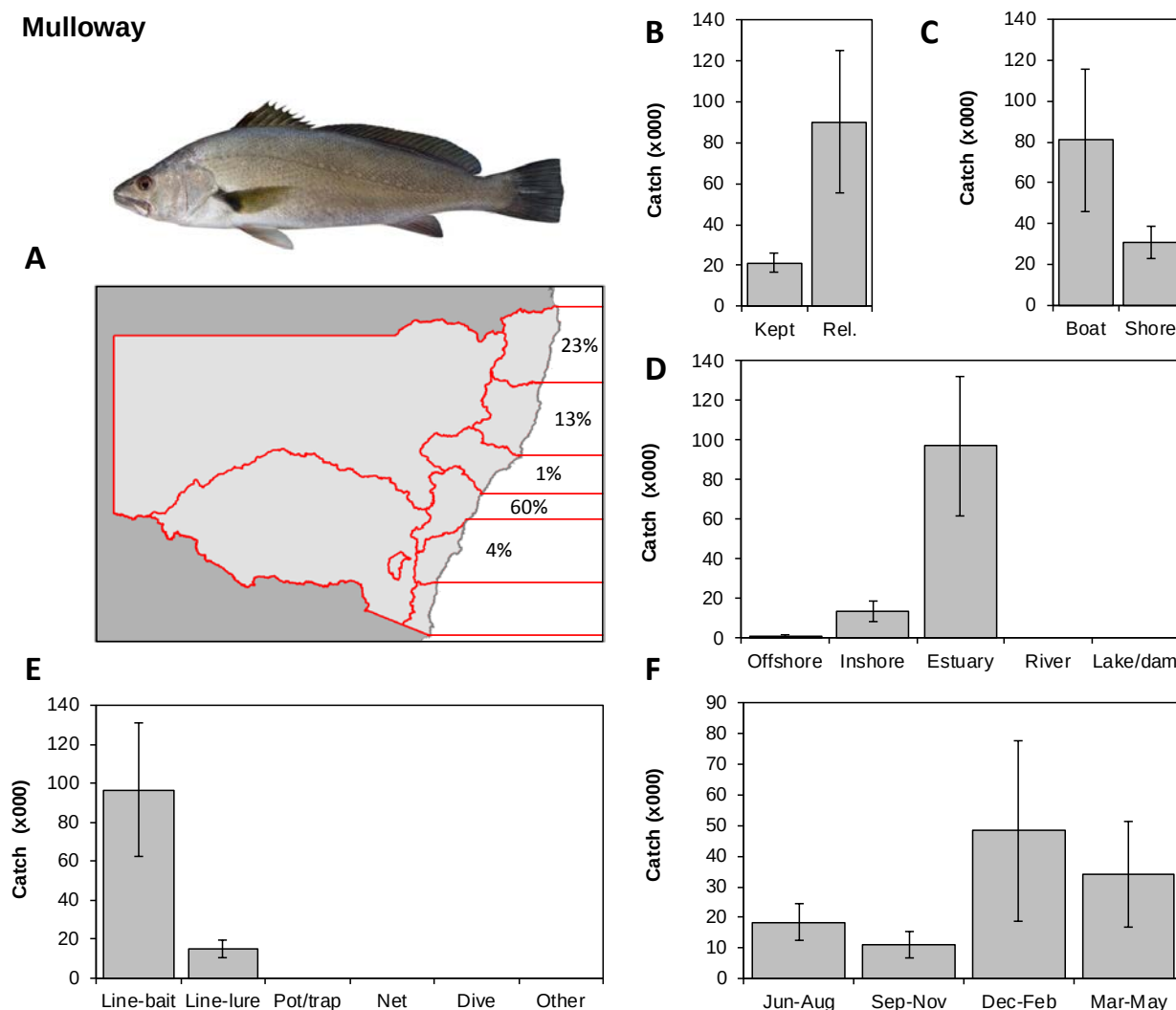
Figure 20 Characteristics of the recreational fishery for leatherjacket in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; ; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Mulloway

Over half of the total recreational catch of Mulloway (*Argyrosomus hololepidotus*) was taken in the Sydney fishing zone (60%), followed by the North Coast (23%), Mid North Coast (13%), with minority catches in the Mid South Coast (4%) and Hunter zones (1%) (Figure 21A). The majority (81%) of all mulloway caught were released (Figure 21B) and boat-based fishing (72%) accounted for most of the catch (Figure 21C). The vast majority of the catch was taken in estuarine waters (87%), followed by inshore coastal waters (12%) and offshore (1%) (Figure 21D). All of the catch was taken by line fishing – primarily using bait (87%), as opposed to lures (13%) (Figure 21E). The summer season (Dec-Feb) accounted for 43% of the catch, followed by autumn (30%), winter (17%) and spring (10%) (Figure 21F).

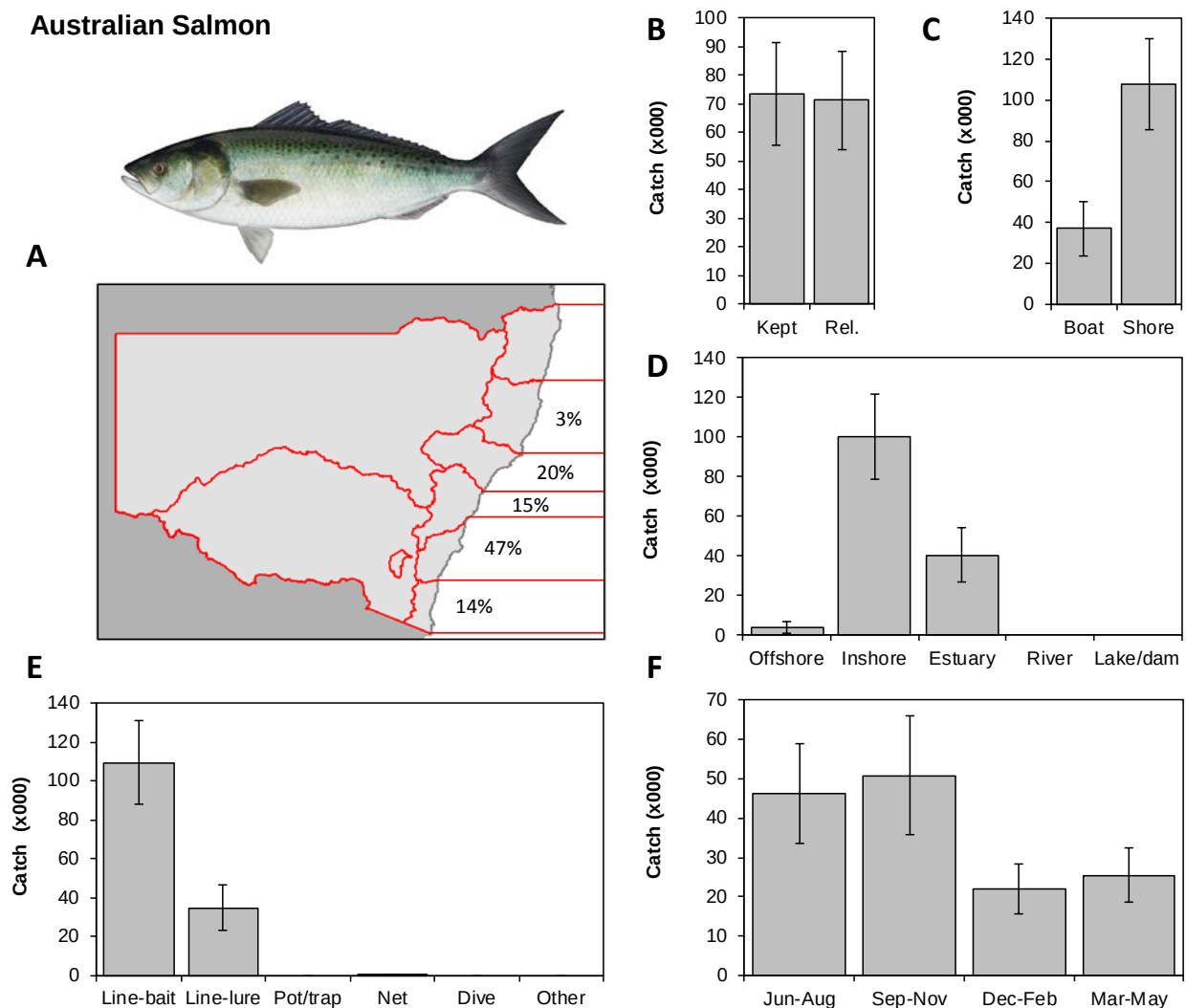
Figure 21 Characteristics of the recreational fishery for Mulloway in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Australian Salmon

Almost half of the total recreational catch of Australian Salmon (*Arripis spp.*) was taken in the Mid South Coast fishing zone (47%), followed by the Hunter (20%), Sydney (15%), South Coast (14%) and Mid North Coast (3%) (Figure 22A). Just over half (51%) of all Australian salmon caught were kept (Figure 22B) and shore-based fishing (74%) accounted for the majority of the catch (Figure 22C). Over two thirds of the catch was taken in inshore coastal waters (69%), followed by estuaries (28%) and a minority in offshore waters (3%) (Figure 22D). Virtually all of the catch was taken by line fishing – mainly using bait (76%) as opposed to lures (24%) with a small component (<1%) taken by net (Figure 22E). The spring season (Sep-Nov) accounted for over a third of the catch (35%), closely followed by winter (32%), then autumn (18%) and summer (15%) (Figure 22F).

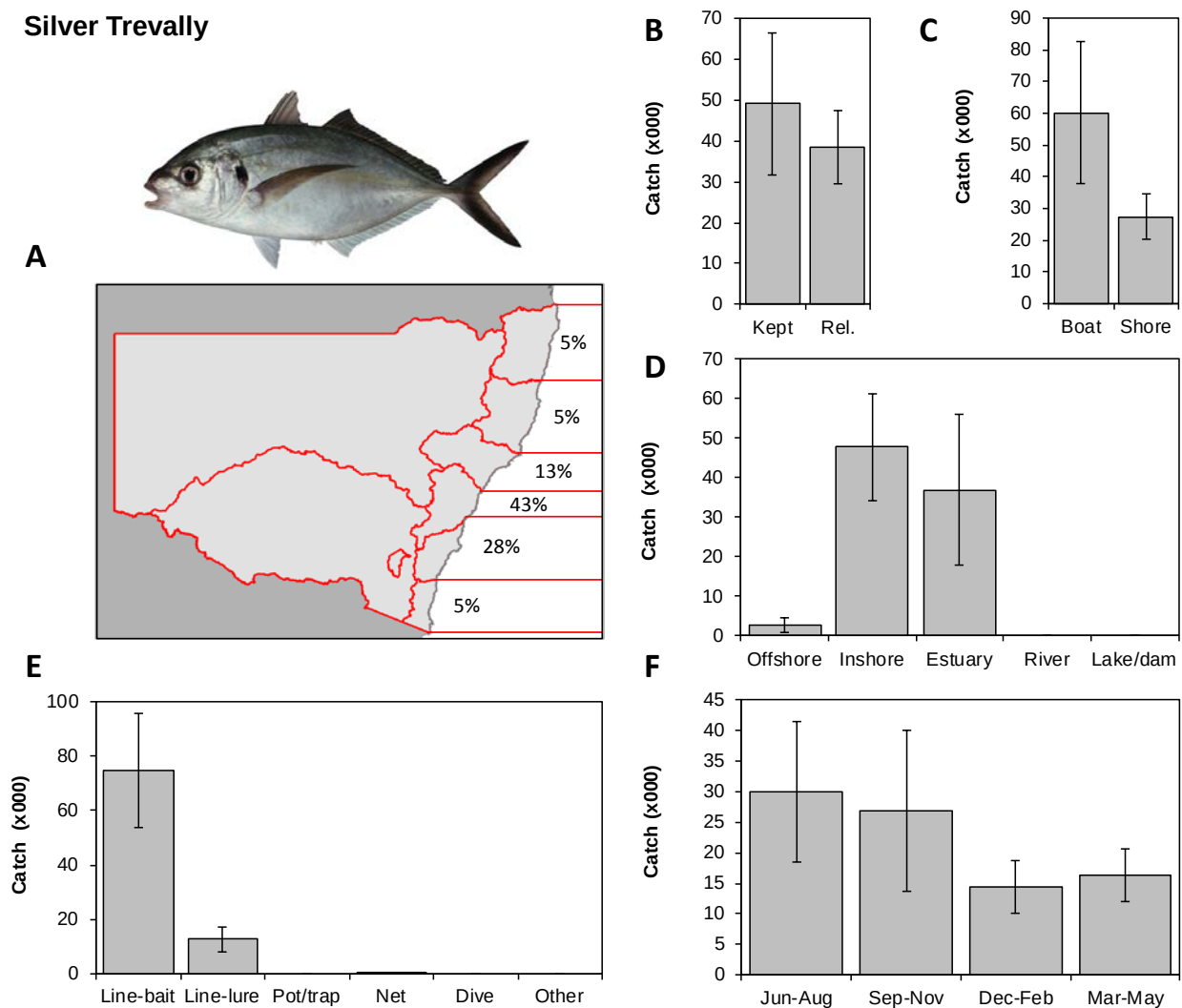
Figure 22 Characteristics of the recreational fishery for Australian Salmon in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Silver Trevally

The Sydney fishing zone accounted for 43% of the total recreational catch of Silver Trevally (*Pseudocaranx dentex*), followed by the Mid South Coast (28%) and Hunter (13%), with the remainder of the catch in the North Coast, Mid North Coast and South Coast zones (at 5% each) (Figure 23A). Over half (56%) of all Silver Trevally caught were kept (Figure 23B) and boat-based fishing (69%) accounted for the majority of the catch (Figure 23C). Over half of the catch was taken in inshore coastal waters (55%), followed by estuaries (42%) and a minority in offshore waters (3%) (Figure 23D). Virtually all of the catch was taken by line fishing – the majority using bait (85%) as opposed to lures (15%), with a small component (<1%) taken by net (Figure 23E). The winter season (Jun-Aug) accounted for over a third of the catch (34%), closely followed by spring (31%), then autumn (19%) and summer (16%) (Figure 23F).

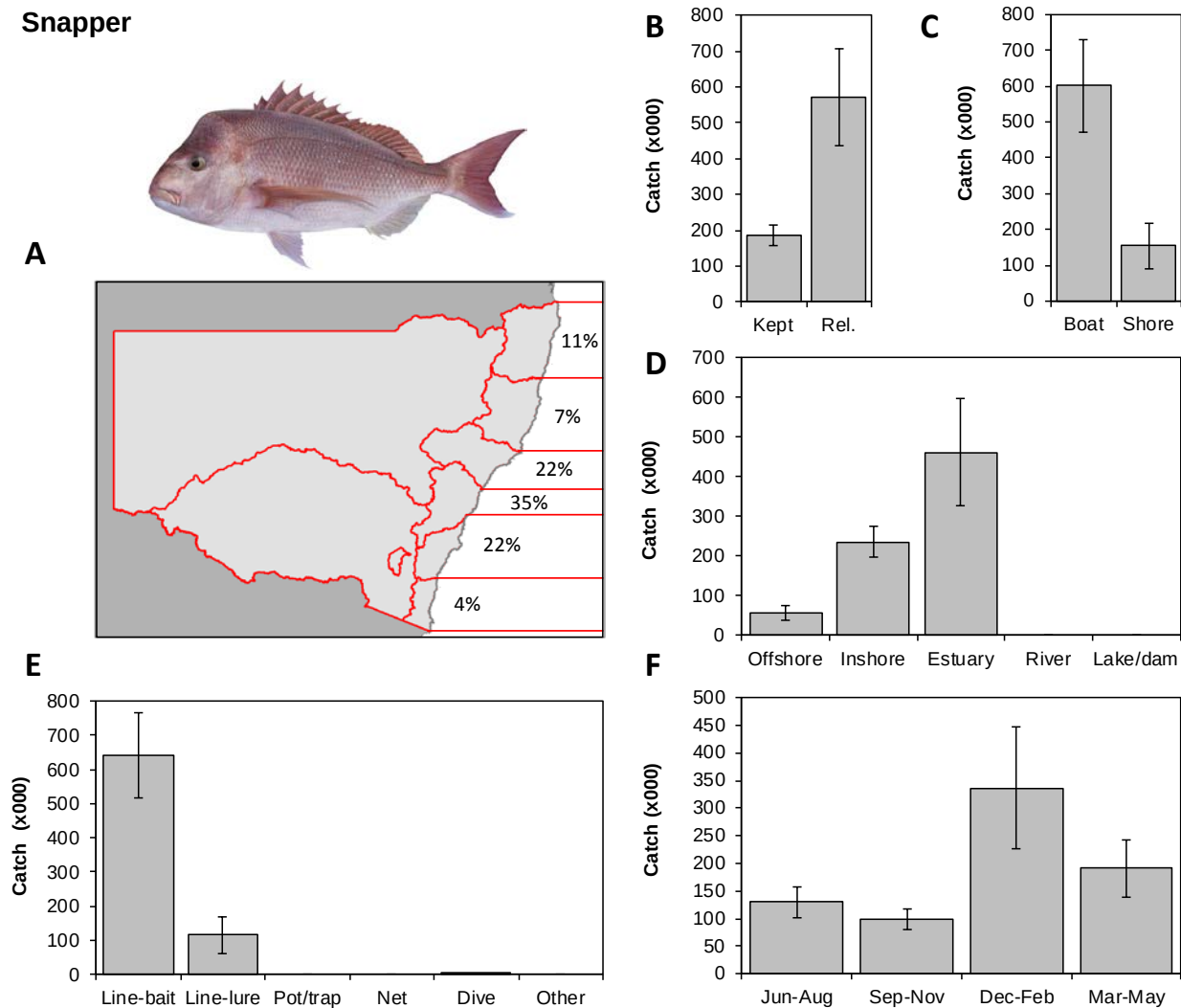
Figure 23 Characteristics of the recreational fishery for Silver Trevally in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Snapper

Over a third of the total recreational catch of Snapper (*Pagrus auratus*) was taken in the Sydney fishing zone (35%), followed by the Hunter and Mid South Coast (at 22% each), North Coast (11%), Mid North Coast (7%) and South Coast (4%) (Figure 24A). The majority (75%) of all Snapper caught were released (Figure 24B) and boat-based fishing dominated the total catch (80%) (Figure 24C). A majority of the catch was taken in estuarine waters (61%), followed by inshore coastal waters (31%) and offshore (8%) (Figure 24D). Virtually all of the catch was taken by line fishing – the vast majority using bait (85%) as opposed to lures (15%), with a small component (<1%) taken by diving (Figure 24E). The summer season (Dec-Feb) accounted for 45% of the catch, followed by autumn (25%), winter (17%) and spring (13%) (Figure 24F).

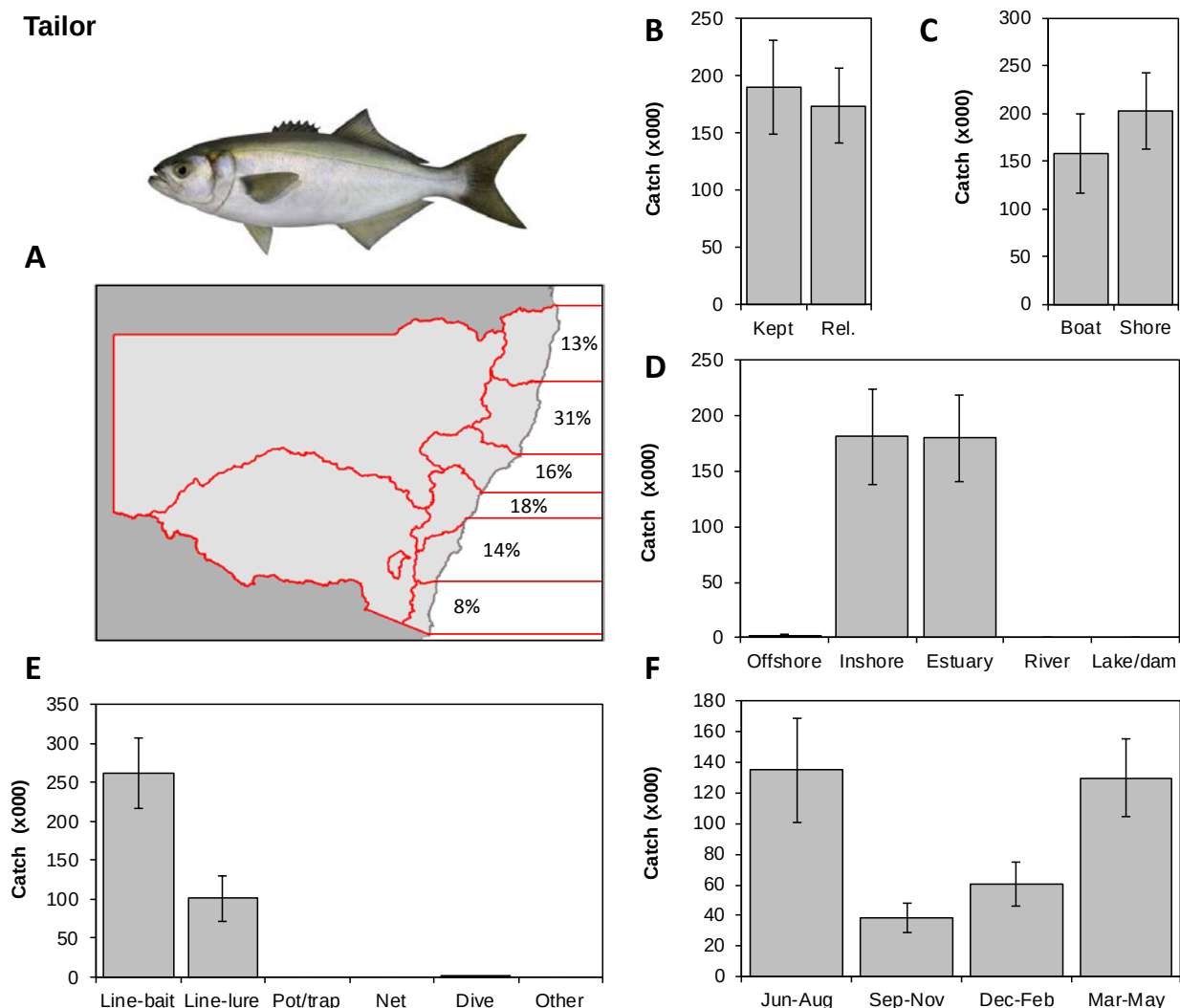
Figure 24 Characteristics of the recreational fishery for Snapper in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Tailor

Close to a third of the total recreational catch of Tailor (*Pomatomus saltatrix*) was taken in the Mid North Coast fishing zone (31%), followed by Sydney (18%), the Hunter (16%), Mid South Coast (14%), North Coast (13%) and South Coast (8%) (Figure 25A). Over half (52%) of all Tailor caught were kept (Figure 25B) and shore-based fishing (56%) accounted for over half of the catch (Figure 25C). Virtually all of the catch was taken in estuaries and inshore coastal waters (at 50% each), with offshore waters at < 1% (Figure 25D). Almost all of the catch was taken by line fishing – mainly using bait (72%) as opposed to lures (28%), with a small component (<1%) taken by diving (Figure 25E). The winter season (Jun-Aug) accounted for over a third of the total catch (37%), closely followed by autumn (36%), then summer (17%) and spring (11%) (Figure 25F).

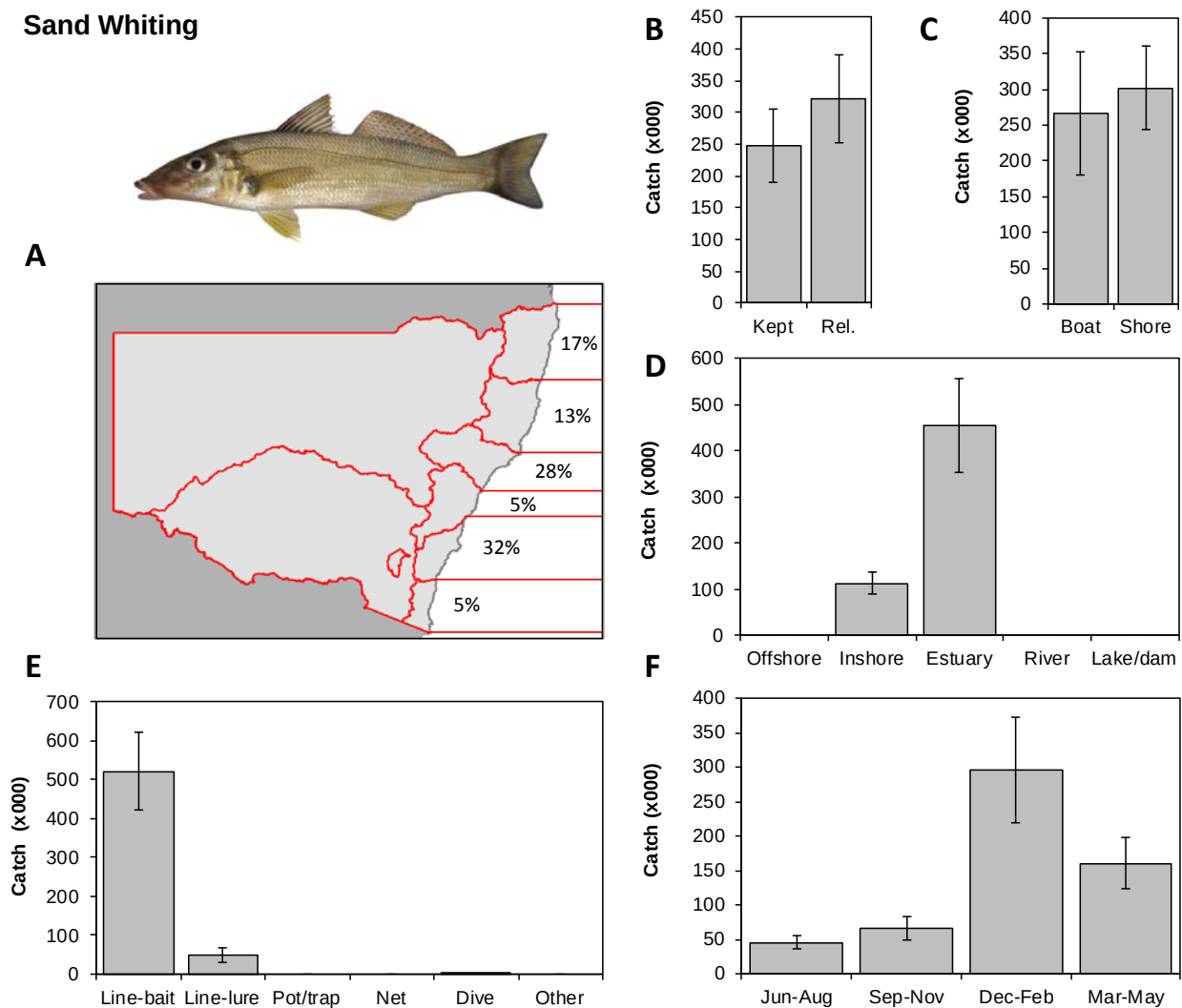
Figure 25 Characteristics of the recreational fishery for Tailor in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Sand Whiting

Close to a third (32%) of the total recreational catch of Sand Whiting (*Sillago ciliata*) was taken in the Mid South Coast fishing zone, followed by the Hunter (28%), North Coast (17%), Mid North Coast (13%), then Sydney and the South Coast (at 5% each) (Figure 26A). Over half (56%) of all Sand Whiting caught were released (Figure 26B) and shore-based fishing (53%) accounted for over half of the catch (Figure 26C). The vast majority of the catch was taken in estuarine waters (80%), with the remainder from inshore coastal waters (20%) (Figure 26D). Almost all of the catch was taken by line fishing – the majority using bait (92%) as opposed to lures (8%), with a small component (<1%) taken by diving (Figure 26E). The summer season (Dec-Feb) accounted for over half of the catch (52%), followed by autumn (28%), spring (12%) and winter (8%) (Figure 26F).

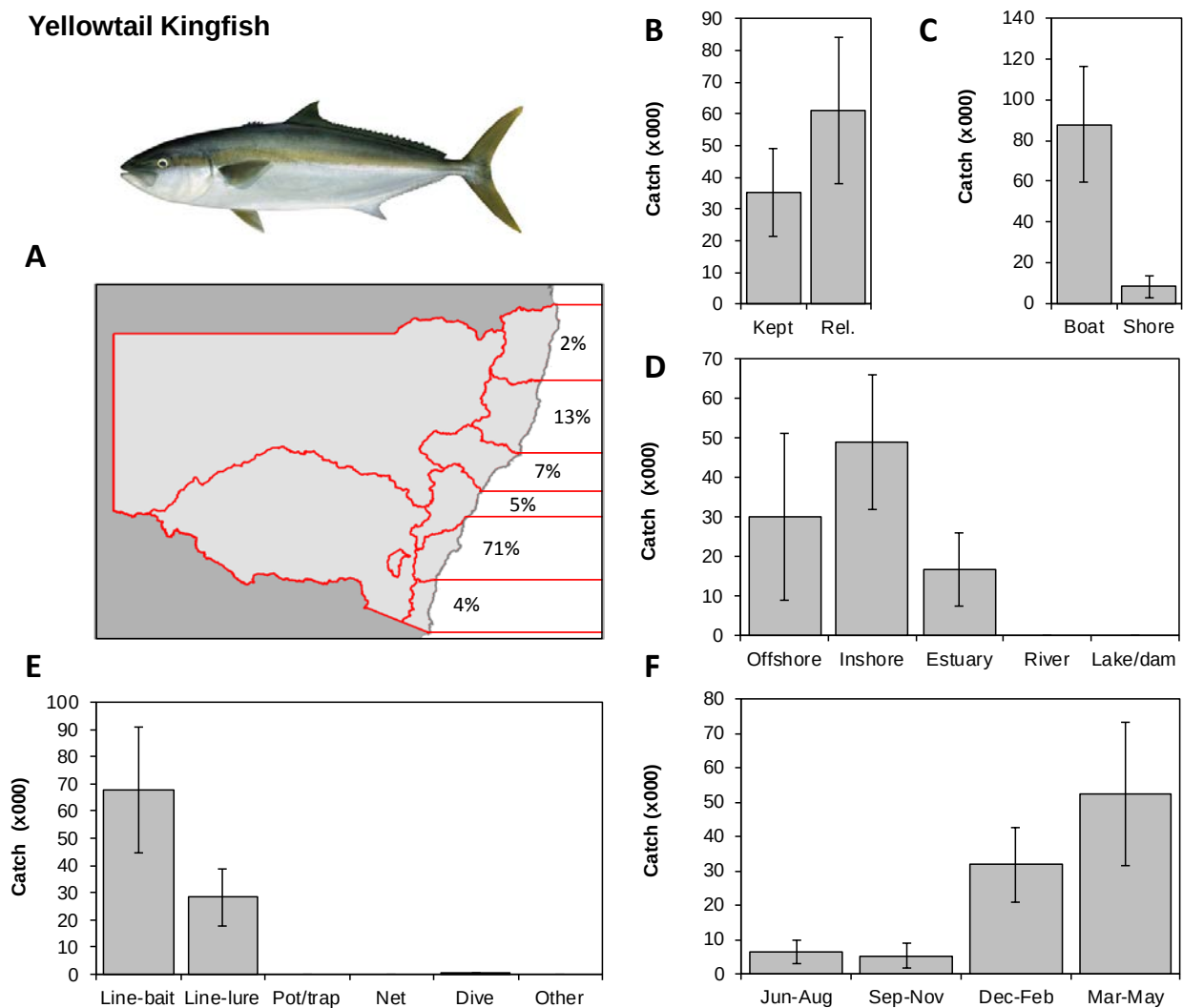
Figure 26 Characteristics of the recreational fishery for Sand Whiting in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Yellowtail Kingfish

The majority of the total recreational catch of Yellowtail Kingfish (*Seriola lalandi*) was taken in the Mid South Coast fishing zone (71%), followed by the Mid North Coast (13%), the Hunter (7%), Sydney (5%), the South Coast (4%) and the North Coast (2%) (Figure 27A). A majority (63%) of all Yellowtail Kingfish caught were released (Figure 27B) and boat-based fishing accounted for the vast majority of the catch (91%) (Figure 27C). Just over half the catch was taken from inshore coastal waters (51%), followed by offshore waters (31%) and estuaries (18%) (Figure 27D). The vast majority of the catch was taken by line fishing – mainly using bait (70%) as opposed to lures (29%), with a small component (<1%) taken by diving (Figure 27E). The autumn season (Mar-May) accounted for just over half of the catch (55%), followed by summer (33%), winter (7%) and spring (6%) (Figure 27F).

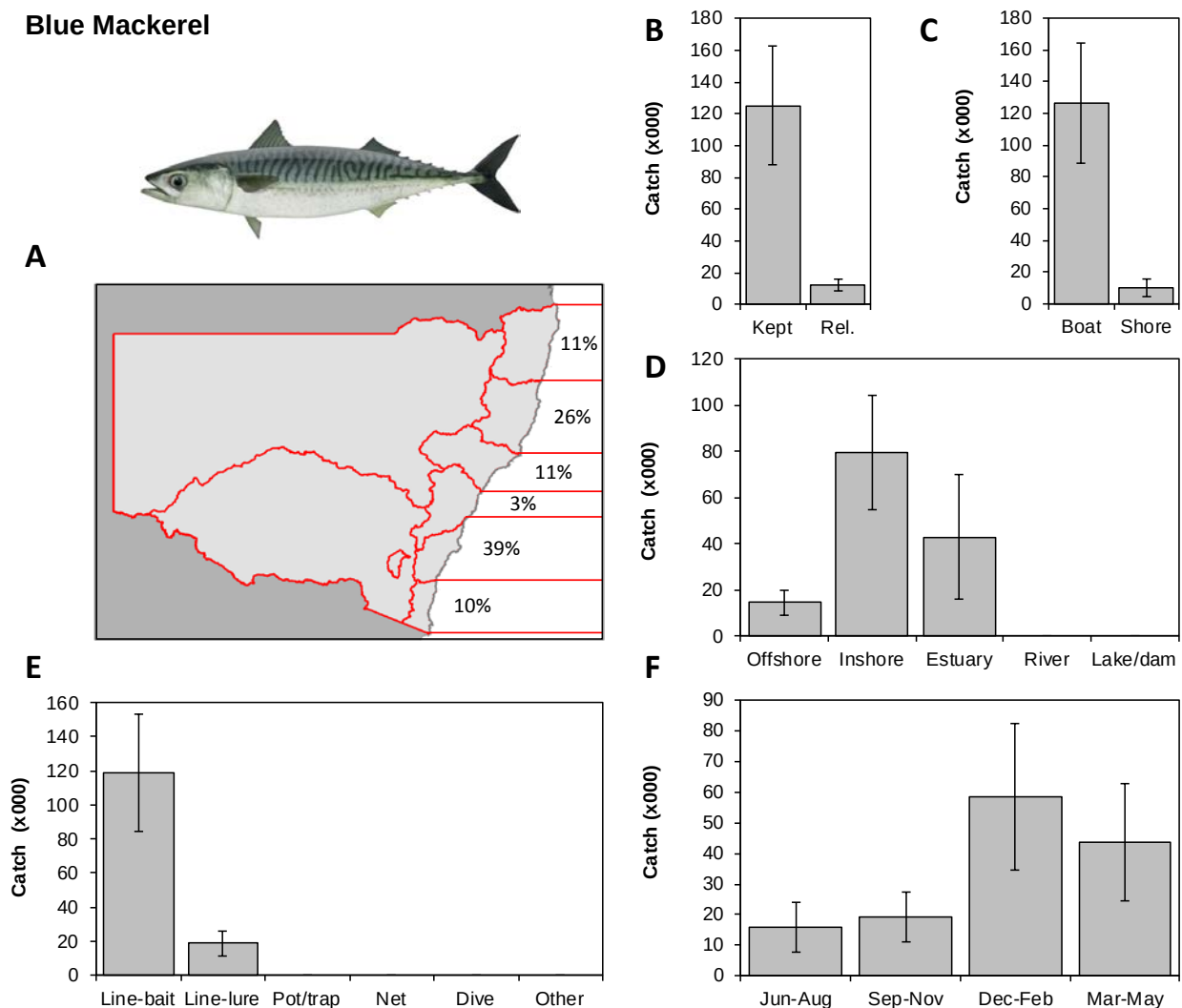
Figure 27 Characteristics of the recreational fishery for Yellowtail Kingfish in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Blue Mackerel

The Mid South Coast fishing zone accounted for 39% of the total recreational catch of Blue Mackerel (*Scomber australasicus*), followed by the Mid North Coast (26%), the North Coast and Hunter (at 11% each), South Coast (10%) and Sydney (3%) (Figure 28A). The vast majority (91%) of all Blue Mackerel caught were kept (Figure 28B) and boat-based fishing (92%) accounted for a similar majority of the catch (Figure 28C). Just over half of the catch was taken from inshore coastal waters (51%), followed by estuaries (31%) and offshore (11%) (Figure 28D). All of the catch was taken by line fishing – mostly using bait (86%) as opposed to lures (14%) (Figure 28E). The summer season (Dec-Feb) accounted for 43% of the catch, followed by autumn (32%), spring (14%) and winter (12%) (Figure 28F).

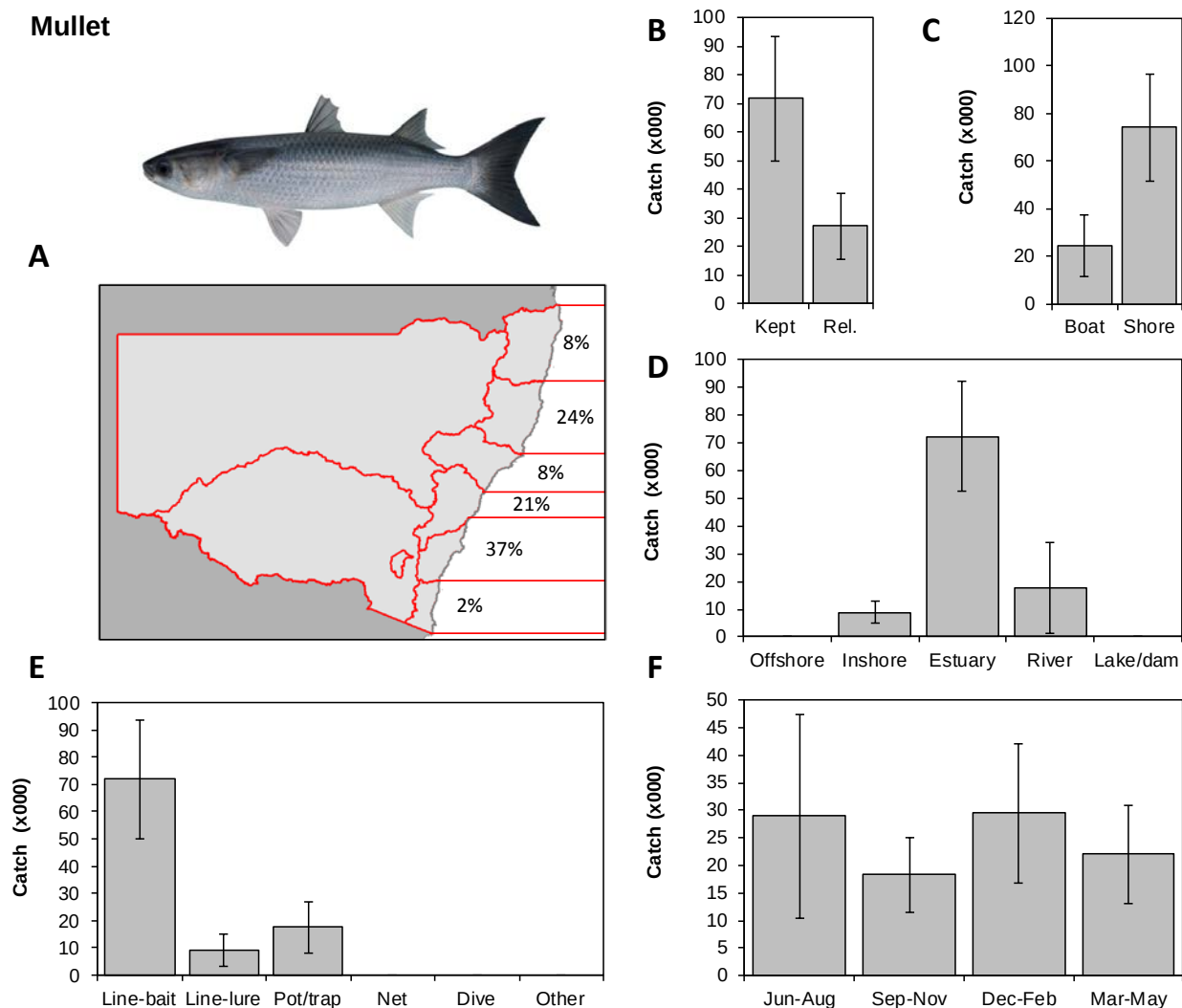
Figure 28 Characteristics of the recreational fishery for Blue Mackerel in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Mullet

The Mid South Coast fishing zone accounted for 37% of the total recreational catch of mullet (*Mugilidae*), followed by the Mid North Coast (24%), Sydney (21%) then the North Coast and Hunter (at 8% each), with the South Coast at 2% (Figure 29A). The majority (73%) of all mullet caught were kept (Figure 29B) and shore-based fishing (75%) accounted for a similar majority of the catch (Figure 29C). A high proportion of the catch was taken in estuarine waters (73%), followed by freshwater rivers (18%) and inshore coastal waters (9%) (Figure 29D). The majority of the catch was taken by line fishing – primarily using bait (73%) as opposed to lures (9%), with a notable component (18%) taken by pots/traps (Figure 29E). The summer season (Dec-Feb) accounted for 30% of the catch, closely followed by winter (29%) then autumn (22%) and spring (19%) (Figure 29F).

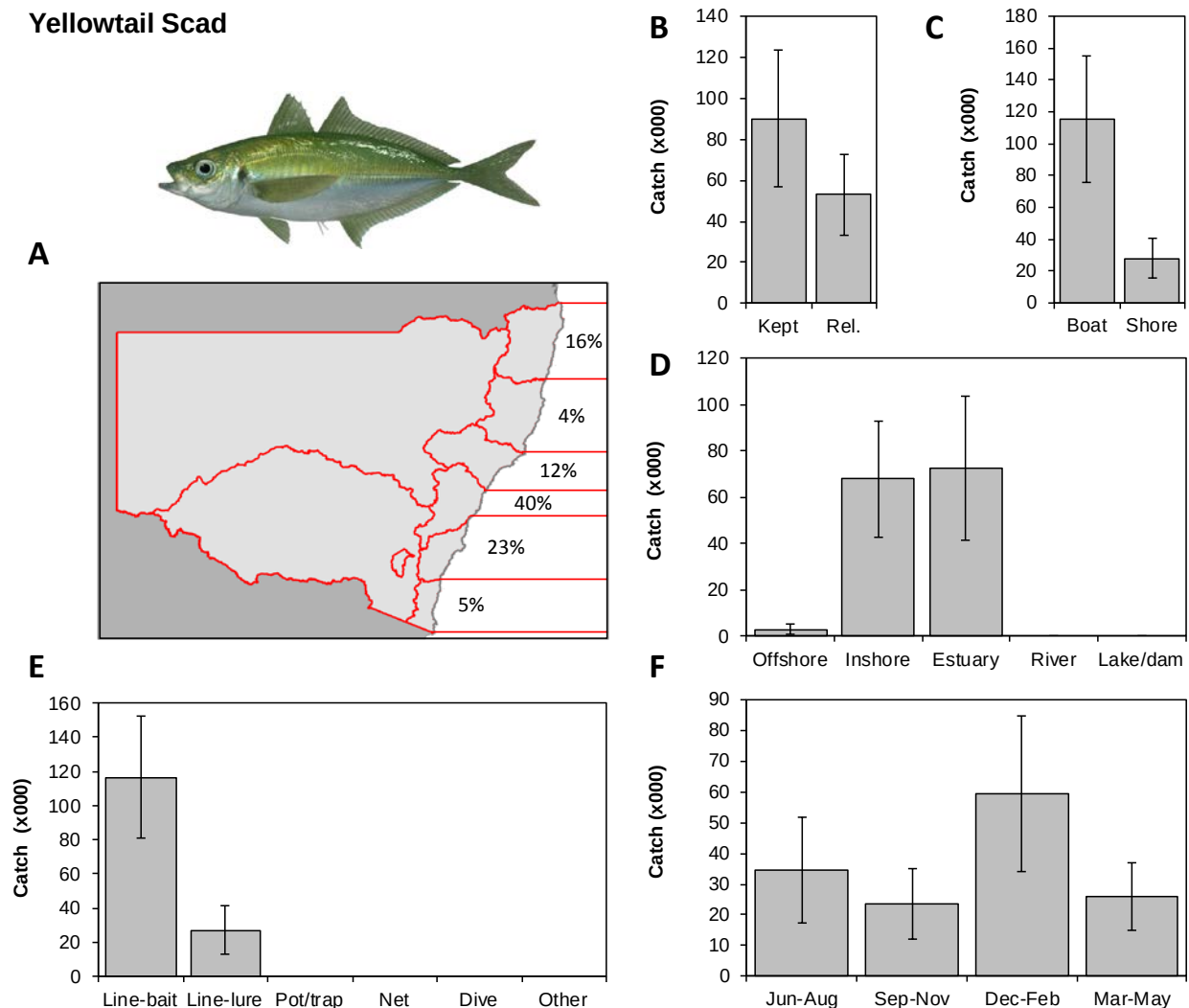
Figure 29 Characteristics of the recreational fishery for mullet in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Yellowtail Scad

The Sydney fishing zone accounted for 40% of the total recreational catch of Yellowtail Scad (*Trachurus novaezelandiae*), followed by the Mid South Coast (23%), North Coast (16%), Hunter (12%), South Coast (5%) and Mid North Coast (4%) (Figure 30A). The majority (63%) of all Yellowtail Scad caught were kept (Figure 30B) and boat-based fishing (80%) accounted for the vast majority of the catch (Figure 30C). Just over half the catch was taken from estuaries (51%), followed closely by inshore coastal waters (47%), with a small minority (2%) in offshore waters (Figure 30D). All of the catch was taken by line fishing – with the majority using bait (81%) as opposed to lures (19%) (Figure 30E). The summer season (Dec-Feb) accounted for 41% of the catch, followed by winter (24%), autumn (18%) and spring (16%) (Figure 30F).

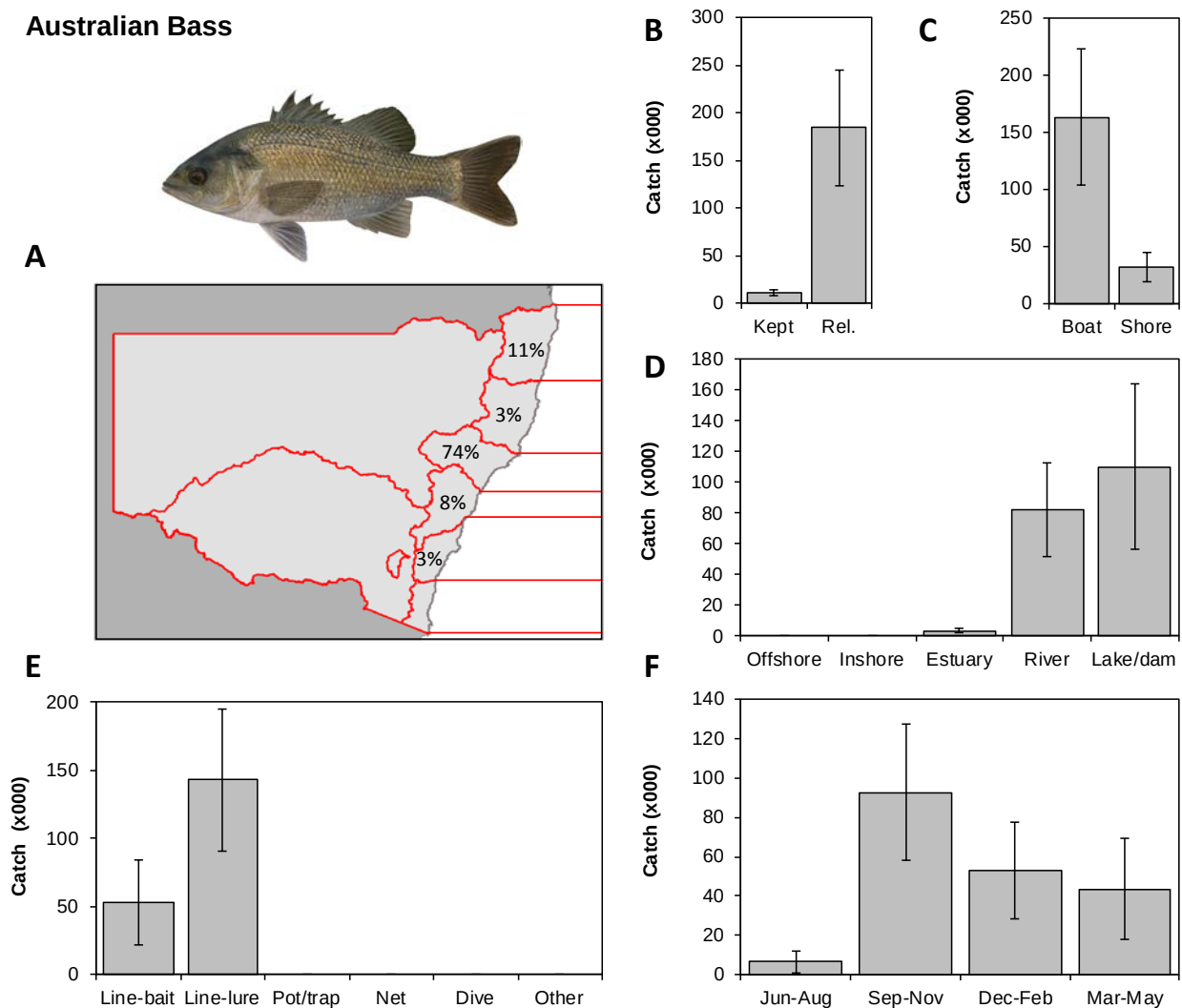
Figure 30 Characteristics of the recreational fishery for Yellowtail Scad in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Australian Bass

The majority of the total recreational catch of Australian Bass (*Macquaria novemaculeata*) was taken in the Hunter fishing zone (74%), followed by the North Coast (11%), Sydney (8%), then the Mid North Coast and Mid South Coast (at 3% each) (Figure 31A). Virtually all (94%) of Australian Bass caught were released (Figure 31B) and boat-based fishing (84%) accounted for the majority of the catch (Figure 31C). Over half the catch was taken in freshwater lakes or dams (56%), followed by freshwater rivers (42%), with a minority (2%) in estuarine waters (Figure 31D). All of the catch was taken by line fishing – primarily using lures (73%) as opposed to bait (27%) (Figure 31E). The spring season (Sep-Nov) accounted for close to half of the catch (47%), followed by summer (27%), autumn (22%) and a minority in winter (3%) (Figure 31F).

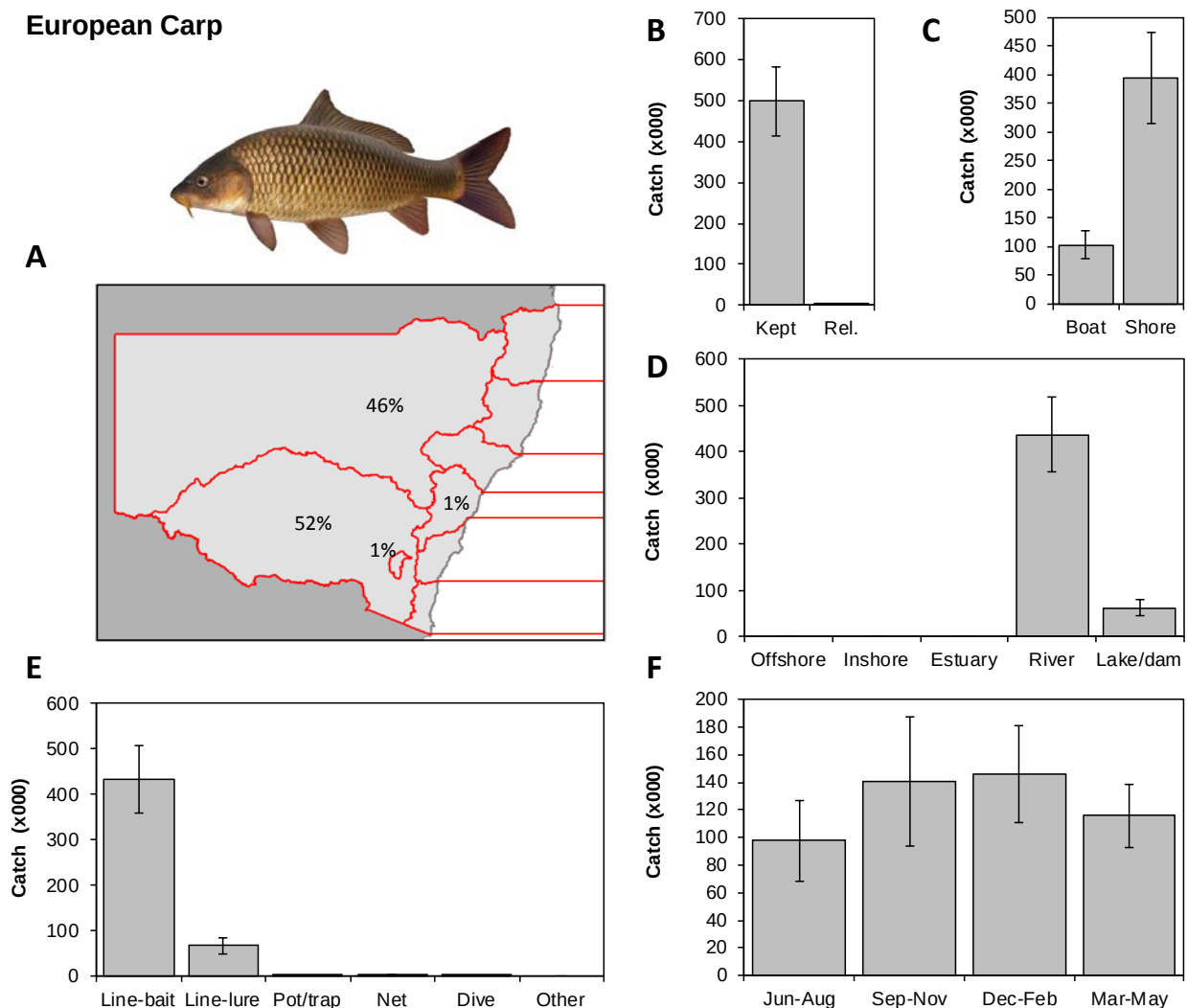
Figure 31 Characteristics of the recreational fishery for Australian Bass in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



European Carp

Over half (52%) of the total recreational catch of European Carp (*Cyprinus carpio*) was taken in the Murray/South West fishing zone, closely followed by the Darling/North West (46%), then Sydney and the ACT (at 1% each) (Figure 32A). Virtually all (99.7%) of the European Carp caught were kept (Figure 32B) and shore-based fishing (79%) accounted for the majority of the catch (Figure 32C). The vast majority of the catch was taken in freshwater rivers (87%), with the remainder (13%) in freshwater lakes or dams (Figure 32D). Virtually all of the catch was taken by line fishing – primarily using bait (86%) as opposed to lures (13%), with a minority (< 1%) taken by various other methods (Figure 32E). The summer season (Dec-Feb) accounted for 29% of the catch, closely followed by spring (28%), autumn (23%) and winter (20%) (Figure 32F).

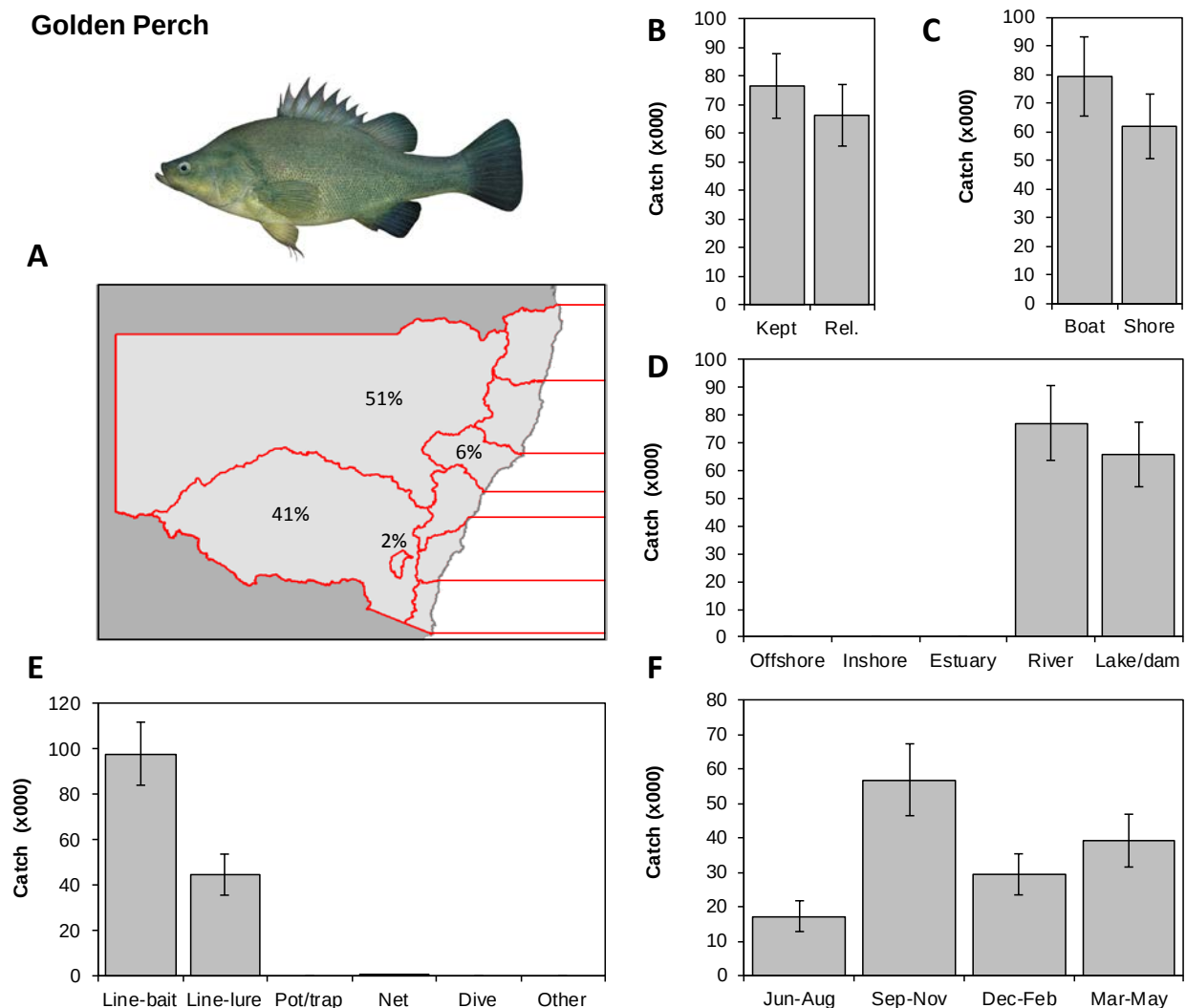
Figure 32 Characteristics of the recreational fishery for European Carp in NSW/ACT waters during 2013/14 – total catch (numbers kept and released) by residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Golden Perch

The majority of the total recreational catch of Golden Perch (*Macquaria ambigua*) was taken in the Darling/North West fishing zone (51%), followed by the Murray/South West (41%), then the Hunter (6%) and ACT (2%) (Figure 33A). Over half (54%) of all Golden Perch caught were kept (Figure 33B) and boat-based fishing (56%) accounted for a similar proportion of the catch (Figure 33C). Just over half of the catch was taken in freshwater rivers (54%), with the remainder (46%) in freshwater lakes or dams (Figure 33D). Virtually all of the catch was taken by line fishing – a majority using bait (69%) as opposed to lures (31%), with a small component (<1%) taken by net (Figure 33E). The spring season (Sep-Nov) accounted for 40% of the catch, followed by autumn (28%), summer (21%) and winter (12%) (Figure 33F).

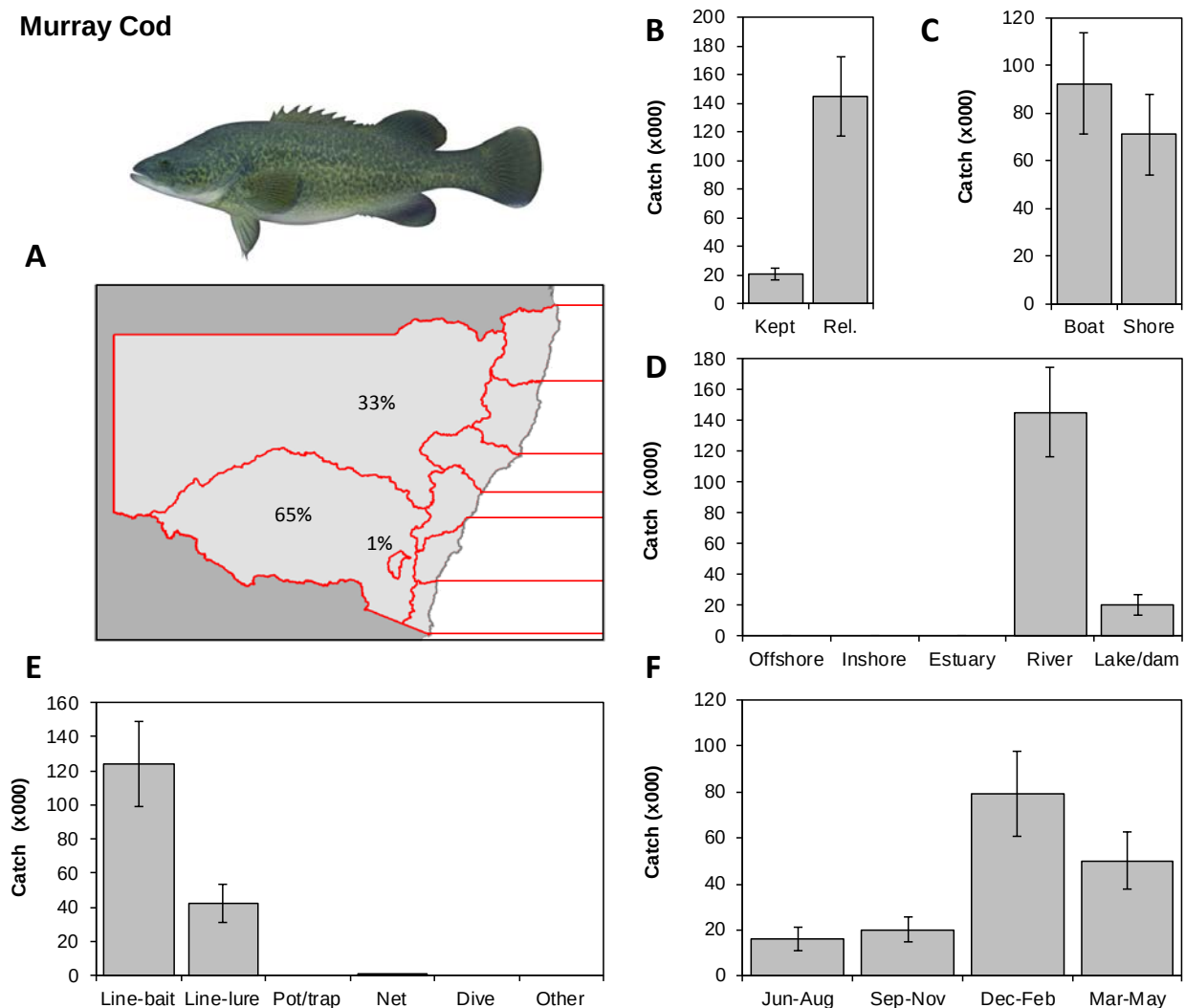
Figure 33 Characteristics of the recreational fishery for Golden Perch in NSW/ACT waters during 2013/14 – total catch (numbers kept and released) by residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Murray Cod

The vast majority of the total recreational catch of Murray Cod (*Maccullochella peelii*) was taken in the Murray/South West fishing zone (65%), followed by the Darling/North West (33%), and a minority (1%) in the ACT (Figure 34A). The vast majority (87%) of all Murray Cod caught were released (Figure 34B) and boat-based fishing accounted for over half (57%) of the catch (Figure 34C). The vast majority of the catch was taken in freshwater rivers (88%), with the remainder (12%) in freshwater lakes and dams (Figure 34D). Virtually all of the catch was taken by line fishing – mainly using bait (75%) as opposed to lures (25%), with a small component (<1%) taken by net (Figure 34E). The summer season (Dec-Feb) accounted for close to half (48%) of the catch, followed by autumn (30%), with a minority in spring (12%) and winter (10%) (Figure 34F).

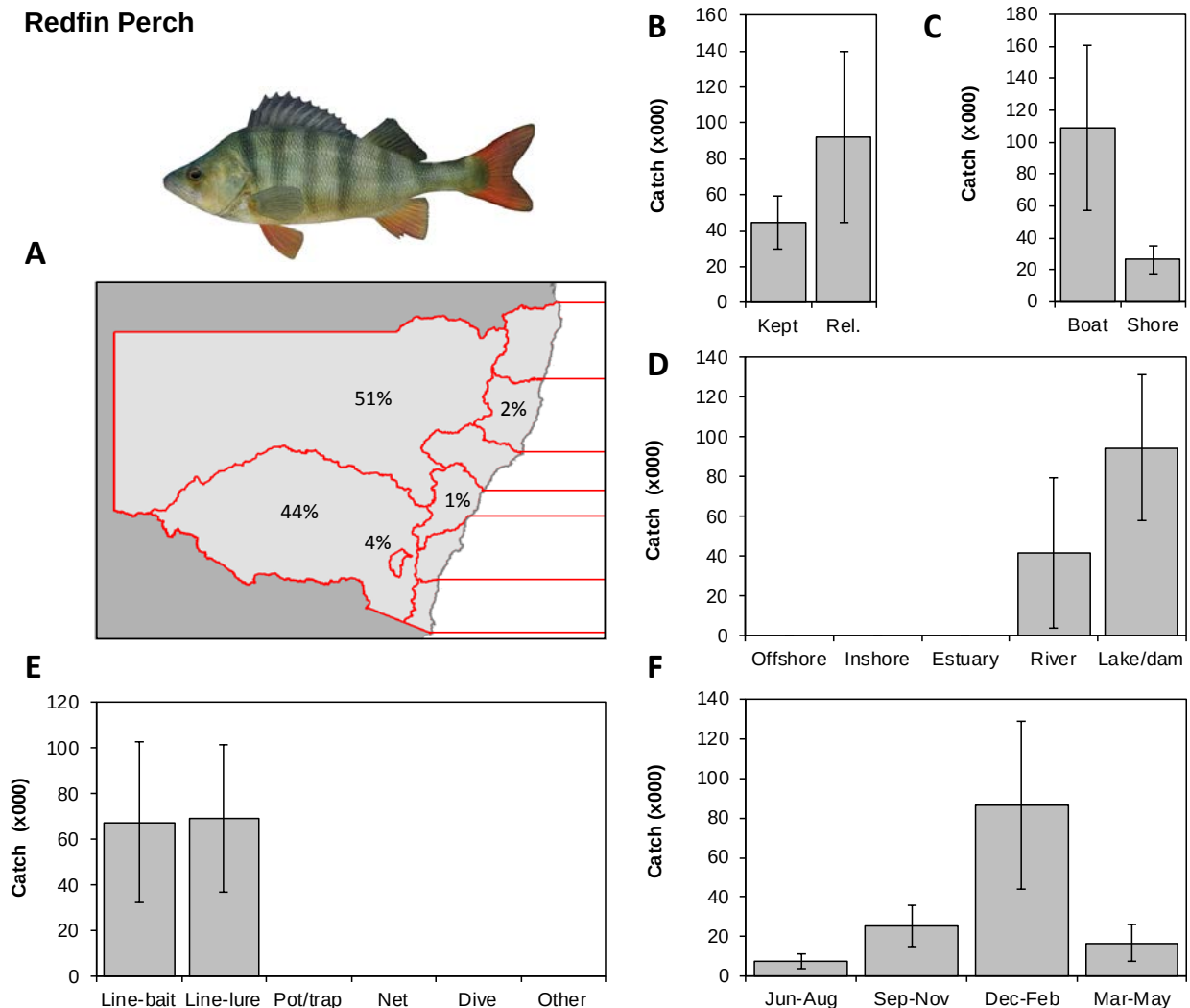
Figure 34 Characteristics of the recreational fishery for Murray Cod in NSW/ACT waters during 2013/14 – total catch (numbers kept and released) by residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Redfin Perch

Just over half (51%) of the total recreational catch of Redfin Perch (*Perca fluviatilis*) was taken in the Darling/North West fishing zone, closely followed by the Murray/South West (44%), then the ACT (4%), Mid North Coast (2%) and Sydney (1%) (Figure 35A). The majority (67%) of all Redfin Perch caught were released (Figure 35B) and boat-based fishing (80%) accounted for the vast majority of the catch (Figure 35C). The majority of the catch was taken in freshwater lakes and dams (69%), with the remainder (31%) in freshwater rivers (Figure 35D). All of the catch was taken by line fishing – with similar proportions using lures (51%) and bait (49%) (Figure 35E). The summer season (Dec-Feb) accounted for the majority (63%) of the catch, followed by spring (19%), autumn (12%) and winter (5%) (Figure 35F).

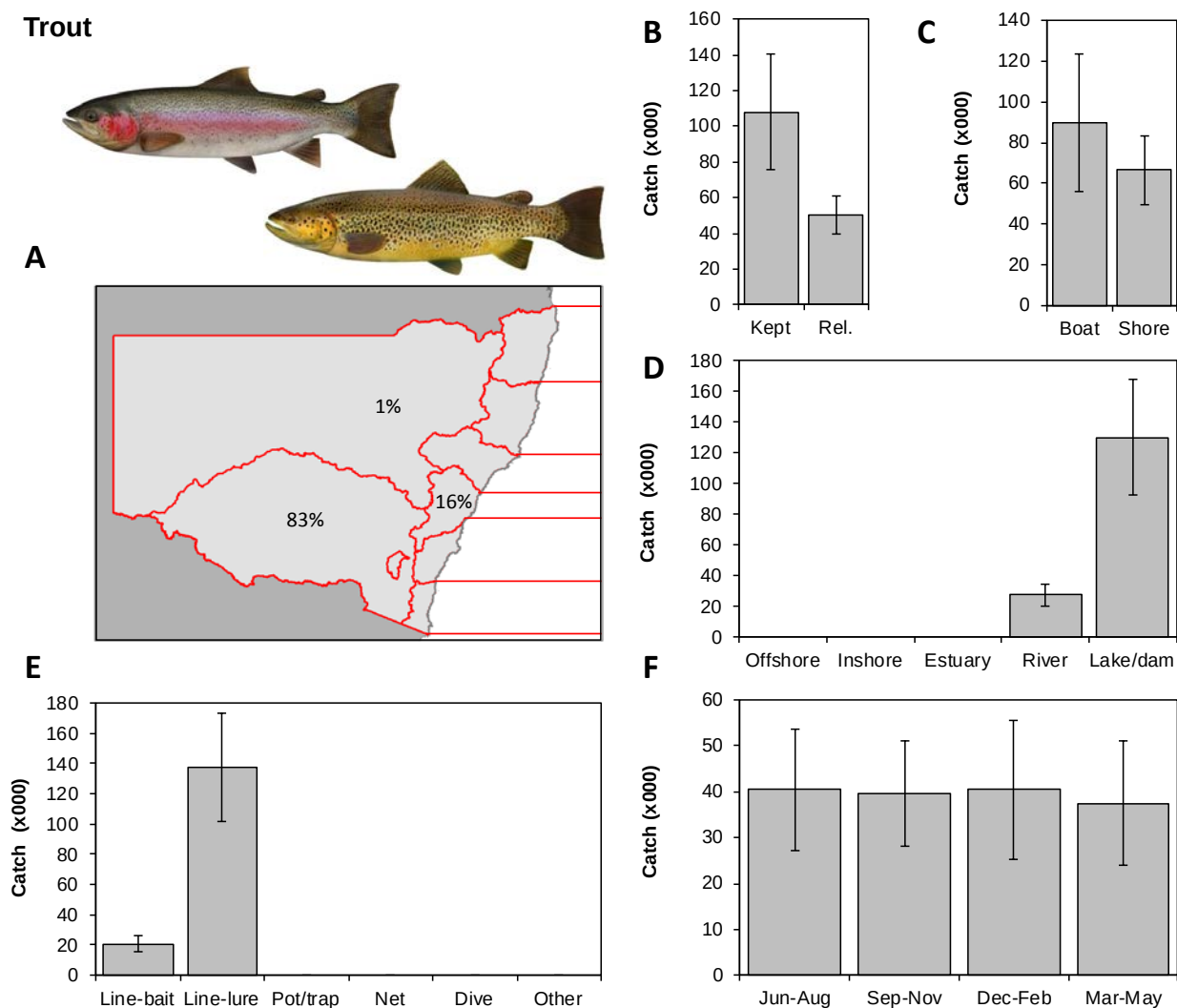
Figure 35 Characteristics of the recreational fishery for Redfin Perch in NSW/ACT waters during 2013/14 – total catch (numbers kept and released) by residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; ; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Trout

The vast majority of the total recreational catch of Brown and Rainbow Trout (*Salmo trutta* & *Oncorhynchus mykiss*) was taken in the Murray/South West fishing zone (83%), followed by the Sydney zone (16%), with a minority (1%) in the Darling/North West (Figure 36A). Note: brown trout comprised just over half (54%) of the total trout catch and similar results were assessed for each species in the analyses below – therefore the results have been grouped. The majority (68%) of all trout caught were kept (Figure 36B) and boat-based fishing (58%) accounted for over half of the catch (Figure 36C). The vast majority of the catch was taken in freshwater lakes and dams (82%), with the remainder (18%) in freshwater rivers (Figure 36D). Virtually all of the catch was taken by line fishing – primarily using lures (87%) as opposed to bait (13%) (Figure 36E). Very similar proportions of the catch occurred across the four seasons – ranging from 26% down to 24% (Figure 36F).

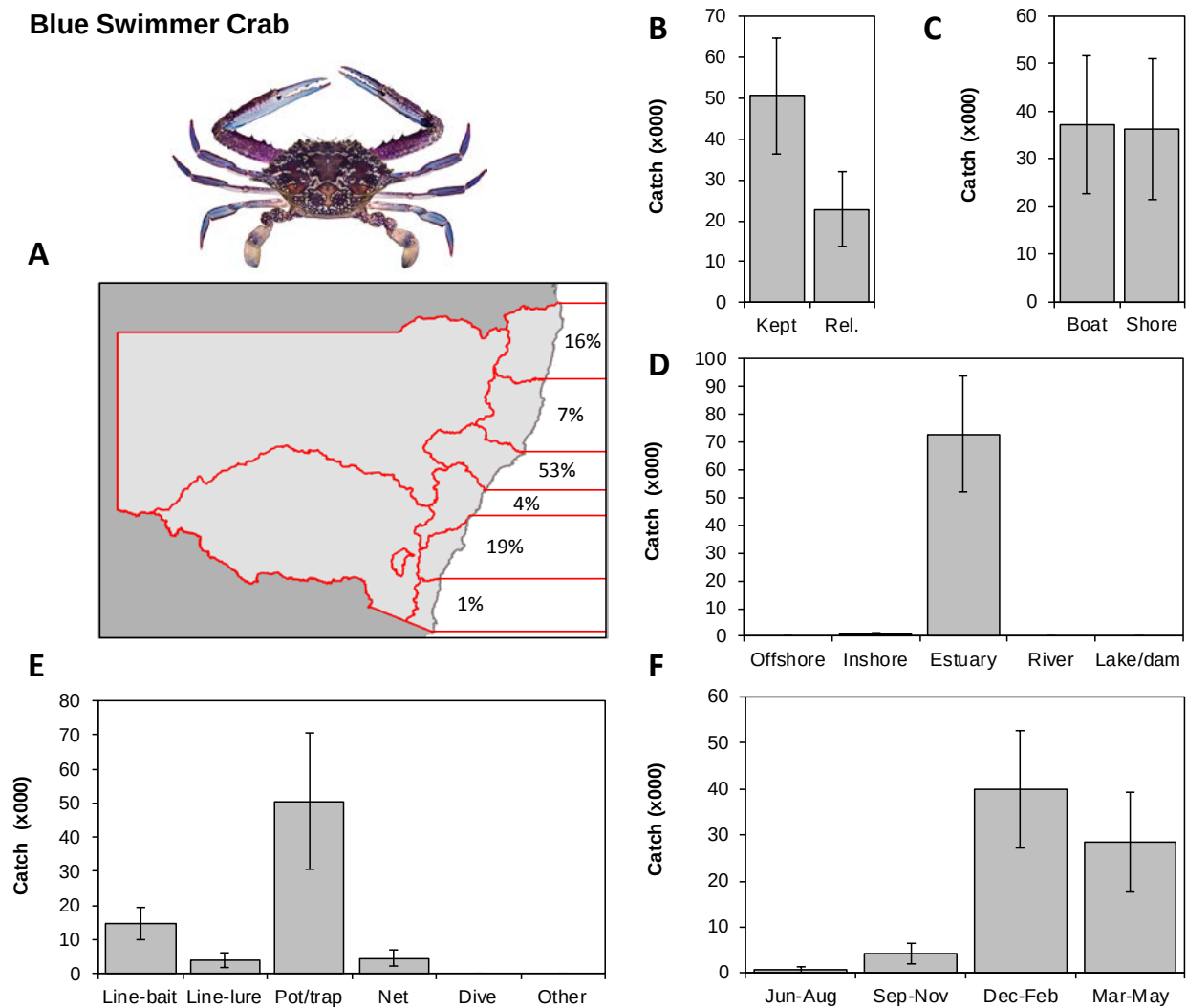
Figure 36 Characteristics of the recreational fishery for trout in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Blue Swimmer Crab

Over half (53%) of the recreational catch of Blue Swimmer Crab (*Portunus pelagicus*) was taken in the Hunter fishing zone, followed by the Mid South Coast (19%), North Coast (16%), Mid North Coast (7%), Sydney (4%) and South Coast (1%) (Figure 37A). The majority (69%) of all Blue Swimmer Crabs caught were kept (Figure 37B) and boat-based fishing (51%) accounted for just over half of the catch (Figure 37C). Virtually all of the catch was taken in estuarine waters (99%), with a minority (1%) in inshore coastal waters (Figure 37D). The majority of the catch was taken by pots/traps (69%), followed by line fishing (25%) and nets (6%) (Figure 37E). The summer season (Dec-Feb) accounted for over half (54%) of the catch, followed by autumn (39%), with minorities in spring (6%) and winter (1%) (Figure 37F).

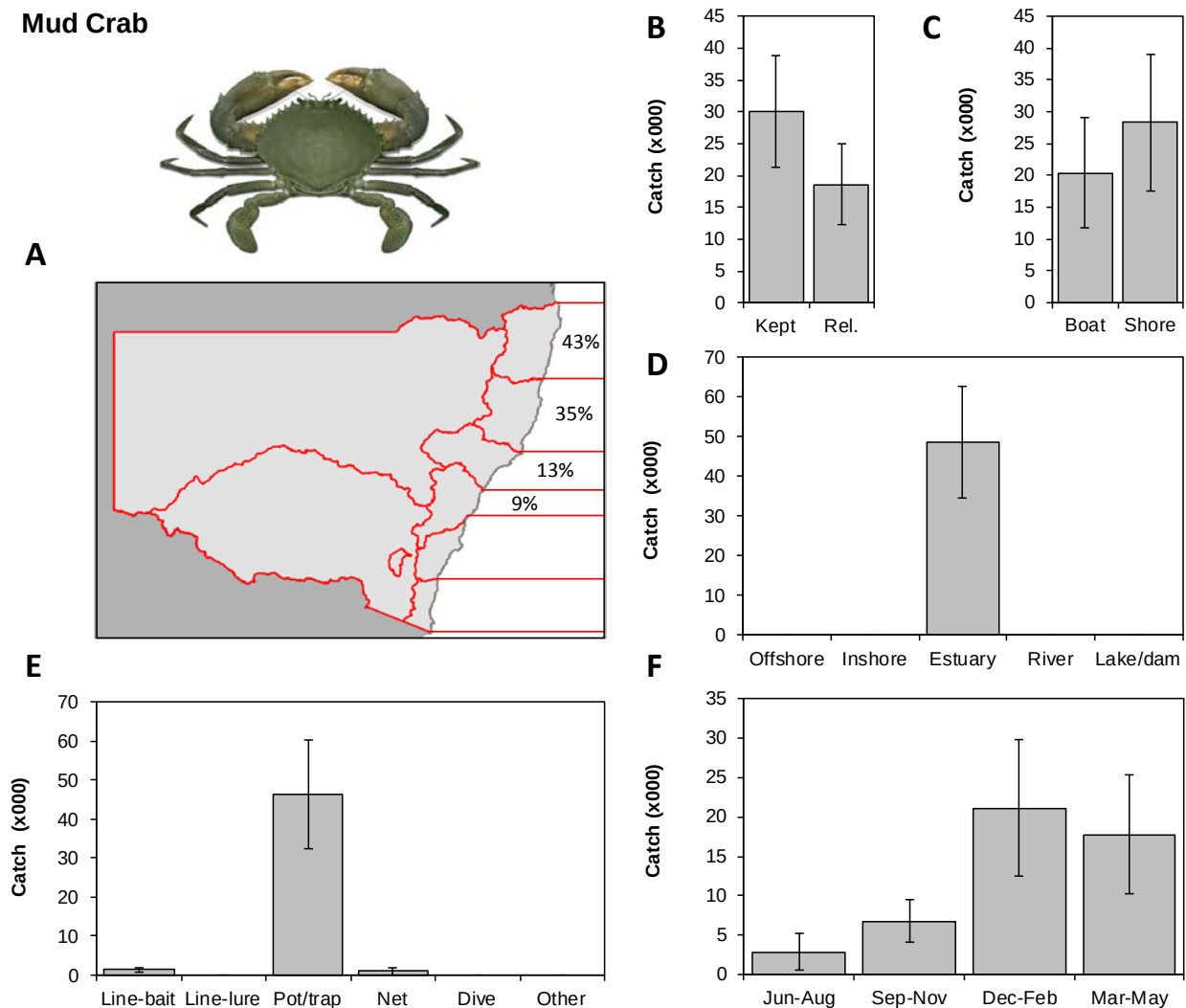
Figure 37 Characteristics of the recreational fishery for Blue Swimmer Crab in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Mud Crab

The North Coast fishing zone accounted for 43% of the total recreational catch of Mud Crab (*Scylla spp.*), closely followed by Mid North Coast (35%), then the Hunter (13%) and Sydney (9%) (Figure 38A). A majority (62%) of all Mud Crabs caught were kept (Figure 38B) and shore-based fishing (58%) accounted for over half of the catch (Figure 38C). The entire catch (100%) was taken in estuarine waters (Figure 38D). The vast majority of the catch was taken by pots/traps (95%), with minorities by line fishing (3%) and nets (2%) (Figure 38E). The summer season (Dec-Feb) accounted for a high proportion (43%) of the catch, closely followed by autumn (37%), with minorities in spring (14%) and winter (6%) (Figure 38F).

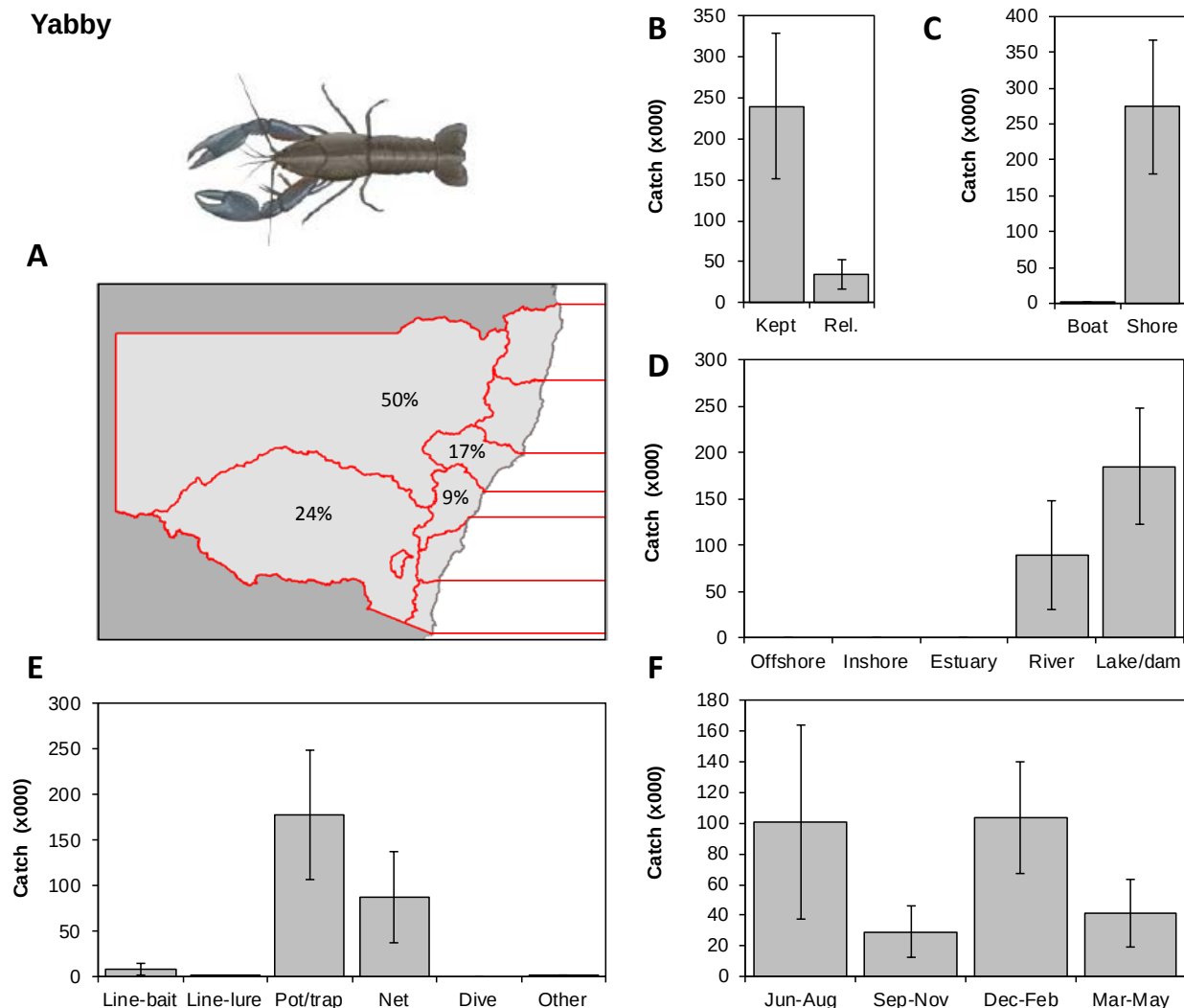
Figure 38 Characteristics of the recreational fishery for Mud Crab in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Yabby (freshwater)

Half (50%) of the total recreational catch of yabbies (*Cherax spp.*) was taken in the Darling/North West fishing zone, followed by the Murray/South West (24%), the Hunter (17%) and Sydney (9%) (Figure 39A). The vast majority (87%) of all yabbies caught were kept (Figure 39B) and shore-based fishing (99.8%) accounted for virtually all of the catch (Figure 39C). Two-thirds of the catch was taken in freshwater lakes and dams (67%), with the remainder (33%) in freshwater rivers (Figure 39D). The majority of the catch was taken by pots/traps (65%), followed by nets (32%), with minorities by line fishing (3%) and other methods (< 1%) (Figure 39E). The summer season (Dec-Feb) accounted for over a third (38%) of the catch, closely followed by winter (37%), autumn (15%) and spring (11%) (Figure 39F).

Figure 39 Characteristics of the recreational fishery for freshwater yabbies in NSW during 2013/14 – total catch (numbers kept and released) by NSW/ACT residents by: A) proportion (%) by fishing zone; B) kept and released; C) boat and shore-based fishing; D) water body fished; E) fishing method; and F) seasonality. Error bars represent one standard error, with equivalent data for A) fishing zones in Appendix 13.



Regional Fisheries

In this section, fishing effort (fisher days) is evaluated within the main fishing zones (refer Figure 3, Appendix 13) in the context of where fishers reside (residential strata, Figure 2), providing a broad assessment of 'imported' fishing effort. Fishing effort has also been assessed in terms of water body type and platform (as summarised in Appendices 6 and 10, respectively). The total catch of key species for each fishing zone has also been assessed (Appendix 13).

Catch and effort information was provided by fishers during the Diary Survey and is presented as expanded estimates for the resident population of NSW and the ACT aged five years and older (as at June 2013) and their recreational fishing activity during the period June 2013 to May 2014.

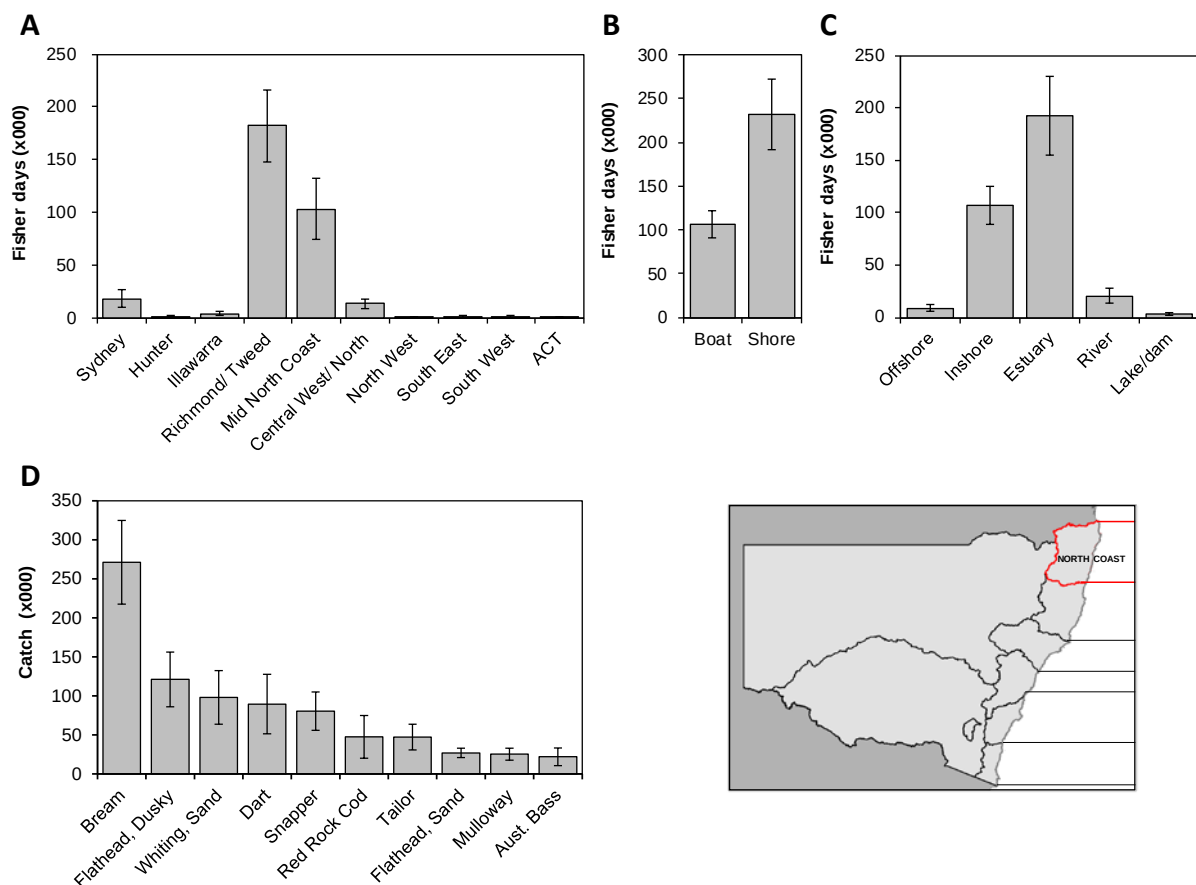
North Coast Fishing Zone

The vast majority (88%) of recreational fishing effort (fisher days) in the North Coast fishing zone (see map below) was attributable to local or nearby residents, namely the Richmond/Tweed stratum (56%) and the Mid North Coast (32%) – with Sydney (6%) and the Central West/North (4%) accounting for most of the remainder (Figure 40A).

A majority (68%) of all fisher days were shore-based (68%) (Figure 40B) and total effort was concentrated in estuarine waters (58%), followed by inshore coastal waters (32%), freshwater rivers (6%), offshore waters (3%) and freshwater lakes/dams (1%) (Figure 40C).

Bream was the most common species caught (33%), followed by dusky flathead (15%), sand whiting (12%), swallowtail dart (11%), snapper (10%), red rock cod and tailor (at 6% each), with a range of other species at < 4% each (Figure 40D).

Figure 40 Characteristics of the North Coast recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



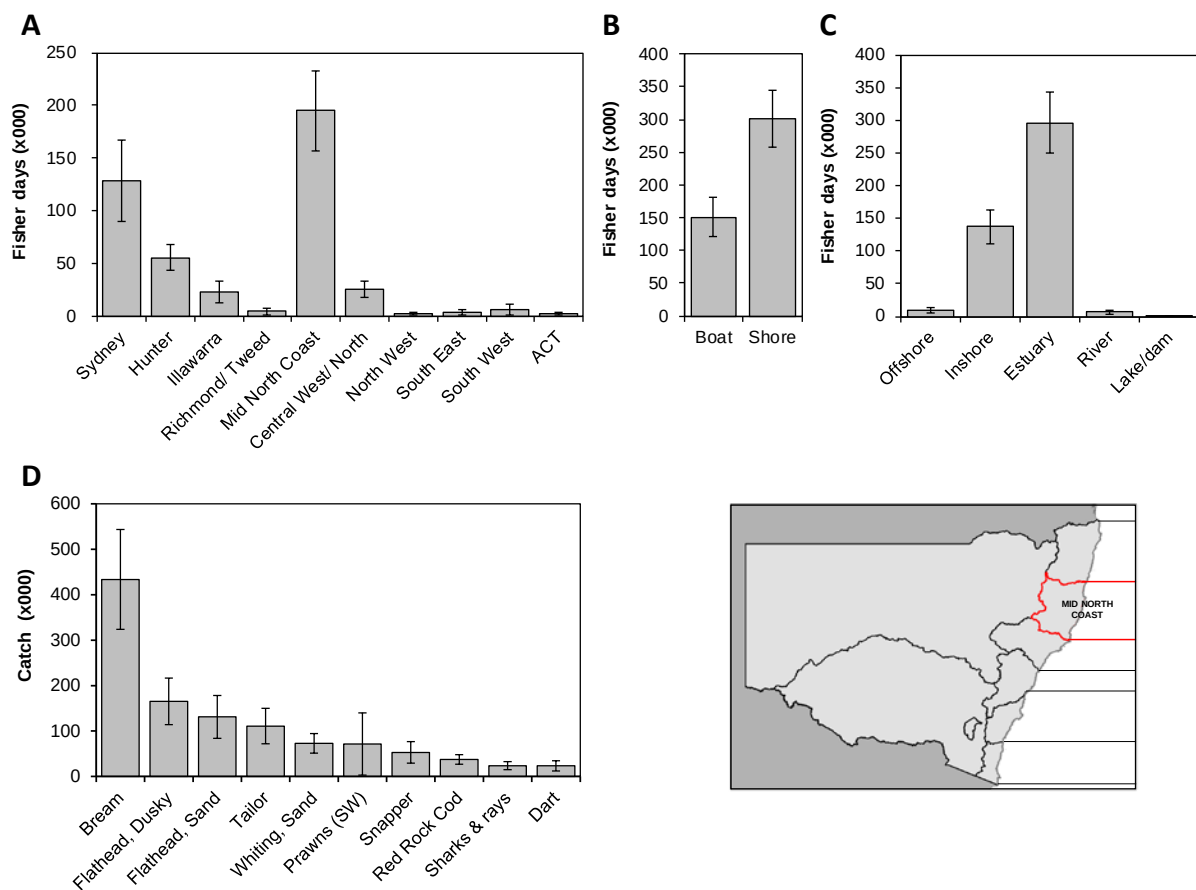
Mid North Coast Fishing Zone

A significant proportion of recreational fishing effort (fisher days) in the Mid North Coast fishing zone (see map below) was attributable to local residents, namely the Mid North Coast stratum (44%), followed by Sydney (29%), the Hunter (12%) – with the Central West/North (6%) and Illawarra (5%) accounting for most of the remainder (Figure 41A).

A majority (67%) of all fisher days were shore-based (Figure 41B) and total effort was concentrated in estuarine waters (66%), followed by inshore coastal waters (30%), with all other water body types at < 3% each (Figure 41C).

Bream was the most common species caught (39%), followed by dusky flathead (15%), sand flathead, (12%), tailor (10%), sand whiting (6%), prawns (6% by number) and snapper (5%), with a range of other species at < 4% each (Figure 41D).

Figure 41 Characteristics of the Mid North Coast recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



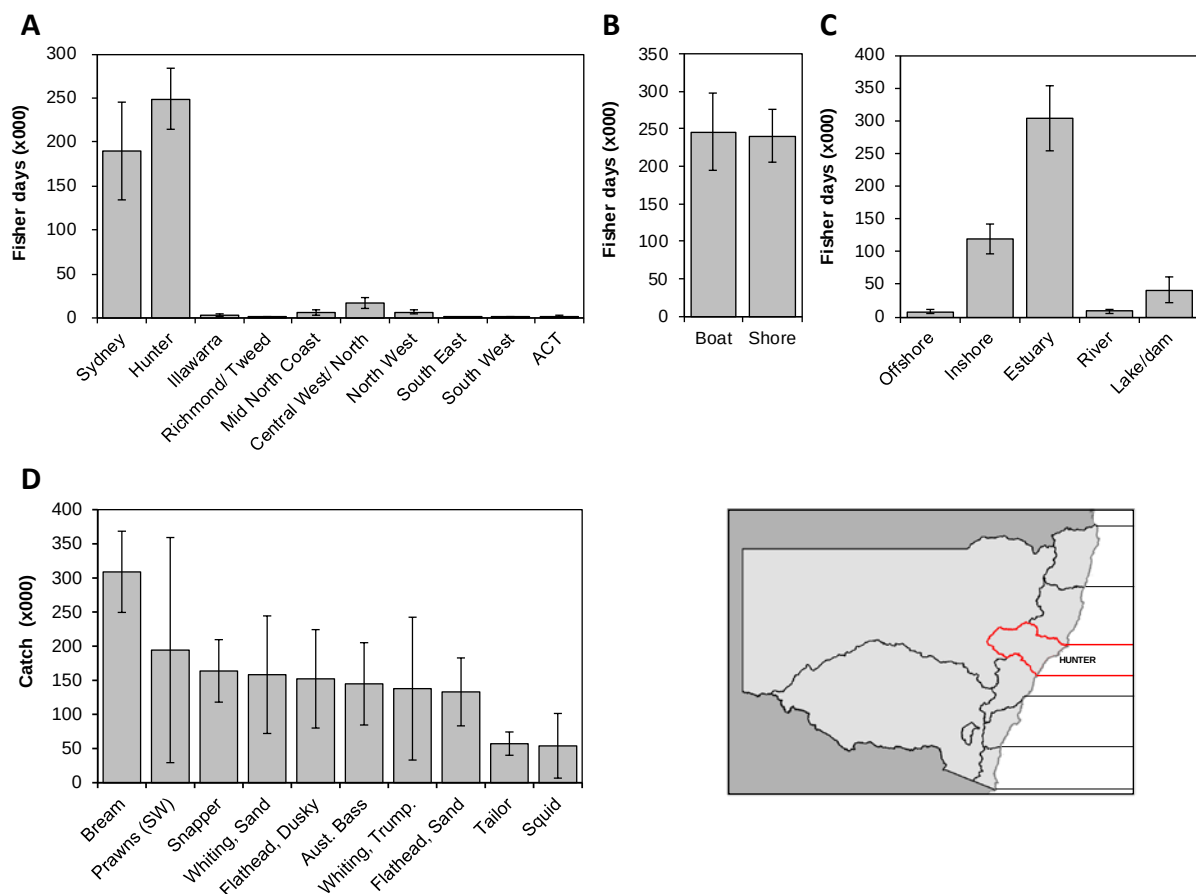
Hunter Fishing Zone

The vast majority (92%) of recreational fishing effort (fisher days) in the Hunter fishing zone (see map below) was attributable to local or nearby residents, namely the Hunter stratum (52%) and Sydney (40%) – with the Central West/North (4%) accounting for half of the remainder (Figure 42A).

Around half (51%) of all fisher days were boat-based (Figure 42B) and total effort was concentrated in estuarine waters (63%), followed by inshore coastal waters (25%), freshwater lakes/dams (9%), with freshwater rivers and offshore waters at < 2% each (Figure 42C).

Bream was the most common species caught (21%), followed by prawns (13%, by number), then similar proportions (11% down to 9%) for snapper, sand whiting, dusky flathead, trumpeter whiting and sand flathead, with a range of other species at < 4% each (Figure 42D).

Figure 42 Characteristics of the Hunter recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



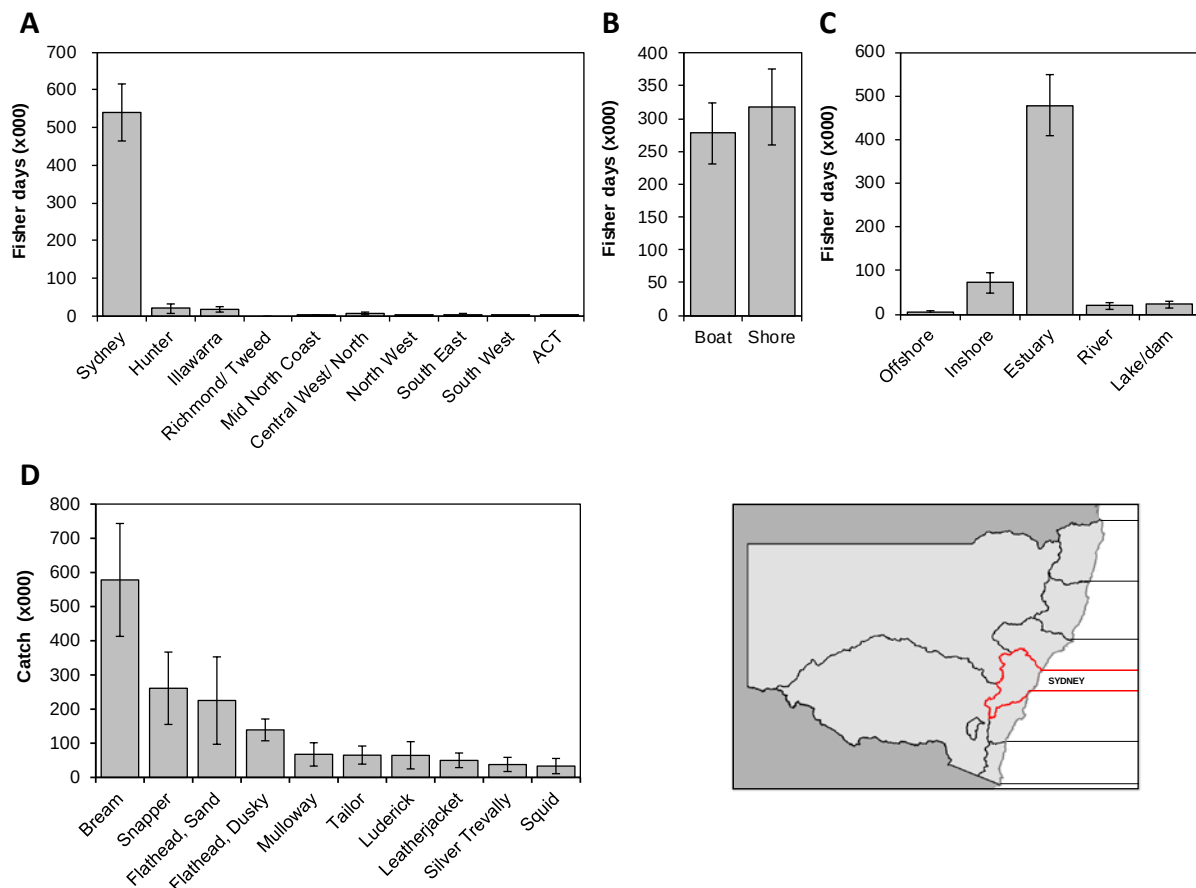
Sydney Fishing Zone

The vast majority of recreational fishing effort (fisher days) in the Sydney fishing zone (see map below) was attributable to local residents, namely the Sydney stratum (91%), with the Hunter (4%) and Illawarra (3%) accounting for most of the remainder (Figure 43A).

Over half (53%) of all fisher days were shore-based (Figure 43B) and total effort was concentrated in estuarine waters (80%), followed by inshore coastal waters (12%), with all other water body types at < 4% each (Figure 43C).

Bream was the most common species caught (38%), followed by snapper (17%), sand flathead (15%), dusky flathead (9%), then mulloway, tailor and luderick (at 4% each) and a range of other species at 3% each, or less (Figure 43D).

Figure 43 Characteristics of the Sydney recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



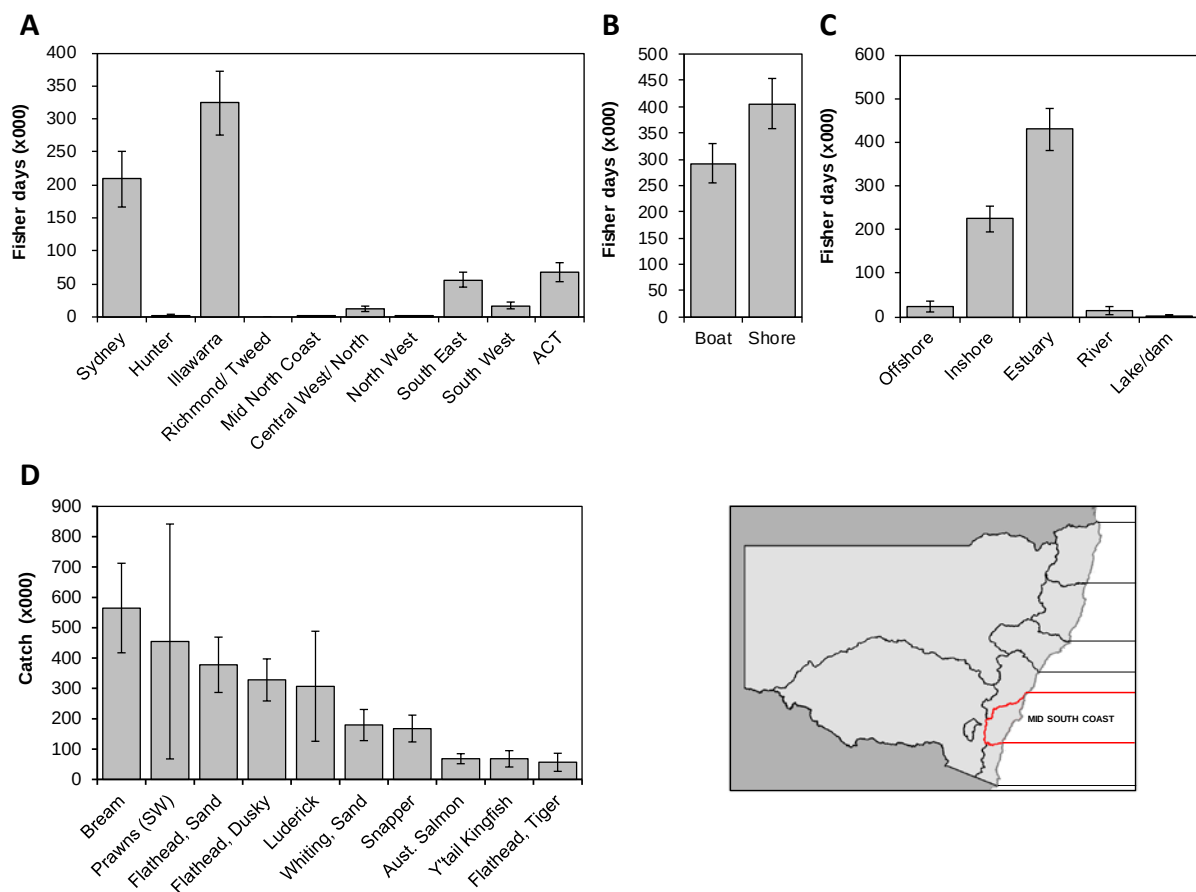
Mid South Coast Fishing Zone

The majority (77%) of recreational fishing effort (fisher days) in the Mid South Coast fishing zone (see map below) was attributable to local or nearby residents, namely the Illawarra stratum (47%) and Sydney (30%) – with the ACT (10%) and South East (8%) accounting for most of the remainder (Figure 44A).

A majority (58%) of all fisher days were shore-based (Figure 44B) and total effort was concentrated in estuarine waters (62%), followed by inshore coastal waters (32%), with all other water body types at < 4% each (Figure 44C).

Bream was the most common species caught (22%), followed by prawns (18%, by number), sand flathead (15%), dusky flathead (13%), luderick (12%), then sand whiting and snapper (at 7% each), with a range of other species at < 3% each (Figure 44D).

Figure 44 Characteristics of the Mid South Coast recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



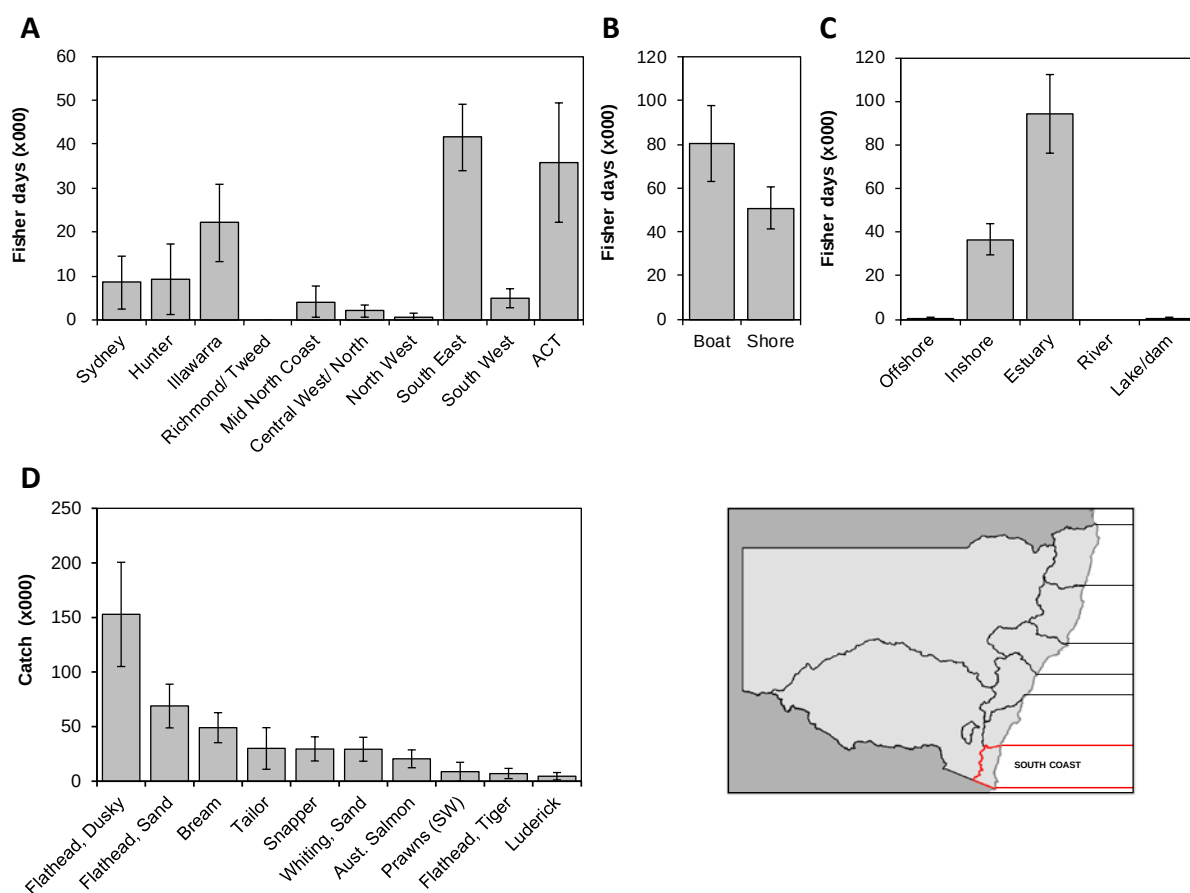
South Coast Fishing Zone

The majority of recreational fishing effort (fisher days) in the South Coast fishing zone (see map below) was attributable to local or nearby residents, namely the South East stratum (32%) and the ACT (28%) – followed by the Illawarra (17%), with Sydney and the Hunter (at 7% each) accounting for most of the remainder (Figure 45A).

A majority (61%) of all fisher days were boat-based (Figure 45B) and total effort was concentrated in estuarine waters (71%), followed by inshore coastal waters (28%), with all other water body types totalling < 1% (Figure 45C).

Dusky flathead was the most common species caught (38%), followed by sand flathead (17%), bream (12%), then tailor, snapper and sand whiting (at 7% each), Australian salmon (5%), with a range of other species at < 3% each (Figure 45D).

Figure 45 Characteristics of the South Coast recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



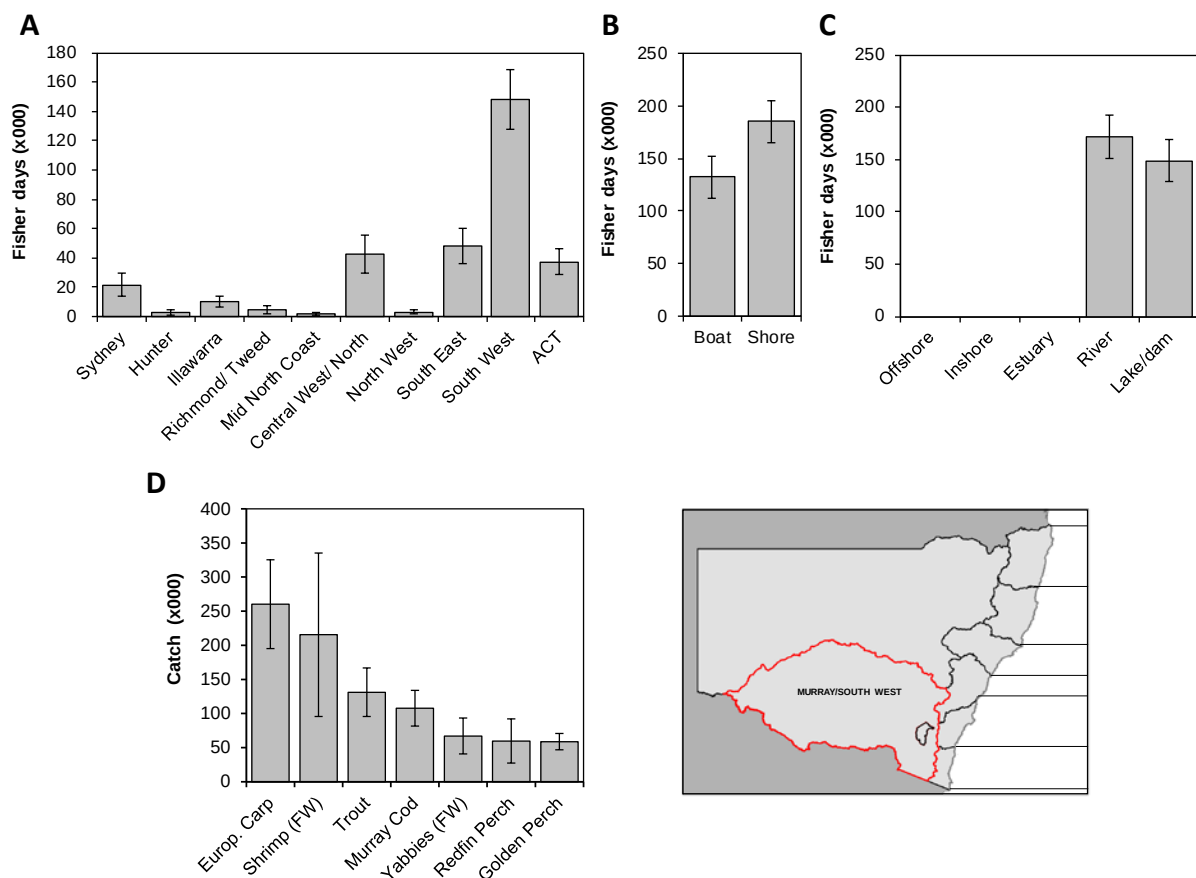
Murray/South West Fishing Zone

A significant proportion of recreational fishing effort (fisher days) in the Murray/South West fishing zone (see map below) was attributable to local residents, namely the South West stratum (46%), followed by the South East (15%), Central West/North (13%), the ACT (12%), Sydney (7%), Illawarra (3%), with the four remaining strata at 1% each (Figure 46A).

A majority (58%) of all fisher days were shore-based (Figure 46B) and total effort was mainly in freshwater rivers (54%), with the remainder in freshwater lakes and dams (46%) (Figure 46C).

European carp was the most common species caught (29%), followed by shrimp (24% by numbers), trout (15%), Murray cod (12%), then yabbies, redfin perch and golden perch – all at 7% each (Figure 46D).

Figure 46 Characteristics of the Murray/South West recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



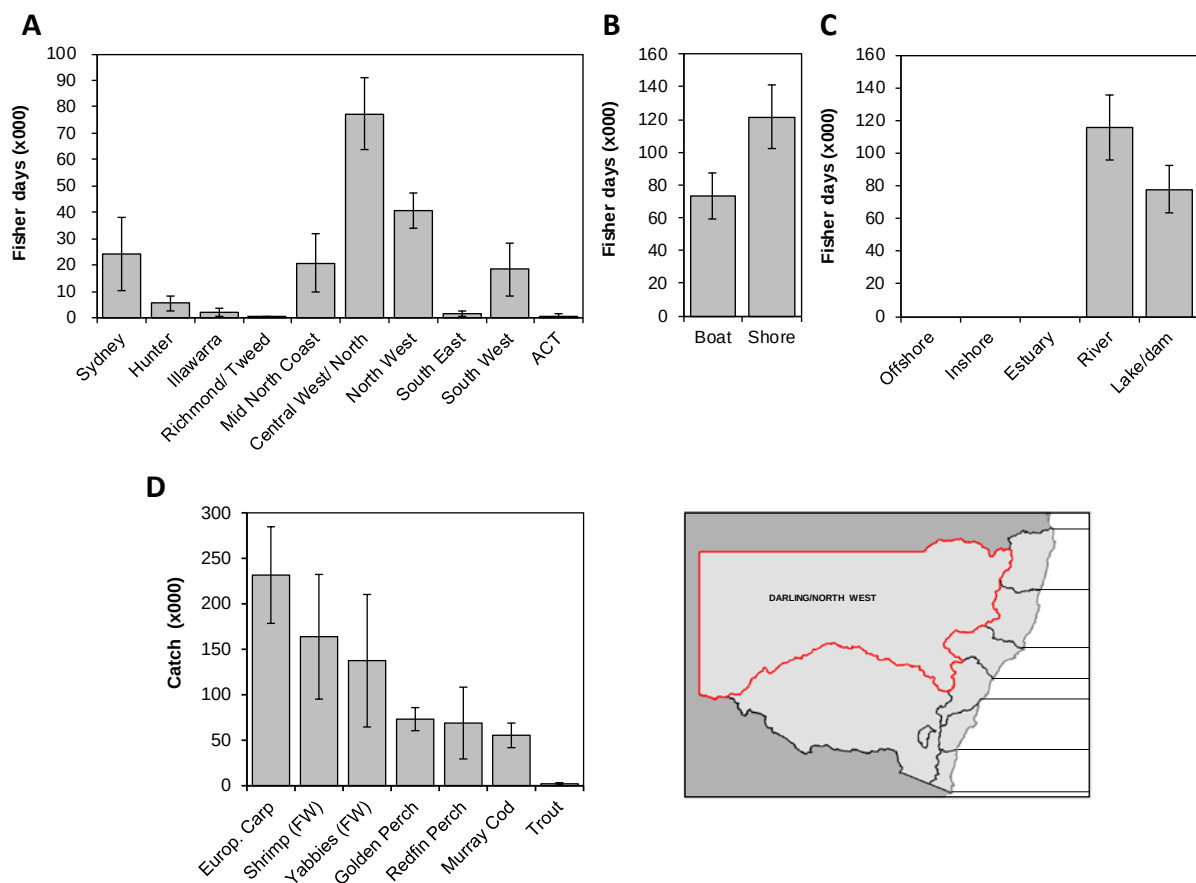
Darling/North West Fishing Zone

A significant proportion of recreational fishing effort (fisher days) in the Darling/North West fishing zone (see map below) was attributable to local and nearby residents, namely the Central West/North stratum (40%) and the North West (21%) – with Sydney (13%), the Mid North Coast (11%) and South West (10%) accounting for most of the remainder (Figure 47A).

A majority (62%) of all fisher days were shore-based (Figure 47B) and total effort was concentrated in freshwater rivers (60%), with the remainder in freshwater lakes and dams (40%) (Figure 47C).

European carp was the most common species caught (32%), followed by shrimp (22% by numbers), yabbies (19%), golden perch (10%), redfin perch (9%), Murray cod (8%) and trout at < 1% (Figure 47D).

Figure 47 Characteristics of the Darling/North West recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



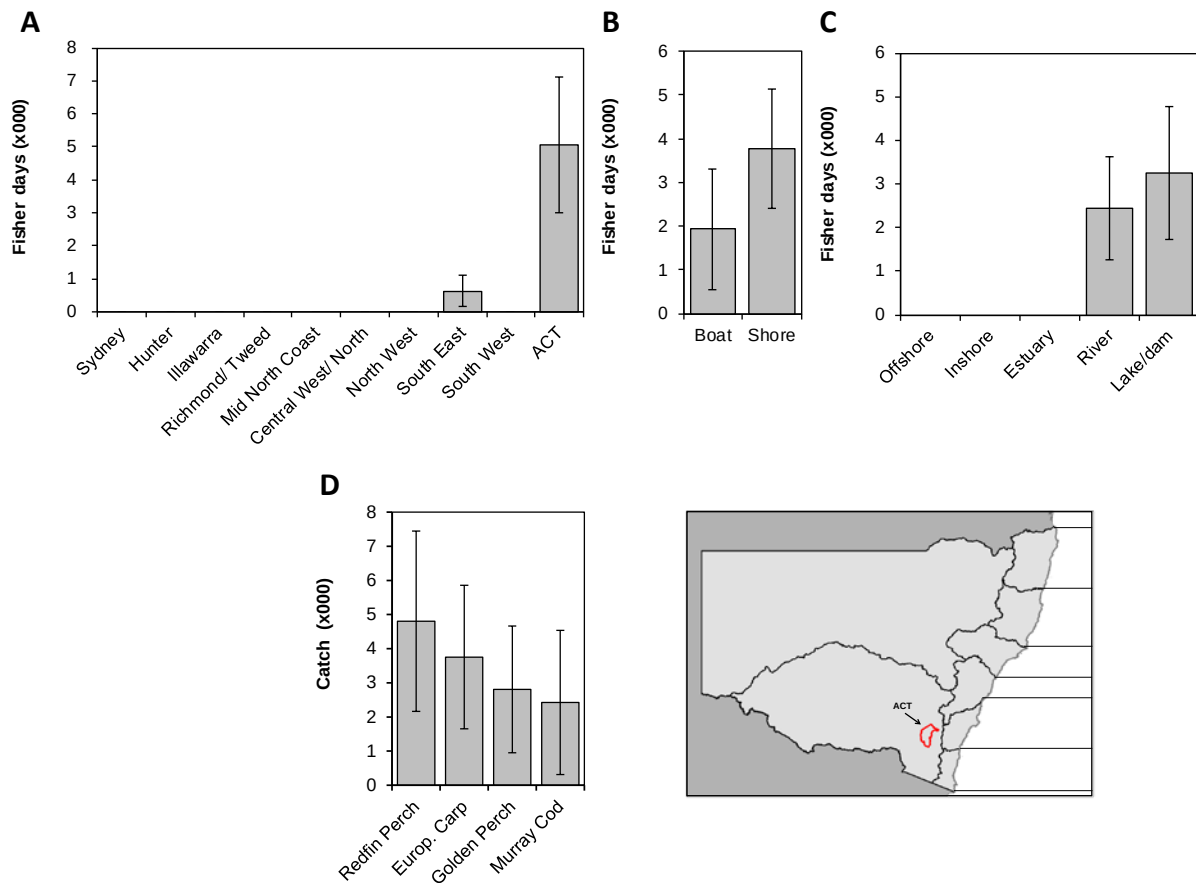
The ACT Fishing Zone

All of the recreational fishing effort (fisher days) in the ACT fishing zone (see map below) was attributable to local and nearby residents, namely the ACT stratum (89%) and the South East (11%) (Figure 48A).

Two-thirds (66%) of all fisher days were shore-based (Figure 48B) and total effort was mainly in freshwater lakes and dams (57%), with the remainder in freshwater rivers (43%) (Figure 48C).

Redfin perch was the most common species caught (35%), followed by European carp (27%), golden perch (20%) and Murray cod (18%) (Figure 48D).

Figure 48 Characteristics of the ACT recreational fishery based on 2013/14 fishing activity by NSW/ACT residents aged five years and older: A) fishing effort (fisher days) by residential stratum; B) fisher days by platform; C) fisher days by water body type; and D) total catch (numbers) for the key species. Error bars represent one standard error.



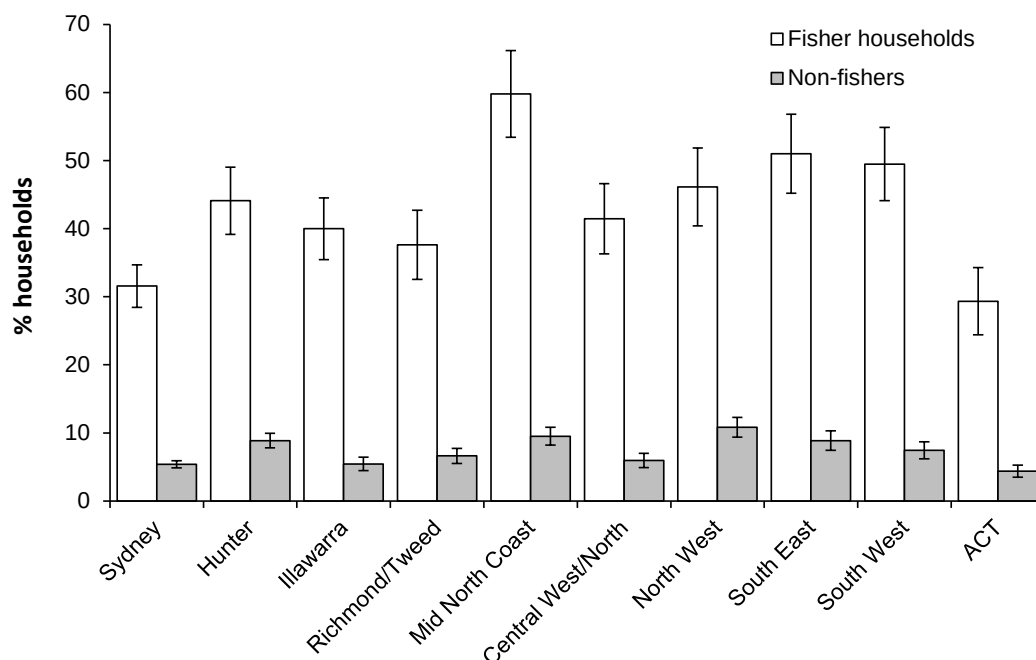
Boat Ownership and Vessel Characteristics

General boat ownership was assessed for all NSW/ACT households in the Screening Survey. However by design, detailed boat profiling information was assessed for households reporting fishing activity during 2013/14, as part of the Wash-up/Attitudinal Survey. This information included length of the boat, main propulsion method, usage for fishing, navigational and fishing aids, mode of storage and market value. In all cases, this information has been expanded to represent the resident population of NSW and the ACT as at June 2013. However, data from the Screening Survey refer to boat ownership as at June 2013, whereas the latter information refers to boat ownership as at the end of the diary period (May 2014) and therefore provides a detailed assessment of the NSW/ACT recreational fishing fleet. Note: eligible boats included canoes, kayaks, jet skis/personal water craft (PWC) – but excluded surfboards and windsurfers, plus any vessel incapable of carrying at least one person (e.g. toy/model boats).

Household Boat Ownership – June 2013

Details of boat ownership from the Screening Survey are provided in Appendix 15 and summarised in Figure 49. As at June 2013, an estimated 320,818 (SE 11,381) NSW/ACT resident households owned at least one boat, representing an overall boat ownership rate of 11%. A substantially higher boat ownership rate (38%) emerged for those households with any fishing activity in NSW/ACT waters in the 12 months prior to June 2013 – whereas the ownership rate among non-fishing households was only 6% (Appendix 15). Boat ownership rates among fishing households varied by residential stratum, ranging from 60% in the Mid North Coast down to 29% in the ACT. Among non-fishing households, boat ownership rates ranged from 11% in the North West down to 4% in the ACT (Figure 49).

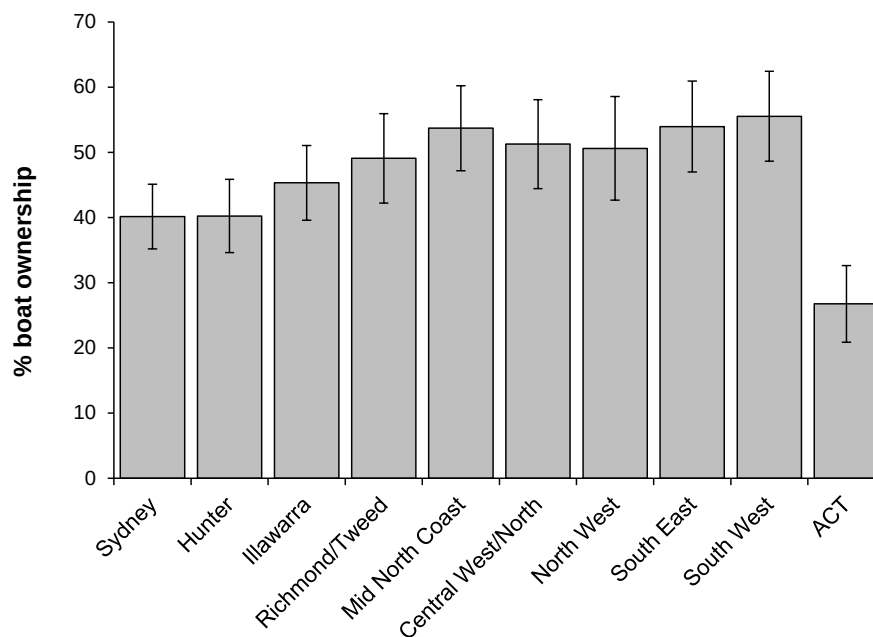
Figure 49 Proportion (%) of fisher and non-fisher households in NSW and the ACT reporting boat ownership as at June 2013, by residential stratum. Error bars represent one standard error.



Boats used for Recreational Fishing – June 2013 to May 2014

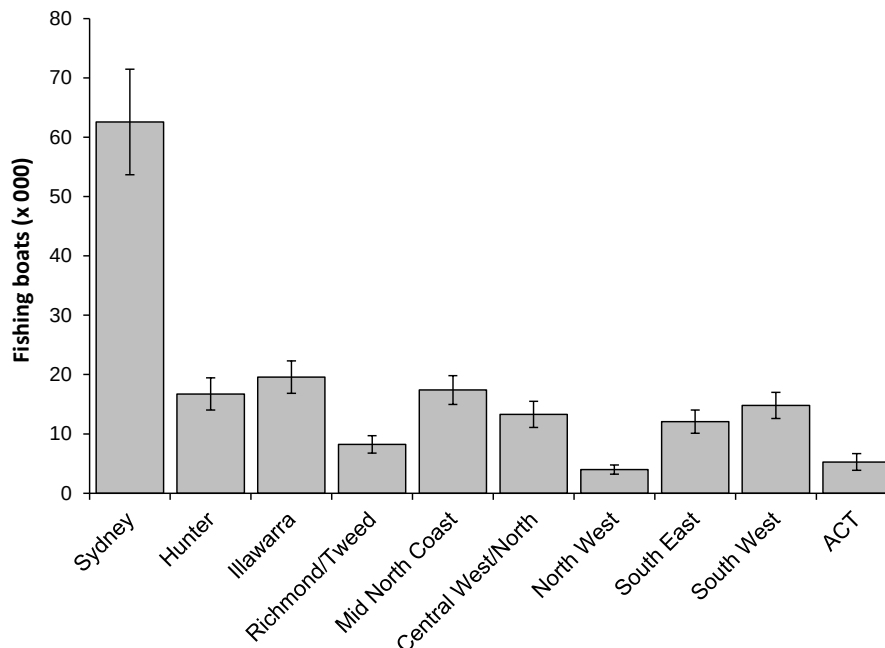
As noted above, boat ownership was also assessed through the Wash-up/Attitudinal Survey among households that completed the Diary Survey and fished during the 12 month period. In response, an estimated 180,622 (SE 10,322) or 44% of households that fished in NSW/ACT waters reported ownership of at least one boat, for a total of 230,118 (SE 13,435) boats of any kind – representing a mean of 1.27 boats per fisher household (Figure 50, Appendix 16).

Figure 50 Proportion (%) of NSW/ACT fisher households reporting boat ownership as at May 2014, by residential stratum. Error bars represent one standard error.



Of the 230,118 boats owned by fisher households as at May 2014, an estimated 173,895 (SE 10,873) or 76% were used for recreational fishing at least once during the diary period (Figure 51, Appendix 17). Consistent with population size and numbers of fishing households, the largest number of boats used for fishing was in the Sydney stratum (62,562), with the smallest in the North West (3,983). However, the proportions of all boats owned by fishing households that were used for fishing in 2013/14 ranged from 92% for the Illawarra stratum down to 66% for the Richmond/Tweed (Appendix 17). The remainder of this section focuses on the above 173,895 boats, identified as the recreational fishing 'fleet' for 2013/14.

Figure 51 Number of boats owned by NSW/ACT fisher households and used for recreational fishing in 2013/14, by residential stratum. Error bars represent one standard error.



Recreational Fishing Boat Profiles

Size of Boats

For each fishing boat, the overall ('gunwale') length was reported and appropriate length groupings applied (in metres). Analysis of these results for the 173,895 fishing boats by residential stratum is contained in Appendix 18. In summary, the 4-4.9 metre length grouping accounted for 40% of all fishing boats (68,862; SE 6,500), followed by 26% for the < 4 metres group (44,641; SE 4,549) and a similar estimate (26%) for the 5-5.9 metres group (44,459; SE 5,127). A minority of all boats were in the larger groups – 5% in the 7 metres plus group (8,259; SE 2,720) and 4% in the 6-6.9 metres group (7,673, SE 1,871).

Usage Levels for Recreational Fishing

For each fishing boat, proportional usage for recreational fishing, as opposed to other activities (e.g. water skiing) was assessed for the diary period, with an average of 82% usage for fishing reported for all boats. Based on usage groupings, a majority of all boats (59%) were reported as being used exclusively for recreational fishing, followed by a quarter (25%) with 50-99% usage for fishing and a minority (16%) with less than 50% usage (Table 12). In terms of exclusive usage for fishing, the proportions were higher for boats smaller than 5 metres (67-68%) than for the 5-5.9 metres group (48%) and the larger boats (28-31%). Note: further information on usage proportions and 'attribution' levels is provided in 'Market Value of Fishing Boats' (Page 79).

Table 12 Numbers of fishing boats by overall length (grouped) and proportion of all usage for recreational fishing in 2013/14, i.e. boats owned by NSW/ACT resident fishing households. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reporting boat ownership. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reporting boat ownership.

Overall length	<50% fishing			50-99% fishing			100% fishing		
	Number	SE	% (row)	Number	SE	% (row)	Number	SE	% (row)
< 4m	7,037	1,946	15.8	7,692	1,710	17.2	29,912	3,669	67.0
4-4.9m	5,312	1,974	7.7	16,585	3,765	24.1	46,966	4,961	68.2
5-5.9m	7,262	2,086	16.3	15,739	3,365	35.4	21,458	3,309	48.3
6-6.9m	2,720	1,480	35.4	2,788	882	36.3	2,165	728	28.2
7m plus	5,501	2,584	66.6	195	147	2.4	2,563	838	31.0
Total	27,833	4,558	16.0	42,998	5,708	24.7	103,064	7,777	59.3

Main Propulsion

Each fishing boat was classified according to the primary propulsion method, with jetskis/PWC separated from all power craft. The vast majority (close to 83%) of all recreational fishing boats were power craft of some kind (Table 13). However, among the smallest size group (< 4 metres), a significant proportion (43%) were row boats, canoes, kayaks etc, with sailing boats a minority of all fishing craft (1%).

Table 13 Numbers of fishing boats by overall length (grouped) and main propulsion method - i.e. boats used for recreational fishing in 2013/14 and owned by NSW/ACT resident fishing households. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reporting boat ownership.

Overall length	Jetski/PWC			Other Power			Row/paddle			Sail		
	No.	SE	% (row)	No.	SE	% (row)	No.	SE	% (row)	No.	SE	% (row)
< 4m	838	501	1.9	24,562	3,045	55.0	19,241	3,204	43.1			
4-4.9m				60,095	5,956	87.3	8,383	2,600	12.2	384	377	0.6
5-5.9m				43,529	5,095	97.9	930	525	2.1			
6-6.9m				7,673	1,871	100.0						
7m plus				6,915	2,424	83.7				1,344	1,242	16.3
Total	838	501	0.5	142,774	9,408	82.1	28,554	4,247	16.4	1,728	1,297	1.0

Boat Storage and Access

Over three-quarters (77%) of all recreational fishing boats were trailer boats, followed by 'car toppers' (12%), then shore-based (8%) and those on marinas/moorings (3%) (Table 14). Whereas trailer boats covered the range of size groups, 'car-toppers' and shore-based boats were predominantly in the smaller size groups (mostly less than 5 metres). Boats kept on marinas or moorings were all in the larger size groups (6 metres or more).

Table 14 Numbers of fishing boats by overall length (grouped) and main storage/access mode - i.e. boats used for recreational fishing in 2013/14 and owned by NSW/ACT resident fishing households. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reporting boat ownership.

Overall length	Trailer			Marina/mooring			Car topper			Shore-based		
	No.	SE	% (row)	No.	SE	% (row)	No.	SE	% (row)	No.	SE	% (row)
< 4m	20,440	2,888	45.8				15,128	2,689	33.9	9,072	2,085	20.3
4-4.9m	58,762	5,855	85.3				5,358	1,827	7.8	4,742	2,084	6.9
5-5.9m	43,845	5,107	98.6				168	167	0.4	446	442	1.0
6-6.9m	7,320	1,855	95.4	353	249	4.6						
7m plus	3,205	1,601	38.8	5,054	2,203	61.2						
Total	133,573	9,019	76.8	5,407	2,217	3.1	20,654	3,358	11.9	14,260	3,044	8.2

Electronic Fishing Aids

For each fishing boat, the availability of echo-sounders ('fish finders') and global positioning systems (GPS) was assessed – whether as fixtures to the vessel or in portable form. In response, echo sounder availability was reported for 56% of all recreational fishing boats, with the highest rate (92%) in the 5-5.9 metre group and the lowest rate (16%) in the < 4 metre group (Table 15). GPS availability was reported for 39% of all recreational fishing boats, with the highest rate (69%) in the 5-5.9 metre group and the lowest rate (12%) in the < 4 metre group (Table 16).

Table 15 Numbers of fishing boats by overall length (grouped) and echo sounder/fish finder availability, i.e. boats used for recreational fishing in 2013/14 and owned by NSW/ACT resident fishing households. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reporting boat ownership.

Overall length	Echo sounder			No echo sounder		
	Number	SE	% (row)	Number	SE	% (row)
< 4m	6,922	1,626	15.5	37,719	4,255	84.5
4-4.9m	37,923	4,324	55.1	30,940	4,863	44.9
5-5.9m	40,839	4,987	91.9	3,621	1,191	8.1
6-6.9m	6,589	1,784	85.9	1,084	566	14.1
7m plus	5,409	1,979	65.5	2,850	1,872	34.5
Total	97,681	7,462	56.2	76,214	7,148	43.8

Table 16 Numbers of fishing boats by overall length (grouped) and global positioning system (GPS) availability, i.e. boats used for recreational fishing in 2013/14 and owned by NSW/ACT resident fishing households. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reporting boat ownership.

Overall length	Number	GPS		Number	No GPS	
		SE	% (row)		SE	% (row)
< 4m	5,267	1,537	11.8	39,374	4,291	88.2
4-4.9m	24,052	4,097	34.9	44,811	5,070	65.1
5-5.9m	30,471	4,274	68.5	13,988	2,870	31.5
6-6.9m	4,635	1,119	60.4	3,038	1,499	39.6
7m plus	3,896	1,486	47.2	4,363	2,282	52.8
Total	68,320	6,792	39.3	105,574	8,043	60.7

Market Value of Fishing Boats

For each fishing boat, the current market value (or replacement cost) was provided by respondents – therefore enabling estimation of the total market value of the recreational fishing fleet (Table 17). Also, as discussed in 'Usage Levels for Recreational Fishing' (Page 76), each boat was assessed in terms of the proportion of total usage (time) during the diary period, that was attributable to recreational fishing (as opposed to other activities, e.g. water skiing). The resultant '% attribution' was applied to the total value for each boat to produce 'attributed' values. i.e. directly attributed to recreational fishing (Table 17).

The estimated total market value of all boats used by residents for recreational fishing in NSW and the ACT during 2013/14 exceeds \$1.53 billion, at an average of over \$8,800 per boat. Around three quarters (74%) of the total value was directly attributed to recreational fishing – totalling over \$1.13 billion (Table 17). The majority (72%) of the total attributed value refers to boats between 4 and 5.9 metres in length. While the average attributed value was over \$6,500 per boat, this was naturally dependent on size – ranging from around \$1,600 for boats under 4 metres to over \$16,000 for vessels in the 6-6.9 metre group.

Table 17 Numbers of fishing boats by overall length (grouped) and market value (total and attributed to fishing), i.e. boats used for recreational fishing in 2013/14 and owned by NSW/ACT resident fishing households. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reporting boat ownership.

Overall length	Total value (\$)		Average per boat	Attribution rate (%)	Attributed value (\$)		Average per boat
	Total	SE			Total	SE	
< 4m	83,669,733	9,608,674	1,874	86.6	72,442,707	9,053,972	1,623
4-4.9m	396,881,361	44,405,436	5,763	86.5	343,155,311	39,902,947	4,983
5-5.9m	595,435,141	74,593,480	13,393	79.5	473,293,062	60,690,727	10,646
6-6.9m	<i>198,825,850</i>	<i>48,976,038</i>	<i>25,912</i>	62.2	<i>123,738,690</i>	<i>31,964,175</i>	<i>16,127</i>
7m plus	259,903,368	95,557,089	31,468	45.9	119,320,381	37,606,728	14,447
Total	1,534,715,453	139,360,921	8,826	73.8	1,131,950,151	89,961,249	6,509

Other Results: Wash-up/Attitudinal Survey

The opinions and attitudes of diarists were obtained in this survey in terms of various fishing-related matters, from the main/key fisher in each household, aged 15 years and older.

The majority of the results in this section have been presented as expanded estimates for resident households (as at June 2013), with recreational fishing activity in NSW/ACT waters during the period June 2013 to May 2014. In total, this equates to 410,059 fishing households. However, due to a small number (<2%) of households containing no fisher aged 15 years or more, a lesser total of 403,183 households has been applied in these analyses.

Recreational Fishing Motivations

Respondents were presented with eight motivational factors, representing both catch and non-catch related components of the recreational fishing experience and asked to rate each as being: 'very important', 'quite important', 'not very important' or 'not at all important'. For additional analysis purposes, values have been assigned to the responses, on a scale from 1 (not at all important) up to 4 (very important).

The two highest rated motivations in terms of overall importance were non-catch related – “to be outdoors, in the fresh air ... to enjoy nature” (a mean score of 3.63, with over 95% reporting at least quite important), closely followed by “to relax or unwind” (mean score of 3.52, with close to 92% reporting at least quite important) (Table 18).

Very high ratings also occurred for: “the enjoyment or sport of catching fish, crabs etc” (mean score of 3.26 and over 85% reporting at least quite important); “to spend time with your family” (mean score 3.26, with nearly 79% reporting at least quite important); and “to spend time with your friends” (mean score of 3.18 and close to 80% reporting at least quite important) (Table 18).

A somewhat lower rating emerged for “to catch fresh fish/crabs etc. for food” (a mean score of 2.75 and over 58% reporting at least quite important), followed by “to be on your own ... to get away from people” (mean score of 2.42 and nearly 41% reporting at least quite important), then “to compete in fishing competitions of any kind” (mean score of 1.20 and less than 5% reporting at least quite important) (Table 18).

Further analysis of these results for other key variables revealed very little differences – indeed none with any statistical significance. For example, in terms of residential stratum, the largest proportional range in mean scores for any motivational factor occurred for “to compete in fishing competitions of any kind” – where a mean score of 1.44 was recorded for the South West stratum, as opposed to 1.12 for the ACT and an overall mean of 1.20. The next largest proportional range occurred for “to catch fresh fish, crabs etc. for food” – where a mean score of 3.03 was recorded for the Illawarra stratum, as opposed to 2.49 for the South West and an overall mean of 2.76.

Also, when analysed by the gender of the main fisher/respondent (where 85% were males), the largest proportional range in mean scores occurred in terms of “to be on your own ... to get away from other people” – where a mean score of 2.66 was recorded for females, opposed to 2.39 for males and an overall mean of 2.44. The differences by gender for all other motivational factors were substantially less than this.

Relatively minor differences also occurred by age group and the largest proportional range in mean scores occurred for “to catch fresh fish, crabs etc. for food” – where a mean score of 3.09 was recorded for the 60 years plus age group, as opposed to 2.39 for the 15-29 years age group and an overall mean of 2.76. The next largest range occurred for “to be on your own ... to get away from people” – where a mean score of 2.50 was reported for the 45-59 years age group, as opposed to 2.11 for the 15-29 years age group and an overall mean of 2.44.

Table 18 Relative importance of motivational factors for recreational fishing - as reported by the main/key fisher aged 15 years or more in resident households with recreational fishing activity in NSW/ACT waters during 2013/14. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 fishing households responded.

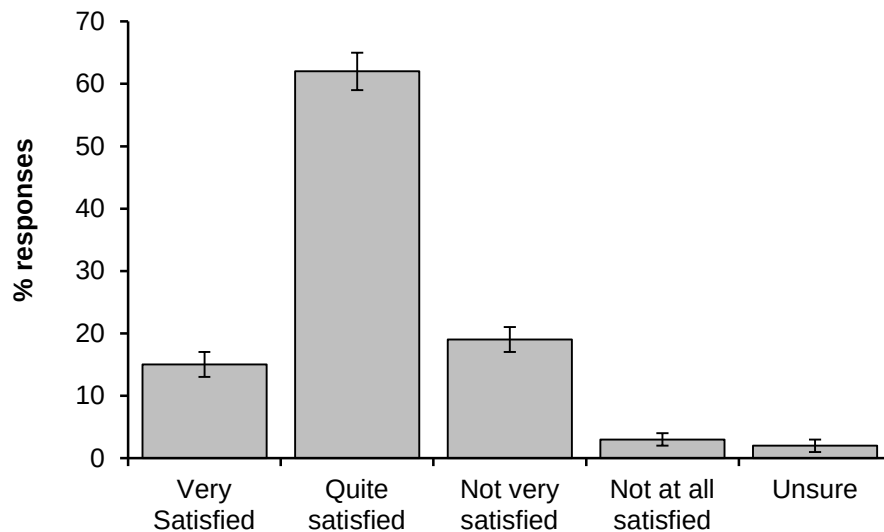
Motivational factor	Row	How important (and score value)					Mean score value
		Very (4)	Quite (3)	Not very (2)	Not at all (1)	Unsure (-)	
To relax or unwind	%	61.3	30.6	7.0	0.7	0.5	3.52
	SE	3.1	2.2	1.1	0.3	0.3	
To be outdoors, in the fresh air ... to enjoy nature	%	69.0	26.5	3.6	0.1	0.8	3.63
	SE	3.2	2.1	0.8	0.1	0.5	
To be on your own ... to get away from people	%	17.9	22.9	43.9	14.5	0.8	2.42
	SE	1.8	2.0	2.5	1.7	0.5	
To spend time with your family	%	52.8	25.9	16.7	3.6	1.0	3.26
	SE	2.8	2.1	1.6	0.7	0.5	
To spend time with your friends	%	43.1	36.7	16.3	2.9	1.0	3.18
	SE	2.6	2.5	1.4	0.8	0.5	
To compete in fishing competitions of any kind	%	1.4	3.2	10.5	83.7	1.2	1.20
	SE	0.4	0.7	1.1	3.5	0.6	
For the enjoyment or sport of catching fish, crabs etc.	%	43.6	41.9	12.7	1.0	0.9	3.26
	SE	2.5	2.7	1.4	0.4	0.5	
To catch fresh fish, crabs etc. for food	%	28.7	29.6	30.1	10.9	0.7	2.75
	SE	2.0	2.3	2.2	1.4	0.5	

Satisfaction with Fishing

All main fishers/respondents were also asked how satisfied they were with the overall quality of their fishing during the diary period, with three-quarters (76%) indicating that they were at least quite satisfied (Figure 52; Appendix 19). Further analysis of these results for other key variables revealed very few differences – indeed none with any statistical significance. For example, in terms of residential strata, the highest general satisfaction levels were reported for the North West and ACT (at 82% each), with the lowest levels in the North Coast (71%) and Mid North Coast (66%), compared with the overall mean of 76% (Appendix 19). Also, when analysed by the gender of the main fisher/respondent (again, 85% were males), a higher (but not significant) general satisfaction level emerged for females (85%), as opposed to males (74%) and an overall mean of 76%. Similarly, minor differences occurred by age group, e.g. the lowest general satisfaction level was 69% for the 60 years plus age group.

All respondents reporting general dissatisfaction (24%) with their fishing in the previous 12 months were asked their main (and any other) reason for this. Detailed responses were recorded by interviewers in terms of: the nature of the problem/issue; the perceived cause; and any suggested solution. As for similar 'open-ended' questioning reported in 'Other Attitudinal Information' (Page 82), final coding and analysis of these responses will be undertaken by Fisheries NSW staff. However, after a broad assessment, the vast majority refer to low catch rates/levels, with many also citing high numbers of under-sized fish. In terms of perceived causes and solutions, the majority provided little further information. Among the remainder, a variety of factors were mentioned including commercial fishing impacts, general over-fishing and various environmental factors, e.g. lack of rain in inland areas.

Figure 52 Overall satisfaction with recreational fishing for the 12 month diary period – as reported by the main/key fisher aged 15 years and older, in each resident household with fishing activity in NSW/ACT waters. Error bars represent one standard error.



Other Attitudinal Information

The opinions and attitudes of the main fisher/respondent (aged 15 years and older) in all fisher and non-fisher households were also assessed in terms of eight fishing-related issues – details of which, along with response profiles (raw data format) are provided below. Note: final coding and analysis of these responses will be undertaken by Fisheries NSW staff.

In this questioning, the main fisher/respondent was invited to provide any comments or suggestions relating to recreational fishing, initially in the form of a 'top of mind' response (i.e. without prompting) and subsequently, through prompting on a range of structured categories (see below). Among the 1,607 households that fully responded to the Wash-up/Attitudinal Survey, 21 households did not contain a main fisher/respondent aged 15 years and over. Therefore, the following details refer to 1,586 households – among which, 985 (or 62%) provided at least one comment. Significantly higher comment rates occurred among households that fished in the diary period (72%), than for non-fishing households (32%). In total, 2,692 separate comments and suggestions were reported in the 8 categories below:

- 1) General initial comments (without prompting): 250 comments/suggestions across a range of issues (not covered by Items 2 to 7 below);
- 2) *"about particular fish or other species that you like to fish for ... or use as bait?"*: 196 comments;
- 3) *"about size or possession limits for any species?"*: 436 comments;
- 4) *"about any other regulations to do with recreational fishing?"*: 614 comments;
- 5) *"about ramps, jetties or other facilities?"*: 335 comments;
- 6) *"about waterways or the environment?"*: 341 comments;
- 7) *"about this survey?"*: 492 comments;
- 8) *"anything else?"*: a total of just 28 comments (indicating strong coverage by the previous categories).

Fishing Club Membership and Final Survey Questions

In the Wash-up Attitudinal Survey, all residents aged five years and older who fished in NSW/ACT waters during the diary period were assessed in terms of current membership of “a fishing or diving club ... or association”. In response, an estimated 42,270 or 5.7% (SE 0.9%) of all fishers reported membership of some kind.

In final questioning for the overall survey, all respondents were asked if they would like to receive a copy of the survey results and among the 1,607 households, 1,301 (81%) said ‘yes’, with higher rates among fisher households (86%) than for non-fishers (68%). Also, respondents in the 1,129 fishing households were asked as to their availability for re-contact (if needed) for any future research by Fisheries NSW and virtually all agreed (1,081 or 96%). Among the remainder, 27 households answered as ‘unsure’, as opposed to the 21 who directly declined. In ‘Diary Survey’ (Page 16), the high response rates achieved in the various components of this study were discussed. *Yet, this latter result is perhaps the ultimate test of the efficacy of the survey instrument.*

Comparison of Key Survey Results – 2000/01 and 2013/14

Comparability of Results

In the remainder of this section, results from the NSW and ACT components of the NRFS in 2000/01 have been compared with the present survey to identify any changes or developments in the recreational fishery over the thirteen year period. Importantly however, it should be noted that despite the robust nature and fundamental comparability of the two studies (as discussed below), the issue of *inter-annual variability is a critical factor* here – and especially in terms of the natural availability of certain species and therefore the catch levels in a given year.

In terms of sample sizes, a key objective of the 2013/14 survey was to achieve a similar number of households who completed the Diary Survey to optimise comparability with the NRFS – namely, 1,661 households in 2001, compared with 1,681 in 2014. However to achieve this, a 45% larger sample was required for the Screening Survey (10,300 in 2000, compared with 14,908 in 2013), primarily due to lower fishing participation rates and related to this, lower diary eligibility rates (or intention to fish) – 28% in 2000, compared with 21% in 2013. Also, somewhat lower response rates occurred at screening (81% in 2000, compared with 76% in 2013), with higher levels of ‘non-contacts’ being the primary difference. In terms of other response rates, excellent results were achieved in both surveys, for example: 92% uptake of the 12 month Diary Survey among eligible households in 2000, compared with 90% in 2013; and 91% completion of the Diary Survey in 2001, compared with 93% in 2014.

The only analytical difference between the two surveys has been in how the fisher ‘drop-in’ adjustment was implemented in the 2000/01 survey. Although the NRFS included non-intending fisher call-backs, the sample size proved insufficient to enable a robust ‘drop-in’ adjustment. Therefore, an ‘equilibrium’ was assumed, whereby fishers who dropped-out of the fishery were effectively replaced by counterparts assumed to have dropped-in, based on demographic and avidity profiles (Lyle *et al.*, 2009b).

Also, related to this was the fact that detailed catch and effort information was only collected during the NRFS diary phase for ‘intending fishers’ in each household aged five years and older at the Screening Survey – therefore requiring an additional ‘drop-in’ adjustment in the above process for unexpected fishing by other household members. By contrast, all state/territory-wide surveys since then have routinely monitored the fishing activity of all household members aged five years and older at screening, i.e. where at least one household member reported an intention to fish in the diary period.

Other minor comparability differences include: slight boundary changes by ABS in residential strata (as discussed in ‘Sampling Strata’, Page 9); collection of detailed fishing boat profiling information in the Screening Survey for the NRFS, as opposed to the recent Wash-up/Attitudinal Survey (and therefore a fourteen year ‘gap’); and the fact that individual respondents (aged 15 years and over) were randomly selected within each household for the NRFS Wash-up/Attitudinal Survey, as opposed to the ‘main/key fisher’ for all subsequent state/territory-wide surveys. Notwithstanding these factors, the application of a consistent survey methodology and analytical procedures mean that the two datasets can be validly compared.

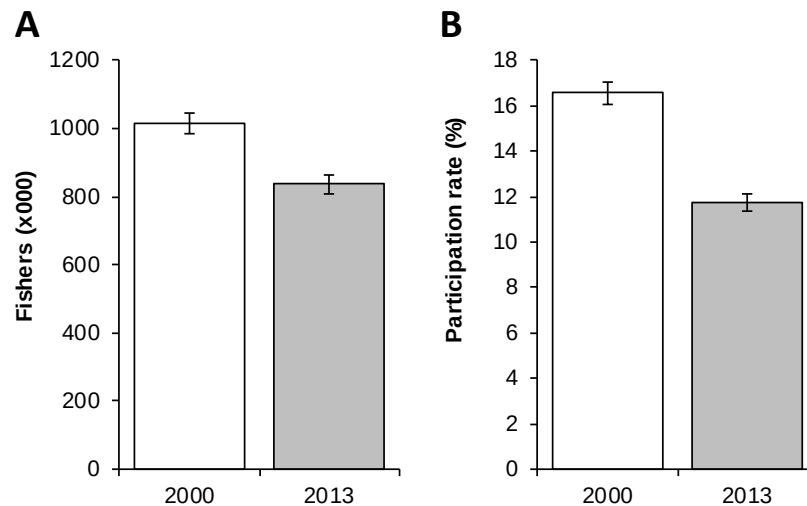
Fisher Characteristics

Participation – Overall and Regionally

Between 2000 and 2013 the estimated number of NSW/ACT residents aged five years and older who fished at least once a year in NSW or ACT waters in the previous 12 months decreased from 1,014,207 (SE 30,071) in 2000 to 836,632 (SE 27,456) in 2013 (Figure 53A; Appendices 1 and 20). When expressed as a proportion of the resident population at the time, this represents a significant decrease from 16.6% in 2000 to 11.7% in 2013 (Figure 53B) – close to a 30% decrease in the participation rate over the 13 year period. However, trends of this kind

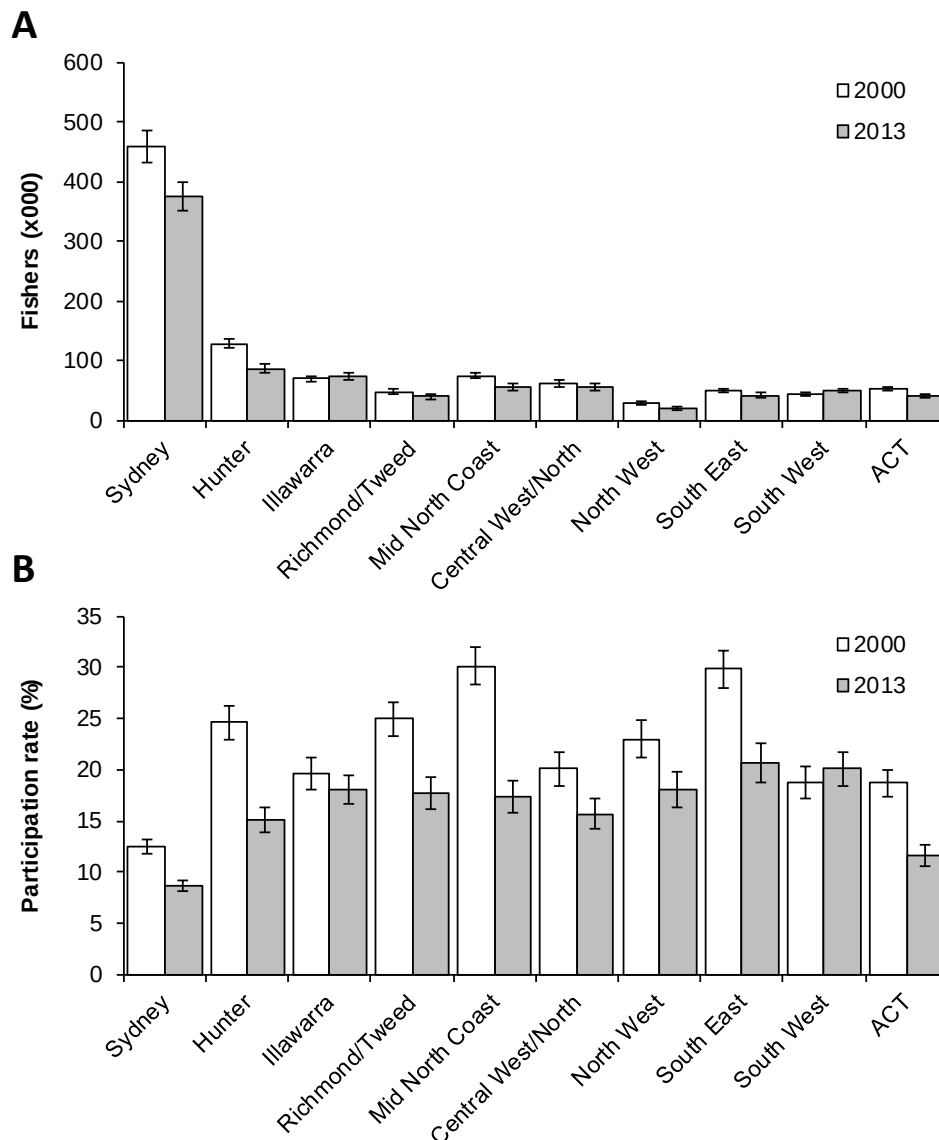
have been reported in all state/territory-wide surveys conducted since the NRFS and also overseas, as discussed later in this section.

Figure 53 Recreational fishing participation in the 12 months prior to May 2000 and June 2013 by residents aged five years and older in NSW/ACT waters: A) number of persons; and B) proportion of the resident population. Error bars represent one standard error.



When analysed by residential stratum, there were fewer fishers in 2013 in absolute terms, with the exception of two strata – namely, the Illawarra (a minor increase from 69,270 in 2000 to 72,700 fishers in 2013) and the South West, where a relatively higher increase occurred, from 43,199 to 49,831 (Figure 54A; Appendix 20). However, the only increase in participation rate occurred in the South West stratum (from 18.8% in 2000 to 20.1% 2013). Yet, all of these increases are not statistically significant. By contrast, the largest proportional decreases occurred in participation rates for the Mid North Coast (from 30.1% to 17.4%), the Hunter (from 24.6% to 15.1%) and the ACT (from 18.7% to 11.6%).

Figure 54 Recreational fishing participation in the 12 months prior to May 2000 and June 2013 by residents aged five years and older in NSW/ACT waters, by residential stratum: A) number of persons; and B) proportion of the resident population. Error bars represent one standard error. Note: the regional boundaries in 2000 differed slightly to those in 2013 - the Australian Statistical Geography Standard (ASGS) (Pink 2011).



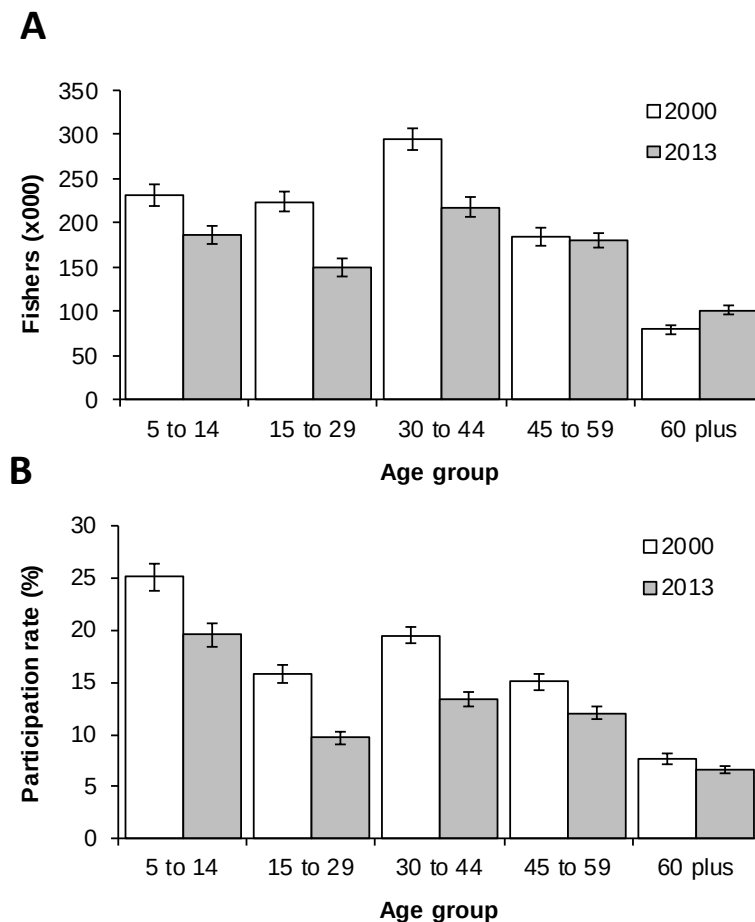
Participation by Age and Gender

In absolute and relative terms the decrease in fishing participation between 2000 and 2013 was more pronounced amongst females, from 320,665 (SE 14,266) fishers or 10.4% (SE 0.5%) of females aged five years and older in 2000 to 239,361 (SE 11,880) fishers or 6.6% (SE 0.3%) in 2013. This compares with the decrease for males, from 693,542 (SE 20,298) fishers or 22.9% (SE 0.7%) of males aged 5 years and older in 2000 to 597,270 (SE 19,265) or 16.9% (SE 0.5%) in 2013.

When analysed by age, the number of fishers in the 45-59 years age group has remained quite stable between 2000 and 2013, with an actual increase in the 60 years and older age group (Figure 55A). However in both cases, this was entirely due to population growth, because participation rates actually decreased during that time for the 45-59 years age group (from

15.1% to 12.0%) and to a lesser extent, for the 60 years and older age group (from 7.6% to 6.7%) (Figure 55B). Yet, the greatest rate of decrease in participation rates over the period occurred in the 15-29 years age group (from 15.8% to 9.7%), followed by the 30-44 years age group (from 19.5% to 13.4%) and to a lesser extent, the 5-14 years age group (from 25.1% to 19.6%) who continue to have the highest participation rate among the age groups (Figure 54B).

Figure 55 Recreational fishing participation in the 12 months prior to May 2000 and June 2013 by residents aged five years and older in NSW/ACT waters, by age group: A) number of persons; and B) proportion of the resident population. Error bars represent one standard error.



As noted in 'Participation – Overall and Regionally' (Page 84), a decrease in participation rates has also occurred in other states, territories and overseas. In fact, based on the results from various state/territory-wide surveys since the NRFS, the annual rate of decrease (i.e. the proportional decrease in the participate rate) in NSW/ACT is very similar to Tasmania (Lyle *et al.*, 2014), with notably higher rates of decrease in all other jurisdictions, namely: Queensland (Webley *et al.*, in press); the Northern Territory (West *et al.*, 2012); and South Australia (Jones 2009). Indeed, apart from some minor differences in the survey results and wording (for NSW/ACT data and text), the following is an effectively direct quotation from the most recent Tasmanian survey report (Lyle *et al.*, 2014),

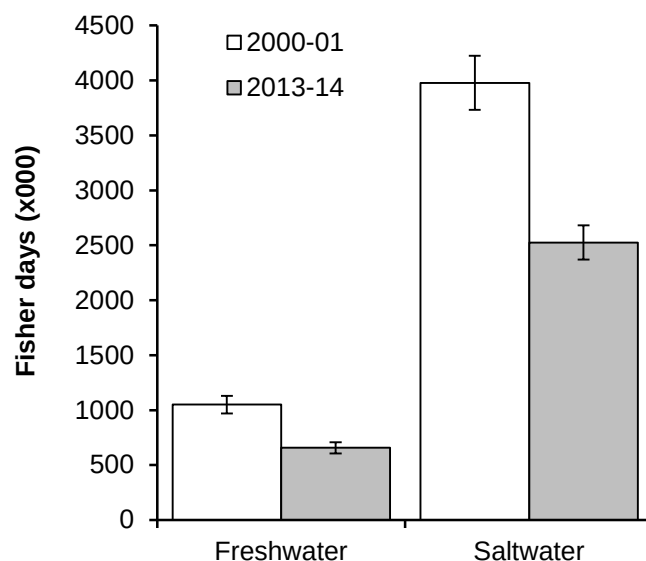
“The pattern of overall declining participation that is emerging appears to be linked to both the ageing of the population and a decline in retention (rather than recruitment) of younger fishers, noting that the highest participation rates have consistently been amongst children (<15 years).

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 close to half the rate for 5-14 year olds. Furthermore, even though the number of persons aged 60 years and older in NSW and the ACT is growing disproportionately to population size, resulting in an increase in numbers of fishers in this age group, participation rates are consistently low 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

Fishing Effort

Between the two survey periods, 2000/01 and 2013/14, annual recreational fishing effort (fisher days) in NSW/ACT waters decreased by 37% – partly linked to the decreased number of fishers, but also due to a lower average number of days fished annually (per fisher). In 2000/01, residents aged 5 years and older accounted for an estimated 5,026,293 (SE 265,243) fisher days of effort in NSW/ACT waters, representing an annual mean of 5.6 days per fisher. In 2013/14, a lower 3,181,035 (SE 169,699) total fisher days emerged, with an annual mean of 4.3 days per fisher. In initial analysis of these changes, that equal rates of decrease (37%) occurred in the number of fisher days for both freshwater and saltwater areas (Figure 56).

Figure 56 Comparison of fishing effort (fisher days) by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 - by freshwater and saltwater. Error bars represent one standard error.



When analysed by fishing platform, a slightly higher rate of decrease (40%) emerged for shore-based fishing effort (fisher days) over the 13 year period, compared with boat-based fishing (34%) (Figure 57). In terms of fishing method, line fishing effort decreased by 35% in the period, with higher rates of decrease for pots/traps (63%) and 'other methods' (e.g. hand-collecting, digging and pumps; 64%) and also for diving and net fishing (where high standard errors occur) (Figure 58). However, a separate analysis of line fishing effort has revealed a greater than average rate of decrease (41%) in fisher days where bait was used, compared with a significant increase (36%) in total fisher days using lures and jigs. That is, the proportion of all line fishing days using lures and jigs has risen from 14% in 2000/01 to 23% in 2013/14.

Figure 57 Comparison of fishing effort (fisher days) by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 – by fishing platform (boat and shore). Error bars represent one standard error.

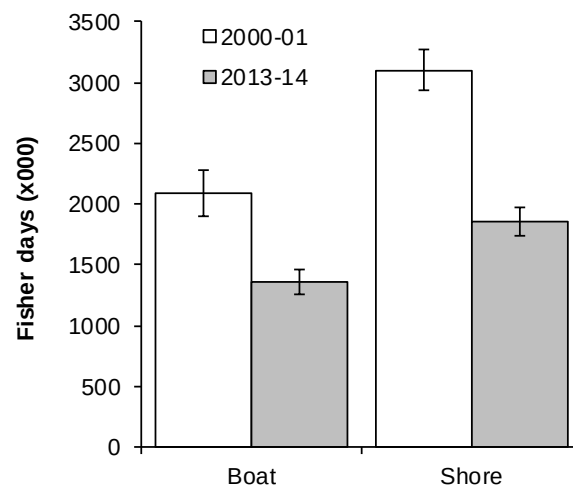
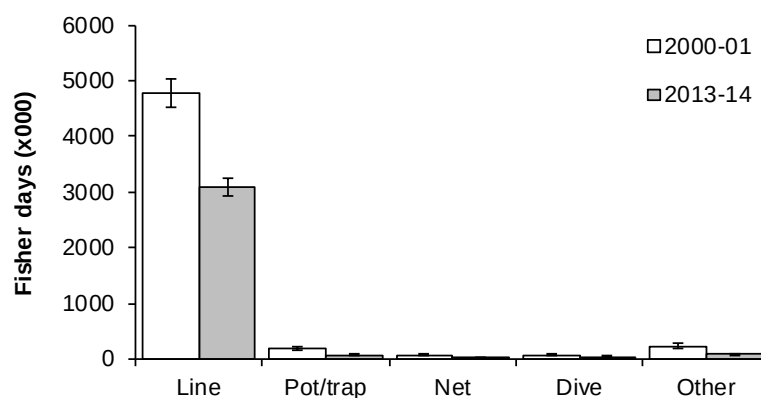


Figure 58 Comparison of fishing effort (fisher days) by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 – by fishing method. Error bars represent one standard error.



When analysed by water body type, a higher than average rate of decrease in fishing effort (fisher days) emerged for in-shore coastal waters (53%) and also for freshwater lakes/dams (43%). Lower than average levels of decrease occurred for all other water body types: offshore waters (32%); estuarine waters (29%); and freshwater rivers (24%) (Figure 59). In terms of fishing zones, higher than average rates of decrease in fishing effort (fisher days) occurred in the majority of zones, with many at around half (50%) the 2000/01 level. However, lower than average rates of decrease occurred in three cases: the Sydney zone (16%); the Mid South Coast (20%) and the Murray/South West (30%) (Figure 60). The estimated numbers of fishers and fisher days by fishing zone in 2000/01 and 2013/14 are presented in Appendix 21.

Figure 59 Comparison of fishing effort (fisher days) by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 – by water body type. Error bars represent one standard error.

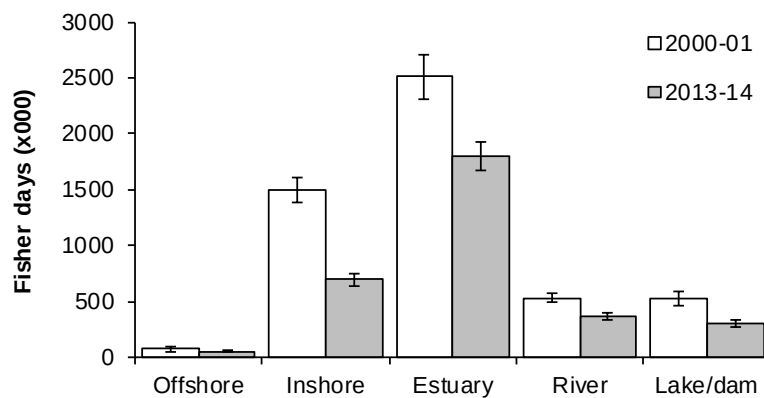
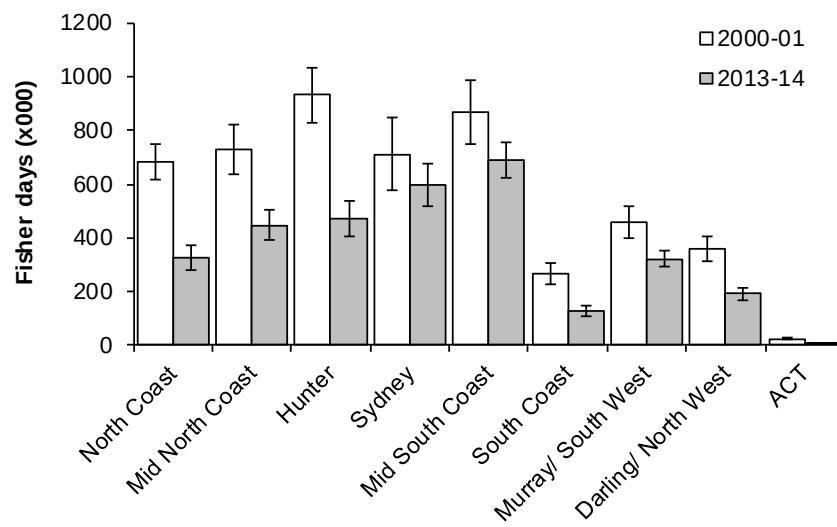


Figure 60 Comparison of fishing effort (fisher days) by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 – by fishing zone. Error bars represent one standard error.



Catch

Catch details for key species in 2000/01 and 2013/14 are provided in Appendices 22 and 23, with comparisons for key marine species in Figure 61 and freshwater species in Figure 62. An estimated 37,347,987 organisms were caught (kept and released) by resident recreational fishers in NSW/ACT waters during 2000/01, compared with 14,059,634 in 2013/14, representing an overall rate of decrease of 62% – and substantially higher than the 37% decrease in fishing effort (fisher days) between the two periods (see 'Fishing Effort', Page 88).

Appendix 22 provides total catch details for some 39 key species/groups, covering the vast majority of the total catch of all organisms in 2000/01 and 2013/14 (i.e. 93% and 94% respectively, of the above estimates) – and again, with an overall rate of decrease of 62%.

Note: due to broader coding in the NRFS, several key species have necessarily been grouped in these analyses, namely flathead, trevally and whiting.

When the total catch of all finfish are compared (excluding small baitfish species), a lesser overall rate of decrease of 49% emerges (Appendix 22). This compares with a 35% decrease in line fishing effort (fisher days) between the two periods (see 'Fishing Effort', Page 88,). In terms of total catch of small baitfish species (Blue Mackerel, mullet, Yellowtail Scad and 'other small baitfish'), an overall 48% decrease rate emerged – although high levels of variability and standard errors occurred (Appendix 22). However, for the various crustaceans a substantially higher overall rate of decrease (77%) occurred between the two periods, but again with high standard error levels in many cases. Yet, this is largely consistent with the decreases in related fishing effort (fisher days) for methods such as pots/traps, nets and hand-collecting – all decrease rates for which, were 63% or higher (see 'Fishing Effort', Page 88). Note: comparisons for all other taxa are limited due to small sample sizes and high standard errors. However, a separate analysis of the total catch by line fishing has shown a doubling of the proportion attributable to lures, jigs and flies from 10% in 2000/01 to 20% in 2013/14.

Appendix 23 provides comparative harvest estimates (kept numbers) on the same basis as for Appendix 22. An overall rate of decrease of 69% emerged in total harvest numbers between the two surveys, compared with 62% for the total catch. When the total harvest levels of all finfish are compared (excluding small baitfish species), a lesser overall rate of decrease of 57% emerges (Appendix 23). In terms of the harvest of small baitfish species (Blue Mackerel, mullet, Yellowtail Scad and 'other small baitfish'), an overall 36% decrease rate emerged – although high levels of variability and standard errors occurred (Appendix 23). For the various crustaceans a substantially higher overall rate of decrease (80%) occurred between the two periods, but again with high standard error levels in many cases. Similarly, comparisons for other taxa are limited by standard error levels.

Also, when the results in Appendices 22 and 23 are compared in terms of the proportion of the total catch that was released, a lower overall proportion (30%) emerged for key species in 2000/01, than for 2013/14 (43%) – with key finfish (excluding bait species) at 52% (2000/01) and 59% (2013/14). Comparative data for release proportions, along with total catch and harvest estimates for key species are depicted in Figures. 61 and 62.

Note: comparisons of total catch, harvest and release rates for key species between the two periods are provided in 'Broad Catch Rates – Line fishing' (Page 95).

Figure 61 Total catch numbers (kept and released), harvest numbers (kept), and proportion (%) of the total catch released for key marine species, by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14. Error bars represent one standard error.

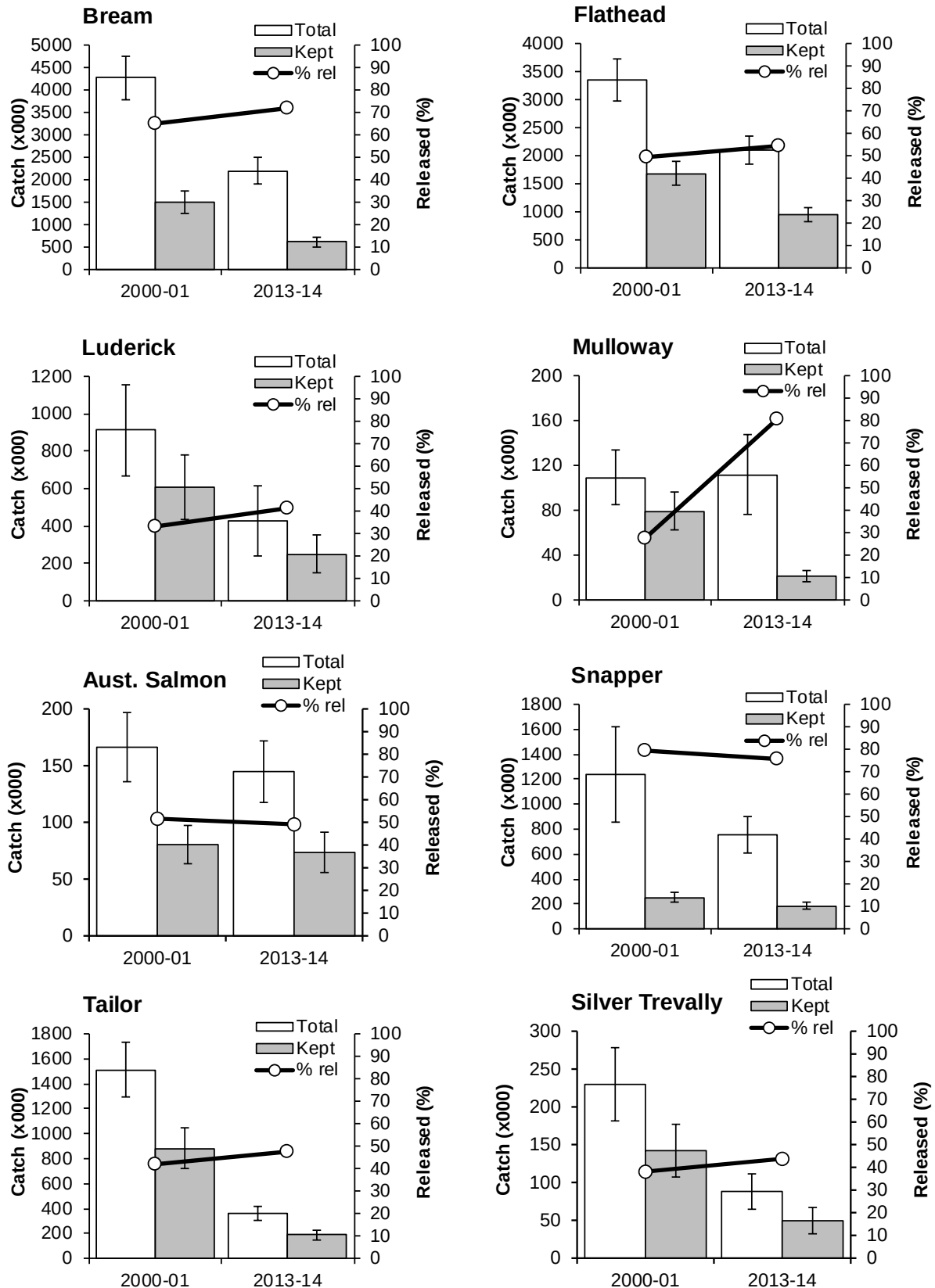


Figure 61, continued

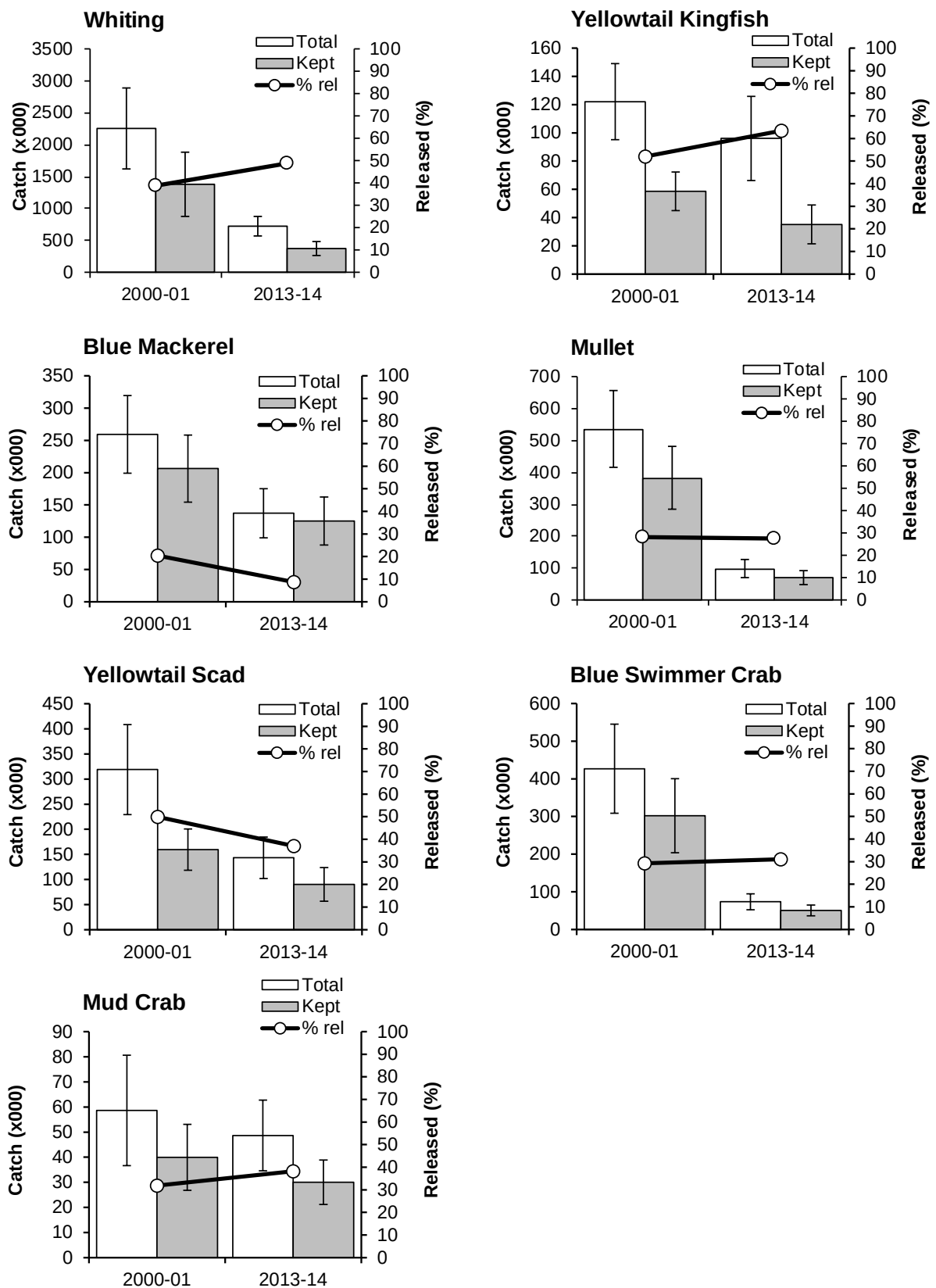
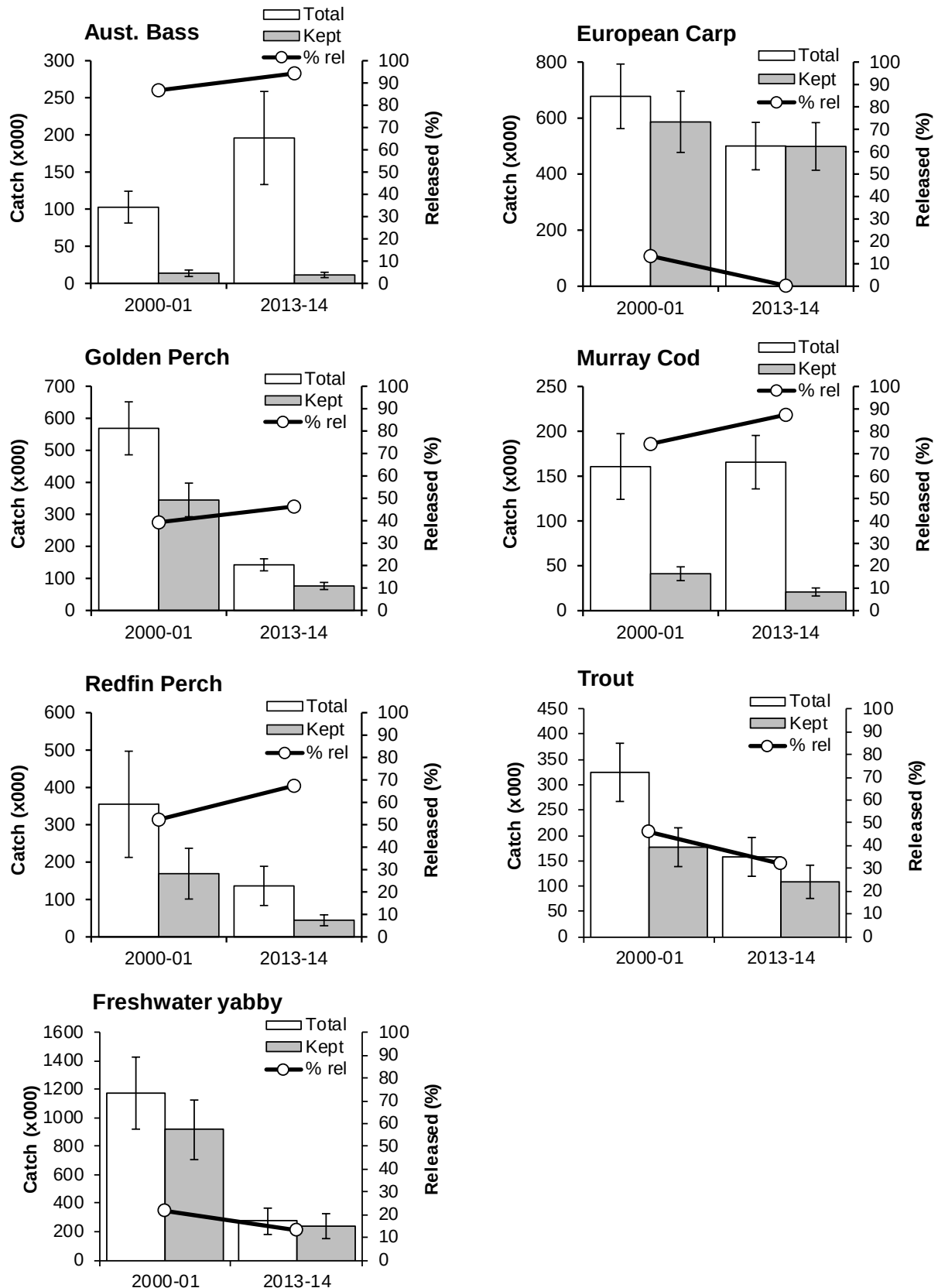


Figure 62 Total catch numbers (kept and released), harvest numbers (kept), and proportion (%) of the total catch released for key freshwater species, by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14. Error bars represent one standard error.



Broad Catch Rates – Line Fishing

Definitions and Methods

The information in this section provides additional assessment of changes in the recreational fishery between the two survey periods – based on broad catch rate analyses, which were specifically developed for this purpose in the *RecSurvey* analysis package.

To optimise comparability and data utility, this catch rate analysis was restricted to line fishing methods, which accounted for the vast majority all fishing effort (fisher days) in the 2000/01 and 2013/14 surveys (95% and 97%, respectively). Other methods such as pots/traps and nets were excluded, due to the high levels of variability in terms of catch, effort and therefore catch rates (e.g. prawns and yabbies). However, comparative catch information for key 'non-fish' species has been included in 'Catch' (Page 91), and Appendix 22.

Only '*desirable*' finfish species/groups were included in this analysis, both in terms of total catch and targeted fishing effort. Desirable finfish species were defined as generally being regarded as either good quality 'table' fish and/or sportfish species. Examples of marine species/groups considered 'undesirable' include Red Rock Cod, sharks/rays and wrasse/groper. These exclusions were based on high release rates and 'un-wanted' being identified as the primary reason for release (see Table 7 and 'Reasons for Release', Page 31). Whereas no freshwater finfish species were excluded on this basis, European Carp were routinely classified as 'undesirable'. Also, fish species predominantly used as bait were excluded, e.g. Blue mackerel, mullet and Yellowtail Scad, to enhance the stability of the analysis.

Therefore broad annual catch rate data were calculated at the household (PSU) level as the number of desirable finfish species caught per fisher day, i.e. where line fishing for any desirable finfish species occurred. For example, where a fisher targeted Murray Cod on a given day and only caught European Carp, this would be included as a 'zero' catch day. On the other hand, in the (albeit rare) case where the only target was European Carp, this would be totally excluded from the analysis – regardless of any ultimate catch. However, virtually all line fishing events were included in this analysis for both 2000/01 and 2013/14 (97% and 96%, respectively). In both cases, less than 1% of line fishing events were excluded on the basis of 'undesirable' species targets, with other exclusions referring to either baitfish or non-fish targets (e.g. Blue Swimmer Crabs).

Importantly, the catch rate analyses were confined to broad/non-directed effort at one of three levels, namely where *any* desirable finfish species/group was targeted: (i) all line fishing days; (ii) line fishing days in saltwater versus freshwater; and (iii) line fishing days in four water body types (ocean, estuaries, rivers and lakes/dams).

In reviewing the following results, a number of factors need to be carefully considered including: the issue of *inter-annual variability* (such as natural changes in abundance of species and also environmental/weather factors, e.g. floods); changes in fishing practices, target preferences and technology over time; and changes in regulations such as size and bag/possession limits. Accordingly, the results in this section almost entirely refer to total catch rates, as opposed to harvest rates – where for example, changes in regulations can have a significant impact. However, a range of harvest rate analyses have been provided as an output of the project. Also, the results in 'Catch' (Page 28) and Appendix 23 should be used for any review of harvest levels for particular species. Other data sources should also be used where appropriate, e.g. annual harvest data from the commercial sector to provide a perspective on inter-annual variability.

Broad Catch Rates

In this catch rate analysis, a total catch of 17,734,886 (SE 1,679,611) desirable finfish species/groups (freshwater and saltwater) was estimated for the 2000/01 survey, compared with 8,565,676 (SE 728,516) for 2013/14 – representing a significant decrease of 52%. Comparable

total fisher days of line-fishing were estimated at 4,681,582 (SE 252,651) for 2000/01 and 3,031,427 (SE 159,467) for 2013/14 – representing a significant decrease of 35%.

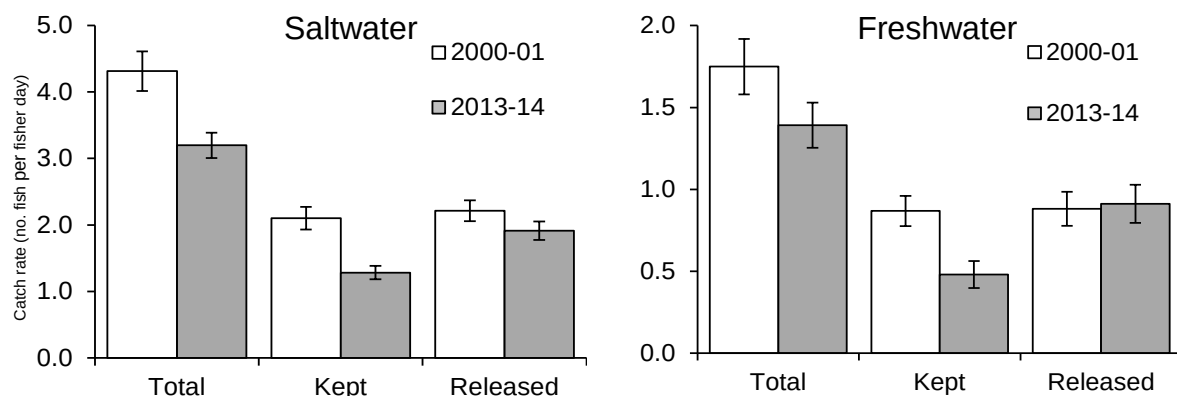
A resultant total catch rate of 3.79 (SE 0.25) desirable finfish per fisher day emerged for 2000/01, compared with 2.83 (SE 0.16) for 2013/14 – representing a lesser, but still significant decrease of 25%. However, when analysed in terms of the proportion of 'successful' fisher days (i.e. at least some catch) versus 'unsuccessful' (or 'zero' catch) days, there was no significant difference between the surveys, with 31% and 33% 'zero' catch days, respectively.

Note: comparable total *harvest* rates were 1.85 (SE 0.14) desirable finfish per fisher day for 2000/01, compared with 1.12 (SE 0.08) for 2013/14 – representing a greater and significant decrease of 39%. However, comparable *release* rates were 1.94 (SE 0.13) desirable finfish per fisher day for 2000/01, compared with 1.71 (SE 0.12) during 2013/14 – representing a minor and non-significant decrease of 12%.

Overall total catch rates for desirable saltwater finfish species were 4.31 per fisher day (SE 0.30) for 2000/01, compared with 3.20 (SE 0.19) for 2013/14 – representing a significant decrease of 26% (Figure 63 and Appendix 24). However, no significant difference emerged in terms of 'zero' catch days between 2000/01 and 2013/14 – namely, 26% and 30% respectively.

Equivalent results for desirable freshwater finfish were 1.75 per fisher day (SE 0.17) for 2000/01, compared with 1.39 (SE 0.14) for 2013/14 – representing a non-significant decrease of 20% (Figure 63 and Appendix 25). Also, no significance difference emerged in terms of 'zero' catch days between 2000/01 and 2013/14 – namely, 48% and 46% respectively.

Figure 63 Mean line fishing catch rates of 'desirable' finfish species, by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 – by saltwater and freshwater. Error bars represent one standard error.

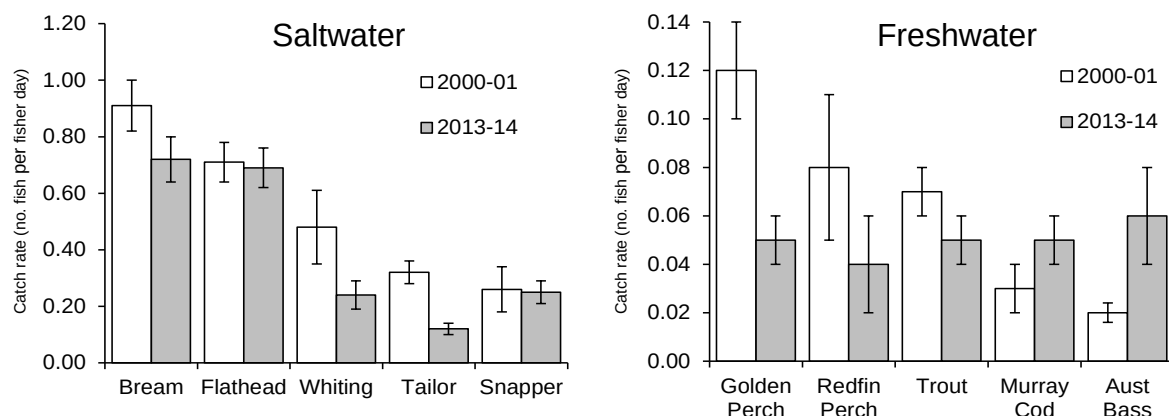


In terms of key saltwater finfish species, tailor had the greatest decrease in total catch rate, from 0.32 fish per fisher day (SE 0.04) in 2000/01, compared with 0.12 (SE 0.02) for 2013/14 – representing a significant decrease of 62% (Figure 64) and especially so in estuarine waters (Appendix 24). A significant decrease in catch rate (60%) also occurred for leatherjackets and predominantly in estuarine waters. Lesser overall rates of decrease occurred for various other species ranging from whiting (50%) through to Snapper (6%) and flathead (3%). However, among these, the only significant change occurred in terms of the catch rate for bream in ocean waters (a decrease of 59%) – compared with a 12% decrease in estuaries and an overall decrease of 20% (Appendix 24). On the other hand, increased catch rates emerged for three key saltwater species, although none was statistically significant. The overall catch rate for Mulloway increased by 68% between the two periods and predominantly in estuarine waters.

Also, Australian Salmon increased by 35%, (mainly in estuarine waters) and Yellowtail Kingfish by 21% (predominantly in ocean waters).

In terms of key freshwater finfish species, Golden Perch had the greatest decrease in total catch rate from 0.12 fish per fisher day (SE 0.02) in 2000/01 to 0.05 (SE 0.01) for 2013/14 – representing a significant decrease of 61% (Figure 64), with decreases in both rivers and lakes/dams (Appendix 25). Lesser overall rates of decrease occurred for Redfin Perch (41%) and trout (25%). However, a slight increase (24%) occurred in catch rates for trout in lakes/dams, but this was offset by a larger and significant decrease (73%) in river catch rates (Appendix 25). Increased catch rates occurred for Australian Bass (over 300% and mainly in lakes/dams), and for Murray Cod (60%), mainly in rivers (Appendix 25). However in both cases, high standard errors mean that little statistical significance can be attached to these increases.

Figure 64 Mean line fishing catch rates of key saltwater and freshwater finfish species/groups by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14. Error bars represent one standard error.



Boats

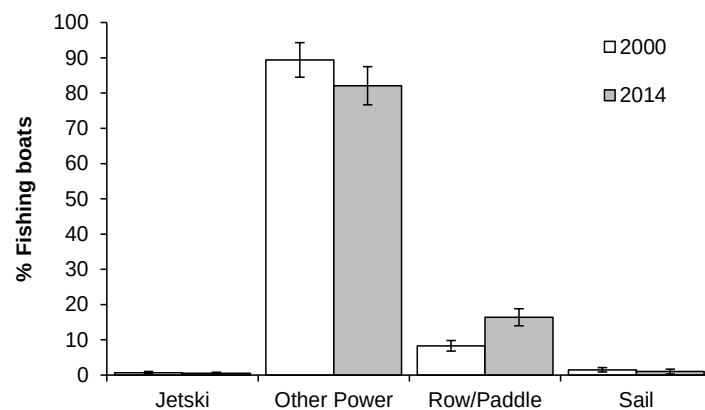
As noted in 'Comparability of Results' (Page 84), all information regarding boats was collected in the NRFS screening phase (2000), whereas only broad boat ownership was assessed at the screening in 2013. Analysis of these results shows that 257,339 (SE 10,097) NSW/ACT resident households owned at least one boat in 2000, representing an overall household ownership rate of 10%, compared with 320,818 (SE 11,381) in 2013 and an overall boat ownership rate of 11%. Substantially higher boat ownership rates emerged for those households with any fishing activity in NSW/ACT waters in the 12 months prior to the Screening Survey – 34% in 2000 and 38% in 2013. By contrast, much lower ownership rates were reported by non-fishing households – 4% in 2000 and 6% in 2013.

In terms of boat profiling for fishing households, this information was collected in the Screening Survey in 2000 and in the Wash-up/Attitudinal Survey in 2014 – hence a 14 year 'gap' applies to the following results. In 2000, 171,009 (SE 7,792) NSW/ACT resident fishing households reported owning 204,457 (SE 10,016) individual boats – a mean of 1.20 per household. A majority of these boats (77%) were used at least once for recreational fishing in the previous 12 months (156,459 boats; SE 8,307). In 2014, 180,622 (SE 10,322) NSW/ACT resident fishing households reported 230,118 (SE 13,435) individual boats – a mean of 1.27 per household. Again, a majority of these boats (76%) were used at least once for recreational fishing in the previous 12 months (173,895 boats; SE 10,873).

The following results refer to the recreational fishing ‘fleet’ for the two periods, namely 156,459 boats in 2000/01 and 173,895 boats in 2013/14. Firstly in terms of residential strata, the proportions of all fishing boats were very similar for seven of the ten strata e.g. Sydney accounted for 37% of all boats in 2000 and 36% in 2014. However, a proportional decrease occurred in the Hunter stratum from 17% in 2000 to 10% in 2014, with a minor proportional increase in the Illawarra (from 8% to 11%) and also in the South West (from 5% to 9%). Yet, these results are at least partially linked to changes in fishing participation rates – namely, the Hunter had the greatest decrease over the period and the South West showed an actual increase (see ‘Participation – Overall and Regionally’, Page 84).

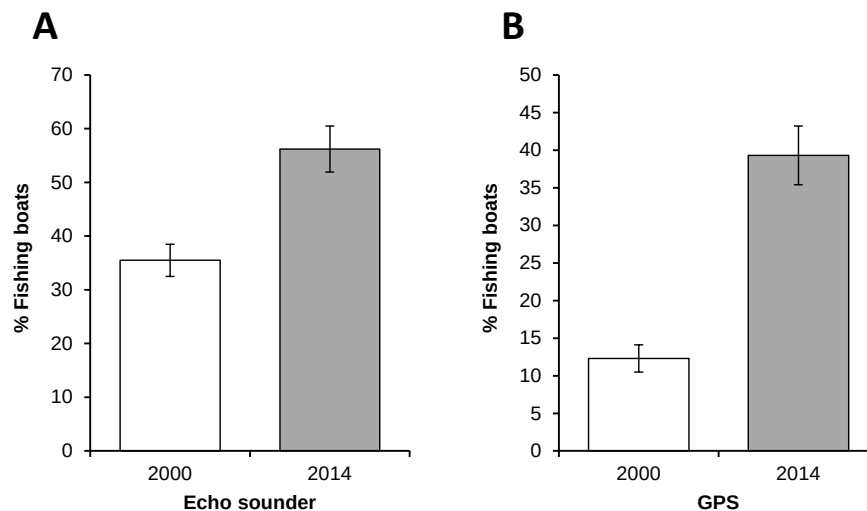
Over three-quarters of the fleet were trailer boats in both periods, namely 76% in 2000 and 77% in 2014, with an increase in the proportion of ‘car-toppers’ (from 8% to 12%) and smaller (but not significant) proportions of boats kept on the shore, or a mooring/marina berth. In terms of overall length, an increased proportion emerged for the smallest size group, i.e. less than 4 metres, from 20% in 2000 to 26% in 2014, with little difference for the 4-4.9 metres group (from 42% to 40%) and no change for the 5-5.9 metres group (26% in both periods). However, a minor decrease occurred among larger boats (6 metres or more) from 12% to 9%. In terms of main propulsion method, power craft (of some kind) dominated the fleet in both periods, with a decrease in the proportion of ‘Other Power’ craft from 89% in 2000 to 82% in 2014 (Figure 65). On the other hand, a significant increase occurred in the proportion of ‘Row/paddle’ boats (from 8% to 16%; Figure 65) and this is consistent with the trend towards ‘car-toppers’ and smaller craft (as noted above) and the increased popularity of kayaks for recreational fishing.

Figure 65 Proportion (%) of recreational fishing boats used by residents in NSW/ACT waters during 2000/01, compared with 2013/14 – by main propulsion method. Error bars represent one standard error.



With regard to electronic fishing aids (whether as fixtures or in portable form), significant increases have emerged in terms of echo sounder (‘fish finder’) availability, namely a proportional increase of more than half, from 36% of all fishing boats in 2000, to 56% in 2014 (Figure 66A). However, a three-fold increase occurred for GPS availability from 12% in 2000 to 39% in 2014 (Figure 66B).

Figure 66 Proportion (%) of recreational fishing boats used by residents in NSW/ACT waters during 2000/01, compared with 2013/14 – with availability of: A) echo sounder or ‘fish finder’; and B) global positioning system (GPS). Error bars represent one standard error.



In terms of proportional usage for recreational fishing, as opposed to other activities (e.g. water skiing) over the previous 12 months, an average of 78% usage was reported for all fishing boats in 2000, compared with 82% for 2014. Also, based on current market valuations by respondents (at the time), a total value of \$1.204 billion (SE \$165 million) was estimated for the recreational fishing fleet in 2000, compared with \$1.535 billion (SE \$139 million) for 2014 – representing a mean of \$7,694 per boat for 2000, compared with \$8,826 for 2014. When individual attribution rates are applied (i.e. annual proportional usage for fishing), the value of the fleet *directly attributable* to recreational fishing was \$794 million (SE \$79 million) in 2000, compared with \$1.132 billion (SE \$90 million) in 2014 – representing a mean of \$5,075 per boat for 2000, compared with \$6,509 for 2014.

Club Membership and Attitudinal Results

Membership of a “fishing or diving club ... or association” was assessed in the NRFS Screening Survey (2000), whereas in the present study, this questioning was included in the Wash-up/Attitudinal Survey (2014). In response, very similar proportions reported club membership in both periods, i.e. among residents aged five years and older who fished in NSW/ACT waters during the previous 12 months – namely 6.1% (SE 0.6%) in 2000, compared with 5.7% (SE 0.9%) in 2014.

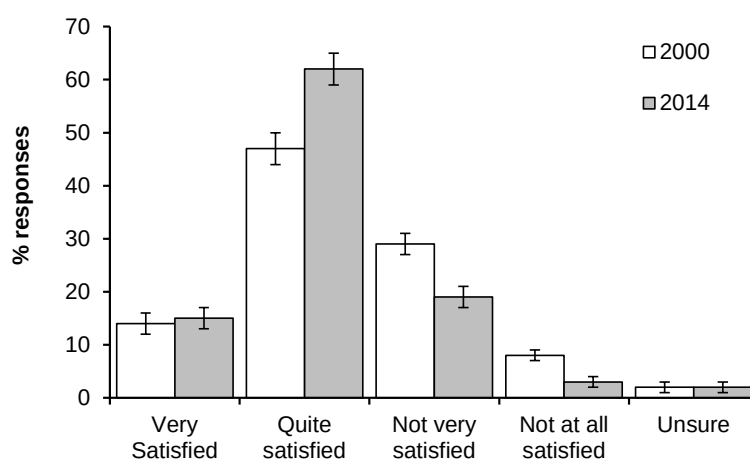
As reported in ‘Recreational Fishing Motivations’ (Page 80), respondents were presented with eight motivational factors, representing both catch and non-catch related components of the recreational fishing experience and asked to rate each as being: ‘very important’, ‘quite important’, ‘not very important’ or ‘not at all important’. As an additional analysis, values were assigned to the responses, on a scale from 1 (not at all important) up to 4 (very important). This question sequence was also asked in the NRFS and results from both surveys have been included in Table 19 – on the basis of expanded estimates of fishing households reporting “at least quite important” and the weighted mean score (from 1 to 4) for each of the motivational factors. Interestingly, very similar results emerged in all but one case, where a minor increase occurred for “to spend time with your family”.

Table 19 Relative importance of motivational factors for recreational fishing - by fishers aged 15 years and over in resident households with recreational fishing activity in NSW/ACT waters - comparison of results from 2001 and 2014.

Motivational factor	% at least quite important		Mean score (min. 1 to max. 4)	
	2001	2014	2001	2014
To relax or unwind	91.6	91.8	3.56	3.52
To be outdoors, in the fresh air ... to enjoy nature	94.2	95.5	3.57	3.63
To be on your own ... to get away from people	39.6	40.8	2.38	2.42
To spend time with your family	68.2	78.7	2.96	3.26
To spend time with your friends	76.9	79.8	3.06	3.18
To compete in fishing competitions of any kind	6.4	4.6	1.30	1.20
For the enjoyment or sport of catching fish, crabs etc.	80.8	85.4	3.24	3.26
To catch fresh fish, crabs etc. for food	56.1	58.3	2.74	2.75

As reported in 'Satisfaction with Fishing' (Page 81), respondents were asked how satisfied they were with the overall quality of their fishing during the diary period and this question sequence was also applied in the NRFS. Comparative results from both surveys are presented in Figure 67, where a significant increase in general satisfaction occurred – with 61% reporting being at least 'quite satisfied' in 2001, compared with 76% in 2014. When analysed by residential stratum, a significant proportional increase occurred in the Richmond/Tweed area – from just 36% reporting 'at least quite satisfied' in 2001 to 71% in 2014. After analysis of the reported reasons for dissatisfaction in 2001, various issues concerning the lower Richmond River emerged – including flooding, related environmental problems and subsequent closure of the river to commercial and recreational fishing by the NSW government. However, for all other residential strata, largely consistent proportional increases occurred in overall satisfaction levels between 2001 and 2014.

Figure 67 Comparison of overall satisfaction with recreational fishing for the 12 month diary period – as reported by fishers in resident households with fishing activity in NSW/ACT waters in 2000/01, compared with 2013/14. Error bars represent one standard error.



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Appendices

Appendix 1 Estimated number and proportion of the NSW and ACT resident population aged five years and older who fished recreationally in NSW or the ACT during the 12 months prior to June 2013 - by gender, age and residential stratum. SE is standard error; values in bold indicate relative standard error > 40%.

Residential stratum	Age group	Male					Female					Total				
		Pop'n	Fishers	SE	% fishers	SE	Pop'n	Fishers	SE	% fishers	SE	Pop'n	Fishers	SE	% fishers	SE
Sydney																
	5 to 14	293,354	56,760	6,636	19.3	2.3	276,890	29,231	4,789	10.6	1.7	570,244	85,991	9,377	15.1	1.6
	15 to 29	506,173	47,768	6,818	9.4	1.3	498,240	16,984	3,695	3.4	0.7	1,004,413	64,752	8,435	6.4	0.8
	30 to 44	529,722	79,622	7,923	15.0	1.5	540,154	22,935	4,090	4.2	0.8	1,069,876	102,558	10,154	9.6	0.9
	45 to 59	437,395	62,086	5,565	14.2	1.3	452,960	21,762	3,366	4.8	0.7	890,355	83,849	7,594	9.4	0.9
	60 plus	389,039	30,678	3,558	7.9	0.9	434,587	7,731	1,820	1.8	0.4	823,626	38,409	4,392	4.7	0.5
	Total	2,155,683	276,915	16,897	12.8	0.8	2,202,831	98,644	9,942	4.5	0.5	4,358,514	375,558	23,716	8.6	0.5
Hunter																
	5 to 14	39,866	10,501	1,694	26.3	4.2	37,463	8,592	1,583	22.9	4.2	77,329	19,094	2,588	24.7	3.3
	15 to 29	61,974	11,609	1,874	18.7	3.0	59,346	5,006	1,326	8.4	2.2	121,320	16,615	2,515	13.7	2.1
	30 to 44	58,706	15,265	1,910	26.0	3.3	59,255	7,206	1,331	12.2	2.2	117,961	22,471	2,819	19.0	2.4
	45 to 59	60,150	13,180	1,587	21.9	2.6	60,984	3,731	851	6.1	1.4	121,134	16,911	2,058	14.0	1.7
	60 plus	63,630	8,620	1,120	13.5	1.8	70,252	2,488	577	3.5	0.8	133,882	11,108	1,431	8.3	1.1
	Total	284,326	59,176	4,615	20.8	1.6	287,300	27,024	3,241	9.4	1.1	571,626	86,200	6,858	15.1	1.2
Illawarra																
	5 to 14	27,886	12,067	1,739	43.3	6.2	26,405	7,137	1,142	27.0	4.3	54,291	19,204	2,438	35.4	4.5
	15 to 29	41,048	9,383	1,548	22.9	3.8	39,216	2,820	1,128	7.2	2.9	80,264	12,204	2,064	15.2	2.6
	30 to 44	37,857	11,234	1,451	29.7	3.8	39,369	5,314	1,132	13.5	2.9	77,226	16,548	2,175	21.4	2.8
	45 to 59	42,357	9,988	1,300	23.6	3.1	44,075	3,878	796	8.8	1.8	86,432	13,866	1,755	16.0	2.0
	60 plus	50,219	8,879	1,194	17.7	2.4	54,729	1,999	493	3.7	0.9	104,948	10,879	1,418	10.4	1.4
	Total	199,367	51,551	3,883	25.9	1.9	203,794	21,149	2,627	10.4	1.3	403,161	72,700	5,661	18.0	1.4

Appendix 1, continued

Residential stratum	Age group	Male					Female					Total				
		Pop'n	Fishers	SE	% fishers	SE	Pop'n	Fishers	SE	% fishers	SE	Pop'n	Fishers	SE	% fishers	SE
Richmond/Tweed																
	5 to 14	15,172	5,808	950	38.3	6.3	14,649	3,302	736	22.5	5.0	29,821	9,110	1,333	30.5	4.5
	15 to 29	18,668	3,585	847	19.2	4.5	18,276	2,590	974	14.2	5.3	36,944	6,175	1,326	16.7	3.6
	30 to 44	19,261	7,811	913	40.6	4.7	21,407	3,046	648	14.2	3.0	40,668	10,857	1,299	26.7	3.2
	45 to 59	25,274	5,515	794	21.8	3.1	27,082	2,608	573	9.6	2.1	52,356	8,123	1,143	15.5	2.2
	60 plus	29,460	3,885	645	13.2	2.2	31,777	1,046	310	3.3	1.0	61,237	4,932	798	8.1	1.3
	Total	107,835	26,603	2,187	24.7	2.0	113,191	12,593	1,773	11.1	1.6	221,026	39,196	3,470	17.7	1.6
Mid North Coast																
	5 to 14	22,013	7,406	1,403	33.6	6.4	20,967	4,134	1,197	19.7	5.7	42,980	11,541	2,087	26.9	4.9
	15 to 29	25,239	5,820	1,205	23.1	4.8	24,768	2,242	1,051	9.1	4.2	50,007	8,062	1,813	16.1	3.6
	30 to 44	25,102	9,391	1,309	37.4	5.2	27,510	3,943	957	14.3	3.5	52,612	13,334	1,934	25.3	3.7
	45 to 59	35,051	7,272	1,164	20.7	3.3	37,849	3,837	865	10.1	2.3	72,900	11,109	1,761	15.2	2.4
	60 plus	49,668	8,841	1,030	17.8	2.1	51,782	2,647	570	5.1	1.1	101,450	11,488	1,333	11.3	1.3
	Total	157,073	38,730	3,221	24.7	2.1	162,876	16,803	2,425	10.3	1.5	319,949	55,533	5,026	17.4	1.6
Central West/North																
	5 to 14	27,662	5,995	1,279	21.7	4.6	25,882	5,520	1,167	21.3	4.5	53,544	11,515	1,853	21.5	3.5
	15 to 29	36,734	7,450	1,607	20.3	4.4	35,392	2,604	947	7.4	2.7	72,126	10,054	2,171	13.9	3.0
	30 to 44	33,117	9,440	1,311	28.5	4.0	34,520	4,998	978	14.5	2.8	67,637	14,438	1,969	21.3	2.9
	45 to 59	38,577	9,940	1,190	25.8	3.1	38,114	3,991	817	10.5	2.1	76,691	13,931	1,604	18.2	2.1
	60 plus	43,273	5,470	915	12.6	2.1	45,460	766	295	1.7	0.6	88,733	6,235	1,036	7.0	1.2
	Total	179,363	38,295	3,468	21.4	1.9	179,368	17,879	2,392	10.0	1.3	358,731	56,174	5,207	15.7	1.5
North West																
	5 to 14	8,495	2,386	417	28.1	4.9	7,937	1,903	409	24.0	5.2	16,432	4,289	671	26.1	4.1
	15 to 29	10,744	2,622	536	24.4	5.0	10,439	1,240	370	11.9	3.5	21,183	3,862	737	18.2	3.5
	30 to 44	9,943	3,059	401	30.8	4.0	10,562	1,601	317	15.2	3.0	20,505	4,660	615	22.7	3.0
	45 to 59	11,909	3,627	442	30.5	3.7	11,762	1,188	282	10.1	2.4	23,671	4,815	596	20.3	2.5
	60 plus	13,031	1,461	271	11.2	2.1	13,229	431	128	3.3	1.0	26,260	1,892	328	7.2	1.2
	Total	54,122	13,155	1,160	24.3	2.1	53,929	6,364	878	11.8	1.6	108,051	19,519	1,806	18.1	1.7

Appendix 1, continued

Residential stratum	Age group	Male					Female					Total				
		Pop'n	Fishers	SE	% fishers	SE	Pop'n	Fishers	SE	% fishers	SE	Pop'n	Fishers	SE	% fishers	SE
South East																
	5 to 14	14,381	4,698	989	32.7	6.9	13,553	2,695	891	19.9	6.6	27,934	7,393	1,498	26.5	5.4
	15 to 29	17,854	6,025	1,122	33.7	6.3	16,685	2,153	673	12.9	4.0	34,539	8,178	1,567	23.7	4.5
	30 to 44	18,672	5,424	810	29.1	4.3	19,838	3,222	690	16.2	3.5	38,510	8,647	1,273	22.5	3.3
	45 to 59	23,862	7,371	936	30.9	3.9	23,637	2,973	644	12.6	2.7	47,499	10,344	1,263	21.8	2.7
	60 plus	26,592	5,913	735	22.2	2.8	26,990	1,411	360	5.2	1.3	53,582	7,324	918	13.7	1.7
	Total	101,361	29,431	2,503	29.0	2.5	100,703	12,455	1,832	12.4	1.8	202,064	41,886	3,850	20.7	1.9
South West																
	5 to 14	18,418	6,927	1,096	37.6	5.9	17,612	4,383	916	24.9	5.2	36,030	11,309	1,598	31.4	4.4
	15 to 29	25,874	7,212	1,269	27.9	4.9	25,098	3,774	948	15.0	3.8	50,972	10,987	1,675	21.6	3.3
	30 to 44	23,336	9,325	1,032	40.0	4.4	23,687	3,281	706	13.8	3.0	47,023	12,606	1,477	26.8	3.1
	45 to 59	26,603	6,019	848	22.6	3.2	26,536	2,751	583	10.4	2.2	53,139	8,770	1,138	16.5	2.1
	60 plus	30,082	5,343	753	17.8	2.5	31,093	816	271	2.6	0.9	61,175	6,159	850	10.1	1.4
	Total	124,313	34,827	2,750	28.0	2.2	124,026	15,005	1,868	12.1	1.5	248,339	49,831	4,009	20.1	1.6
ACT																
	5 to 14	22,610	5,003	917	22.1	4.1	21,604	2,359	653	10.9	3.0	44,214	7,362	1,265	16.7	2.9
	15 to 29	41,847	7,168	1,311	17.1	3.1	41,267	2,401	847	5.8	2.1	83,114	9,569	1,766	11.5	2.1
	30 to 44	43,156	7,256	1,125	16.8	2.6	43,534	4,264	895	9.8	2.1	86,690	11,520	1,681	13.3	1.9
	45 to 59	34,389	6,736	972	19.6	2.8	35,876	1,615	428	4.5	1.2	70,265	8,350	1,178	11.9	1.7
	60 plus	28,129	2,423	572	8.6	2.0	31,648	809	291	2.6	0.9	59,777	3,232	706	5.4	1.2
	Total	170,131	28,586	2,631	16.8	1.5	173,929	11,447	1,585	6.6	0.9	344,060	40,034	3,708	11.6	1.1
Total - NSW/ACT																
	5 to 14	489,857	117,551	7,591	24.0	1.5	462,962	69,256	5,684	15.0	1.2	952,819	186,807	10,816	19.6	1.1
	15 to 29	786,155	108,643	7,875	13.8	1.0	768,727	41,815	4,673	5.4	0.6	1,554,882	150,458	10,021	9.7	0.6
	30 to 44	798,872	157,828	8,714	19.8	1.1	819,836	59,811	4,894	7.3	0.6	1,618,708	217,639	11,493	13.4	0.7
	45 to 59	735,567	131,733	6,428	17.9	0.9	758,875	48,335	3,930	6.4	0.5	1,494,442	180,068	8,752	12.0	0.6
	60 plus	723,123	81,515	4,377	11.3	0.6	791,547	20,144	2,169	2.5	0.3	1,514,670	101,659	5,386	6.7	0.4
	Total	3,533,574	597,270	19,265	16.9	0.5	3,601,947	239,361	11,880	6.6	0.3	7,135,521	836,632	27,456	11.7	0.4

Appendix 2 Annual recreational catch (total, kept and released numbers) in NSW/ACT waters during 2013/14 by residents aged five years and older - by reporting group and species. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Reporting group	Standard Fish Name	Scientific name/s	Total		Kept		Released	
			Number	SE	Number	SE	Number	SE
Bream	Bream	<i>Acanthopagrus</i> spp.	2,205,656	299,714	614,434	107,686	1,591,221	246,909
Flathead, Dusky	Dusky Flathead	<i>Platycephalus fuscus</i>	1,058,613	132,768	481,164	63,864	577,448	82,707
Flathead, Sand	Sand Flathead	<i>Platycephalus caeruleopunctatus</i> & <i>bassensis</i>	962,892	181,433	440,763	98,777	522,129	89,480
Flathead, Tiger	Tiger Flathead	<i>Platycephalus richardsoni</i>	82,330	31,558	39,417	14,738	42,913	19,117
Leatherjacket	Leatherjacket	Balistidae & Monacanthidae - undifferentiated	116,622	26,752	71,269	21,133	45,353	11,091
Luderick	Luderick	<i>Girella tricuspidata</i>	428,213	186,579	250,074	102,050	178,139	90,456
Mulloway	Mulloway	<i>Argyrosomus hololepidotus</i>	111,573	35,512	21,361	4,481	90,211	34,588
Red Rock Cod	Red Rock Cod	<i>Scorpaena jacksoniensis</i>	151,531	34,435	6,430	3,022	145,100	33,952
Salmon, Australian	Australian Salmon	<i>Arripis</i> spp.	144,706	27,036	73,535	17,779	71,171	17,321
Sharks	Gummy Shark	<i>Mustelus antarcticus</i>	4,000	1,553	1,020	432	2,980	1,449
	Hammerhead Shark	Sphyrnidae - undifferentiated	2,030	1,824			2,030	1,824
	Mako Shark	<i>Isurus oxyrinchus</i>	297	209			297	209
	Port Jackson Shark	<i>Heterodontus portusjacksoni</i>	3,240	1,715			3,240	1,715
	School Shark	<i>Galeorhinus galeus</i>	386	385	386	385		
	Tiger Shark	<i>Galeocerdo cuvier</i>	268	247			268	247
	Whaler Shark	Carcharhinidae	13,488	6,634	1,683	978	11,805	6,504
	Wobbegong Shark	Brachaeluridae - undifferentiated	9,510	5,234			9,510	5,234
	Shark, other	Several families - undifferentiated	613	458			613	458
	Shark, unspecified	Several families - undifferentiated	3,871	1,616			3,871	1,616
Rays	Shovelnose Ray	<i>Aptychotrema rostrata</i>	35,627	10,515	1,959	864	33,668	10,243
	Ray, other	Dasyatidae - undifferentiated	34,506	7,064	234	233	34,272	7,060
	Ray, unspecified	Dasyatidae - undifferentiated	1,103	713			1,103	713
Silver Trevally	Silver Trevally	<i>Pseudocaranx dentex</i>	87,501	23,509	49,081	17,410	38,420	8,952
Snapper	Snapper	<i>Pagrus auratus</i>	755,350	144,387	185,590	29,943	569,760	135,449
Swallowtail Dart	Swallowtail Dart	<i>Trachinotus coppingeri</i>	118,935	39,889	43,275	18,872	75,661	25,676
Tailor	Tailor	<i>Pomatomus saltatrix</i>	363,147	59,901	189,614	40,826	173,533	32,817

Appendix 2, continued

Reporting group	Standard Fish Name	Scientific name/s	Total		Kept		Released	
			Number	SE	Number	SE	Number	SE
Tunas	Albacore Tuna	<i>Thunnus alalunga</i>	2,267	1,664	1,164	827	1,104	954
	Bonito	<i>Sarda</i> spp.	48,082	28,429	40,231	24,104	7,851	4,769
	Mackerel Tuna	<i>Euthynnus affinis</i>	2,394	1,022	1,562	751	832	567
	Northern Bluefin Tuna	<i>Thunnus tonggol</i>	828	590	665	519	163	162
	Skipjack Tuna	<i>Katsuwonus pelamis</i>	966	700	966	700		
	Yellowfin Tuna	<i>Thunnus albacares</i>	2,510	943	1,745	716	765	455
Whiting, Sand	Sand Whiting	<i>Sillago ciliata</i>	568,827	111,478	247,470	56,795	321,357	68,607
Whiting, School	School Whiting	<i>Sillago flindersi</i>	11,807	4,278	4,995	2,078	6,813	2,645
Whiting, Trumpeter	Trumpeter Whiting	<i>Sillago maculata</i>	152,986	104,916	123,580	100,107	29,406	18,174
Wrasse/groppers	Blue Groper	<i>Achoerodus viridis</i>	9,620	4,834	3,529	1,985	6,092	4,248
	Maori Wrasse	<i>Ophthalmolepis lineolata</i>	18,088	6,027	4,141	1,565	13,946	5,541
	Pigfish	<i>Bodianus unimaculatus</i>	2,374	1,166	1,901	944	473	489
	Parrotfish	Scaridae - undifferentiated	8,567	4,224	436	290	8,131	4,214
	Tuskfish	<i>Choerodon</i> spp.	2,207	1,174	226	168	1,981	1,156
	Wrasse, other	Labridae - undifferentiated	65,510	26,378	7,664	4,438	57,846	25,401
	Wrasse, unspecified	Labridae - undifferentiated	5,434	1,930	1,406	786	4,028	1,744
Yellowtail Kingfish	Yellowtail Kingfish	<i>Seriola lalandi</i>	96,115	29,791	35,134	13,720	60,981	22,968
Baitfish	Blue Mackerel	<i>Scomber australasicus</i>	137,119	37,988	125,129	37,285	11,990	3,785
	Mullet	Mugilidae - undifferentiated	98,859	26,572	71,725	21,899	27,134	11,388
	Yellowtail Scad	<i>Trachurus novaezelandiae</i>	143,230	41,272	90,182	33,361	53,048	19,684
	Herring	Clupeidae - undifferentiated	291,749	148,514	287,290	148,180	4,459	3,320
	Pilchard	Clupeidae - undifferentiated	5,527	5,435	5,527	5,435		
	Other small baitfish	Several families - undifferentiated	20,735	10,954	20,735	10,954		
Freshwater fish	Australian Bass	<i>Macquaria novemaculeata</i>	195,802	62,660	11,305	3,690	184,497	60,569
	European Carp	<i>Cyprinus carpio</i>	500,164	84,945	498,735	84,914	1,428	1,074
	Golden Perch	<i>Macquaria ambigua</i>	142,601	18,752	76,529	11,117	66,072	10,703
	Murray Cod	<i>Maccullochella peelii</i>	165,557	29,865	20,816	4,383	144,741	28,013
	Redfin Perch	<i>Perca fluviatilis</i>	136,279	52,588	44,426	14,649	91,853	47,557
	Brown Trout	<i>Salmo trutta</i>	85,275	24,849	59,935	21,319	25,340	6,283
	Rainbow Trout	<i>Oncorhynchus mykiss</i>	72,700	18,485	47,885	14,583	24,815	6,678

Appendix 2, continued

Reporting group	Standard Fish Name	Scientific name/s	Total		Kept		Released	
			Number	SE	Number	SE	Number	SE
Scalefish, other (saltwater)	Amberjack	<i>Seriola dumerili</i>	204	202	204	202		
	Barracuda	<i>Sphyræna barracuda</i>	1,867	1,069	279	196	1,588	945
	Batfish/butter bream	<i>Monodactylus argenteus</i>	7,639	2,744	874	871	6,764	2,602
	Cobia	<i>Rachycentron canadum</i>	433	273	224	162	209	147
	Cod/groupers	Serranidae - undifferentiated	21,301	5,106	1,749	856	19,552	4,993
	Dolphinfish	<i>Coryphaena hippurus</i>	74,859	28,913	25,509	7,551	49,350	22,977
	Drummer, Rock Blackfish	<i>Girella elevata</i>	53,502	24,534	34,631	16,109	18,871	9,227
	Drummer, Silver	<i>Kyphosus sydneyanus</i>	3,856	2,192	1,541	1,142	2,315	1,283
	Eastern Wirrah	<i>Acanthistius ocellatus</i>	1,781	1,369	213	210	1,568	1,353
	Emperor, unspecified	Lethrinidae - undifferentiated	109	108	109	108		
	Fish, unknown	Several families - undifferentiated	1,552	731			1,552	731
	Flounder/sole	Bothidae & Pleuronectidae spp, Soleidae	40,929	8,184	21,864	4,757	19,065	5,658
	Fusilier	<i>Caesio</i> & <i>Pterocaesio</i> spp.	870	862			870	862
	Garfish	Hemiramphidae - undifferentiated	21,863	7,540	18,838	7,304	3,025	1,358
	Gurnard	Triglidae & Peristediidae - undifferentiated	5,812	2,576	1,390	917	4,422	2,310
	Long Tom	Belonidae - undifferentiated	1,794	751	322	320	1,473	679
	Mackerel, Narrow-barred	<i>Scomberomorus commerson</i>	5,906	2,222	5,283	2,178	623	443
	Mackerel, Spotted	<i>Scomberomorus munroi</i>	13,303	6,532	13,140	6,530	163	162
	Marlin, Black	<i>Makaira indica</i>	898	495	283	282	615	406
	Marlin, Blue	<i>Makaira nigricans</i>	216	151			216	151
	Marlin, Striped	<i>Tetrapturus audax</i>	163	162			163	162
	Morwong, Grey	<i>Nemadactylus douglasii</i>	33,431	7,889	30,211	7,596	3,219	1,178
	Morwong, Red	<i>Cheilodactylus fuscus</i>	16,661	8,245	10,299	5,249	6,362	4,571
	Pearl Perch	<i>Glaucosoma scapulare</i>	6,527	2,970	4,434	2,067	2,093	1,131
	Perch, unspecified	Percichthyidae & Serranidae - undifferentiated	385	378	385	378		
	Pike	Sphyrænidae - undifferentiated	12,620	4,233	147	112	12,473	4,232
	Queenfish	<i>Scomberoides</i> spp.	183	181			183	181
	Redfish	<i>Centroberyx affinis</i>	38,146	15,022	21,450	13,154	16,696	6,795
	Rock Cale/Kelpfish	Chironemidae & Aplodactylidae - undifferentiated	11,891	8,400			11,891	8,400

Appendix 2, continued

Reporting group	Standard Fish Name	Scientific name/s	Total		Kept		Released	
			Number	SE	Number	SE	Number	SE
Scalefish, other (saltwater) continued	Sergeant Baker	<i>Aulopus purpurissatus</i>	101,794	35,282	8,314	5,221	93,480	31,000
	Silverbiddy	Gerreidae - undifferentiated	9,692	9,671	6,461	6,447	3,231	3,224
	Snapper, Mangrove jack	<i>Lutjanus argentimaculatus</i>	281	280	140	140	140	140
	Snapper, Russels/moses	<i>Lutjanus russellii</i>	653	611	40	42	613	609
	Snapper, other	Lutjanus - undifferentiated	84	83	84	83		
	Stargazer	Uranoscopidae - undifferentiated	349	258			349	258
	Sweep	<i>Scorpius lineolata</i>	39,790	13,192	9,167	4,923	30,623	12,270
	Tarwhine	<i>Rhabdosargus sarba</i>	59,236	22,163	18,759	6,761	40,477	18,158
	Teraglin	<i>Atractoscion aequidens</i>	46,150	11,321	32,574	7,846	13,575	4,917
	Toads/pufferfish	Tetraodontidae & Ostraciidae - undifferentiated	37,782	9,120			37,782	9,120
	Trevally, Giant	<i>Caranx ignobilis</i>	483	446	322	298	161	149
	Trevally, other	Carangidae - undifferentiated	51	51	51	51		
	Trumpeter, Bastard	<i>Latridopsis forsteri</i>	278	275	278	275		
	Trumpeter/grunters	Terapontidae	5,108	1,861	121	119	4,988	1,857
	Wahoo	<i>Acanthocybium solandri</i>	40	42	40	42		
Scalefish, other (freshwater)	Atlantic Salmon	<i>Salmo salar</i>	529	393	406	349	123	128
	Bony Bream	<i>Nematalosa erebi</i> & <i>Nematalosa vlaminghi</i>	7,627	2,909	2,670	2,173	4,957	1,940
	Eastern Cod	<i>Maccullochella ikei</i>	920	587			920	587
	River Blackfish	<i>Gadopsis marmoratus</i>	1,144	1,140	1,144	1,140		
	Silver Perch	<i>Bidyanus bidyanus</i>	14,870	4,585	4,040	2,331	10,831	3,946
	Spangled Perch	<i>Leiopotherapon unicolor</i>	8,105	7,867			8,105	7,867
	Trout Cod	<i>Maccullochella macquariensis</i>	13,353	7,727			13,353	7,727
Scalefish, other (saltwater and freshwater)	Catfish, eeltail	Plotosidae - undifferentiated	54,870	13,123	1,479	1,342	53,391	13,046
	Catfish, forktail	Ariidae - undifferentiated	23,403	8,566	363	358	23,040	8,529
	Catfish, unspecified	Plotosidae - undifferentiated	36,880	32,513	36,760	32,513	120	117
	Eel	Several families - undifferentiated	30,341	7,529	4,275	2,502	26,066	7,113
Blue Swimmer Crab	Blue Swimmer Crab	<i>Portunus pelagicus</i>	73,501	20,944	50,637	14,220	22,864	9,014
Mud Crab	Mud Crab	<i>Scylla</i> spp.	48,634	14,075	30,052	8,865	18,582	6,325
Rock lobster	Rock lobster	Palinuridae - undifferentiated	26,507	14,273	23,216	12,501	3,291	2,798

Appendix 2, continued

Reporting group	Standard Fish Name	Scientific name/s	Total		Kept		Released	
			Number	SE	Number	SE	Number	SE
Prawns (saltwater)	Prawns (saltwater)	Penaeidae - undifferentiated	728,843	426,343	724,756	426,343	4,087	2,861
Shrimp (freshwater)	Shrimp (freshwater)	Palaemonidae - undifferentiated	409,711	148,424	330,025	108,398	79,686	62,268
Nippers (saltwater)	Nippers (saltwater)	<i>Trypaea australiensis</i>	1,415,852	403,605	1,319,066	367,909	96,787	71,069
Yabbies (freshwater)	Yabbies (freshwater)	<i>Cherax</i> spp.	275,108	92,992	239,838	89,047	35,270	18,012
Crustaceans, other	Murray Crayfish	<i>Euastacus armatus</i>	1,167	755	346	217	821	587
	Razorfish	<i>Pinna dolabrata</i>	2,255	2,242	2,255	2,242		
	Crabs, other	Brachyura - undifferentiated	6,448	6,178	6,448	6,178		
Squids	Squids	Loliginidae - undifferentiated	111,799	53,498	105,308	51,757	6,491	4,737
Cephalopods, other	Cuttlefish	Sepiidae - undifferentiated	11,292	8,518	6,359	4,591	4,933	4,166
	Southern Calamari	<i>Sepioteuthis australis</i>	6,472	5,549	6,472	5,549		
	Octopus	Octopodidae - undifferentiated	6,801	2,583	306	221	6,495	2,569
Abalone	Abalone	Haliotidae - undifferentiated	18,843	11,735	18,423	11,718	421	413
Pipis	Pipis	<i>Donax (Plebidonax) deltoides</i>	90,452	31,719	87,760	31,272	2,692	2,653
Worms	Beach worms	Arenicolidae - undifferentiated	239,085	85,662	239,085	85,662		
	Blood worms	<i>Glycera</i> spp.	12,471	12,205	12,471	12,205		
	Worms, other	Class Polychaeta - undifferentiated	10,622	10,543	10,622	10,543		
Other taxa	Cunjuvoi	<i>Pyura praeputialis</i>	1,013	1,002	1,013	1,002		
	Non-fish, other	Several families - undifferentiated	62	61			62	61

Appendix 3 Annual recreational catch (kept and released numbers) of key species in NSW/ACT waters during 2013/14, by residents aged five years and older - by targeted and non-targeted effort. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Targeted		Non-targeted		% targeted
	Number	SE	Number	SE	
Bream	1,185,608	237,660	1,020,048	110,422	53.8
Flathead, Dusky	678,678	107,257	379,935	60,737	64.1
Flathead, Sand	613,034	153,414	349,858	55,907	63.7
Flathead, Tiger	57,381	29,450	24,949	10,852	69.7
Leatherjacket	5,375	3,808	111,247	26,492	4.6
Luderick	351,703	185,438	76,509	20,438	82.1
Mulloway	63,394	30,531	48,179	17,946	56.8
Red Rock Cod	131	131	151,400	34,432	0.1
Salmon, Australian	71,053	20,020	73,653	15,636	49.1
Sharks and rays	251	247	108,686	19,303	0.2
Silver Trevally	14,945	12,138	72,556	15,738	17.1
Snapper	225,491	41,012	529,859	137,162	29.9
Swallowtail Dart	48,558	26,653	70,377	21,864	40.8
Tailor	165,796	40,483	197,352	37,147	45.7
Tunas	40,269	28,230	16,778	3,927	70.6
Whiting, Sand	307,164	70,128	261,663	55,397	54.0
Whiting, School	390	277	11,418	4,269	3.3
Whiting, Trumpeter	109,899	90,145	43,087	19,064	71.8
Wrasse/groper	8,260	5,970	103,539	32,965	7.4
Yellowtail Kingfish	63,223	21,200	32,892	13,727	65.8
Blue Mackerel	64,835	29,439	72,284	24,000	47.3
Mullet	41,987	13,667	56,872	21,363	42.5
Yellowtail Scad	37,206	16,506	106,024	34,178	26.0
Other small baitfish	219,730	110,931	98,280	71,079	69.1
Australian Bass	154,872	56,903	40,930	20,837	79.1
European Carp	91,399	49,612	408,765	66,316	18.3
Golden Perch	116,952	16,999	25,649	5,344	82.0
Murray Cod	120,808	25,295	44,749	8,208	73.0
Redfin Perch	110,385	50,934	25,893	6,221	81.0
Trout	151,725	37,204	6,250	3,208	96.0
Scalefish, other	139,532	33,581	732,983	90,975	16.0
Blue Swimmer Crab	54,183	20,137	19,318	5,954	73.7
Mud Crab	46,001	13,977	2,633	1,188	94.6
Rock lobster	17,378	9,862	9,129	8,304	65.6
Prawns (saltwater)	728,843	426,343			100.0
Shrimp (freshwater)	403,215	148,321	6,497	4,697	98.4
Nippers (saltwater)	1,415,852	403,605			100.0
Yabbies (freshwater)	272,932	92,978	2,177	1,244	99.2
Crustaceans, other	9,761	6,615	109	108	98.9
Squids	94,195	51,828	17,604	6,376	84.3
Cephalopods, other	16,616	13,926	7,948	2,669	67.6
Abalone	5,882	3,515	12,961	8,556	31.2
Pipis	90,452	31,719			100.0
Worms	262,178	94,992			100.0
Other taxa	1,013	1,002	62	61	94.3

Appendix 4 Annual recreational harvest (kept numbers) of key species in NSW/ACT waters during 2013/14, by residents aged five years and older - by targeted and non-targeted effort. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Targeted		Non-targeted		% targeted
	Number	SE	Number	SE	
Bream	375,788	90,015	238,647	35,853	61.2
Flathead, Dusky	329,341	55,647	151,823	22,316	68.4
Flathead, Sand	291,752	80,227	149,011	28,810	66.2
Flathead, Tiger	30,834	13,938	8,583	4,605	78.2
Leatherjacket	3,203	2,906	68,067	20,942	4.5
Luderick	209,917	101,178	40,157	12,204	83.9
Mulloway	8,716	3,173	12,646	3,121	40.8
Red Rock Cod	131	131	6,300	2,990	2.0
Salmon, Australian	39,534	14,078	34,001	10,419	53.8
Sharks and rays	251	247	5,031	1,356	4.8
Silver Trevally	12,651	10,130	36,431	9,548	25.8
Snapper	103,423	20,311	82,167	20,002	55.7
Swallowtail Dart	27,138	16,147	16,137	6,282	62.7
Tailor	110,862	32,036	78,752	19,184	58.5
Tunas	32,042	23,885	14,291	3,312	69.2
Whiting, Sand	156,641	42,123	90,828	21,673	63.3
Whiting, School	163	163	4,831	2,071	3.3
Whiting, Trumpeter	103,331	88,771	20,249	11,893	83.6
Wrasse/groper	4,722	3,575	14,581	3,863	24.5
Yellowtail Kingfish	19,346	7,083	15,788	11,456	55.1
Blue Mackerel	62,197	29,173	62,932	23,199	49.7
Mullet	36,526	12,714	35,199	17,420	50.9
Yellowtail Scad	24,140	12,510	66,042	28,407	26.8
Other small baitfish	219,730	110,931	93,822	70,635	70.1
Australian Bass	5,420	3,091	5,885	1,957	47.9
European Carp	91,399	49,612	407,336	66,276	18.3
Golden Perch	62,814	9,770	13,715	3,437	82.1
Murray Cod	13,736	3,705	7,080	2,214	66.0
Redfin Perch	34,767	14,362	9,659	2,933	78.3
Trout	104,197	30,910	3,623	2,499	96.6
Scalefish, other	78,548	17,529	242,320	46,200	24.5
Blue Swimmer Crab	39,280	13,620	11,356	4,259	77.6
Mud Crab	28,979	8,772	1,073	483	96.4
Rock lobster	14,087	7,372	9,129	8,304	60.7
Prawns (saltwater)	724,756	426,343			100.0
Shrimp (freshwater)	325,696	108,317	4,329	4,188	98.7
Nippers (saltwater)	1,319,066	367,909			100.0
Yabbies (freshwater)	237,854	89,034	1,984	1,230	99.2
Crustaceans, other	8,940	6,575	109	108	98.8
Squids	89,222	50,035	16,086	6,309	84.7
Cephalopods, other	11,979	9,848	1,157	667	91.2
Abalone	5,882	3,515	12,540	8,533	31.9
Pipis	87,760	31,272			100.0
Worms	262,178	94,992			100.0
Other taxa	1,013	1,002			100.0

Appendix 5 Annual harvest of key species in NSW waters by NSW/ACT residents, aged five years and older - indicative estimates of the total weight (tonnes), compared with estimates for the commercial fisheries sector during 2013/14.

Species/ group	Recreational Estuarine Harvest			Recreational Marine Harvest			Total Harvest (t)			% Recreational
	Numbers	Average weight (g)	Total weight (t)	Numbers	Average weight (g)	Total weight (t)	Recreational (t)	Commercial (t)	Grand Total (t)	
Bream	497,270	525	261	117,164	589	69	330	343	672	49.1
Flathead, Dusky	468,978	593	278	9,691	1,023	10	288	115	404	71.4
Flathead, Sand	61,715	409	25	379,048	488	185	210	101	311	67.5
Mulloway	14,181	2,530	36	7,181	2,897	21	57	59	116	49.0
Salmon, Australian	24,759	2,870	71	48,776	2,283	111	182	1,112	1,294	14.1
Silver Trevally	23,036	543	13	26,046	558	15	27	168	195	13.9
Snapper	39,544	564	22	146,046	860	126	148	220	368	40.2
Tailor	52,933	499	26	136,681	593	81	107	62	169	63.5
Whiting, Sand	180,864	278	50	66,606	278	19	69	79	148	46.5
Yellowtail Kingfish	2,046	3,223	7	33,088	3,434	114	120	109	229	52.5

Appendix 6 Annual recreational effort (numbers of fishers and fisher days) and catch (kept and released numbers) of key species by water body type during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

	Offshore		Inshore		Estuary		River		Lake/dam	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Effort										
Fishers	24,576	4,472	234,531	16,111	522,009	28,458	129,691	10,093	104,026	9,046
Fisher days	54,773	14,316	695,542	60,058	1,795,958	125,190	359,490	32,802	300,533	35,081
Catch										
Bream			257,142	38,667	1,947,059	291,295	1,455	934		
Flathead, Dusky	162	163	36,593	16,793	1,018,321	131,180	3,536	2,520		
Flathead, Sand	134,470	53,517	666,050	129,453	162,372	65,700				
Flathead, Tiger	10,496	8,488	65,522	29,697	6,312	4,356				
Leatherjacket	8,928	5,136	58,712	18,377	48,982	14,227				
Luderick			105,070	42,360	323,142	181,284				
Mulloway	864	592	13,663	4,876	97,045	35,131				
Red Rock Cod	19,725	7,622	118,470	32,716	13,336	5,600				
Salmon, Australian	4,111	2,854	100,115	21,231	40,480	13,759				
Sharks and rays	3,128	1,264	57,928	14,346	47,881	12,742				
Silver Trevally	2,699	1,765	47,847	13,478	36,955	19,198				
Snapper	57,673	18,536	235,764	39,565	461,913	135,807				
Swallowtail Dart			114,259	39,816	4,676	2,428				
Tailor	1,869	980	181,215	42,999	180,064	39,057				
Tunas	16,459	8,279	36,302	23,007	4,287	2,486				
Whiting, Sand			113,741	23,925	455,086	100,635				
Whiting, School	1,424	1,062	206	206	10,178	4,113				
Whiting, Trumpeter					152,986	104,916				
Wrasse/groper	11,999	5,401	91,764	33,476	8,036	2,415				
Yellowtail Kingfish	30,176	21,116	49,013	16,904	16,927	9,242				
Blue Mackerel	14,601	5,507	79,619	24,975	42,898	26,861				
Mullet			8,913	4,169	72,340	19,807	17,606	16,405		
Yellowtail Scad	2,970	2,201	67,875	25,246	72,385	31,145				
Other small baitfish			4,322	3,600	313,688	150,342				

Appendix 6, continued

Species/group	Offshore		Inshore		Estuary		River		Lake/dam	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Australian Bass					3,621	1,567	82,152	30,346	110,029	53,963
European Carp							437,111	80,667	63,053	16,933
Golden Perch							77,026	13,392	65,574	11,563
Murray Cod							145,467	28,594	20,090	6,780
Redfin Perch							41,804	37,644	94,475	36,674
Trout							27,719	7,021	130,256	37,914
Scalefish, other	96,958	26,414	392,985	82,966	265,383	41,108	84,379	34,426	32,809	15,708
Blue Swimmer Crab			744	443	72,757	20,941				
Mud Crab					48,634	14,075				
Rock lobster			21,425	13,068	5,082	3,179				
Prawns (saltwater)					728,843	426,343				
Shrimp (freshwater)							375,309	142,794	34,403	23,582
Nippers (saltwater)					1,415,852	403,605				
Yabbies (freshwater)							89,886	58,991	185,222	62,057
Crustaceans, other			6,448	6,178	2,255	2,242	1,167	755		
Squids			22,243	7,903	89,556	52,223				
Cephalopods, other			2,366	1,219	22,198	14,129				
Abalone			17,461	10,544	1,383	1,377				
Pipis			88,651	31,668	1,802	1,789				
Worms			199,307	69,587	62,870	40,673				
Other taxa			1,074	1,004						

Appendix 7 Annual recreational harvest (kept numbers) of key species by water body type during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Offshore		Inshore		Estuary		River		Lake/dam	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Bream			117,164	23,168	497,270	102,394				
Flathead, Dusky	162	163	9,528	5,990	468,978	63,571	2,496	1,732		
Flathead, Sand	55,338	25,210	323,710	77,228	61,715	22,588				
Flathead, Tiger	5,125	4,239	33,365	13,956	926	926				
Leatherjacket	6,718	4,212	36,562	13,995	27,989	10,261				
Luderick			84,912	40,157	165,162	93,764				
Mulloway	864	592	6,316	2,230	14,181	3,885				
Red Rock Cod	331	214	4,373	2,829	1,726	1,020				
Salmon, Australian	1,666	1,651	47,110	13,766	24,759	9,585				
Sharks and rays	582	340	2,931	1,171	1,769	644				
Silver Trevally	1,041	847	25,005	7,569	23,036	15,695				
Snapper	30,674	9,289	115,372	20,605	39,544	17,370				
Swallowtail Dart			42,793	18,866	481	478				
Tailor	540	388	136,141	37,223	52,933	16,377				
Tunas	11,066	5,651	31,271	19,833	3,996	2,436				
Whiting, Sand			66,606	14,825	180,864	51,919				
Whiting, School	405	403			4,590	2,038				
Whiting, Trumpeter					123,580	100,107				
Wrasse/groper	4,008	2,263	13,615	6,205	1,680	980				
Yellowtail Kingfish	10,467	5,362	22,621	12,032	2,046	1,132				
Blue Mackerel	12,727	4,651	75,441	24,439	36,961	26,547				
Mullet			7,317	3,411	47,081	13,681	17,327	16,402		
Yellowtail Scad	1,671	1,201	50,600	20,494	37,911	24,611				
Other small baitfish			4,322	3,600	309,229	150,006				

Appendix 7, continued

Species/group	Offshore		Inshore		Estuary		River		Lake/dam	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Australian Bass					803	573	3,910	1,469	6,592	3,322
European Carp							436,665	80,667	62,070	16,905
Golden Perch							43,442	8,353	33,087	6,476
Murray Cod							18,882	4,317	1,935	771
Redfin Perch							2,335	1,172	42,091	14,594
Trout							7,094	2,604	100,725	32,327
Scalefish, other	38,774	8,769	170,362	34,280	67,464	15,708	40,592	32,522	3,677	2,256
Blue Swimmer Crab			249	248	50,387	14,218				
Mud Crab					30,052	8,865				
Rock lobster			18,508	11,128	4,708	3,125				
Prawns (saltwater)					724,756	426,343				
Shrimp (freshwater)							301,047	100,783	28,978	23,117
Nippers (saltwater)					1,319,066	367,909				
Yabbies (freshwater)							78,907	58,232	160,932	56,758
Crustaceans, other			6,448	6,178	2,255	2,242	346	217		
Squids			21,918	7,858	83,390	50,444				
Cephalopods, other			525	369	12,611	9,864				
Abalone			17,040	10,525	1,383	1,377				
Pipis			85,958	31,221	1,802	1,789				
Worms			199,307	69,587	62,870	40,673				
Other taxa			1,013	1,002						

Appendix 8 Annual recreational effort (numbers of fishers and fisher days) and catch (kept and released numbers) of key species by fishing method during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

	Line		Pot/trap		Net		Dive		Other	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Effort										
Fishers	729,396	31,372	33,610	5,256	14,569	3,609	11,037	2,675	33,979	5,233
Fisher days	3,083,157	161,261	69,263	11,926	19,703	4,785	40,767	19,132	85,533	16,203
Catch										
Bream	2,202,206	299,596			189	189	3,261	1,905		
Flathead, Dusky	1,057,388	132,763	402	289	566	567	256	255		
Flathead, Sand	960,013	181,351			1,416	1,418	1,464	1,066		
Flathead, Tiger	82,330	31,558								
Leatherjacket	98,497	19,718					18,125	16,551		
Luderick	418,273	186,442					9,940	5,904		
Mulloway	111,573	35,512								
Red Rock Cod	151,531	34,435								
Salmon, Australian	144,517	27,030			189	189				
Sharks and rays	108,912	19,326	25	25						
Silver Trevally	87,407	23,508			94	95				
Snapper	754,795	144,326					555	550		
Swallowtail Dart	118,935	39,889								
Tailor	362,891	59,901					256	255		
Tunas	57,047	28,585								
Whiting, Sand	568,707	111,478					120	118		
Whiting, School	11,807	4,278								
Whiting, Trumpeter	152,986	104,916								
Wrasse/groper	111,217	34,110					582	410		
Yellowtail Kingfish	95,924	29,790					191	189		
Blue Mackerel	137,119	37,988								
Mullet	81,206	24,843	17,652	9,477						
Yellowtail Scad	143,230	41,272								
Other small baitfish	318,010	150,408								

Appendix 8, continued

Species/group	Line		Pot/trap		Net		Dive		Other	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Australian Bass	195,802	62,660								
European Carp	498,043	84,933	495	486	1,181	1,169	444	429		
Golden Perch	142,483	18,752			118	117				
Murray Cod	165,498	29,865			59	58				
Redfin Perch	136,279	52,588								
Trout	157,975	38,760								
Scalefish, other	845,938	100,254					26,577	19,509		
Blue Swimmer Crab	18,638	5,932	50,402	19,989	4,461	2,495				
Mud Crab	1,394	576	46,217	13,979	1,022	1,017				
Rock lobster							26,507	14,273		
Prawns (saltwater)					728,843	426,343				
Shrimp (freshwater)			400,040	148,147	9,672	5,651				
Nippers (saltwater)									1,415,852	403,605
Yabbies (freshwater)	8,444	6,300	178,131	71,224	87,636	50,272			897	889
Crustaceans, other	109	108	1,058	747	276	270			8,427	6,567
Squids	106,331	53,227					5,469	4,237		
Cephalopods, other	24,447	14,172			117	116				
Abalone							18,566	11,616	278	275
Pipis									90,452	31,719
Worms									262,178	94,992
Other taxa	62	61							1,013	1,002

Appendix 9 Annual recreational harvest (kept numbers) of key species by fishing method during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Line		Pot/trap		Net		Dive		Other	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Bream	611,079	107,521			94	95	3,261	1,905		
Flathead, Dusky	480,411	63,861	402	289	94	95	256	255		
Flathead, Sand	439,111	98,733			189	189	1,464	1,066		
Flathead, Tiger	39,417	14,738								
Leatherjacket	53,144	13,135					18,125	16,551		
Luderick	240,134	101,807					9,940	5,904		
Mulloway	21,361	4,481								
Red Rock Cod	6,430	3,022								
Salmon, Australian	73,441	17,779			94	95				
Sharks and rays	5,282	1,464								
Silver Trevally	49,081	17,410								
Snapper	185,034	29,728					555	550		
Swallowtail Dart	43,275	18,872								
Tailor	189,358	40,826					256	255		
Tunas	46,333	24,191								
Whiting, Sand	247,350	56,795					120	118		
Whiting, School	4,995	2,078								
Whiting, Trumpeter	123,580	100,107								
Wrasse/groppers	18,721	6,662					582	410		
Yellowtail Kingfish	34,943	13,719					191	189		
Blue Mackerel	125,129	37,285								
Mullet	57,302	20,144	14,423	8,620						
Yellowtail Scad	90,182	33,361								
Other small baitfish	313,551	150,072								

Appendix 9, continued.

Species/group	Line		Pot/trap		Net		Dive		Other	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Australian Bass	11,305	3,690								
European Carp	496,615	84,902	495	486	1,181	1,169	444	429		
Golden Perch	76,410	11,117			118	117				
Murray Cod	20,757	4,383			59	58				
Redfin Perch	44,426	14,649								
Trout	107,819	32,450								
Scalefish, other	294,291	48,401					26,577	19,509	-	-
Blue Swimmer Crab	11,356	4,259	35,915	13,432	3,366	2,255				
Mud Crab	857	433	29,195	8,774						
Rock lobster							23,216	12,501		
Prawns (saltwater)					724,756	426,343				
Shrimp (freshwater)			320,353	108,056	9,672	5,651				
Nippers (saltwater)									1,319,066	367,909
Yabbies (freshwater)	8,251	6,297	150,754	66,808	79,936	49,225			897	889
Crustaceans, other	109	108	237	188	276	270			8,427	6,567
Squids	99,839	51,476					5,469	4,237		
Cephalopods, other	13,019	9,870			117	116				
Abalone							18,145	11,599	278	275
Pipis									87,760	31,272
Worms									262,178	94,992
Other taxa									1,013	1,002

Appendix 10 Annual recreational effort (numbers of fishers and fisher days) and catch (kept and released numbers) of key species in NSW/ACT waters by fishing platform during 2013/14, by residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

	Boat		Shore		Both		%
	Number	SE	Number	SE	Number	SE	Shore
Effort							
Fishers	390,607	23,715	550,589	26,544	n/a	n/a	n/a
Fisher days	1,365,838	100,202	1,862,738	116,019	n/a	n/a	n/a
Catch							
Bream	936,858	141,269	1,266,434	245,069	2,363	1,499	57.5
Flathead, Dusky	864,620	125,743	193,116	35,971	877	685	18.3
Flathead, Sand	865,775	179,864	97,117	16,412			10.1
Flathead, Tiger	82,330	31,558					0.0
Leatherjacket	72,994	16,201	43,628	20,022			37.4
Luderick	189,685	132,239	238,528	69,431			55.7
Mulloway	80,790	34,594	30,782	7,841			27.6
Red Rock Cod	133,235	33,816	18,296	5,984			12.1
Salmon, Australian	37,020	13,316	107,686	22,254			74.4
Sharks and rays	65,238	16,713	43,699	9,024			40.1
Silver Trevally	60,069	22,300	27,432	7,258			31.3
Snapper	600,898	129,578	154,345	62,710	108	108	20.4
Swallowtail Dart	2,697	1,730	116,238	39,636			97.7
Tailor	159,037	41,430	202,305	40,024	1,806	1,724	56.0
Tunas	29,762	9,285	27,285	22,846			47.8
Whiting, Sand	266,240	86,178	302,395	58,891	192	185	53.2
Whiting, School	7,647	3,508	3,866	2,442	294	293	33.6
Whiting, Trumpeter	149,356	104,862	3,630	3,365			2.4
Wrasse/groppers	73,324	22,912	38,476	16,342			34.4
Yellowtail Kingfish	87,868	28,437	8,247	5,093			8.6
Blue Mackerel	126,606	37,587	10,513	5,470			7.7
Mullet	24,718	12,900	74,140	22,635			75.0
Yellowtail Scad	115,238	39,390	27,992	12,356			19.5
Other small baitfish	84,881	47,696	233,130	138,828			73.3
Australian Bass	163,173	59,749	31,955	13,073	674	675	16.4
European Carp	103,567	23,912	394,026	79,355	2,571	1,410	79.2
Golden Perch	79,390	13,701	61,980	11,162	1,231	859	43.8
Murray Cod	92,435	21,205	71,065	16,726	2,057	1,325	43.5
Redfin Perch	108,842	51,691	26,650	8,732	786	775	19.7
Trout	89,902	33,836	66,395	17,050	1,678	1,439	42.5
Scalefish, other	531,477	65,342	340,010	76,029	1,028	613	39.0

Appendix 10, continued

Species/group	Boat		Shore		Both		% Shore
	Number	SE	Number	SE	Number	SE	
Blue Swimmer Crab	37,210	14,523	36,291	14,750			49.4
Mud Crab	20,308	8,653	28,325	10,712			58.2
Rock lobster	2,846	1,667	23,661	12,778			89.3
Prawns (saltwater)	356,186	323,746	372,657	191,261			51.1
Shrimp (freshwater)	113,617	70,639	296,095	108,889			72.3
Nippers (saltwater)	24,993	15,475	1,390,859	402,861			98.2
Yabbies (freshwater)	667	482	274,442	92,991			99.8
Crustaceans, other	3,313	2,363	6,448	6,178	109	108	66.1
Squids	93,986	52,451	17,814	7,480			15.9
Cephalopods, other	21,141	14,113	3,423	1,306			13.9
Abalone	6,851	4,177	11,992	7,824			63.6
Pipis			90,452	31,719			100.0
Worms			262,178	94,992			100.0
Other taxa	62	61	1,013	1,002			94.3

Appendix 11 Annual recreational harvest (kept numbers) of key species by fishing platform during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	Boat		Shore		Both		% Shore
	Number	SE	Number	SE	Number	SE	
Bream	327,621	88,151	286,813	45,903			46.7
Flathead, Dusky	395,582	61,812	85,583	13,954			17.8
Flathead, Sand	398,036	97,538	42,727	9,032			9.7
Flathead, Tiger	39,417	14,738					0.0
Leatherjacket	40,289	10,525	30,980	18,320			43.5
Luderick	116,483	77,396	133,591	44,543			53.4
Mulloway	9,615	2,673	11,746	3,534			55.0
Red Rock Cod	4,900	2,909	1,530	818			23.8
Salmon, Australian	22,759	10,500	50,776	14,210			69.1
Sharks and rays	3,058	1,007	2,224	941			42.1
Silver Trevally	35,955	16,935	13,126	4,079			26.7
Snapper	179,438	29,802	6,043	3,113	108	108	3.3
Swallowtail Dart	852	866	42,422	18,657			98.0
Tailor	74,365	26,327	115,249	29,637			60.8
Tunas	22,813	6,785	23,520	19,696			50.8
Whiting, Sand	103,972	35,833	143,497	40,693			58.0
Whiting, School	3,381	1,802	1,614	1,034			32.3
Whiting, Trumpeter	122,236	100,098	1,344	1,342			1.1
Wrasse/groper	10,774	2,967	8,529	5,981			44.2
Yellowtail Kingfish	34,579	13,716	555	318			1.6
Blue Mackerel	117,337	37,072	7,792	3,969			6.2
Mullet	13,726	5,785	57,999	20,852			80.9
Yellowtail Scad	84,301	33,248	5,881	2,777			6.5
Other small baitfish	81,663	47,060	231,888	138,824			74.0
Australian Bass	8,282	3,467	3,023	1,240			26.7
European Carp	103,567	23,912	392,597	79,321	2,571	1,410	79.1
Golden Perch	41,415	8,081	34,089	6,862	1,025	730	45.1
Murray Cod	10,141	2,516	10,458	2,964	217	215	50.8
Redfin Perch	30,594	12,942	13,832	6,742			31.1
Trout	70,276	28,386	36,835	14,418	708	708	34.4
Scalefish, other	190,236	28,225	130,306	42,910	326	325	40.7
Blue Swimmer Crab	29,064	10,103	21,573	9,617			42.6
Mud Crab	11,760	4,659	18,292	7,068			60.9
Rock lobster	2,846	1,667	20,370	10,970			87.7
Prawns (saltwater)	356,186	323,746	368,570	191,243			50.9
Shrimp (freshwater)	80,137	58,244	249,888	88,160			75.7
Nippers (saltwater)	23,164	14,035	1,295,902	367,250			98.2
Yabbies (freshwater)	667	482	239,172	89,047			99.7
Crustaceans, other	2,492	2,250	6,448	6,178	109	108	72.1
Squids	88,597	50,680	16,711	7,431			15.9
Cephalopods, other	12,712	9,866	424	321			3.2
Abalone	6,851	4,177	11,571	7,798			62.8
Pipis			87,760	31,272			100.0
Worms			262,178	94,992			100.0
Other taxa			1,013	1,002			100.0

Appendix 12 Annual recreational effort (numbers of fishers and fisher days) and catch (kept and released numbers) of key species by season during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

	Winter (Jun-Aug)		Spring (Sep-Nov)		Summer (Dec-Feb)		Autumn (Mar-May)	
	Number	SE	Number	SE	Number	SE	Number	SE
Effort								
Fishers	239,037	15,440	327,757	20,006	407,411	22,390	312,535	20,813
Fisher days	603,908	44,496	729,641	52,882	1,049,339	68,240	798,148	59,119
Catch								
Bream	471,108	74,585	366,909	64,615	735,284	121,017	632,355	148,935
Flathead, Dusky	168,224	37,261	244,886	42,962	362,627	57,957	282,876	57,505
Flathead, Sand	136,829	31,668	187,409	49,301	483,845	144,402	154,810	31,407
Flathead, Tiger	9,103	4,457	24,763	12,480	40,515	27,658	7,948	4,445
Leatherjacket	24,405	7,586	30,022	12,916	24,904	11,215	37,291	12,833
Luderick	198,106	104,398	63,828	24,964	77,338	28,520	88,941	56,014
Mulloway	18,450	5,962	10,934	4,332	48,256	29,523	33,933	17,136
Red Rock Cod	46,739	10,997	19,752	5,309	41,698	10,693	43,342	27,038
Salmon, Australian	46,234	12,559	50,836	15,180	22,140	6,283	25,495	6,956
Sharks and rays	12,606	3,257	25,945	10,575	47,273	12,869	23,113	6,539
Silver Trevally	30,005	11,492	26,822	13,107	14,316	4,288	16,357	4,324
Snapper	129,763	28,051	98,340	19,010	336,387	110,039	190,860	52,311
Swallowtail Dart	58,722	22,525	14,043	6,828	16,636	6,731	29,535	14,714
Tailor	134,854	34,205	38,219	9,439	60,531	14,725	129,544	25,457
Tunas	10,473	6,805	32,006	27,567	5,719	2,033	8,848	3,088
Whiting, Sand	46,228	10,405	66,079	17,471	296,100	76,649	160,419	37,137
Whiting, School	4,343	3,182	3,107	1,417	4,069	2,443	287	283
Whiting, Trumpeter	26,197	20,674	11,358	6,499	61,020	39,391	54,411	45,251
Wrasse/groppers	36,562	10,262	30,573	15,313	18,187	8,744	26,477	14,521
Yellowtail Kingfish	6,454	3,409	5,400	3,511	31,810	10,873	52,452	20,762
Blue Mackerel	15,951	8,301	19,274	8,034	58,315	23,871	43,580	19,051
Mullet	28,977	18,441	18,296	6,783	29,529	12,629	22,056	8,887
Yellowtail Scad	34,492	17,312	23,548	11,596	59,365	25,360	25,824	11,005
Other small baitfish	24,806	14,275	127,709	65,792	77,127	43,335	88,367	55,155
Australian Bass	6,658	5,496	92,567	34,606	52,932	24,515	43,645	25,482
European Carp	97,921	29,126	140,683	47,108	145,714	35,263	115,846	22,731
Golden Perch	17,184	4,482	56,819	10,398	29,306	5,995	39,291	7,695
Murray Cod	16,203	5,098	20,080	5,453	79,296	18,358	49,977	12,497
Redfin Perch	7,450	3,865	25,500	10,594	86,497	42,760	16,832	9,389
Trout	40,481	13,156	39,541	11,550	40,468	15,053	37,485	13,595
Scalefish, other	183,663	31,146	156,410	32,830	300,913	46,884	231,529	45,164

Appendix 12, continued

Species/group	Winter (Jun-Aug)		Spring (Sep-Nov)		Summer (Dec-Feb)		Autumn (Mar-May)	
	Number	SE	Number	SE	Number	SE	Number	SE
Blue Swimmer Crab	816	610	4,322	2,187	39,951	12,634	28,411	10,811
Mud Crab	2,863	2,338	6,832	2,627	21,133	8,668	17,805	7,474
Rock lobster	2,469	1,528	8,438	5,114	7,286	5,678	8,314	4,596
Prawns (saltwater)			111,999	74,655	599,459	364,501	17,386	17,088
Shrimp (freshwater)	4,211	4,186	46,901	17,789	173,693	103,172	184,906	81,238
Nippers (saltwater)	232,692	84,809	238,783	77,716	612,080	240,574	332,297	129,930
Yabbies (freshwater)	100,531	62,884	29,364	16,694	103,582	35,961	41,632	22,056
Crustaceans, other	7,231	6,217			276	270	2,363	2,245
Squids	30,717	18,439	11,365	4,464	21,853	10,351	47,865	36,269
Cephalopods, other	2,034	983	150	121	7,729	3,191	14,651	13,780
Abalone	6,583	3,582	2,074	2,066	4,644	3,059	5,542	3,894
Pipis	36,763	25,902	16,413	8,349	20,338	13,192	16,939	10,000
Worms	77,938	32,101	47,530	20,737	106,954	60,497	29,756	15,967
Other taxa	1,013	1,002			62	61		

Appendix 13 Annual recreational effort (numbers of fishers and fisher days) and catch (kept and released numbers) of key species by fishing zone during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

		North Coast	Mid North Coast	Hunter	Sydney	Mid South Coast	South Coast	Murray/ Sth. West	Darling/ Nth. West	ACT
Effort										
Fishers	No:	79,053	113,132	149,738	210,665	179,233	42,210	102,097	57,877	3,631
	SE	8,882	9,990	16,549	21,875	15,184	4,815	7,964	6,888	1,147
Fisher days	No:	328,121	447,559	474,688	595,144	690,396	128,945	320,381	191,166	5,698
	SE	45,493	57,745	66,177	78,485	66,943	20,944	29,918	25,718	2,110
Catch										
Bream	No:	271,270	433,534	308,943	578,216	564,645	49,047			
	SE	53,664	109,997	59,470	165,427	147,579	13,755			
Flathead, Dusky	No:	121,129	165,536	152,000	138,935	328,184	152,828			
	SE	35,152	51,204	72,114	31,929	69,245	47,679			
Flathead, Sand	No:	26,950	131,137	132,901	225,062	377,984	68,858			
	SE	6,048	46,990	49,739	127,890	91,291	19,962			
Flathead, Tiger	No:	3,244	1,245	6,246	7,926	56,662	7,007			
	SE	2,685	1,209	4,514	7,902	29,656	4,658			
Leatherjacket	No:	372	10,351	16,336	49,943	35,293	4,326			
	SE	362	5,115	9,876	21,341	10,962	1,974			
Luderick	No:	15,789	19,553	16,671	64,664	307,038	4,498			
	SE	11,980	7,609	7,882	40,148	181,309	3,363			
Mulloway	No:	25,398	13,994	804	67,313	4,063				
	SE	7,676	5,145	450	34,124	2,853				
Red Rock Cod	No:	47,534	37,531	14,610	6,255	43,001	2,601			
	SE	27,380	10,604	6,998	3,057	15,343	1,785			
Salmon, Australian	No:	721	4,072	29,599	21,449	68,448	20,417			
	SE	548	2,304	12,361	10,943	16,716	8,165			
Sharks and rays	No:	16,721	23,808	27,628	22,833	13,628	4,320			
	SE	5,601	8,853	10,983	11,296	2,731	2,004			

Appendix 13, continued

Species/group		North Coast	Mid North Coast	Hunter	Sydney	Mid South Coast	South Coast	Murray/ Sth. West	Darling/ Nth. West	ACT
Silver Trevally	No:	4,531	4,313	11,779	37,707	24,737	4,434			
	SE	2,978	2,670	3,813	20,811	8,145	2,331			
Snapper	No:	80,485	53,042	163,737	260,929	167,607	29,550			
	SE	24,593	23,560	45,902	105,905	44,010	11,030			
Swallowtail Dart	No:	89,483	23,407	4,840		1,205				
	SE	38,139	11,302	2,909		1,105				
Tailor	No:	47,324	110,931	57,093	65,319	52,494	29,987			
	SE	16,521	38,963	17,034	26,528	12,987	19,068			
Tunas	No:	4,256	5,945	4,478	2,391	39,025	954			
	SE	1,961	2,634	2,559	1,726	28,206	643			
Whiting, Sand	No:	98,100	72,859	158,209	31,121	179,306	29,231			
	SE	34,309	21,490	86,243	8,766	51,033	10,920			
Whiting, School	No:	5,068	1,344	3,004	294	1,935	163			
	SE	3,278	844	2,282	293	1,236	163			
Whiting, Trumpeter	No:	851	6,707	137,905	7,522					
	SE	864	4,564	104,688	5,331					
Wrasse/groppers	No:	2,460	21,527	26,233	16,151	43,798	1,631			
	SE	1,190	8,666	20,752	11,444	15,735	853			
Yellowtail Kingfish	No:	1,455	12,185	6,331	4,335	68,246	3,562			
	SE	980	11,347	3,100	3,043	27,042	1,776			
Blue Mackerel	No:	15,615	35,936	14,787	4,047	53,199	13,535			
	SE	7,335	19,646	8,111	2,957	29,798	6,541			
Mullet	No:	8,038	23,949	8,103	20,759	36,135	1,875			
	SE	3,728	11,454	4,709	16,710	16,116	1,125			
Yellowtail Scad	No:	22,224	6,273	16,872	57,310	33,012	7,538			
	SE	15,753	3,658	6,931	29,715	21,629	6,540			
Other small baitfish	No:	235,610	69,187		11,475		1,739			
	SE	142,375	48,552		10,031		1,110			

Appendix 13, continued

Species/group		North Coast	Mid North Coast	Hunter	Sydney	Mid South Coast	South Coast	Murray/ Sth. West	Darling/ Nth. West	ACT
Australian Bass	No:	21,997	5,606	144,883	16,497	6,434	385			
	SE	11,197	2,944	60,292	11,481	3,395	378			
European Carp	No:			902	2,826	946		260,160	231,577	3,752
	SE			687	2,286	934		65,074	53,076	2,103
Golden Perch	No:			7,861				58,682	73,247	2,810
	SE			3,887				11,909	12,679	1,857
Murray Cod	No:							107,743	55,388	2,426
	SE							26,109	13,530	2,114
Redfin Perch	No:		2,242		751			59,627	68,851	4,807
	SE		1,579		541			32,394	39,591	2,642
Trout	No:				24,781			131,159	2,035	
	SE				14,736			35,530	1,166	
Scalefish, other	No:	106,478	109,055	163,262	210,567	166,821	13,593	63,712	39,026	
	SE	20,221	25,359	40,219	68,999	35,199	5,584	33,625	16,842	

Appendix 13, continued

Species/group		North Coast	Mid North Coast	Hunter	Sydney	Mid South Coast	South Coast	Murray/ Sth. West	Darling/ Nth. West	ACT
Blue Swimmer Crab	No:	11,828	5,510	38,912	2,902	13,745	603			
	SE	11,589	2,698	16,241	1,712	5,522	428			
Mud Crab	No:	20,893	16,818	6,559	4,364					
	SE	9,672	8,539	4,722	3,066					
Rock lobster	No:		555	383	11,788	13,781				
	SE		550	378	9,851	9,795				
Prawns (saltwater)	No:		71,586	194,275		454,336	8,646			
	SE		68,380	165,096		386,990	8,608			
Shrimp (freshwater)	No:		3,289	27,152				215,468	163,802	
	SE		3,149	23,079				119,929	68,556	
Nippers (saltwater)	No:	445,228	386,488	285,047	122,004	141,064	36,022			
	SE	262,609	206,374	198,301	85,792	62,987	26,287			
Yabbies (freshwater)	No:			45,894	24,752			66,996	137,467	
	SE			45,382	24,360			26,205	72,827	
Crustaceans, other	No:			2,530		6,173		1,167		
	SE			2,258		6,172		755		
Squids	No:	431		53,847	32,994	24,397	130			
	SE	422		47,387	22,496	9,980	131			
Cephalopods, other	No:	201	2,274	14,662	5,680	1,747				
	SE	197	1,183	13,787	3,018	675				
Abalone	No:			2,765	7,605	8,473				
	SE			2,754	7,575	5,570				
Pipis	No:	20,524	52,726	8,340		8,862				
	SE	9,535	28,595	6,817		7,154				
Worms	No:	111,543	22,940			118,925	8,770			
	SE	55,770	13,298			72,410	4,652			
Other taxa	No:		1,013				62			
	SE		1,002				61			

Appendix 14 Annual recreational harvest (kept numbers) of key species by fishing zone during 2013/14, by NSW/ACT residents aged five years and older. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group		North Coast	Mid North Coast	Hunter	Sydney	Mid South Coast	South Coast	Murray/ Sth. West	Darling/ Nth. West	ACT
Bream	No:	60,683	112,175	99,442	119,467	202,985	<i>19,681</i>			
	SE	14,818	33,593	30,567	39,037	81,480	<i>7,404</i>			
Flathead, Dusky	No:	40,534	66,984	67,811	74,090	160,170	71,575			
	SE	12,245	18,867	27,204	19,012	36,696	30,394			
Flathead, Sand	No:	<i>11,687</i>	<i>49,128</i>	57,149	110,169	180,871	<i>31,759</i>			
	SE	3,259	18,552	23,162	68,477	46,976	<i>9,549</i>			
Flathead, Tiger	No:	1,344	1,245	812	7,926	25,735	2,355			
	SE	948	1,209	815	7,902	12,223	1,379			
Leatherjacket	No:		7,858	12,390	35,995	<i>13,919</i>	1,107			
	SE		4,094	7,561	18,522	<i>4,981</i>	730			
Luderick	No:	14,873	10,246	10,746	56,143	154,777	3,288			
	SE	11,772	5,629	7,101	38,540	93,215	2,180			
Mulloway	No:	<i>10,858</i>	<i>5,389</i>	295	3,117	1,702				
	SE	<i>3,519</i>	<i>1,790</i>	256	1,752	1,026				
Red Rock Cod	No:	68	451	1,414	1,578	2,382	537			
	SE	67	415	1,378	1,391	1,074	419			
Salmon, Aust.	No:	721	2,732	13,115	18,489	28,915	9,563			
	SE	548	1,589	8,646	9,979	6,660	4,124			
Sharks and rays	No:	782	1,822	803	607	1,088	179			
	SE	451	1,035	486	604	489	178			
Silver Trevally	No:	3,266	3,187	6,516	22,285	13,703	125			
	SE	2,082	2,236	2,476	15,522	5,679	124			
Snapper	No:	<i>41,827</i>	20,511	27,510	7,028	80,674	8,041			
	SE	<i>11,744</i>	9,310	8,359	3,497	24,027	3,367			
Swallowtail Dart	No:	41,307	1,873			94				
	SE	18,809	1,605			95				
Tailor	No:	29,462	87,571	16,411	20,964	22,600	12,606			
	SE	12,718	33,972	6,891	13,431	6,469	7,367			

Appendix 14, continued

Species/group		North Coast	Mid North Coast	Hunter	Sydney	Mid South Coast	South Coast	Murray/ Sth. West	Darling/ Nth. West	ACT
Tunas	No:	3,161	4,659	4,188	1,450	31,922	954			
	SE	1,694	2,201	2,511	1,064	23,876	643			
Whiting, Sand	No:	26,674	28,393	61,995	8,538	107,054	14,814			
	SE	9,728	8,780	30,299	3,202	41,790	7,336			
Whiting, School	No:	1,888	1,117	1,527		299	163			
	SE	1,647	813	931		222	163			
Whiting, Trumpeter	No:	511	3,415	118,310	1,344					
	SE	519	3,228	100,053	1,342					
Wrasse/groppers	No:	1,277	1,646	368	5,960	8,915	1,138			
	SE	805	768	339	5,874	2,879	687			
Yellowtail Kingfish	No:	427	11,745	1,763	189	19,084	1,927			
	SE	236	11,348	1,345	188	7,365	1,033			
Blue Mackerel	No:	14,053	34,062	14,026	3,721	47,691	11,575			
	SE	6,715	19,423	8,089	2,940	29,436	5,368			
Mullet	No:	7,675	19,788	4,276	17,371	20,842	1,772			
	SE	3,720	10,658	2,937	16,395	8,605	1,120			
Yellowtail Scad	No:	7,975	5,979	5,115	45,127	24,092	1,894			
	SE	4,518	3,646	3,175	28,071	16,637	1,855			
Other small baitfish	No:	232,122	69,187		11,475		768			
	SE	142,030	48,552		10,031		546			
Australian Bass	No:	2,186	1,202	5,967	336	1,228	385			
	SE	996	1,040	3,283	337	724	378			
European Carp	No:			902	2,826	946		259,715	230,594	3,752
	SE			687	2,286	934		65,074	53,067	2,103
Golden Perch	No:			1,132				32,099	42,437	860
	SE			754				7,322	8,026	842
Murray Cod	No:							11,528	9,288	
	SE							2,578	3,376	
Redfin Perch	No:		1,498		751		20,734	20,634		809
	SE		1,086		541		9,858	10,756		498
Trout	No:				17,163			90,657		
	SE				13,248			29,460		

Appendix 14, continued

Species/group		North Coast	Mid North Coast	Hunter	Sydney	Mid South Coast	South Coast	Murray/ Sth. West	Darling/ Nth. West	ACT
Scalefish, other	No:	39,547	48,986	57,418	74,012	54,039	4,656	37,357	4,853	
	SE	10,110	15,064	18,662	28,038	11,576	1,631	32,435	2,961	
Blue Swimmer Crab	No:	5,998	3,381	30,341	2,187	8,128	603			
	SE	5,796	2,187	12,183	1,556	3,604	428			
Mud Crab	No:	10,648	10,718	5,024	3,662					
	SE	4,805	5,829	3,944	2,446					
Rock lobster	No:		555	383	11,788	10,490				
	SE		550	378	9,851	7,178				
Prawns (saltwater)	No:		69,542	194,275		452,293	8,646			
	SE		68,350	165,096		386,996	8,608			
Shrimp (freshwater)	No:		3,289	27,152				148,533	151,052	
	SE		3,149	23,079				69,547	63,636	
Nippers (saltwater)	No:	441,155	316,901	266,034	117,891	141,064	36,022			
	SE	262,326	143,724	185,315	82,560	62,987	26,287			
Yabbies (freshwater)	No:			45,894	9,076			54,294	130,575	
	SE			45,382	8,932			23,110	72,465	
Crustaceans, other	No:			2,530		6,173		346		
	SE			2,258		6,172		217		
Squids	No:	431		53,466	28,048	23,233	130			
	SE	422		47,387	18,002	9,909	131			
Cephalopods, other	No:			10,397	2,182	557				
	SE			9,659	1,997	371				
Abalone	No:			2,765	7,605	8,052				
	SE			2,754	7,575	5,534				
Pipis	No:	20,524	52,726	5,648		8,862				
	SE	9,535	28,595	4,281		7,154				
Worms	No:	111,543	22,940			118,925	8,770			
	SE	55,770	13,298			72,410	4,652			
Other taxa	No:		1,013							
	SE		1,002							

Appendix 15 Numbers of NSW/ACT resident households reporting boat ownership as at June 2013, by previous fishing activity in the 12 months prior to June 2013, by residential stratum. SE is standard error.

Residential stratum	Fishers				Non-fishers				Total			
	Own boat		No boat		Own boat		No boat		Own boat		No boat	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Sydney	64,629	6,383	140,142	9,789	81,200	7,894	1,428,017	13,339	145,829	9,961	1,568,159	9,961
Hunter	19,058	2,129	24,157	2,412	17,683	2,132	181,966	3,429	36,741	2,860	206,123	2,860
Illawarra	14,696	1,665	22,044	2,159	7,284	1,313	126,474	2,751	21,980	2,062	148,518	2,062
Richmond/Tweed	7,573	1,021	12,556	1,303	5,178	854	73,042	1,648	12,751	1,281	85,598	1,281
Mid North Coast	17,487	1,861	11,763	1,524	10,913	1,494	103,782	2,473	28,400	2,231	115,545	2,231
Central West/North	12,047	1,496	17,014	1,889	7,493	1,315	118,434	2,495	19,540	1,923	135,448	1,923
North West	4,378	542	5,111	592	4,058	544	33,416	837	8,436	721	38,527	721
South East	10,647	1,210	10,231	1,217	6,009	967	61,721	1,723	16,655	1,466	71,953	1,466
South West	12,441	1,355	12,696	1,410	6,165	1,030	76,673	1,917	18,606	1,617	89,369	1,617
ACT	6,485	1,092	15,622	1,735	5,394	1,089	117,846	2,167	11,879	1,506	133,468	1,506
Total	169,441	7,719	271,335	10,987	151,377	8,761	2,321,372	14,978	320,818	11,381	2,592,707	11,381

Appendix 16 Boat ownership and numbers of boats owned by NSW/ACT resident households (as at June 2013), with fishing activity in NSW/ACT waters during 2013/14. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reported boat ownership.

Residential stratum	Fisher households				Boats		
	Own boat	SE	No boat	SE	Number	SE	Mean
Sydney	72,245	8,957	107,672	10,718	87,573	11,193	1.2
Hunter	16,527	2,304	24,539	2,930	22,490	3,314	1.4
Illawarra	16,433	2,079	19,815	2,340	21,365	2,905	1.3
Richmond/Tweed	9,621	1,346	9,978	1,461	12,398	1,872	1.3
Mid North Coast	17,064	2,075	14,708	1,994	21,405	2,825	1.3
Central West/North	14,912	1,982	14,177	2,065	19,914	2,897	1.3
North West	3,931	616	3,835	623	5,115	874	1.3
South East	10,698	1,384	9,126	1,419	14,223	2,327	1.3
South West	13,913	1,726	11,136	1,605	18,783	2,632	1.4
ACT	5,279	1,163	14,450	1,915	6,851	1,676	1.3
Total	180,622	10,322	229,437	12,164	230,118	13,435	1.3

Appendix 17 Numbers of boats owned and used for fishing in 2013/14 by NSW/ACT resident fisher households (as at June 2013). SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reported boat ownership.

Residential stratum	Numbers of Boats				% used for fishing
	Any fishing use	SE	No fishing	SE	
Sydney	62,562	8,898	25,012	6,159	71%
Hunter	16,727	2,724	5,763	1,644	74%
Illawarra	19,574	2,729	1,791	732	92%
Richmond/Tweed	8,232	1,482	4,166	1,103	66%
Mid North Coast	17,395	2,419	4,010	1,310	81%
Central West/North	13,296	2,208	6,618	1,865	67%
North West	3,983	766	1,131	360	78%
South East	12,067	1,955	2,156	680	85%
South West	14,791	2,206	3,992	961	79%
ACT	5,267	1,412	1,585	890	77%
Total	173,895	10,873	56,223	7,063	76%

Appendix 18 Numbers of boats used for fishing in 2013/14 by NSW/ACT resident fisher households (as at June 2013), by length of boat and stratum. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households reported boat ownership.

Residential stratum	< 4 metres		4-4.9 metres		5-5.9 metres		6-6.9 metres		7 metres plus	
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
Sydney	9,740	2,859	25,999	5,502	19,048	4,380	2,667	1,510	5,108	2,573
Hunter	3,689	1,388	6,487	1,535	5,211	1,366	1,143	481	197	197
Illawarra	6,577	1,599	5,662	1,238	6,029	1,364	516	396	791	533
Richmond/Tweed	2,163	780	3,935	939	1,630	535	331	237	174	172
Mid North Coast	5,182	1,423	7,464	1,521	3,707	987	794	471	249	247
Central West/North	5,554	1,453	4,254	1,058	2,425	832	743	440	318	237
North West	2,035	592	1,316	386	376	194	152	108	104	103
South East	3,092	1,055	5,614	1,185	2,290	615	810	450	262	257
South West	4,837	1,165	5,623	1,199	3,061	935	517	382	753	429
ACT	1,771	686	2,508	882	683	361			305	221
Total	44,641	4,549	68,862	6,500	44,459	5,127	7,673	1,871	8,259	2,720

Appendix 19 Overall satisfaction with recreational fishing in the period June 2013 to May 2014 - as reported by the main/key fisher aged 15 years or more, in resident households with recreational fishing activity in NSW/ACT waters. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 fishing households responded.

Residential stratum	How satisfied ...										% at least quite satisfied
	Very		Quite		Not very		Not at all		Unsure		
	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE	
Sydney	25,994	5,508	110,462	10,992	29,240	5,464	6,286	2,866	3,837	1,954	78%
Hunter	5,516	1,552	24,884	2,880	8,564	1,702	638	457	1,066	557	75%
Illawarra	5,686	1,375	20,910	2,374	8,386	1,575	628	445	404	298	74%
Richmond/Tweed	2,053	624	11,666	1,495	4,184	1,022	788	450	512	292	71%
Mid North Coast	3,518	986	17,152	2,162	7,600	1,406	1,264	579	1,636	675	66%
Central West/North	4,412	1,133	18,938	2,299	4,680	1,157	314	306	548	395	81%
North West	1,238	376	4,862	699	885	292	294	151	136	133	82%
South East	3,387	883	11,085	1,522	4,482	942	322	193	401	285	74%
South West	4,629	1,090	14,785	1,807	4,581	1,024	187	186	615	434	78%
ACT	2,653	812	13,346	1,838	3,354	1,008	177	176			82%
Total	59,086	6,328	248,089	12,506	75,955	6,529	10,898	3,062	9,154	2,281	76%

Appendix 20 Estimated number of persons and proportion of the resident population aged 5 years and older, who fished recreationally in NSW or the ACT in the 12 months prior to May 2000 and the 12 months prior to June 2013, by residential stratum. SE is standard error.

Residential stratum	Fishers				Non-fishers				Participation Rates			
	2000		2013		2000		2013		2000		2013	
	Number	SE	Number	SE	Number	SE	Number	SE	%	SE	%	SE
Sydney	459,104	26,578	375,558	23,716	3,237,541	26,578	3,982,956	23,716	12.4	0.7	8.6	0.5
Hunter	128,360	8,430	86,200	6,858	393,003	8,430	485,426	6,858	24.6	1.6	15.1	1.2
Illawarra	69,207	5,356	72,700	5,661	283,201	5,356	330,461	5,661	19.6	1.5	18.0	1.4
Richmond/Tweed	48,076	3,114	39,196	3,470	144,519	3,114	181,830	3,470	25.0	1.6	17.7	1.6
Mid North Coast	74,889	4,556	55,533	5,026	174,048	4,556	264,416	5,026	30.1	1.8	17.4	1.6
Central West/North	61,674	5,174	56,174	5,207	245,044	5,174	302,557	5,207	20.1	1.7	15.7	1.5
North West	28,774	2,327	19,519	1,806	96,263	2,327	88,532	1,806	23.0	1.9	18.1	1.7
South East	48,919	3,064	41,886	3,850	115,034	3,064	160,178	3,850	29.8	1.9	20.7	1.9
South West	43,199	3,523	49,831	4,009	186,848	3,523	198,508	4,009	18.8	1.5	20.1	1.6
ACT	52,005	3,697	40,034	3,708	226,013	3,697	304,026	3,708	18.7	1.3	11.6	1.1
Total	1,014,207	30,071	836,632	27,456	5,101,514	30,071	6,298,889	27,456	16.6	0.50	11.7	0.4

Appendix 21 Annual recreational effort (number of fishers and fisher days) by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 – by fishing zone. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 fishing households responded.

Fishing Zone	2000/01				2013/14			
	Fishers	SE	Fisher days	SE	Fishers	SE	Fisher days	SE
North Coast	138,712	11,854	684,337	64,419	79,053	8,882	328,121	45,493
Mid North Coast	160,348	14,370	729,071	93,245	113,132	9,990	447,559	57,745
Hunter	240,228	20,533	931,667	102,617	149,738	16,549	474,688	66,177
Sydney	228,995	22,583	712,247	135,567	210,665	21,875	595,144	78,485
Mid South Coast	219,375	19,294	867,959	118,663	179,233	15,184	690,396	66,943
South Coast	67,290	8,797	266,220	41,399	42,210	4,815	128,945	20,944
Murray/South West	115,406	10,546	460,746	50,472	102,097	7,964	320,381	29,918
Darling/North West	972,669	10,228	358,206	39,146	57,877	6,888	191,166	25,718
ACT	14,821	2,550	25,244	5,107	3,631	1,147	5,698	2,110

Appendix 22 Annual recreational catch (kept and released numbers) of key species by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	2000/01		2013/14		Proportional change (%)
	Number	SE	Number	SE	
Bream	4,274,412	481,383	2,205,656	299,714	51.6
Flathead	3,343,172	372,340	2,103,835	246,280	62.9
Leatherjacket	438,343	88,698	116,622	26,752	26.6
Luderick	912,106	242,478	428,213	186,579	46.9
Mulloway	109,400	23,872	111,573	35,512	102.0
Red Rock Cod	225,254	32,272	151,531	34,435	67.3
Salmon, Australian	166,315	30,509	144,706	27,036	87.0
Sharks	113,422	37,308	37,703	11,452	33.2
Rays	135,998	47,076	71,235	13,877	52.4
Snapper	1,242,083	384,122	755,350	144,387	60.8
Swallowtail Dart	196,259	62,526	118,935	39,889	60.6
Tailor	1,511,131	219,254	363,147	59,901	24.0
Trevally	229,760	48,439	88,034	23,513	38.3
Tuna	108,445	47,962	57,047	28,585	52.6
Whiting	2,259,931	639,150	733,620	154,662	32.5
Wrasse/groppers	213,232	43,307	111,800	34,111	52.4
Yellowtail Kingfish	122,064	26,963	96,115	29,791	78.7
Blue Mackerel	259,359	60,161	137,119	37,988	52.9
Mullet	535,637	119,509	98,859	26,572	18.5
Yellowtail Scad	318,947	89,733	143,230	41,272	44.9
Other small baitfish	235,233	66,875	318,010	150,408	135.2
Australian Bass	102,544	21,429	195,802	62,660	190.9
European Carp	677,724	115,151	500,164	84,945	73.8
Golden Perch	568,743	82,808	142,601	18,752	25.1
Murray Cod	160,680	36,670	165,557	29,865	103.0
Redfin Perch	354,834	141,973	136,279	52,588	38.4
Trout	325,347	56,929	157,975	38,760	48.6
Blue Swimmer Crab	426,880	118,206	73,501	20,944	17.2
Mud Crab	58,642	22,011	48,634	14,075	82.9
Rock lobster	18,162	8,075	26,507	14,273	145.9
Prawns saltwater	9,564,042	5,379,154	728,843	426,343	7.6
Shrimp freshwater	239,577	93,882	409,711	148,424	171.0
Nippers saltwater	2,580,638	492,261	1,415,852	403,605	54.9
Yabbies freshwater	1,170,880	251,740	275,108	92,992	23.5
Squids	139,419	47,038	111,799	53,498	80.2
Cephalopods, other	19,771	5,896	24,564	14,173	124.2
Abalone	85,311	58,262	18,843	11,735	22.1
Pipis	832,677	194,589	90,452	31,719	10.9
Worms	301,381	84,488	262,178	94,992	87.0

Appendix 23 Annual recreational harvest (kept numbers) of key species by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	2000/01		2013/14		Proportional change (%)
	Number	SE	Number	SE	
Bream	1,494,515	246,427	614,434	107,686	41.1
Flathead	1,689,523	211,518	961,344	126,411	56.9
Leatherjacket	246,212	61,054	71,269	21,133	28.9
Luderick	609,992	173,546	250,074	102,050	41.0
Mulloway	79,095	16,889	21,361	4,481	27.0
Red Rock Cod	28,238	7,344	6,430	3,022	22.8
Salmon, Australian	80,389	16,901	73,535	17,779	91.5
Sharks	19,212	4,647	3,089	1,160	16.1
Rays	7,943	4,217	2,193	895	27.6
Snapper	253,298	36,796	185,590	29,943	73.3
Swallowtail Dart	76,445	25,715	43,275	18,872	56.6
Tailor	879,011	163,103	189,614	40,826	21.6
Trevally	142,078	34,881	49,454	17,413	34.8
Tuna	94,281	47,496	46,333	24,191	49.1
Whiting	1,385,810	502,701	376,044	115,771	27.1
Wrasse/groper	93,955	20,122	19,303	6,674	20.5
Yellowtail Kingfish	58,597	13,637	35,134	13,720	60.0
Blue Mackerel	206,313	51,876	125,129	37,285	60.7
Mullet	383,117	98,143	71,725	21,899	18.7
Yellowtail Scad	159,635	41,152	90,182	33,361	56.5
Other small baitfish	191,820	62,095	313,551	150,072	163.5
Australian Bass	<i>13,677</i>	<i>4,378</i>	<i>11,305</i>	<i>3,690</i>	82.7
European Carp	586,553	109,183	498,735	84,914	85.0
Golden Perch	344,881	52,406	76,529	11,117	22.2
Murray Cod	41,169	7,705	20,816	4,383	50.6
Redfin Perch	169,167	68,004	44,426	14,649	26.3
Trout	176,334	39,244	107,819	32,450	61.1
Blue Swimmer Crab	301,995	98,515	<i>50,637</i>	<i>14,220</i>	16.8
Mud Crab	<i>39,964</i>	<i>13,161</i>	<i>30,052</i>	<i>8,865</i>	75.2
Rock lobster	11,972	5,751	23,216	12,501	193.9
Prawns saltwater	9,458,274	5,368,839	724,756	426,343	7.7
Shrimp freshwater	228,353	88,955	330,025	108,398	144.5
Nippers saltwater	2,479,647	478,049	1,319,066	367,909	53.2
Yabbies freshwater	916,091	213,361	239,838	89,047	26.2
Squids	134,649	46,939	105,308	51,757	78.2
Cephalopods, other	10,574	4,886	13,136	9,871	124.2
Abalone	41,087	18,792	18,423	11,718	44.8
Pipis	743,444	170,324	87,760	31,272	11.8
Worms	298,472	84,409	262,178	94,992	87.8

Appendix 24 Mean line fishing catch rates of key marine finfish species/groups (numbers per fisher day), by residents aged five years and older who fished in NSW waters during 2000/01, compared with 2013/14 - by water body type. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	2000/01							2013/14							Proportional change in total catch rate (%)
	Total catch (numbers)	Ocean		Estuary		All Saltwater		Total catch (numbers)	Ocean		Estuary		All Saltwater		
		Catch rate	SE	Catch rate	SE	Catch rate	SE		Catch rate	SE	Catch rate	SE	Catch rate	SE	
Bream	4,237,360	0.87	0.12	1.29	0.12	0.91	0.09	2,195,105	0.35	0.05	1.13	0.13	0.72	0.08	80.0
Flathead	3,339,716	1.08	0.19	0.77	0.08	0.71	0.07	2,095,595	1.30	0.19	0.69	0.08	0.69	0.07	96.9
Leatherjacket	379,545	0.09	0.02	0.11	0.03	0.08	0.02	98,497	0.08	0.02	0.03	0.01	0.03	0.01	40.1
Luderick	881,651	0.23	0.11	0.24	0.05	0.19	0.05	418,273	0.14	0.06	0.19	0.10	0.14	0.06	73.3
Mulloway	102,571	0.04	0.01	0.02	0.01	0.02	0.00	111,359	0.02	0.01	0.06	0.02	0.04	0.01	167.7
Salmon, Australian	165,576	0.10	0.02	0.01	0.00	0.04	0.01	144,517	0.15	0.03	0.02	0.01	0.05	0.01	134.8
Snapper	1,240,551	0.35	0.05	0.32	0.15	0.26	0.08	754,655	0.42	0.06	0.27	0.07	0.25	0.04	93.9
Swallowtail Dart	196,259	0.13	0.04	0.00	0.00	0.04	0.01	118,935	0.16	0.05	0.00	0.00	0.04	0.01	93.6
Tailor	1,480,837	0.52	0.10	0.32	0.05	0.32	0.04	362,557	0.26	0.06	0.10	0.02	0.12	0.02	37.8
Trevally	221,269	0.11	0.03	0.03	0.01	0.05	0.01	87,940	0.07	0.02	0.02	0.01	0.03	0.01	61.4
Tuna	108,368	0.07	0.03	0.00	0.00	0.02	0.01	55,253	0.08	0.04	0.00	0.00	0.02	0.01	78.7
Whiting	2,255,992	0.31	0.05	0.78	0.24	0.48	0.13	725,097	0.16	0.03	0.35	0.08	0.24	0.05	49.6
Yellowtail Kingfish	122,005	0.06	0.01	0.01	0.01	0.03	0.01	95,924	0.11	0.04	0.01	0.01	0.03	0.01	121.4

Appendix 25 Mean line fishing catch rates of key freshwater finfish species/groups (numbers per fisher day), by residents aged five years and older who fished in NSW/ACT waters during 2000/01, compared with 2013/14 - by water body type. SE is standard error; values in bold indicate relative standard error > 40%; values in italics indicate fewer than 30 households recorded catches of the species.

Species/group	2000/01								2013/14							
	Total catch (numbers)	River		Lake/dam		All Freshwater		Total catch (numbers)	River		Lake/dam		All Freshwater		Proportional change in total catch rate (%)	
		Catch rate	SE	Catch rate	SE	Catch rate	SE		Catch rate	SE	Catch rate	SE	Catch rate	SE		
Australian Bass	90,956	0.13	0.03	<i>0.05</i>	<i>0.02</i>	0.02	0.00	192,181	<i>0.24</i>	<i>0.09</i>	<i>0.39</i>	<i>0.17</i>	0.06	0.02	326.3	
Golden Perch	568,744	0.67	0.11	0.51	0.10	0.12	0.02	142,483	0.23	0.04	0.23	0.03	0.05	0.01	38.7	
Murray Cod	160,104	0.27	0.06	<i>0.06</i>	<i>0.02</i>	0.03	0.01	165,384	0.43	0.07	<i>0.07</i>	<i>0.02</i>	0.05	0.01	159.5	
Redfin Perch	353,849	<i>0.05</i>	<i>0.01</i>	0.71	0.29	0.08	0.03	136,279	<i>0.12</i>	<i>0.11</i>	0.33	0.13	0.04	0.02	59.5	
Trout	325,045	0.31	0.07	0.37	0.08	0.07	0.01	157,975	<i>0.08</i>	<i>0.02</i>	0.46	0.12	0.05	0.01	75.1	

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