

NSW Charter Fishery Monitoring, 2021/22 – Key Results

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NSW Charter Fishery Monitoring, 2021/22 – Key Results

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Non-technical summary

Objectives

The objectives of the Charter Fishery Monitoring component of the NSW Recreational Fisheries Monitoring Program are to:

- i) Describe spatial and temporal patterns in retained catch and effort for the Nearshore Marine Charter Fishery using data from industry logbooks and on-board observers
- ii) Describe observed spatial and temporal patterns in discarded catch
- iii) Describe the size composition of observed catches (retained and discarded) for key species caught by the fishery
- iv) Describe observed interactions between threatened, endangered and protected (TEP) species and the fishery
- v) Describe the demographic characteristics of charter fishery clientele.

Key words

Recreational fishing, charter fishing, logbooks, fishery observers, discarding, wildlife interaction, bycatch, client demographics, size composition

The NSW Nearshore Marine Charter Fishery

A key component of the recreational fishery in NSW is the ‘for hire’ Charter Fishery, which consists of hundreds of vessels and caters to tens of thousands of fishers annually. By far the largest part of the NSW Charter Fishery operates in nearshore marine waters – the ‘Nearshore Marine Charter Fishery’, which targets a diverse range of important recreational fish species. This fleet is monitored using a combination of mandatory industry logbook reporting and an on-board scientific observer program. The primary source of information is derived from logbook data (spatio-temporal retained catch and fishing effort), but this is complemented by targeted independent observer surveys to collect additional relevant information (size composition, rates of discarding, client demographic information and interactions with threatened, endangered and protected species; TEPs). The data collected contributes variously to the assessment and monitoring of key species for state and national reporting frameworks, cross-sectoral harvest strategies, Total Allowable Fishing (TAF) allocations, and allows evaluation the impacts of changes to management regulations and socio-economic analyses of the recreational fishing industry.

This report presents key results from the third year of the Charter Fishery Monitoring component of the Recreational Fisheries Monitoring Program (RFMP). Outcomes from the recreational fishing telephone-diary survey component of the RFMP are detailed in a separate report (Murphy *et al.*, 2023).

Industry Logbooks

State-wide, industry logbooks revealed that 84 charter vessels operated in the Nearshore Marine Charter Fishery undertaking 3,320 fishing trips with 22,841 clients in 2021/22. The number of clients per trip ranged from 1 to 19 (mean $\pm$ SE, 6.9 ± 0.1). Trip duration ranged from 1 to 12 hours with an average ($\pm$ SE) of 5.7 ± 0.1 hours per trip.

The Nearshore Marine Charter Fishery harvested 100,331 individual organisms of 128 different species with just 30 species comprising 95% of the total retained catch. More than half of the catch were made up of Snapper (21.3%), Bluespotted Flathead (17.3%), Grey Morwong (9.7%), Yellowtail Scad (5.1%) and Blue Mackerel (5.0%). An average ($\pm$ SE) of 30.2 ± 0.4 fish were retained per trip with a mean ($\pm$ SE) species diversity of 4.3 ± 0.1 species per trip.

On-board Observer Monitoring

Observers were present on 190 nearshore charter trips with 22 operators working out of 13 ports between Ballina and Bermagui between November 2021 and February 2023. This program was heavily affected by disruptions to charter fishing activity because of extensive coastal flooding and the COVID-19 pandemic, and as a consequence observer monitoring finished later than intended in order to complete planned spatio-temporal observer sampling effort. Nonetheless, observed trips represented 2.9% of the total number of nearshore charter trips reported in industry logbooks to have been undertaken state-wide during this period.

Catch and effort

The number of clients per observed trip ranged from 2 to 20 (average $\pm$ SE, 7.5 ± 0.2). Trip duration ranged from 2.5 to 10.3 h with an average ($\pm$ SE) of 6.8 ± 0.1 h per trip. Observers recorded the capture of 14,154 individual organisms of 124 different species with just 29 species comprising 95% of the total observed catch (kept and released). Most organisms caught were kept (56%) with the remaining 44% released. Species observed to be kept in the greatest numbers were Bluespotted Flathead, Snapper, Yellowtail Scad, Blue Mackerel and Grey Morwong. The species observed to be released in the greatest numbers were Snapper, Longspine Flathead, Eastern Red Scorpionfish, Sergeant Baker and Silver Sweep.

Release rates

Observers recorded an average ($\pm$ SE) of 63.8 ± 2.8 individuals caught per trip. Of this, an average ($\pm$ SE) of 41.8 ± 2.1 individuals per trip were kept and 21.9 ± 1.4 individuals per trip were subsequently released. Average ($\pm$ SE) species diversity of the total catch per trip was 11.3 ± 0.3 species per trip with 7.3 ± 0.3 species per trip kept and 7.0 ± 0.3 species per trip released. Species with low release rates included Eastern Blackspot Pigfish, Venus Tuskfish, Grey Morwong, Yellowtail Scad, Teraglin, Bluespotted Flathead and Blue Mackerel. Species with high release rates included Longspine Flathead, Mado, Eastern Red Scorpionfish, Silver Sweep, Barracouta, Sergeant Baker and Mahi Mahi.

Size composition

The lengths of 12,779 individuals (90% of captured fish) were measured by on-board observers prior to retention or release. For key species with a minimum legal length (MLL), most of the retained catch (61-90%) was 0-10 cm above their respective MLLs.

Wildlife interactions

Observers monitored wildlife interactions with charter fishing vessels on 90% of observed charter trips. A total of 328 observations recorded 4,404 individual animals across 23 species in the vicinity of charter vessels. These were dominated by seabirds (92% of the total) and marine mammals (dolphins, whales, seals; 8%). Seabirds from eight families were observed with the most common being Shearwaters, and Gulls/Terns. Only 14 direct interactions (involving 68 individuals) with the fishery were observed at a rate of 1.50 interactions per 100 h fishing. Seabirds were recorded in 13 direct interactions and a single interaction involved a marine mammal (seal). Three incidences of bycatch were recorded, involving several species of seabirds becoming entangled in fishing line or hooked, at a bycatch rate of 0.32 events per 100 h fishing.

Client demographics

Demographic data was collected from a total of 1,425 clients on observed charter trips. Charter clients were primarily male (89%), with 11% female. Charter clients ranged in age from 3 to 90 years; most (94%) were adults with similar proportions (~25%) aged between 15 and 29, 30 and 44, and 45 and 59 years. Most (71%) charter clients came from the area local to the charter operation, however 26% came from inland regions of NSW or from interstate. Just over 1% of charter clients came from overseas, including four different countries.

Conclusions

The numbers of individual fish and the species diversity of the retained catch was underestimated when recorded in logbooks compared with the same data collected by independent observers, highlighting the key importance of

regular observer-based monitoring for validation of fisheries data to be used for assessment purposes. The data series represented by the biennial monitoring of the NSW Nearshore Marine Charter Fishery has provided an important dataset for stock assessments, and informing recreational fishing-specific Performance Indicators within future multi-sector harvest strategies being developed in NSW.

When interpreting any changes in the NSW recreational (including charter) fishery through time it is important to consider the potential causes of inter-annual variability. While these may reflect changes in fish abundance, they may also be influenced by environmental and socio-economic factors, as well as changes to fishing practices, targeting preferences, technology, and regulations.

The 2021/22 period encompassed a combination of extreme environmental and social factors that likely impacted on recreational and charter fishing activity. During 2021/22, coastal and inland regions of NSW experienced some of the highest rainfall and flooding on record. The COVID-19 pandemic continued to disrupt society, with continuing restrictions on movement in early 2021/22 affecting the ability of fishers to travel within the state. These environmental and social conditions were in marked contrast to conditions experienced during the previous monitoring period (2019/20) which was characterised by severe drought and bushfires, as well as societal disruptions related to COVID-19. These major environmental and social impacts highlight the importance of the consistent, on-going time-series for recreational and charter fishing provided by the RFMP.

Introduction

This study represents the third comprehensive assessment of the Nearshore Marine Charter Fishery in New South Wales (NSW) undertaken as part of the NSW-DPI Fisheries' Recreational Fisheries Monitoring Program (RFMP).

This report provides a snapshot of retained catch and effort, rates of discarding and size composition for key species, client demographic information and interactions with TEP species for 2021/22, and builds on previous monitoring completed in 2017/18 (Hughes *et al.*, 2021) and 2019/20 (Hughes *et al.*, 2023). The ongoing time-series of data collected by the RFMP allows for an examination of trends through time that will assist in the management and assessment of recreational fisheries in NSW. Critically, this monitoring contributes the 'on-site' data to aid robust estimation of state-wide indices for the more common recreational fish species caught, and as such represents a key companion dataset to that collected by the recreational fishing telephone-diary survey component (hereafter 'TD Survey') of the RFMP (e.g. Murphy *et al.*, 2023).

Report structure

The first section of the report provides the background and need for the research provided by the broader RFMP, as well as the Charter Fishery monitoring component specifically, and summarises the survey design, monitoring approach and analyses. Catch and effort results are summarised at both a state-wide and bioregional level. Additional data collected by on-board observers on rates of discarding, size composition, wildlife abundance and interactions, and client demographics are also summarised. This report focusses on results from the Charter Monitoring component of the RFMP from data collected during 2021/22, but also includes comparison with the results of previous surveys undertaken 2017/18 (Hughes *et al.*, 2021) and 2019/20 (Hughes *et al.*, 2023), where appropriate. Detailed results are also summarised in species 'report cards' for 13 key recreational species of interest caught by the Nearshore Marine Charter Fishery in NSW, including retained catch, rates of discarding, size composition and harvest rates. The report is intentionally compiled as a data report, and thus commentary on the findings is intentionally brief. Appendices provide catch data for all species recorded for logbook and observer monitoring during the 2021/22 survey period.

Background

Why do we monitor recreational fishing in NSW?

The fisheries resources of NSW are shared among recreational fishers, commercial fishers, charter operators, and Aboriginal cultural fishers. Information from all harvesting sectors are therefore required to ensure effective and sustainable management of sustainable shared fisheries resources, at the same time as servicing socio-economic objectives of recreational fishing (Sutinen & Johnston, 2003; Crowe *et al.*, 2013; Fenichel *et al.*, 2013; Ryan *et al.*, 2016). The non-fishing public also value science- and data-based management, and recognise the importance of this for ensuring healthy aquatic ecosystems more broadly.

Recreational fishing is a popular activity in NSW, with up to ~20% of adult NSW residents estimated to participate in recreational fishing annually (Henry and Lyle, 2003; West *et al.*, 2015; Moore *et al.*, 2023). The recreational fishery therefore represents an important harvesting sector and has been repeatedly demonstrated to take a significant proportion of the catch of many key species (Henry and Lyle 2003; West *et al.* 2015; Murphy *et al.*, 2020; 2022; 2023). Such high participation rates also deliver considerable additional value to the NSW community via enhancement of social capital, promotion of stewardship for natural resources, and provision of numerous health benefits (e.g., McPhee, 2017; Hyder *et al.*, 2018). In addition, the recreational sector is estimated to contribute about \$4 billion to the NSW and ACT economies annually and supports the equivalent of ~33,000 fulltime jobs (McIlgorm and Pepperell, 2013; Moore *et al.*, 2023).

The Recreational Fisheries Monitoring Program

NSW DPI-Fisheries and the NSW Recreational Fishing Trust have committed to ongoing collection of high-quality information on recreational fishing within NSW, through the Recreational Fisheries Monitoring Program (RFMP). The data provided by the RFMP is essential for meeting management and reporting requirements for several State and Federal agencies. Ongoing data on recreational fisheries are particularly important for NSW as fisheries management is increasingly guided by cross-sectoral harvest strategies, supported by regular stock assessments, Total Allowable Fishing (TAF) allocation, and stock status reporting (e.g. fish.gov.au, dpi.nsw.gov.au/fishing/commercial/open-for-comment/stock-status-summary-reports). The data collected by the RFMP also allows evaluation the impacts of existing management regulations, and management changes under consideration (e.g., Ochwada-Doyle *et al.* 2021; 2023a; Taylor *et al.*, 2024).

The RFMP is a comprehensive citizen-science program that engages with thousands of recreational fishers, who voluntarily provide information on their fishing activities within a rigorously designed scientific framework. There are two components: 1) ‘off-site’ TD Surveys of randomly-selected long term (1 and 3 year) NSW recreational fishing licence holders; and 2) Charter Fishery Monitoring – mandatory industry logbooks and targeted ‘on-site’ surveys, focussed on the NSW ‘for hire’ Nearshore Marine Charter Fishery.

The primary objective of the Charter Fishery Monitoring component of the RFMP is to collect data from which state-wide indices of retained catch derived from the RFRS component can be converted into harvest weights for use in stock assessment for key recreational fish species. Together with retained catch data, additional information on rates of discarding and size composition for key species, client demographic information and interactions with TEPS provided by monitoring of the NSW Nearshore Marine Charter Fishery also contributes to a range of activities undertaken by the RFMP; some examples of these from recent years include:

- Provision of robust estimates of recreational catch, effort and size compositions to support stock assessments and stock status determination (e.g., Status of Australian Fish Stocks; SAFS), and contribute to decision making (such as quota setting), for key recreational fish species;
- Providing sources of evidence for threat and risk assessment under the Recreational Fishing Environmental Impact Assessment (EIA) process;
- Testing and evaluating the impact of proposed changes in management regulations, such as bag and size limits (e.g., Ochwada-Doyle *et al.* 2021; 2023a), which are increasingly being driven by recreational resource users;
- Providing data and analysis to support the deliberations and recommendations of the Recreational Fishing NSW Advisory Council (RFNSW);
- Providing data required to support mandated reporting requirements for recreational industries, such as the National Plan of Action for Minimising Incidental Catch of Seabirds in Australian Capture Fisheries (Department of Agriculture and Water Resources, 2018);
- Providing supporting data and analysis to ensure continued access to Southern Bluefin Tuna by anglers;
- Estimation of impacts of droughts, bushfires and global pandemics on recreational anglers (e.g., Ochwada-Doyle *et al.* 2023b; 2024);
- Providing data for use in analysis and research publications prepared by researchers from within NSW DPI-Fisheries, as well as external organisations such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Australian National Centre for Ocean Resources and Security (ANCORS) and Universities;
- Evaluating spatial distribution patterns and angler interactions with TEPS (e.g., Hughes *et al.*, 2022).

The RFMP provides the only source of quantitative data on the activities of recreational fishers in NSW. This information is used in a number of different ways to assess the status of the resources that recreational fishers exploit. For example, data from the RFMP are used to ensure sustainable exploitation and management of these stocks and provide indicators of performance for this important industry. The information generated through the RFMP is the primary means by which the recreational sector can demonstrate its role as a significant user and custodian of wild fisheries resources. This in turn ensures that the interests of recreational fishers remain central

in broader dialogue regarding resource management and that the needs of the recreational sector are therefore formally recognised and reflected in management arrangements and harvest strategies.

Charter Fishing in NSW

The Charter Fishery in NSW involves hundreds of vessels engaged by tens of thousands of fishers and operates over 10° latitude (Figure 1) in waterbodies ranging from estuaries to offshore marine waters, targeting species ranging from small-bodied finfish and crustaceans to large gamefish. The Charter Fishery provides clients with fishing expertise and vessels to maximise their fishing success across a range of fishing forms and species, and to access areas not normally available to them. Charter businesses are commercial enterprises, but charter clients are subject to the same rules and regulations concerning species size and bag limits as all other recreational fishers in NSW. ‘For hire’ recreational charter fisheries operate in most industrialised and many developing countries throughout the world (Dell’Apa *et al.*, 2015; Lichtkoppler *et al.*, 2015; Hughes *et al.* 2021).

The NSW Charter Fishery provides an estimated annual AU\$50.2 million into the NSW economy from operators and their clients along with almost 200 fulltime jobs (McIlgorm and Pepperell, 2014). The fishery operates out of more than 30 coastal ports across NSW (Figure 1) with the economic impact being greatest in regional areas. There are currently 103 active licenced charter operators in NSW operating under at least one of four endorsement types – “Estuarine Fishing”, “Nearshore Bottom and Sportfishing”, “Deep Sea Bottom Fishing” and “Gamefishing” – depending on the category of fishing undertaken. By far the largest component of the NSW Charter Fishery in terms of catch and effort is the fleet operating in coastal marine waters – accessed by licenced charter operators holding either a “Nearshore Bottom and Sportfishing” or “Deep Sea Bottom Fishing” endorsement (hereafter, combined as the “Nearshore Marine Charter Fishery”). In 2021/22, there were 78 active licenced charter operators in NSW with a “Nearshore Bottom and Sportfishing” endorsement, 25 with an “Estuarine Fishing” endorsement, 16 with a “Deep Sea Bottom Fishing” endorsement and 16 with a “Gamefishing” endorsement (NSW DPI unpublished catch statistics).

Overview of monitoring approach

Monitoring of the NSW Charter Fishery by the RFMP is focussed on the Nearshore Marine Charter Fishery because it is the largest (in terms of vessels, operators and clients), operates state-wide, is generally conducted from large vessels for ease of hosting on-board observers, and targets numerous species of importance to recreational, commercial and charter sectors with requirements for data to be used in monitoring and assessment. The primary source of information is derived from logbook data, but this is complemented by targeted independent observer surveys to collect trip-specific information on effort, catch, biological data (fish lengths), rates of discarding, interactions with TEPS, and demographic information on charter clientele. Key focal species are Bluespotted Flathead (*Platycephalus caeruleopuncatus*), Grey Morwong (*Nemadactylus douglasii*), Snapper (*Chrysophrys auratus*), Yellowtail Kingfish (*Seriola lalandi*), Teraglin (*Atractoscion atelodus*) and Pearl Perch (*Glaucosoma scapulare*), but information on all species caught by the fishery are recorded.

Industry logbooks are a cost-effective means of collecting catch and effort information for many commercial and charter fisheries globally (e.g., Dell’Apa *et al.*, 2015; Lichtkoppler *et al.*, 2015; Ryan *et al.*, 2016; Hughes *et al.*, 2021). While logbook data often provides a reasonable overview of species composition and relative harvest, such data can be subject to several sources of bias and erroneous reporting (Cotter and Pilling, 2007; Hughes *et al.*, 2023). For example, variable rates of fisher compliance with mandated reporting requirements means that data may not actually reflect total fishing activity or catch. Other sources of bias include inaccurate species identification and variable reporting of interactions with TEPS (Cotter and Pilling, 2007). In addition, logbooks may not require the recording of data from discarded catches (Hughes *et al.*, 2021; 2023).

Use of trained on-board observers are a common means to complement and validate self-reported logbook data, and overcome some of the limitations outlined above (Cotter and Pilling, 2007; Chromy *et al.*, 2009). On-board observers travelling on fishing vessels can provide high quality data on catch and effort for all retained and discarded species, along with the collection of other data which may influence reported catches. This may include spatio-temporal information on the activity of the fishing vessel, gear used, environmental conditions and habitats fished. Observers may also collect other useful data such as biological data, demographic information from charter clients (for use in socio-economic analyses), and interactions with TEPS (Hughes *et al.* 2022).

A combination of mandatory industry-based logbook and an on-board observer program is therefore used to monitor the Nearshore Marine Charter Fishery within the RFMP.

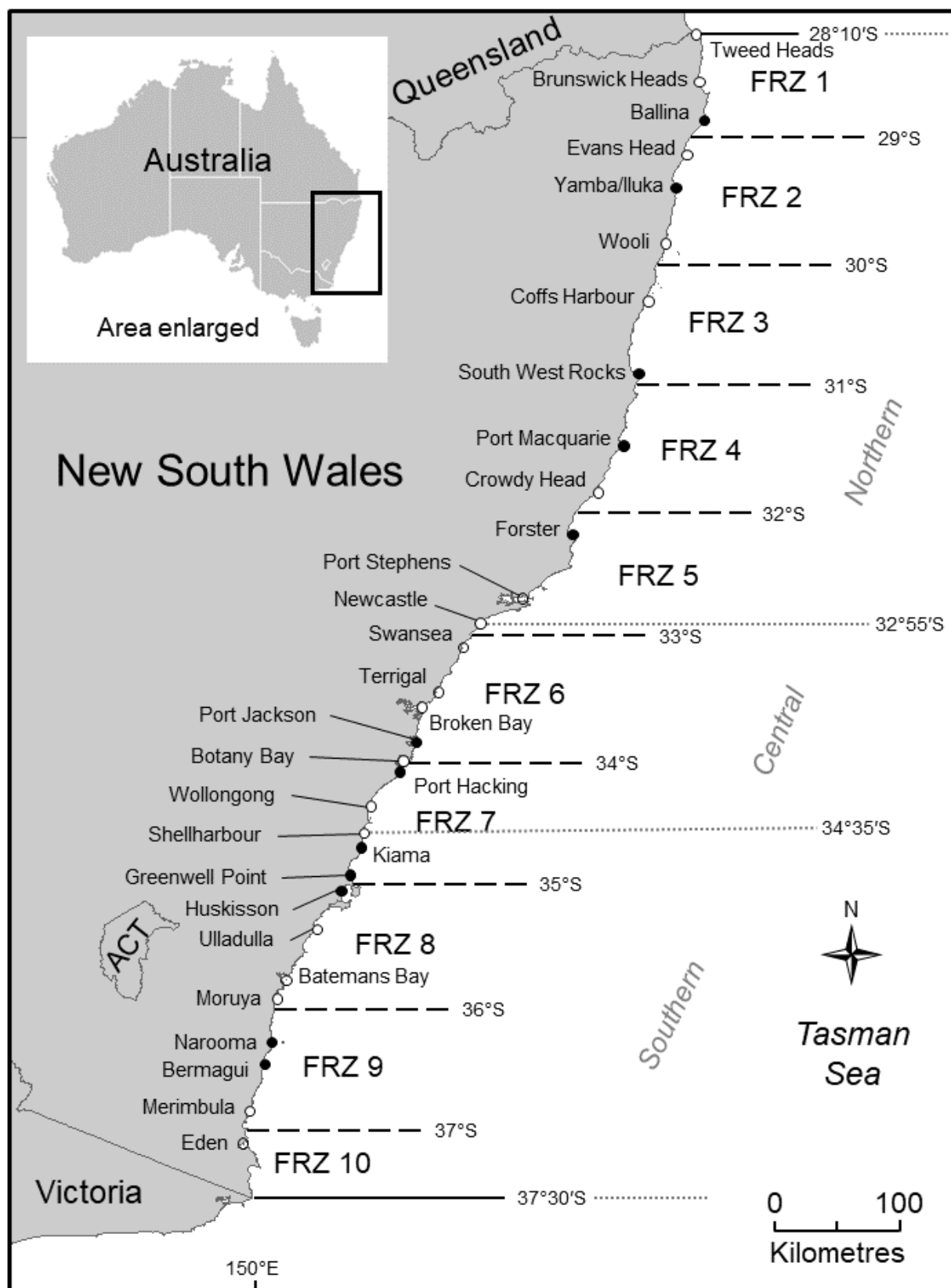


Figure 1. Map of coastal NSW showing the ten one-degree Fishers Reporting Zones (FRZs; bounded by horizontal dashed lines) against which operators within the NSW Charter Fishery are required to report catch and effort in their mandatory logbooks. Also shown are the 'Northern', 'Central' and 'Southern' MEMA management regions (bounded by horizontal dotted lines). Ports where the nearshore charter fishery operates (○) and ports where observed trips occurred (●) during 2021/22 are also shown.

Methods

Industry Logbooks

Catch and effort reporting in the mandatory NSW DPI Charter Fishing Logbook is described in detail in Hughes *et al.* (2021). Here, logbook data for the Nearshore Marine Charter Fishery are aggregated to correspond with the three NSW Marine Estate Management Authority (MEMA) management regions – ‘Northern’, ‘Central’ and ‘Southern’ (Figure 1), which is the current framework under which management and reporting for the NSW Marine Estate is conducted (MEMA, 2018). These reporting regions are also used in the TD Survey (Murphy *et al.*, 2020; 2022; 2023).

On-board Observer Monitoring

On-board observer monitoring of the Nearshore Marine Charter Fishery was stratified according to a two-factor matrix which assigned available observer trips state-wide across the ten one-degree-latitude FRZs and four seasons between November 2021 and October 2022 according to spatio-temporal retained catch recorded in mandatory industry logbooks for the previous three financial years (2018/19 – 2020/21) as described in Hughes *et al.* (2021; 2023). Funding for this monitoring dictated that a maximum of 200 observer trips could be undertaken.

On-board observer monitoring occurred on selected vessels originating from certain ports within NSW (Figure 1). Not all vessels and ports were observed during each season as a result of variable rates of voluntary operator participation, availability of observer staff, and weather conditions. The program was also heavily affected by disruptions to charter fishing activity as a result of the COVID-19 pandemic and coastal flooding which occurred during the planned monitoring period (Murphy *et al.*, 2023). As a consequence, observer monitoring finished later than planned, running from November 2021 until February 2023, in order to complete the planned spatio-temporal observer sampling effort.

Specific details of data collection methods employed on each charter trip observed are described in Hughes *et al.* (2021; 2023).

Results

Industry Logbooks

Effort

State-wide, a total of 22,841 clients took 3,320 trips with 84 Nearshore Marine Charter Fishery operators in 2021/22, consisting of a total of 18,812 hours of charter operation. Most state-wide charter trips occurred in the Northern (1,168; 35%) and Southern (1,114 trips; 34%) regions, with slightly less undertaken in the Central region (1,038 trips; 31%; Table 1, Appendix 1).

The number of clients per trip ranged from 1 to 19 (mean $\pm$ SE, 6.9 ± 0.1 ; Figure 2A). The highest mean ($\pm$ SE) number of clients per trip occurred in the Northern (7.0 ± 0.1) and Central (6.9 ± 0.1) regions with slightly fewer clients per trip recorded in the Southern region (6.7 ± 0.1 ; Figure 2A).

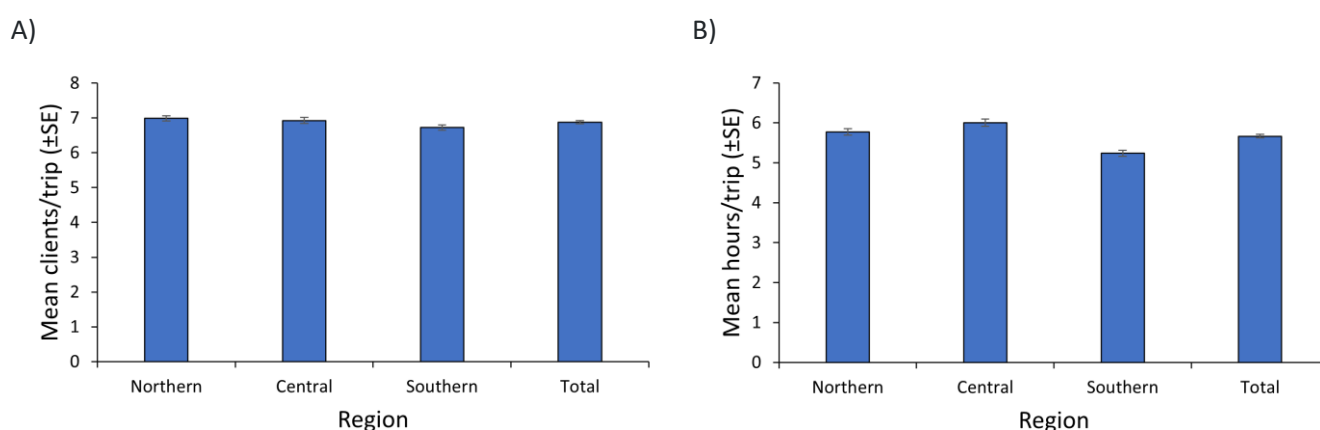


Figure 2. Variation in: A) the mean number of clients per trip ($\pm$ SE), and B) the mean hours per trip ($\pm$ SE), in the Nearshore Marine Charter Fishery in each of the MEMA management regions and state-wide recorded by industry logbooks in 2021/22. Number of trips per region can be found in Table 1.

Trip duration ranged from 1 to 12 hours with an average ($\pm$ SE) of 5.7 ± 0.1 hours per trip (Figure 2B). Overall, the mean ($\pm$ SE) trip duration was highest in the Northern and Central regions (5.8 ± 0.1 & 6.0 ± 0.1 h per trip, respectively) and lowest in the Southern region (5.2 ± 0.1 h per trip; Figure 2B).

Catch

State-wide, operators within the Nearshore Marine Charter Fishery retained 100,331 individual organisms of 128 different species in 2021/22 (Table 1, Appendices 1 & 2). Thirty species comprised 95% of the total retained catch; the other 99 species caught contributing the remaining 5% (Appendices 1 & 2). The species harvested in the greatest numbers state-wide were Snapper (21,372 individuals), Bluespotted Flathead (17,352), Grey Morwong (9,687), Yellowtail Scad (5,142) and Blue Mackerel (5,046); these five species making up approximately 58% of the total retained catch (Table 1, Appendices 1 & 2).

Catch varied between the reporting regions with the highest number of individuals retained in the Southern region (37,909) and the lowest in the Northern region (29,754) with 32,668 retained in the Central region (Table 1, Appendix 1). Species diversity of the retained catch was similarly highest in the Central and Northern regions (89 & 90 species, respectively) with slightly fewer species recorded in the Southern region (85 species; Table 1, Appendix 1).

Table 1. Number of trips recorded, number of species recorded and numbers of individuals retained by the Nearshore Marine Charter Fishery for the top 20 species, and total catch of all individuals, in the Northern, Central and Southern MEMA regions recorded in industry logbooks during 2021/22. Total catch of all species and species names are given in Appendices 1 & 2.

MEMA Region	Northern	Central	Southern	State-wide
Number of trips	1168	1038	1114	3320
Number of species	90	89	85	128
Common name				
Snapper	9235	3660	8477	21372
Bluespotted Flathead	4085	6184	7083	17352
Grey Morwong	614	4434	4639	9687
Yellowtail Scad	1055	3820	267	5142
Blue Mackerel	2239	871	1936	5046
Teraglin	3360	1008	58	4426
Tiger Flathead	81	506	3385	3972
Redfish	193	1136	1061	2390
Maori Wrasse	283	990	914	2187
Yellowtail Kingfish	450	1124	427	2001
Silver Sweep	56	1145	659	1860
Australian Bonito	236	762	793	1791
Silver Trevally	213	575	904	1692
Flathead (other)	683	121	884	1688
Pearl Perch	1566	66	7	1639
Reef Ocean Perch	2	211	1349	1562
Ocean Jacket	413	774	328	1515
Eastern Blackspot Pigfish	291	632	431	1354
Mahi Mahi	664	538	93	1295
...				
All individuals	29754	32668	37909	100331

The three most abundant species overall, Snapper, Bluespotted Flathead and Grey Morwong, made up a combined 47, 44 and 53% of the retained catch in the Northern, Central and Southern regions, respectively (Table 1, Appendix 1). Despite the overall dominance of these species, there was some variation in species contribution to retained catches across regions (Table 1). Snapper made a higher contribution to the catch in the Northern region (31%) than in the Southern or Central regions (11 and 22%, respectively; Table 2, Appendix 1). This pattern was also seen for Bluespotted Flathead with contribution to recorded logbook catch in the Southern and Central regions (19% in each), higher than in the Northern region (14%). For Grey Morwong, contribution to catches ranged from 2% in the Northern region to 14% in the Central region and 12% in the Southern region. For other important species like Silver Sweep (*Scorpius lineolata*), Tiger Flathead (*Platycephalus richardsoni*), Reef Ocean Perch (*Helicolenus percoides*), and Redfish (*Centroberyx affinis*), catches were higher in the Central and Southern regions than in the Northern region. Conversely, catches of Teraglin, Pearl Perch, Mahi Mahi (*Coryphaena hippurus*) and Venus Tuskfish (*Choerodon venustus*) were greater in the Northern region than further south (Table 1, Appendix 1).

Retained catch per trip

In the 3,320 nearshore charter fishing trips undertaken in NSW during 2021/22, logbook data showed that an average of 30.2 ± 0.4 fish were retained per trip (Figure 3A). Overall, the mean number of individuals retained per trip was higher in the Southern region (34.0 ± 0.8) than in the Central or Northern regions (31.5 ± 0.6 and 25.0 ± 0.8 individuals per trip, respectively; Figure 3A).

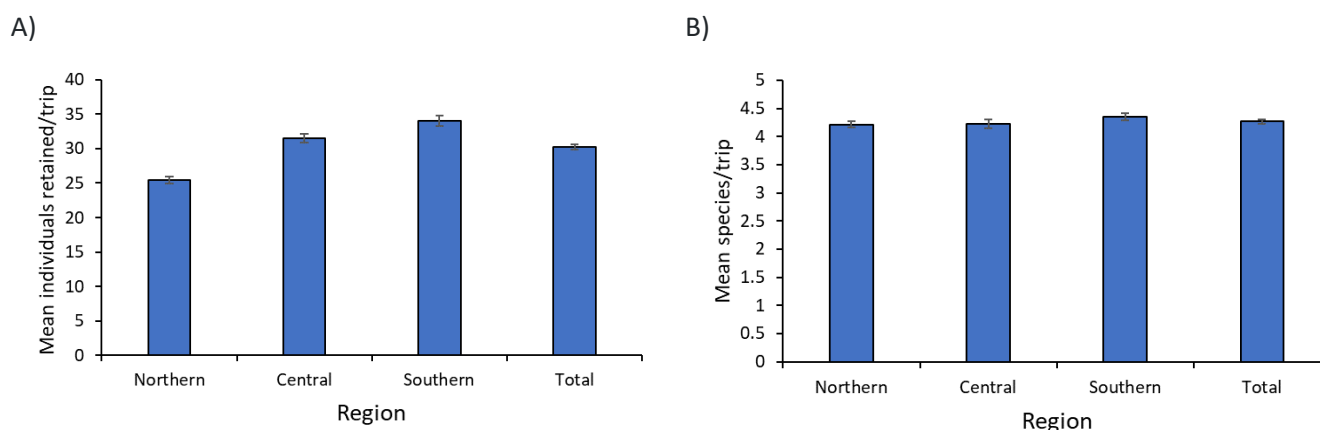


Figure 3. Variation in: A) the mean number of individuals retained per fishing trip ($\pm$ SE), and B) the mean number of species retained per fishing trip ($\pm$ SE), in the Nearshore Marine Charter Fishery in each of the MEMA management regions and state-wide recorded by industry logbooks in 2021/22. Number of trips per region can be found in Table 1.

State-wide mean species diversity in the retained catch per nearshore charter trip in 2021/22 was 4.3 ± 0.1 species per trip (Figure 3B). The mean number of species retained per trip varied spatially with the number of species per trip retained in the Northern and Central regions (4.2 ± 0.1 species per trip), lower than in the Southern region (4.4 ± 0.1 ; Figure 3B).

On-board Observer Monitoring

Observer coverage

Of the 200 observer days planned to be monitored, 190 nearshore charter trips (95%) were successfully observed between November 2021 and February 2023 (Table 2). Observer trips were taken with 22 individual charter operators working out of 13 ports between Ballina ($28^{\circ}52'S$, $153^{\circ}34'E$) and Bermagui ($36^{\circ}25'S$, $150^{\circ}04'E$; Figure 1). Adherence to the sampling design varied both spatially and temporally; deviance from the original design was due primarily to variable rates of voluntary operator participation, vessel capacity restrictions, observer availability and trip cancellations (resulting from weather conditions and mechanical failures). The program was also heavily affected by disruptions to charter fishing activity as a result of the COVID-19 pandemic and coastal flooding which occurred during the planned monitoring period (Murphy *et al.*, 2023). As a consequence, observer monitoring finished later than planned, running from November 2021 until February 2023, in order to complete the planned spatio-temporal observer sampling effort. Overall, observed trips accounted for 2.9% of the total number of nearshore charter trips reported to have been undertaken state-wide between November 2021 and February 2023 from information recorded in industry logbooks.

Effort

State-wide, 190 trips with 22 Nearshore Marine Charter Fishery operators were observed between November 2021 and February 2023, consisting of 1,285 hours on-board charter vessels (including 935 hours of active fishing). A total of 1,425 clients were present on observed trips, and ranged between 2 and 20 with an average ($\pm$ SE) of 7.5 ± 0.2 clients per trip (Figure 4A). Trip duration ranged from 2.5 to 10.3 hours with an average ($\pm$ SE) of 6.8 ± 0.1 hours per trip (Figure 4B). Hours spent actively fishing during trips ranged from 0.8 to 7.9 hours with an average ($\pm$ SE) of 4.9 ± 0.1 hours per trip.

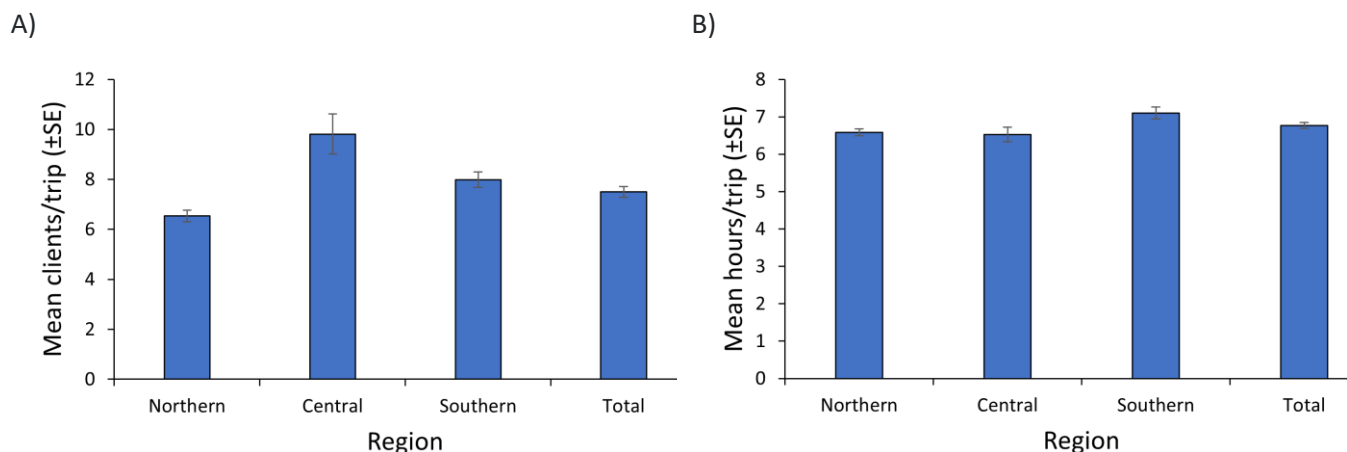


Figure 4. Variation in: A) the mean number of clients per trip ($\pm$ SE), and B) the mean hours per trip ($\pm$ SE), in observed Nearshore Marine Charter Fishery trips in each of the MEMA management between November 2021 and February 2023. Number of trips per region can be found in Table 2.

The highest mean ($\pm$ SE) number of clients per observed trip occurred in the Central region (9.8 ± 0.8) with smaller numbers of clients per trip recorded in the Northern and Southern regions (6.5 ± 0.2 & 8.0 ± 0.3 clients per trip, respectively) (Figure 4A). Overall, the mean ($\pm$ SE) trip duration was slightly higher in the Southern region (7.1 ± 0.2) than in the Northern and Central regions (6.6 ± 0.1 & 6.5 ± 0.2 h per trip, respectively; Figure 4B).

Table 2. Number of trips, species, individuals caught and % of catch released for the top 20 species, and total catch of all individuals, in the Northern, Central and Southern MEMA regions recorded by on-board observers on Nearshore Marine Charter Fishery trips between November 2021 and February 2023. Total catch of all species and species names are given in Appendices 3 & 4.

MEMA Region	Northern		Central		Southern		State-wide	
Number of trips	94		27		69		190	
Number of species	82		53		75		124	
Common name	Total	Release %	Total	Release %	Total	Release %	Total	Release %
Snapper	1384	63.8	251	71.3	1215	37.0	2850	53.0
Bluespotted Flathead	343	16.6	87	12.6	1252	17.4	1682	17.0
Blue Mackerel	173	1.2	99	2.0	697	25.7	969	18.9
Yellowtail Scad	671	2.2	39	12.8	168	29.2	878	7.9
Longspine Flathead	54	100.0	299	100.0	391	99.7	744	99.9
Eastern Red Scorpionfish	339	100.0	58	53.4	323	79.9	720	87.2
Grey Morwong	62	14.5	144	4.9	494	6.5	700	6.9
Sergeant Baker	190	88.4	169	49.7	294	67.7	653	69.1
Silver Sweep	128	98.4	64	54.7	408	65.9	600	71.7
Redfish	157	90.4	114	57.0	185	31.9	456	58.3
Southern Maori Wrasse	23	52.2	29	34.5	400	18.0	452	20.8
Mahi Mahi	326	68.1	0	-	30	76.7	356	68.8
Teraglin	277	13.0	8	0.0	2	100.0	287	13.2
Yellowtail Kingfish	133	35.3	6	66.7	117	91.5	256	61.7
Mado	57	100.0	25	96.0	137	100.0	219	99.5
Barracouta	18	100.0	5	40.0	184	69.6	207	71.5
Reef Ocean Perch	3	0.0	13	92.3	189	50.3	205	52.2
Pearl Perch	183	26.2	1	0.0	0	-	184	26.1
Eastern Blackspot Pigfish	39	2.6	29	3.4	103	0.0	171	1.2
...								
All individuals	5145	46.9	1631	52.1	7378	39.9	14154	43.9

Catch

On-board observers recorded the capture of 14,154 individual organisms of 124 different species state-wide (Table 2, Appendices 3 & 4). Just 29 species comprised 95% of the total observed catch; the other 95 species caught contributing the remaining 5% (Table 2, Appendices 3 & 4). The species observed caught in the greatest numbers state-wide were Snapper (2,850 individuals), Bluespotted Flathead (1,682), Blue Mackerel (969), Yellowtail Scad (878) and Longspine Flathead (*Platycephalus grandispinis*; 744); these species comprised ~50% of the total observed catch.

Of the organisms caught, most (56.1%) were kept (7,947 individuals consisting of 96 species; Table 2, Appendices 3 & 4). The species observed to be kept in the greatest numbers were Bluespotted Flathead (1,396 individuals), Snapper (1,339), Yellowtail Scad (809), Blue Mackerel (786), and Grey Morwong (652); these species comprised ~63% of the kept catch.

The remaining 43.9% (6,207 individuals comprising 86 species) were subsequently released (Table 2, Appendices 3 & 4). The species observed to be released in the greatest numbers were Snapper (1,511 individuals), Longspine Flathead (743), Eastern Red Scorpionfish (*Scorpaena cardinalis*; 628), Sergeant Baker (*Latropiscis purpurissatus*; 451), and Silver Sweep (430); these species comprised ~61% of the released catch.

Catch per trip

In the 190 state-wide fishing trips observed between November 2021 and February 2023, an average of 63.8 ± 2.8 individuals per trip was caught (Figure 5A). Of this, an average of 41.8 ± 2.1 individuals per trip were kept and 21.9 ± 1.4 individuals per trip were subsequently released. The mean number of individuals caught per trip were far higher in the Southern region (94.1 ± 4.8 individuals per trip) than in the Northern and Central regions (43.5 ± 2.1 & 53.1 ± 5.4 individuals per trip, respectively; Figure 5A).

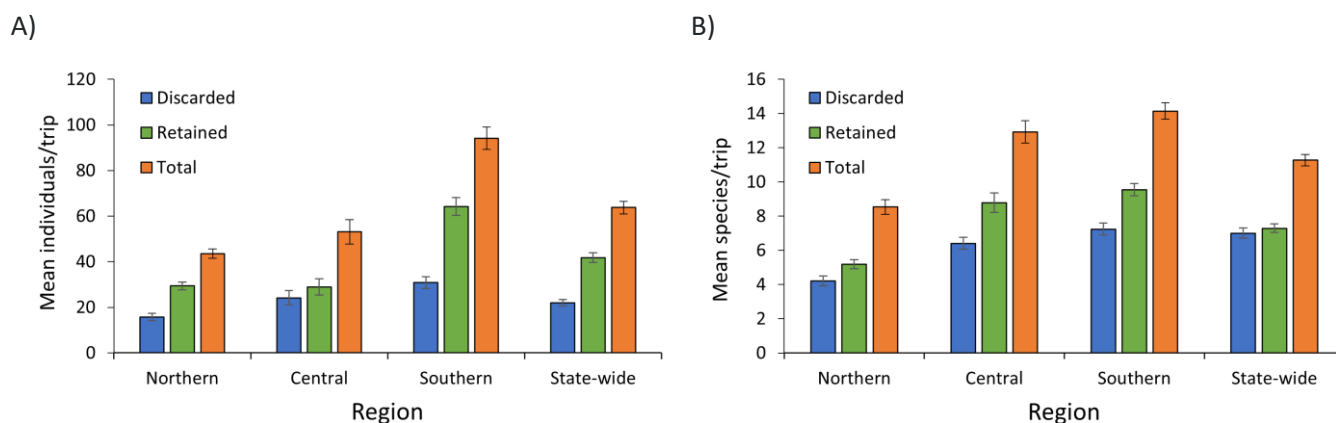


Figure 5. Variation in A) mean ($\pm$ SE) number of individuals, and B) mean ($\pm$ SE) number of species, discarded and retained per Nearshore Marine Charter Fishery trip in each of the MEMA management regions observed between November 2021 and February 2023. Number of trips observed per MEMA management region can be found in Table 2.

State-wide, mean species diversity of the total catch per nearshore charter trip was 11.3 ± 0.3 species per trip (Figure 5B). Of this, an average of 7.3 ± 0.3 species per trip were kept and 7.0 ± 0.3 species per trip were released. This pattern of higher mean number of species kept than released per trip was consistent across all regions observed (Figure 5B). The mean number of species caught per trip was higher in the Southern region (14.1 ± 0.5 species per trip) than in the Central or Northern regions (12.9 ± 0.7 & 8.5 ± 0.4 species per trip, respectively; Figure 5B). Average numbers of species kept and released per trip were consistent with this pattern (Figure 5B).

Release rates

Overall, of the 14,154 individual organisms observed to be caught state-wide between November 2021 and February 2023, 6,207 (43.9%) were subsequently released (Table 2, Appendices 3 & 4). For species caught in the greatest numbers (those making up 95% of the total catch), the proportions released varied considerably between species. Species with high release rates included Longspine Flathead (99%), Mado (*Atypichthys strigatus*; 99%), Eastern Red Scorpionfish (87%), Silver Sweep (72%), Barracouta (*Thyrsites atun*; 72%), Sergeant Baker (69%) and Mahi Mahi (69%) (Table 2, Appendices 3 & 4). In comparison, species with low release rates included Eastern Blackspot Pigfish (*Bodianus unimaculatus*; 1%), Venus Tuskfish (1%), Grey Morwong (7%), Yellowtail Scad (8%), Teraglin (13%), Bluespotted Flathead (17%) and Blue Mackerel (20%) (Table 2, Appendices 3 & 4).

There was also some spatial variability in release rates with just 39.9% of the catch released in the Southern region, compared with 46.9 and 52.1% in the Northern and Central regions, respectively (Table 2, Appendix 3).

Length Composition

Overall, of the 14,154 individual organisms observed to be caught state-wide between November 2021 and February 2023, the lengths of 12,779 (90%) were measured by on-board observers prior to retention or release. High percentages of most key species caught were measured with 100% of the 2,850 Snapper, 1,682 Bluespotted Flathead, 700 Grey Morwong, 256 Yellowtail Kingfish, 184 Pearl Perch and 287 Teraglin caught, measured. Due primarily to *in situ* use for bait, some species also caught in large numbers had a much smaller percentage of their catch measured (e.g., 68% of 969 Blue Mackerel and 24% of 878 Yellowtail Scad). Size frequency distributions for 13 of the species are presented in [Report cards for key species](#).

Wildlife interactions

Of the 190 observer trips undertaken state-wide between November 2021 and February 2023, wildlife observations and records of interactions with charter fishing vessels were made on 174 trips (92%). Overall, a total of 328 observations were made from charter fishing vessels recording a total of 4,404 individuals consisting of 23 species (Table 3). The most commonly observed group were seabirds with 4,059 individuals (~92% of the total), followed by marine mammals (dolphins, whales, seals) with 343 individuals (~8% of the total, along with one elasmobranch (unidentified whaler shark) and one marine reptile (unidentified sea turtle; Table 3).

Seabirds

Eighteen species of seabirds from eight families were positively identified, including four albatross species (Diomedidae), three gull, noddy and tern species (Laridae), six petrel, prion and shearwater species (Procellariidae), one storm petrel (Oceanitidae), one gannet (Sulidae), one pelican (Pelecanidae), one cormorant (Phalacrocoracidae) and one eagle (Accipitridae; Table 3).

Shearwaters were the most abundant group recorded with 2,423 individuals (60% of all birds) recorded (Table 3). The next most abundant group were gulls, noddies and terns with 1,070 individuals (26%) recorded. All other groups contributed the remaining 14% of individuals recorded (Table 3). The most abundant species identified were Silver Gull *Chroicocephalus novaehollandiae* (Laridae) with 831 individuals recorded, followed by 637 Short-tailed Shearwater *Ardenna tenuirostris* (Procellariidae), 427 Australian Gannet *Morus serrator*, 403 Flesh-footed Shearwater *A. carneipes* (Procellariidae) and 176 Crested Tern *Sterna bergii* (Laridae; Table 3).

State-wide there was a strong seasonal pattern in seabird abundance with the highest number of birds recorded in summer (1,812 individuals) and the lowest recorded in winter (615 individuals), with 877 recorded in spring and 755 recorded in autumn (Table 3, Figure 6A). This pattern was driven by high seasonal abundances of the most commonly recorded seabird group, petrels, prions and shearwaters; Table 3, Figure 6A). Gannets were also far more abundant in winter (390 individuals recorded), than over the rest of the year (37 individuals; Table 3, Figure 6A).

Table 3. Seasonal abundance of wildlife recorded by observers from Nearshore Marine Charter Fishery vessels between November 2021 and February 2023 state-wide.

Season	Spring	Summer	Autumn	Winter	Total
Number of trips	32	65	43	34	174
Number of species	8	10	14	12	20
Taxon					
Birds (Aves)					
Albatrosses (Diomedidae)	29	4	40	5	78
Black-browed Albatross <i>Thalassarche melanophris</i>			17		17
Buller's Albatross <i>T. bulleri</i>			1	2	3
Shy Albatross <i>T. cauta</i>	5	4	4	2	15
Campbell Albatross <i>T. impavida</i>			1		1
Unidentified albatross	24		17	1	42

Season	Spring	Summer	Autumn	Winter	Total
Number of trips	32	65	43	34	174
Number of species	8	10	14	12	20
Taxon					
Gulls, noddies and terns (Laridae)	284	425	258	103	1070
Silver Gull <i>Chroicocephalus novaehollandiae</i>	245	338	182	66	831
Crested Tern <i>Sterna bergii</i>	32	77	48	19	176
Little Tern <i>Sternula albifrons</i>	7	10	28	14	59
Unidentified gulls, noddies and terns				4	4
Petrels, prions and shearwaters (Procellariidae)	528	1369	439	87	2423
Gould's Petrel <i>Pterodroma leucoptera</i>		2			2
Grey Petrel <i>Procellaria cinerea</i>		4			4
Flesh-footed Shearwater <i>Ardenna carneipes</i>		357	43	3	403
Short-tailed Shearwater <i>A. tenuirostris</i>	86	326	195	30	637
Sooty Shearwater <i>A. grisea</i>				2	2
Southern Giant Petrel <i>Macronectes giganteus</i>				5	5
Unidentified petrel				1	1
Unidentified shearwater	442	680	201	46	1369
Southern storm petrels (Oceanitidae)			3	25	28
Black-bellied Storm Petrel <i>Fregetta tropica</i>			3	25	28
Gannets and boobies (Sulidae)	25	4	8	390	427
Australian Gannet <i>Morus serrator</i>	25	4	8	390	427
Pelicans (Pelecanidae)	1				1
Australian Pelican <i>Pelecanus conspicillatus</i>	1				1
Cormorants and shags (Phalacrocoracidae)			1		1
Pied Cormorant <i>Phalacrocorax varius</i>			1		1
Fantails (Rhipiduridae)	2				2
Willy Wagtail <i>Rhipidura leucophrys</i>	2				2
Swallows and martins (Hirundinidae)			3		3
Welcome Swallow <i>Hirundo neoxena</i>			3		3
Eagles, hawks, kites and harriers (Accipitridae)		1	1	2	4
White-bellied Sea Eagle <i>Haliaeetus leucogaster</i>		1	1	2	4
Unidentified birds	8	9	2	3	22
Total birds	877	1812	755	615	4059
Mammals (Mammalia)					
Baleen Whales (Mysticeti)	6		1	34	41

Season	Spring	Summer	Autumn	Winter	Total
Number of trips	32	65	43	34	174
Number of species	8	10	14	12	20
Taxon					
Humpback Whale <i>Megaptera novaeangliae</i>	4		1	27	32
Unidentified whale	2			7	9
Oceanic Dolphins (Delphinidae)	105	72	30	94	301
Common Dolphin <i>Delphinus delphis</i>	61	18		93	172
Bottlenose Dolphin <i>Tursiops truncatus</i>	44	54	30	1	129
Eared Seals (Otariidae)				1	1
Unidentified fur seal <i>Arctocephalus</i> sp.				1	1
Total mammals	111	72	31	129	343
Others					
Sharks, Skates and Rays (Elasmobranchii)		1			1
Whaler Sharks (Carcharhinidae)		1			1
Unidentified whaler shark		1			1
Reptiles (Reptilia)	1				1
Sea Turtles (Cheloniidae)	1				1
Unidentified sea turtle	1				1
Total (all species)	989	1885	786	744	4404

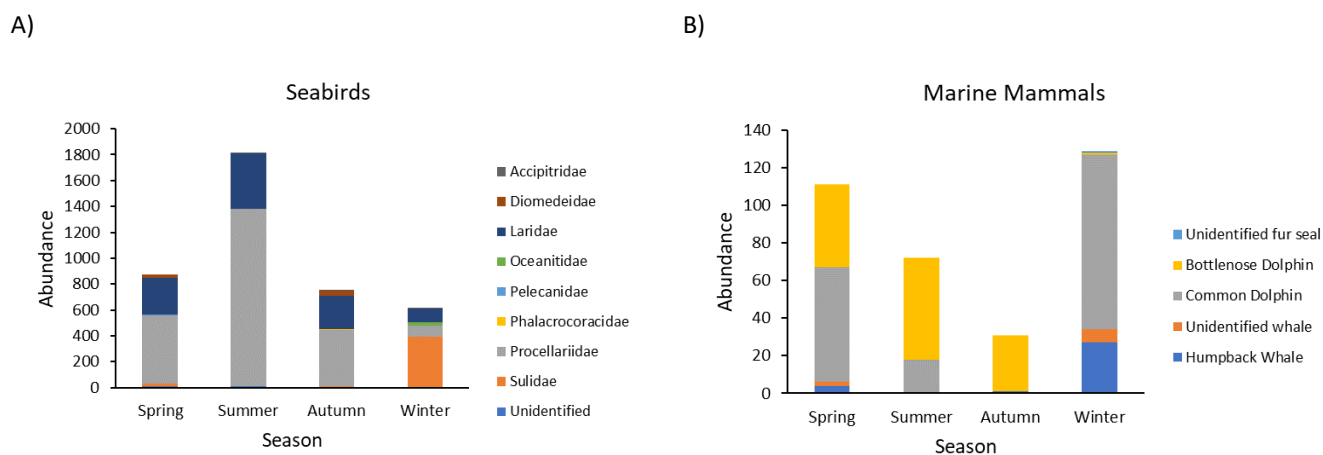


Figure 6. Seasonal abundance of A) Seabirds, and B) Marine mammals, recorded by observers from Nearshore Marine Charter Fishery vessels between November 2021 and February 2023 state-wide. Common names for families can be found in Table 3.

Marine Mammals

Dolphins were the most abundant marine mammals with 301 individuals recorded, either Common Dolphin *Delphinus delphis* or Bottlenose Dolphin *Tursiops truncatus* (Delphinidae), along with forty-one whales, primarily Humpback Whale *Megaptera novaeangliae* (Mysteceti; Table 3). Abundance of marine mammals was highly seasonal with far more individuals recorded in winter (129) and spring (111) than in summer (72) and autumn (31; Table 3, Figure 6B). This pattern was primarily driven by high seasonal abundances of Bottlenose and Common Dolphins, and Humpback Whales (Table 6, Figure 6B).

Interactions

Overall, 4,404 individual animals were observed in the vicinity of charter fishing vessels during the study period state-wide, however only 14 events (comprising 68 individuals) were recorded where wildlife directly interacted with the fishery at a rate of 1.50 interactions per 100 h fishing (Table 4). These interactions occurred on 8 trips out of the 190 observed at a rate of 4.2% of trips. Direct interactions with the fishery were recorded in summer (4 occasions), autumn (8 occasions) and once each in winter and spring (Table 4). Marine mammals were only recorded in a single direct interaction (0.11 interactions per 100 h fishing) and 13 interactions involved seabirds (1.39 interactions per 100 h fishing).

Bycatch

Three incidences of bycatch were recorded, involving several species of seabirds becoming entangled in fishing line (one Short-tailed Shearwater) or hooked, either in the mouth (one Australian Gannet) or on the body (one unidentified shearwater; Table 4). All individuals were released alive. This represents a bycatch rate of 0.32 individuals per 100 h fishing (Table 4).

Table 4. List of the 14 direct interactions between wildlife (n=68) and Nearshore Marine Charter Fishery vessels recorded by observers between November 2021 and February 2023 state-wide. * denotes events where bycatch was recorded.

Season	Event date	Species	Family	Count	Details
Summer	22/01/2022	Flesh-footed Shearwater	Procellariidae	3	Eating discards
Summer	22/01/2022	Grey Petrel	Procellariidae	1	Eating discards
Summer	22/01/2022	Unidentified shearwater	Procellariidae	5	Eating discards
Summer	19/02/2022	Unidentified shearwater	Procellariidae	30*	Hooked through foot, released alive
Autumn	19/03/2022	Short-tailed Shearwater	Procellariidae	7*	Entangled in line, released alive
Autumn	2/05/2022	Australian Gannet	Sulidae	1*	Baited hook swallowed, released alive
Autumn	14/05/2022	Black-browed Albatross	Diomedidae	5	Eating discards
Autumn	14/05/2022	Black-browed Albatross	Diomedidae	3	Eating discarded bait
Autumn	14/05/2022	Black-browed Albatross	Diomedidae	1	Chasing hooked fish
Autumn	14/05/2022	Unidentified albatross	Diomedidae	7	Eating discards
Autumn	14/05/2022	Unidentified albatross	Diomedidae	1	Eating discards
Autumn	14/05/2022	Unidentified albatross	Diomedidae	1	Eating discards
Winter	23/06/2022	Australian Gannet	Sulidae	2	Chasing hooked fish
Spring	18/09/2022	Unidentified fur seal	Otariidae	1	Depredating hooked fish
Totals	14 events	6 species	4 families	68 individuals	

Demography of charter clientele

Demographic data on the number of clients per trip and their sex was collected via direct observation and trip booking information from a total of 1,425 clients on the 190 nearshore charter trips observed between November 2021 and February 2023 state-wide. Additional demographic data specific to client age and location of residence was collected during interviews with observers from 1,398 clients (98.1% of total). Non-participation in interviews with observers was primarily due to motion sickness or not an inability to communicate in English.

Overall, charter clients were primarily male (89.0%), with 11.0% female. Charter clients ranged in age from 3 to 90 years with the majority (94%) being adults (≥ 18 years old). Similar proportions of charter clients were aged between 15 and 29 (23%), 30 and 44 (29%) and 45 and 59 years (27%; Figure 7A). Sixteen percent of clients were older than 60 years of age.

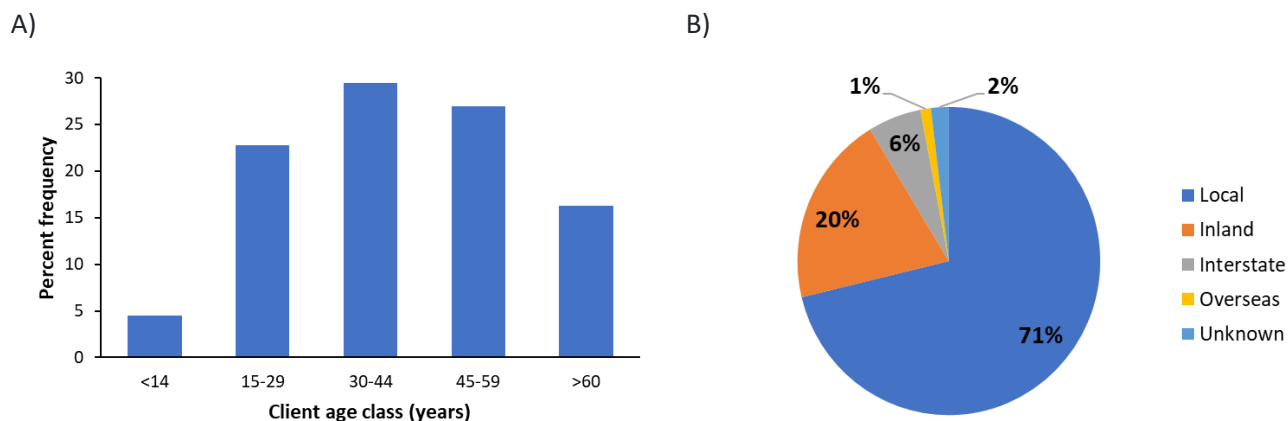


Figure 7. Information collected on Nearshore Marine Charter Fishery clientele in interviews with on-board observers between November 2021 and February 2023 state-wide (n = 1,398): A) age class, B) place of residence.

Most (71%) charter clients came from the area local to the charter operation, however 26% came from inland regions of NSW or from interstate (Figure 7B). Just over one percent of charter clients (n=16) came from overseas, including the United States, Holland, France and the United Kingdom.

Discussion

Information presented via monitoring of the Nearshore Marine Charter Fishery in NSW demonstrates that the sector accounts for considerable catches for some species (e.g. Bluespotted Flathead, Snapper, Grey Morwong), and confirms that the sector supports important social and economic services to coastal communities throughout the state. Within the RFMP, observer monitoring of nearshore charter vessels is also an important companion dataset to the biennial recreational fishing TD Survey (e.g., Murphy *et al.*, 2020; 2022; 2023); length data collected for key recreational fish species caught by the charter fishery used to estimate harvest weights from the numbers of fish recorded in the TD Survey, and used in stock assessments.

Logbook catch and effort

Logbook records revealed that state-wide nearshore charter fishing effort in terms of number of total trips taken, trip hours and clients was similar in 2021/22 (3,320 trips, 18,812 h, 22,841 clients) and 2019/20 (3,623 trips, 21,004 h, 24,749 clients; Hughes *et al.*, 2023), but much lower than in 2017/18 (4,560 trips, 25,266 h, 33,766 clients; Hughes *et al.*, 2021). Consequently, total species and number of individuals recorded in logbooks in 2021/22 (~100,000 individuals of 129 species) were very similar to those reported in 2019/20 (~106,000 individuals of 138 species; Hughes *et al.*, 2023), but were substantially lower than that recorded in logbooks for 2017/18 (~151,000 individuals of 146 species; Hughes *et al.*, 2021). Despite this overall decline in effort and catch, spatial patterns in 2021/22 were more uniform across fishing regions than in 2019/20, primarily attributable to the impact that the “Black Summer” bushfire disaster had on coastal communities and businesses, and operation of the Nearshore Marine Charter Fishery, which was particularly severe on the NSW South Coast during autumn 2019/20 (DPIE, 2020).

Temporal patterns of declining catch and effort in 2021/22 and 2019/20, when compared with 2017/18, were also mirrored by those reported for the overall NSW recreational fishery in the TD Survey for each period (Murphy *et al.*, 2021; 2022; 2023). Both 2019/20 and 2021/22 encompassed periods of extreme environmental conditions, which in combination with restriction on movements consequent of the COVID-19 pandemic, severely impacted people’s ability to go recreational fishing (Murphy *et al.*, 2022; 2023; Ochwada-Doyle *et al.*, 2024). During 2019/20, NSW experienced some of the worst drought conditions on record, as well as an extreme bushfire season that affected much of the state (Bureau of Meteorology, 2020). The COVID-19 pandemic was at its peak during this time with severe restrictions on movement throughout NSW. In contrast, the 2021/22 survey period was impacted by severe, record-breaking rainfall and flooding events, with COVID-19 continuing to cause restriction to movement in NSW (Murphy *et al.*, 2023).

Species-specific catches and harvest rates

Species composition for 2021/22 indicated the top five species retained across the state were Snapper, Bluespotted Flathead, Grey Morwong, Yellowtail Scad and Blue Mackerel, identical to 2019/20 (Hughes *et al.*, 2023) and similar to those recorded in 2017/18 (Hughes *et al.*, 2021). Despite the above temporal declines in overall catch and effort, species-specific catches and harvest rates remained relatively similar (or increased) between 2019/20 and 2021/22 for most species (see [Report cards for key species](#) below). Important exceptions were Bluespotted Flathead, Yellowtail Scad, Yellowtail Kingfish and Pearl Perch, the retained catches of which did decline by ~15, 22, 43 and 37%, respectively, between 2019/20 and 2021/22. Declines in the retained catch and harvest rates for these species compared to previous surveys may be a result of lower overall nearshore marine charter fishing effort with restricted access to fishing grounds due to flooding, storms, wet weather and high seas. During strong La Niña weather events such as experienced during 2021/22, more tropical cyclones and east coast low pressure systems can be expected, leading to storm surges, higher than normal significant wave heights and severe beach erosion along the NSW coast (Barnard *et al.*, 2015). The overall recreational catches derived from the biennial TD Survey of predominantly marine species such as Sand Flathead, Snapper, Grey Morwong and Yellowtail Kingfish also declined in comparison to catches recorded in 2019/20, and were attributed at least in part to the abovementioned adverse environmental conditions present during 2021/22 (Murphy *et al.*, 2023).

Comparison of logbook and observer data

Data collected by onboard observers is valuable in comparison with information collected by fishers in mandatory logbooks, thus enabling independent validation and adjustment for biases (if identified) for use in monitoring, assessment, management, and by industry (Cotter & Pilling, 2007; Chromy *et al.*, 2009). As a consequence of disruptions to charter fishing activity because of extensive coastal flooding and the COVID-19 pandemic, the charter observer monitoring program was extended to February 2023, in order to complete the planned spatio-temporal observer sampling effort. As a result, data collected in logbooks for the 2021/22 financial year and that collected by observers were not in exact temporal alignment.

Nonetheless, comparison of state-wide effort data from the two sources revealed that the mean number of clients per trip recorded in logbooks (6.9 ± 0.1 clients/trip) were only marginally lower than those recorded by observers (7.5 ± 0.2 clients/trip). Similarly, the mean duration of charter trips recorded in logbooks were also lower (5.7 ± 0.1 h/trip) than that recorded by observers (6.8 ± 0.1 h/trip). A slight bias is therefore identified in an underestimate of effort in terms of the numbers of clients and the duration of trips recorded in logbooks, when evaluated against data collected by independent observers.

In terms of state-wide catch data, the number of retained individuals per trip recorded in logbooks (30.2 ± 0.4 individuals/trip) was considerably lower than the same information recorded by observers (41.8 ± 2.1 individuals/trip). Similarly, the species diversity of the retained catch as recorded in logbooks was just 4.3 ± 0.1 species/trip, whereas the species diversity of the retained catch recorded by observers was 7.3 ± 0.3 species/trip. The same pattern was previously identified in both 2019/20 (Hughes *et al.*, 2023) and 2017/18 (Hughes *et al.*, 2021). A clear indicator of bias is therefore identified in an underestimate of the numbers of individual fish and the species diversity of the retained catch recorded in logbooks, when evaluated against data collected by observers.

The top five retained species recorded were similar in logbooks and by observers during the survey period (logbook: Snapper, Bluespotted Flathead, Grey Morwong, Yellowtail Scad, Blue Mackerel; observer: Bluespotted Flathead, Snapper, Yellowtail Scad, Blue Mackerel, Grey Morwong). Although the species' ranks of importance were different in each dataset, the consistency in species composition between the two sources was similarly also found in 2017/18 and 2019/20 (Hughes *et al.*, 2021; 2023).

Release rates

Most organisms caught were kept (56%) with the remaining 44% released in the observer survey period, a similar rate of discarding compared with that observed in 2019/20 (42% released; Hughes *et al.*, 2023), but lower than that recorded during a pilot study in 2017/18 (34%; Hughes *et al.*, 2021). However, species with highest (Longspine Flathead, Mado, Eastern Red Scorpionfish, Silver Sweep, Barracouta, Sergeant Baker) and lowest (Eastern Blackspot Pigfish, Venus Tuskfish, Grey Morwong, Yellowtail Scad, Teraglin) release rates recorded in this study were similar across survey periods.

Length composition

For key species with a minimum legal length (MLL), most of the retained catch (61-90%) was 0-10 cm above their respective MLLs (see *Report cards for key species* below). A very similar pattern where the majority of retained individuals of the same key species were less than ~10 cm above the MLL was also recorded in 2019/20 (Hughes *et al.*, 2023) and 2017/18 (Hughes *et al.*, 2021). This pattern was also similar to those documented for Snapper, Grey Morwong and Bluespotted Flathead in the coastal recreational trailer boat fishery (Steffe and Murphy, 2011) and the commercial Ocean Trap and Line Fishery (Stewart and Hughes, 2008).

Wildlife abundance and interactions

The number of observations, species diversity and counts of individuals in the vicinity of charter vessels in 2021/22 state-wide (328 observations, 23 species, ~4,400 individuals) was lower than recorded in 2019/20 (571 observations, 36 species, ~9,700 individuals; Hughes *et al.*, 2023). Despite this, seabirds were by far the most abundant group observed in both studies, contributing ~90% of all wildlife observed – mainly petrels, prions and shearwaters (Procellariidae), and gulls, noddies and terns (Laridae) – followed by marine mammals (seals,

dolphins and whales). A similarly low rate of direct interactions between wildlife and the fishery was also recorded in 2019/20 (3.02 per 100 h fishing; Hughes *et al.*, 2023) compared with that reported here for 2021/22 (1.50 per 100 h). Rates of bycatch were also similarly low in the current study (0.32 per 100 h fishing) compared with that recorded in 2019/20 (0.49 per 100 h; Hughes *et al.*, 2023).

Demography of charter clients

Charter clients were predominantly (~90%) male, and this has not changed historically from previous observer studies (Hughes *et al.*, 2021; 2023) or that reported in off-site recreational fishing surveys in NSW (e.g., West *et al.*, 2015; Murphy *et al.*, 2020; 2022; 2023). The percentage of charter clients from the area local to the charter operation (72%) increased compared with 2019/20 (65%), with a concomitant decrease in the percentage of clients from inland regions of NSW or from interstate from 34% in 2019/20 (Hughes *et al.*, 2023) to 26% in 2021/22. Approximately 1% of charter clients came from overseas in both 2021/22 and 2019/20, likely due to restrictions to overseas travel in place due to the COVID-19 pandemic during both periods.

Conclusions

The data series represented by the biennial monitoring of the NSW Nearshore Marine Charter Fishery has already been identified as a key emerging data series for informing recreational fishing-specific Performance Indicators within multi-sector harvest strategies (Fowler *et al.*, 2022). Such a developing time series will be crucial in the development of future harvest strategies for key recreational fish stocks and species in NSW. Industry logbook data represents a potentially cost-effective means of collecting this data for key recreational species harvested by the fishery, however if these metrics are going to be used for monitoring and assessment purposes, a periodic independent observer program may be useful to evaluate and adjust for any bias identified in logbook data.

As well as evaluation of industry logbooks, independent observer monitoring of the NSW Nearshore Marine Charter Fishery provides an opportunity to collect additional information complementary to that collected by logbooks for use in assessment and management of NSW's fisheries resources. Such information includes species composition of discards and rates of discarding, the lengths of retained and discarded catch, assessment of impacts on non-target species and demographic information collected on charter clientele for provision to industry.

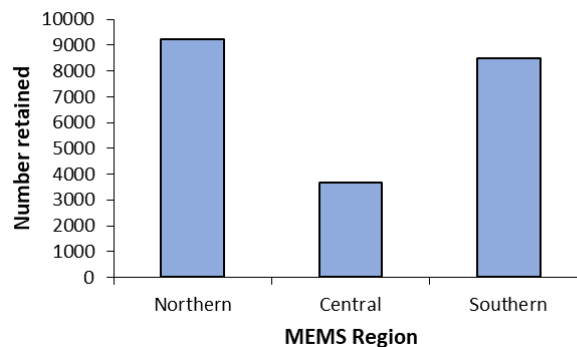
Report cards for key species

Snapper (*Chrysophrys auratus*)

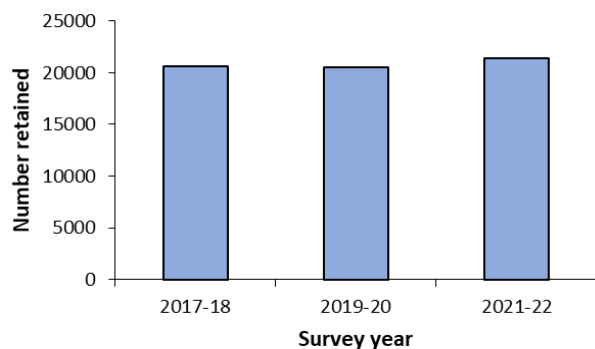


- Total retained charter catch was 21,372 individuals during 2021/22 (logbook)
- Release rate was 53% (observer)

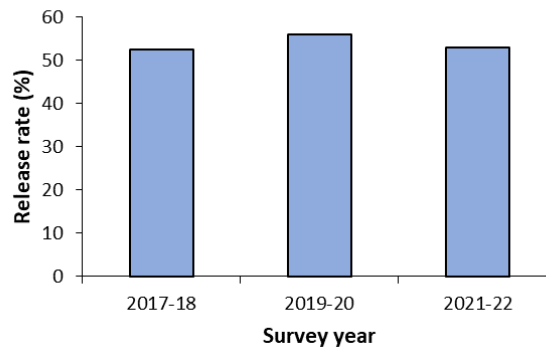
Retained catch by region 2021/22 (logbook)



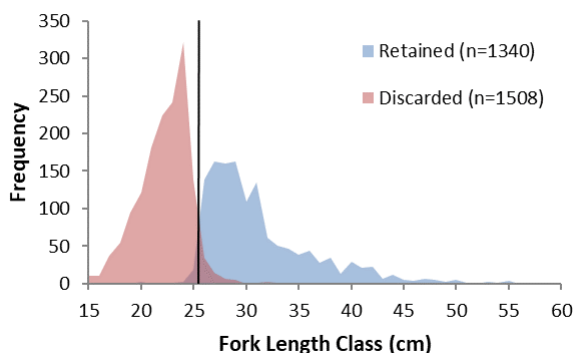
Retained catch by survey year (logbook)



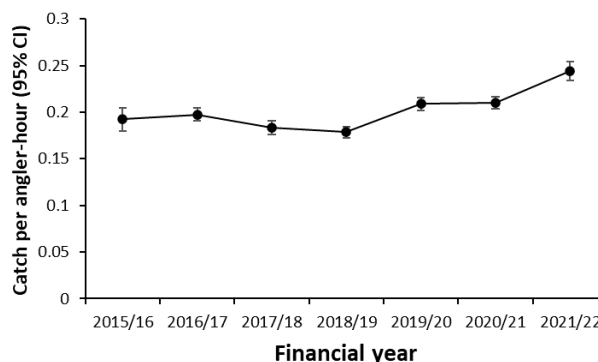
Release rates by survey year (observer)



Size composition 2021/22 (observer)*



Harvest rates 2015/16 – 2021/22 (logbook)



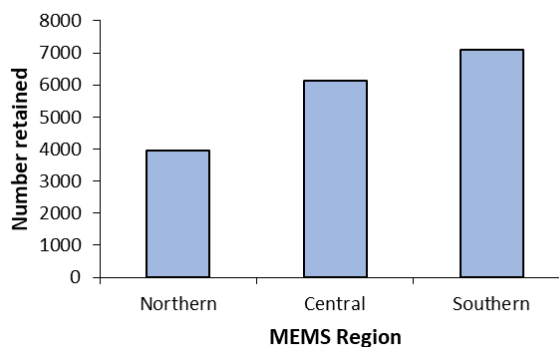
* Vertical black line is at the minimum legal length (30 cm total length converted to fork length).

Bluespotted Flathead (*Platycephalus caeruleopunctatus*)

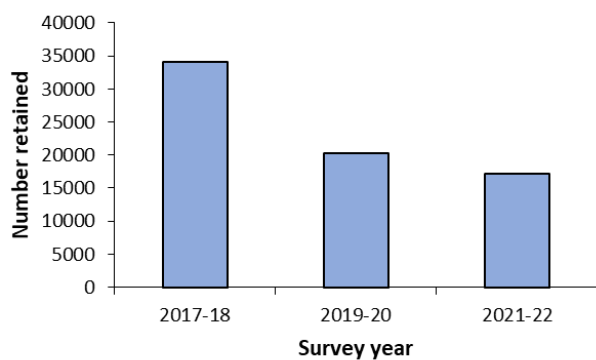


- Total retained charter catch was 17,352 individuals during 2021/22 (logbook)
- Release rate was 17% (observer)

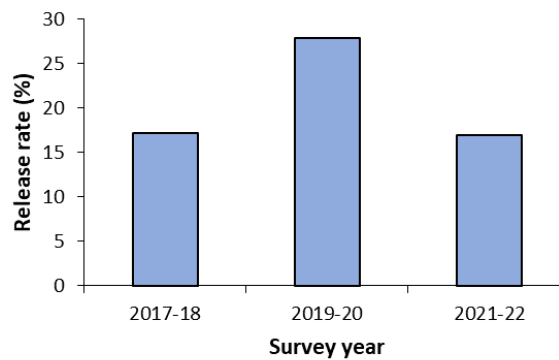
Retained catch by region 2021/22 (logbook)



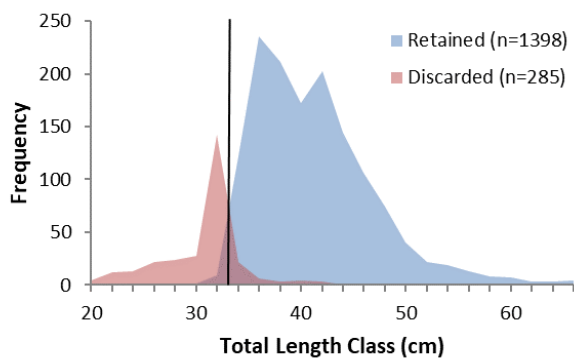
Retained catch by survey year (logbook)



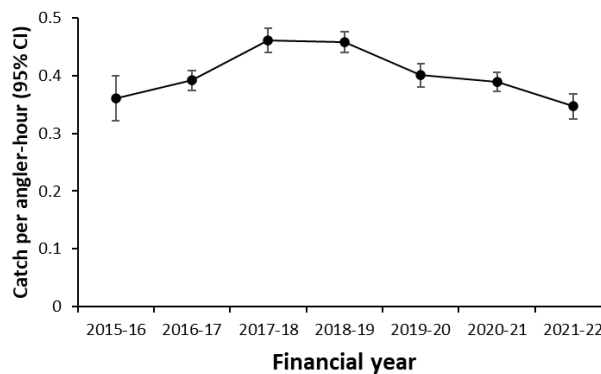
Release rates by survey year (observer)



Size composition 2021/22 (observer)*

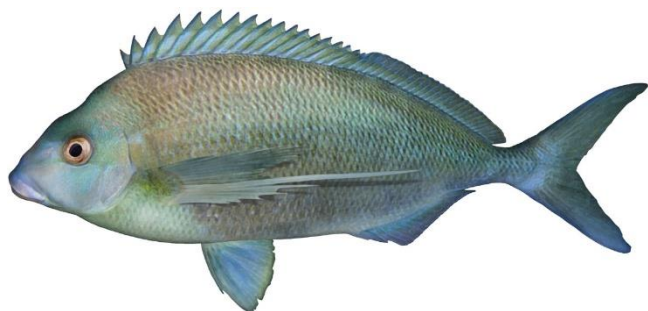


Harvest rates 2015/16 – 2021/22 (logbook)



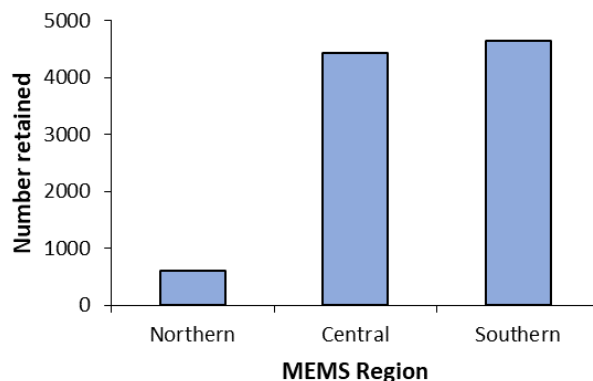
* Vertical black line is at the minimum legal length (33 cm total length).

Grey Morwong (*Nemadactylus douglasii*)

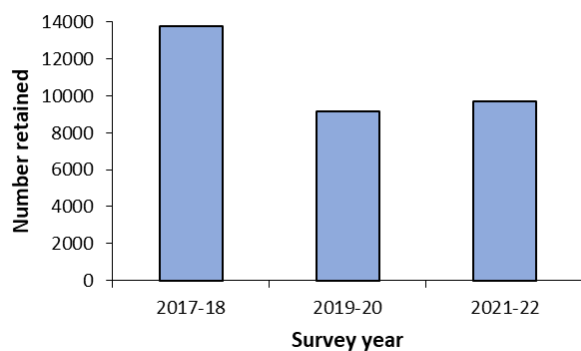


- Total retained charter catch was 9,687 individuals during 2021/22 (logbook)
- Release rate was 7% (observer)

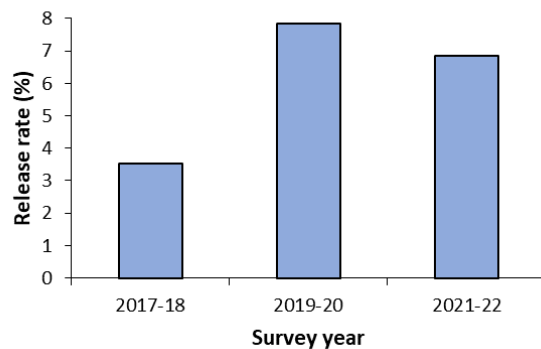
Retained catch by region 2021/22 (logbook)



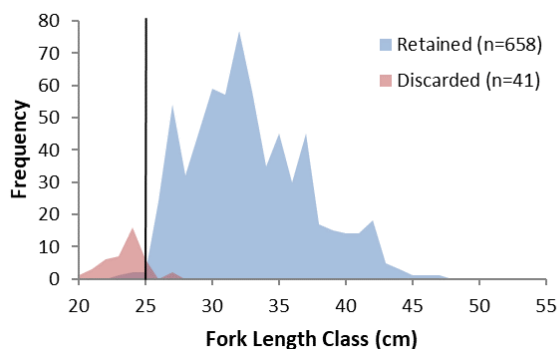
Retained catch by survey year (logbook)



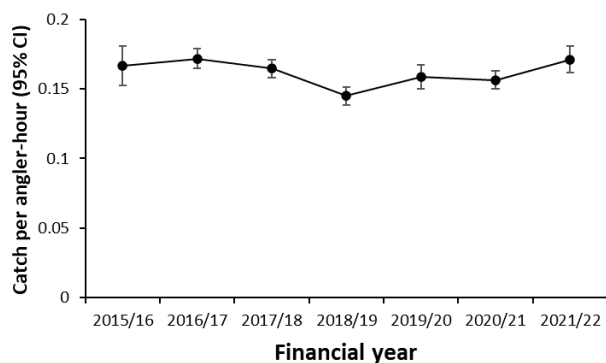
Release rates by survey year (observer)



Size composition 2021/22 (observer)*



Harvest rates 2015/16 – 2021/22 (logbook)



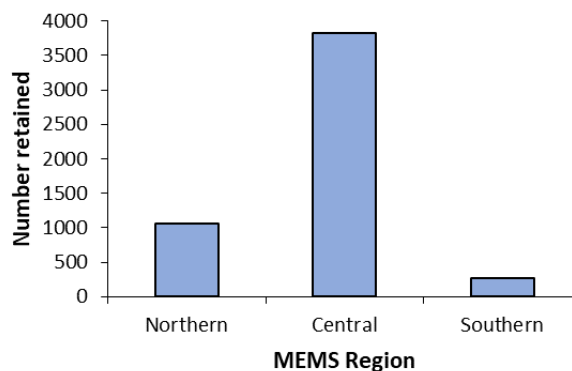
* Vertical black line is at the minimum legal length (30 cm total length converted to fork length).

Yellowtail Scad (*Trachurus novaezelandiae*)

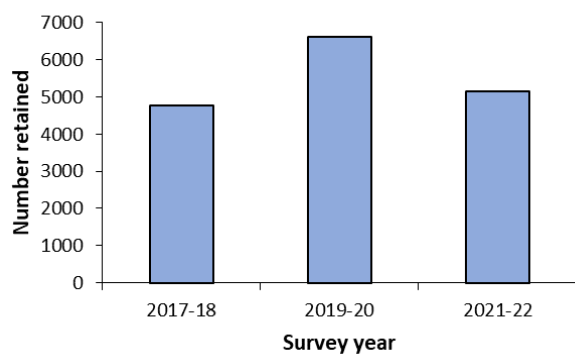


- Total retained charter catch was 5,142 individuals during 2021/22 (logbook)
- Release rate was 8% (observer)

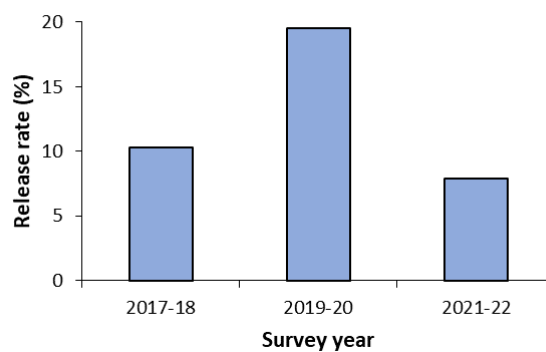
Retained catch by region 2021/22 (logbook)



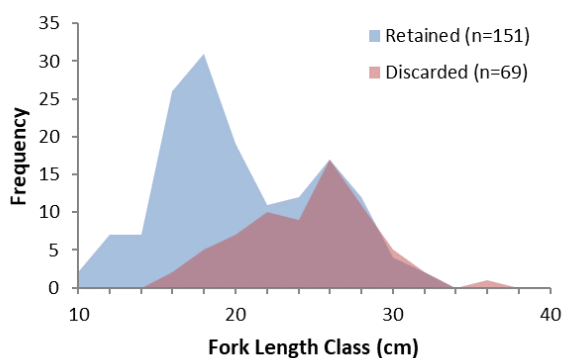
Retained catch by survey year (logbook)



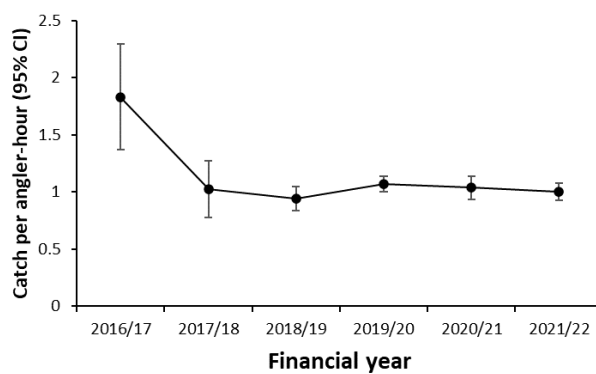
Release rates by survey year (observer)



Size composition 2021/22 (observer)



Harvest rates 2016/17 – 2021/22 (logbook)

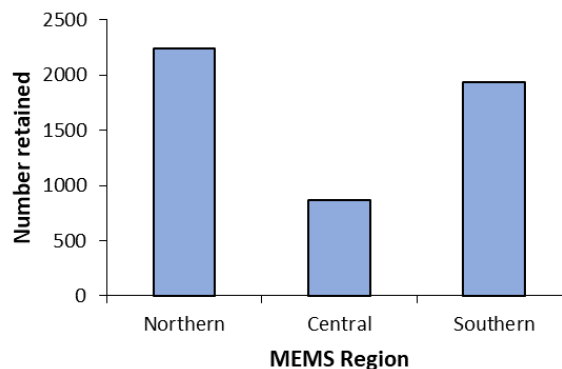


Blue Mackerel (*Scomber australasicus*)

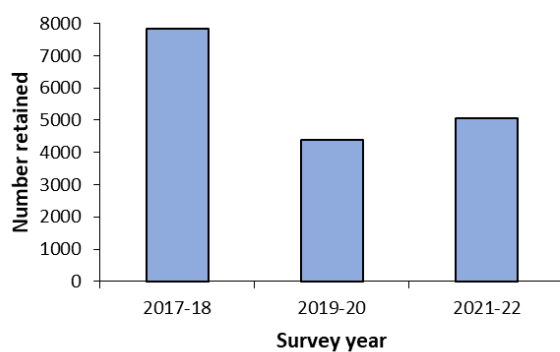


- Total retained charter catch was 5,046 individuals during 2021/22 (logbook)
- Release rate was 19% (observer)

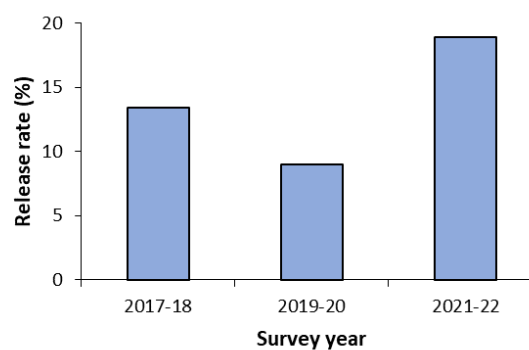
Retained catch by region 2021/22 (logbook)



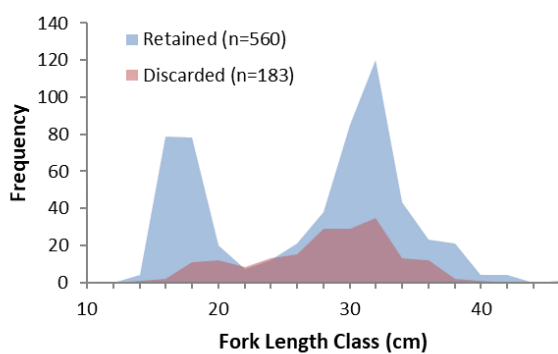
Retained catch by survey year (logbook)



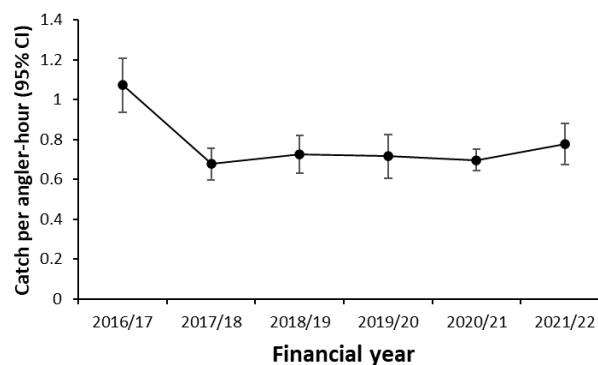
Release rates by survey year (observer)



Size composition 2021/22 (observer)



Harvest rates 2016/17 – 2021/22 (logbook)

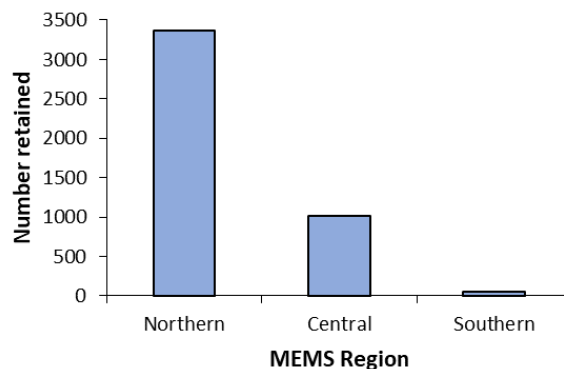


Teraglin (*Atractoscion atelodus*)

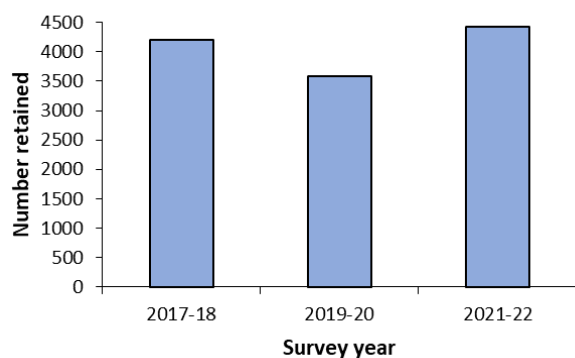


- Total retained charter catch was 4,426 individuals during 2021/22 (logbook)
- Release rate was 13% (observer)

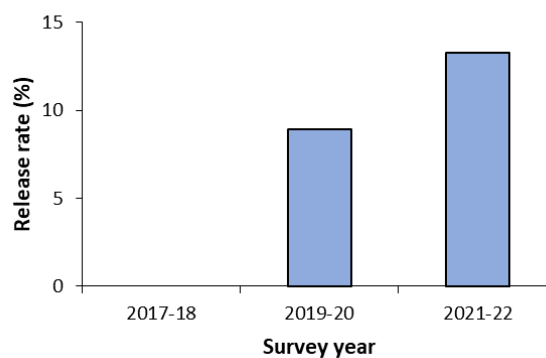
Retained catch by region 2021/22 (logbook)



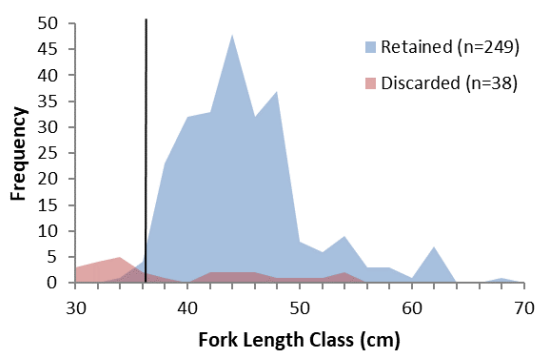
Retained catch by survey year (logbook)



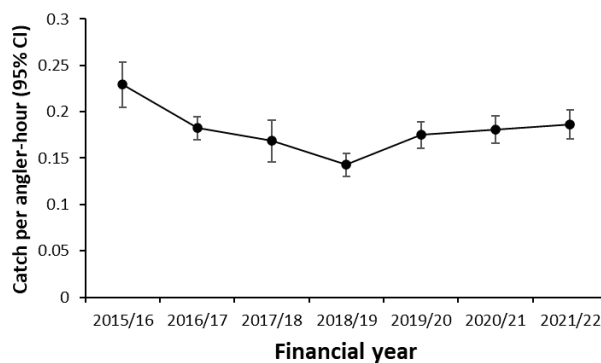
Release rates by survey year (observer)**



Size composition 2021/22 (observer)*



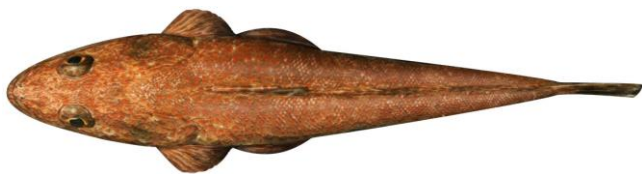
Harvest rates 2015/16 – 2021/22 (logbook)



* Vertical black line is at the minimum legal length (38 cm total length converted to fork length).

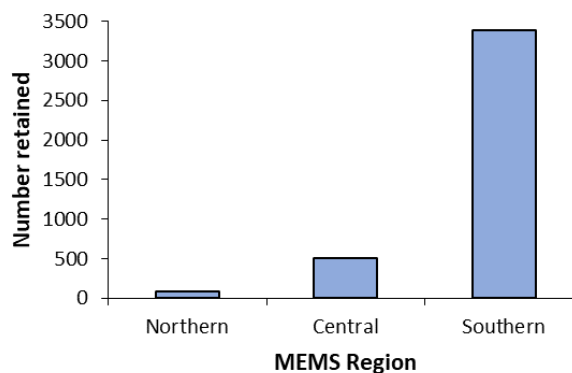
** The observer survey for 2017/18 was focussed on southern NSW and therefore recorded very few Teraglin.

Tiger Flathead (*Platycephalus richardsoni*)

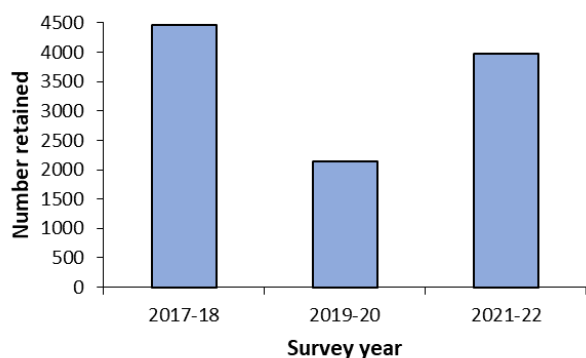


- Total retained charter catch was 3,972 individuals during 2021/22 (logbook)
- Release rate was 34% (observer)

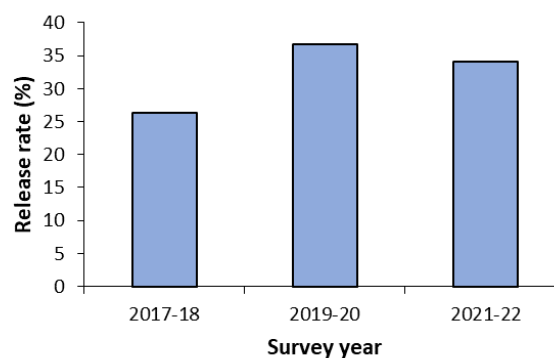
Retained catch by region 2021/22 (logbook)



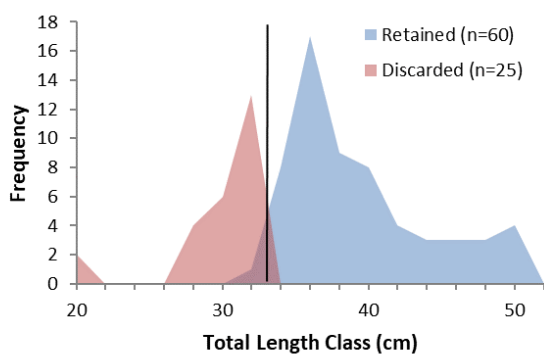
Retained catch by survey year (logbook)



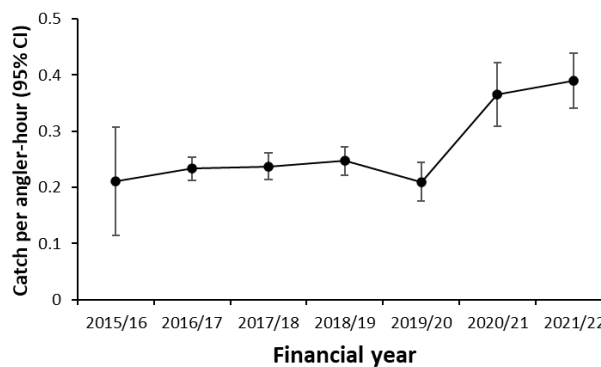
Release rates by survey year (observer)



Size composition 2021/22 (observer)*



Harvest rates 2015/16 – 2021/22 (logbook)



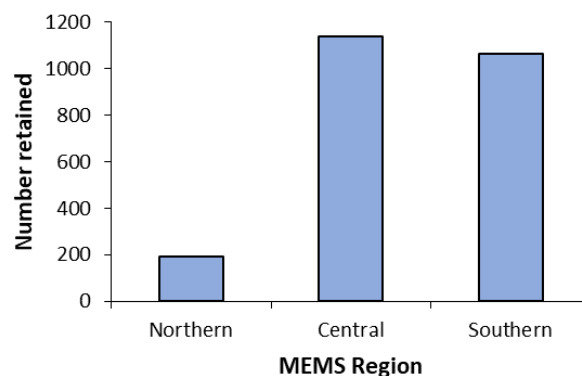
* Vertical black line is at the minimum legal length (33 cm total length).

Redfish (*Centroberyx affinis*)

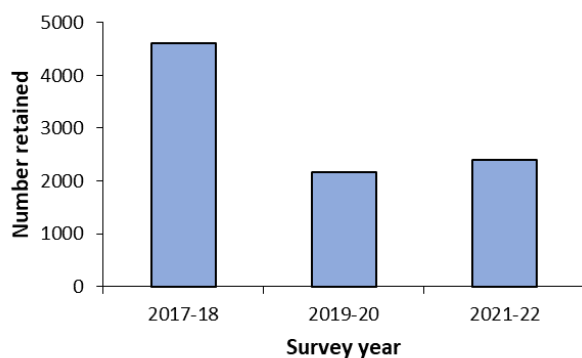


- Total retained charter catch was 2,390 individuals during 2021/22 (logbook)
- Release rate was 58% (observer)

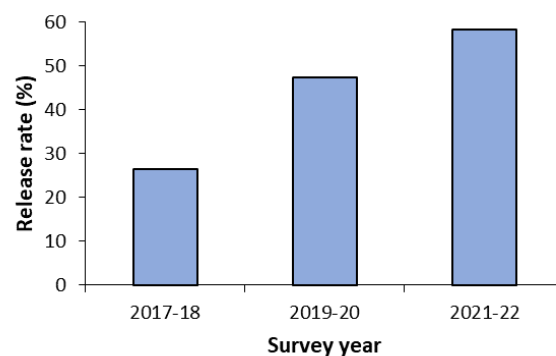
Retained catch by region 2021/22 (logbook)



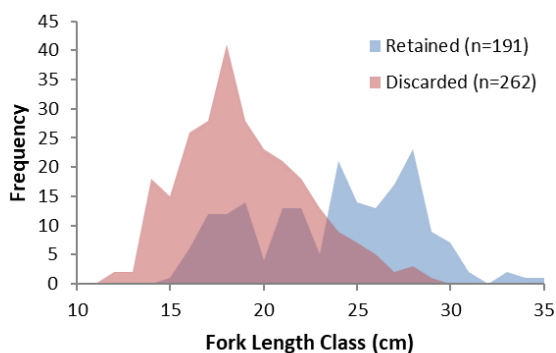
Retained catch by survey year (logbook)



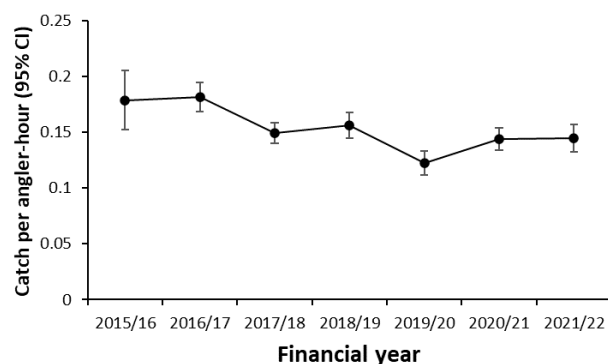
Release rates by survey year (observer)



Size composition 2021-22 (observer)



Harvest rates 2015/16 – 2021/22 (logbook)

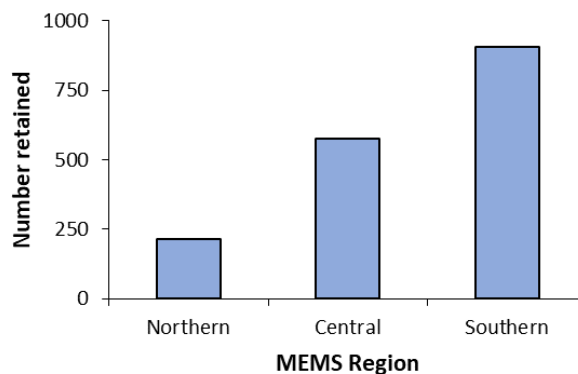


Yellowtail Kingfish (*Seriola lalandi*)

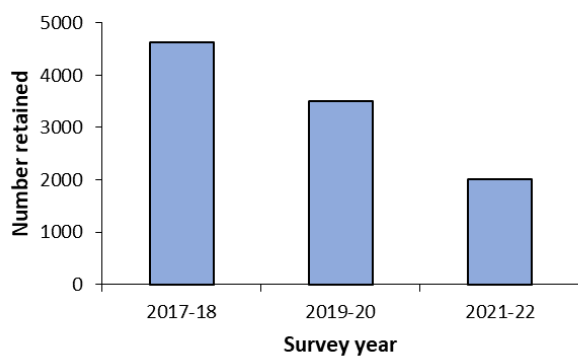


- Total retained charter catch was 2,001 individuals during 2021-22 (logbook)
- Release rate was 61% (observer)

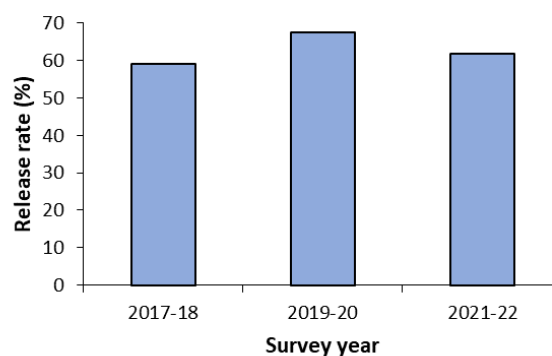
Retained catch by region 2021/22 (logbook)



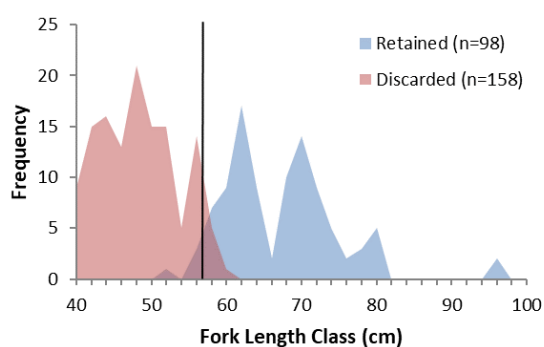
Retained catch by survey year (logbook)



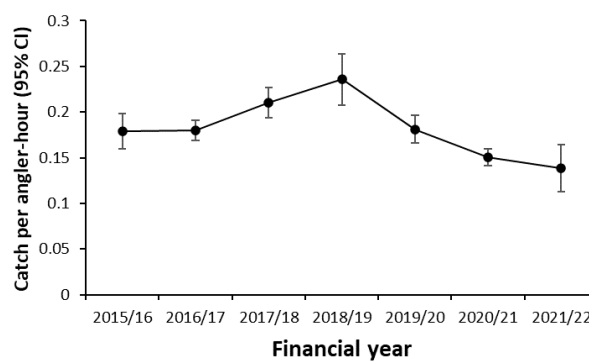
Release rates by survey year (observer)



Size composition 2021/22 (observer)*

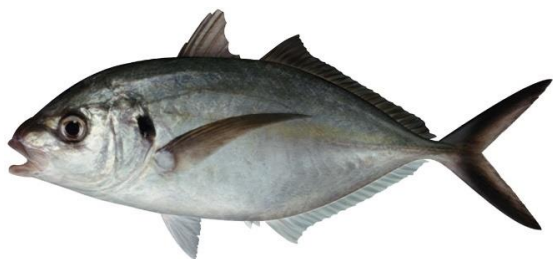


Harvest rates 2015/16 – 2021/22 (logbook)



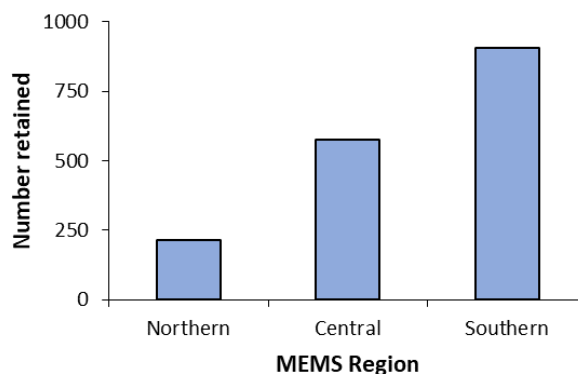
* Vertical black line is at the minimum legal length (65 cm total length converted to fork length).

Silver Trevally (*Pseudocaranx georgianus*)

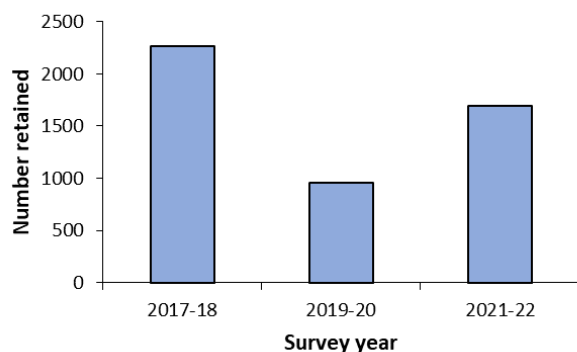


- Total retained charter catch was 1,692 individuals during 2021/22 (logbook)
- Release rate was 28% (observer)

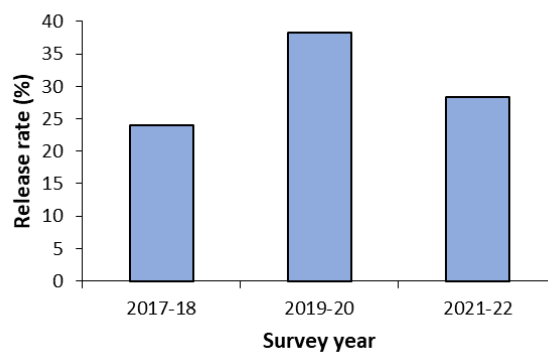
Retained catch by region 2021/22 (logbook)



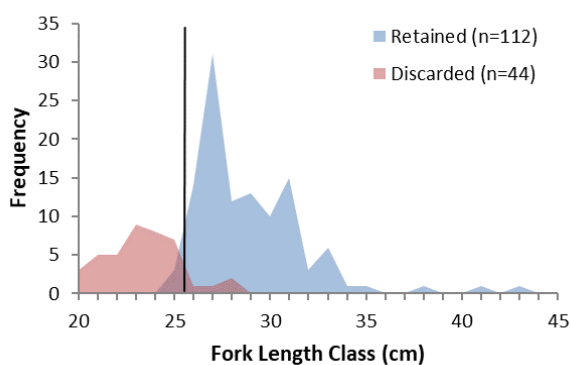
Retained catch by survey year (logbook)



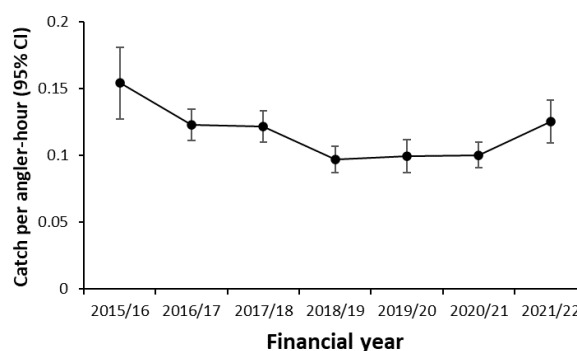
Release rates by survey year (observer)



Size composition 2021/22 (observer)*



Harvest rates 2015/16 – 2021/22 (logbook)



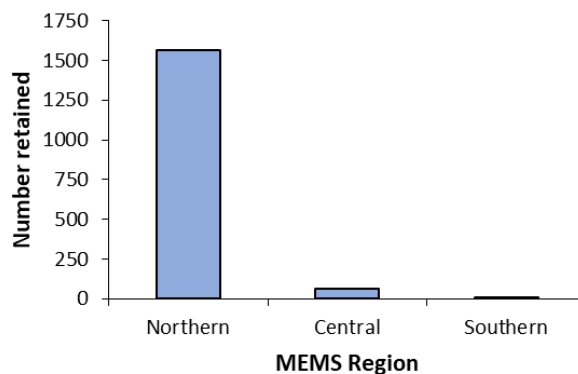
* Vertical black line is at the minimum legal length (30 cm total length converted to fork length).

Pearl Perch (*Glaucosoma scapulare*)

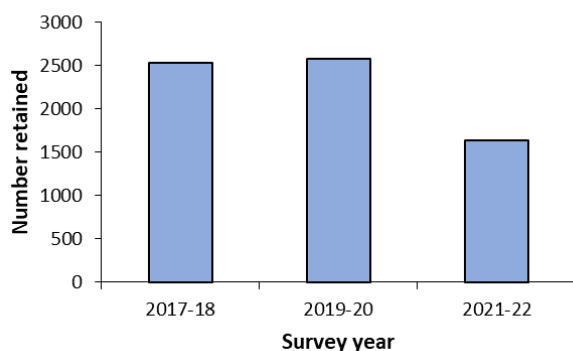


- Total retained charter catch was 1,639 individuals during 2021/22 (logbook)
- Release rate was 26% (observer)

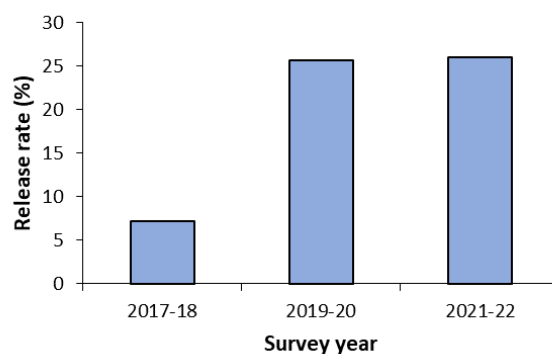
Retained catch by region 2021/22 (logbook)



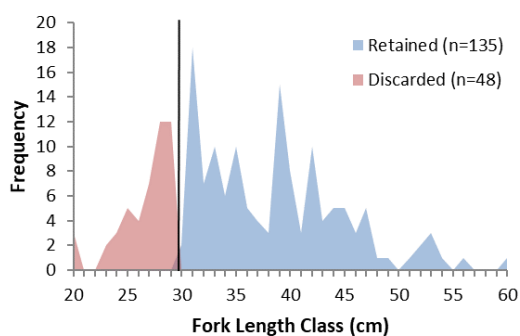
Retained catch by survey year (logbook)



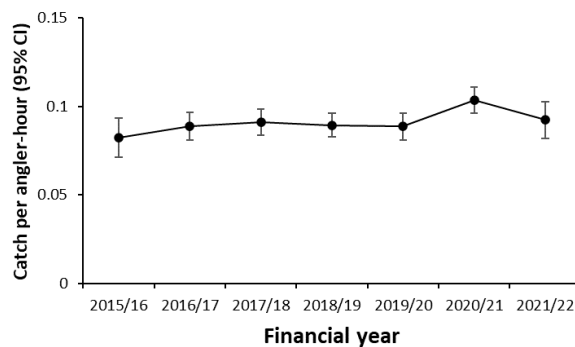
Release rates by survey year (observer)**



Size composition 2021/22 (observer)*



Harvest rates 2015/16 – 2021/22 (logbook)



* Vertical black line is at the minimum legal length (30 cm total length converted to fork length).

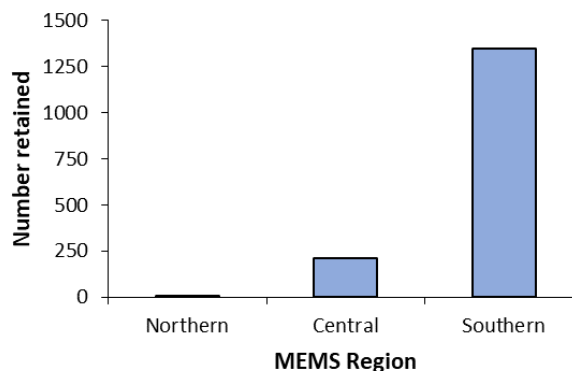
** The observer survey for 2017/18 was focussed on southern NSW and therefore recorded very few Pearl Perch.

Reef Ocean Perch (*Helicolenus percoides*)

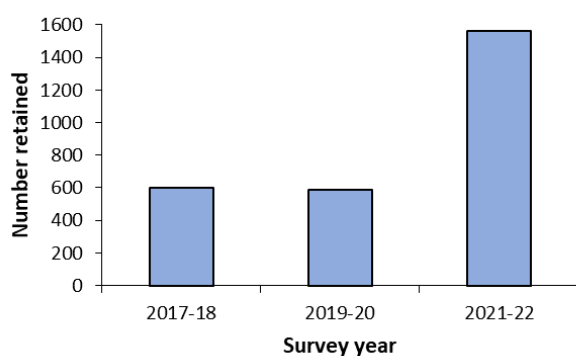


- Total retained charter catch was 1,562 individuals during 2021/22 (logbook)
- Release rate was 52% (observer)

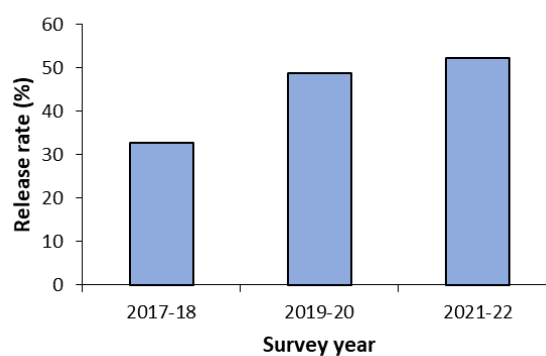
Retained catch by region 2021/22 (logbook)



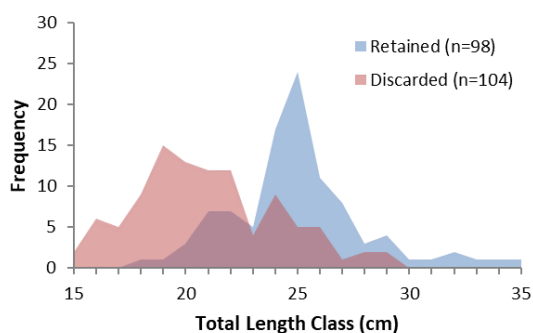
Retained catch by survey year (logbook)



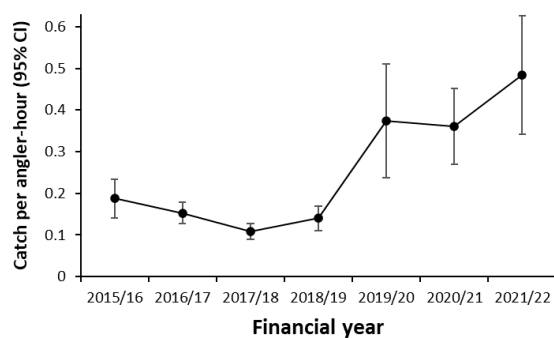
Release rates by survey year (observer)



Size composition 2021/22 (observer)



Harvest rates 2015/16 – 2021/22 (logbook)

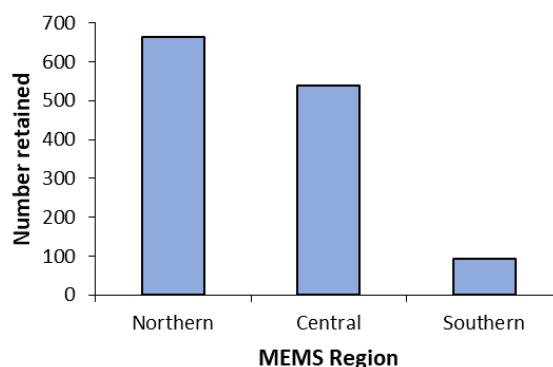


Mahi Mahi (*Coryphaena hippurus*)

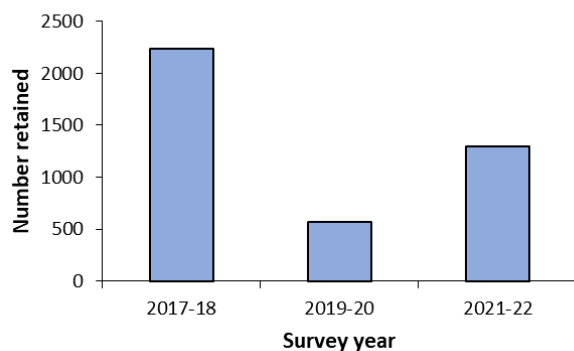


- Total state-wide retained charter catch was 1,295 individuals during 2021/22
- Release rate was 69% (observer)

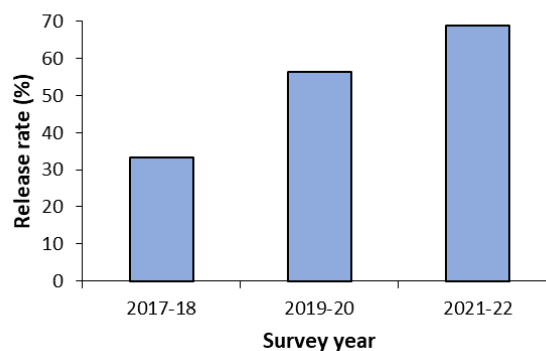
Retained catch by region 2021/22 (logbook)



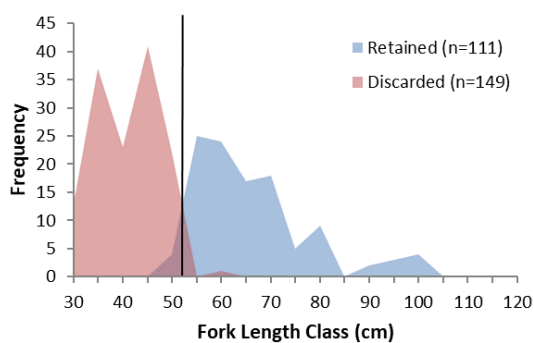
Retained catch by survey year (logbook)



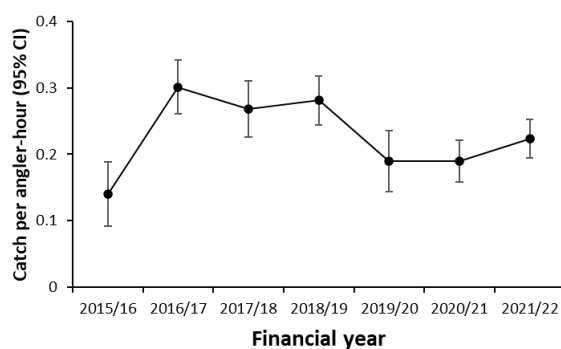
Release rates by survey year (observer)**



Size composition 2021/22 (observer)*



Harvest rates 2015/16 – 2021/22 (logbook)



* Vertical black line is at the minimum legal length (60 cm total length converted to fork length).

** The observer survey for 2017/18 was focussed on southern NSW and therefore recorded very few Mahi Mahi.

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Appendices

Appendix 1

Numbers of individuals of each species retained by the nearshore charter fishery in each MEMA management region and state-wide as recorded in industry logbooks during 2021/22.

MEMA Region		Northern	Central	Southern	Total
Number of trips		1168	1038	1114	3320
Number of species		90	89	85	128
Common name	Species name/s				
Snapper	<i>Chrysophrys auratus</i>	9235	3660	8477	21372
Bluespotted Flathead	<i>Platycephalus caeruleopunctatus</i>	4085	6184	7083	17352
Grey Morwong	<i>Nemadactylus douglasii</i>	614	4434	4639	9687
Yellowtail Scad	<i>Trachurus novaezelandiae</i>	1055	3820	267	5142
Blue Mackerel	<i>Scomber australasicus</i>	2239	871	1936	5046
Teraglin	<i>Atractoscion atelodus</i>	3360	1008	58	4426
Tiger Flathead	<i>Platycephalus richardsoni</i>	81	506	3385	3972
Redfish	<i>Centroberyx affinis</i>	193	1136	1061	2390
Southern Maori Wrasse	<i>Ophthalmolepis lineolatus</i>	283	990	914	2187
Yellowtail Kingfish	<i>Seriola lalandi</i>	450	1124	427	2001
Silver Sweep	<i>Scorpius lineolata</i>	56	1145	659	1860
Australian Bonito	<i>Sarda australis</i>	236	762	793	1791
Silver Trevally	<i>Pseudocaranx georgianus</i>	213	575	904	1692
Flathead (other)	Platycephalidae - undifferentiated	683	121	884	1688
Pearl Perch	<i>Glaucosoma scapulare</i>	1566	66	7	1639
Ocean Reef Perch	<i>Helicolenus percoides</i>	2	211	1349	1562
Ocean Jacket	<i>Nelussetta ayraud</i>	413	774	328	1515
Eastern Pigfish	<i>Bodianus unimaculatus</i>	291	632	431	1354
Mahi Mahi	<i>Coryphaena hippurus</i>	664	538	93	1295
Venus Tuskfish	<i>Choerodon venustus</i>	1206			1206
Sergeant Baker	<i>Latropiscis purpurissatus</i>	4	708	214	926
Longfin Pike	<i>Dinolestes lewini</i>		152	696	848
Sweetlips	Haemulidae - undifferentiated	4	823	1	828
Eastern Red Scorpionfish	<i>Scorpaena jacksoniensis</i>	7	166	549	722
Leatherjacket (other)	Monacanthidae - undifferentiated	250	185	127	562
Tailor	<i>Pomatomus saltatrix</i>	85	359	78	522
Jackass Morwong	<i>Nemadactylus macropterus</i>	9	52	452	513
Moses' Snapper	<i>Lutjanus russellii</i>	225		180	405
Fusiliers, Tropical Snappers & Slopefishes	Caesionidae, Lutjanidae & Symphysanodontidae - undifferentiated	383			383
Deepsea Ocean Perch	<i>Helicolenus</i> spp.	2	45	336	383

MEMA Region		Northern	Central	Southern	Total
Number of trips		1168	1038	1114	3320
Number of species		90	89	85	128
Common name	Species name/s				
Marbled Flathead	<i>Platycephalus marmoratus</i>	153	148	77	378
Longfin Perch	<i>Caprondon longimanus</i>	2	197	98	297
Dusky Flathead	<i>Platycephalus fuscus</i>	145	65	45	255
Crimsonband Wrasse	<i>Notolabrus gymnogenis</i>	90	64	80	234
Southern Calamari	<i>Sepioteuthis australis</i>		126	62	188
Red Gurnard	<i>Chelidonichthys kumu</i>	9	76	101	186
Common Blacktip Shark	<i>Carcharhinus limbatus</i>	185			185
School Mackerel	Scombridae - undifferentiated	12	97	70	179
Mulloway	<i>Argyrosomus japonicus</i>	149	29		178
Goldspot Pigfish	<i>Bodianus perditio</i>	90	73	10	173
Samson fish	<i>Seriola hippos</i>	169	1	2	172
Eastern School Whiting	<i>Sillago flindersi</i>	36	116	13	165
Sixspine Leatherjacket	<i>Meuschenia freycineti</i>	2	44	98	144
Eastern Orange Perch	<i>Lepidoperca pulchella</i>		16	113	129
Yellowfin Pigfish	<i>Bodianus flavipinnis</i>	2	41	74	117
Gummy Shark	<i>Mustelus antarcticus</i>	27	16	73	116
Amberjack	<i>Seriola dumerili</i>	100	5	1	106
Latchet	<i>Pterygotrigla polyommata</i>	12	2	91	105
Yellowfin Bream	<i>Acanthopagrus australis</i>	96	4	2	102
Australian Salmon	<i>Arripis trutta</i>		45	56	101
Maori Rockcod	<i>Epinephelus undulatostratus</i>	98			98
Tarwhine	<i>Rhabdosragus sarba</i>	72	18	1	91
Bastard Red Cod	<i>Pseudophycis breviuscula</i>		91		91
Mackerel Tuna	<i>Euthynnus affinis</i>	38	38	12	88
Jack Mackerel	<i>Trachurus declivis</i>			77	77
Estuary Leatherjacket (rough/fanbelly)	<i>Scobinichthys granulatus</i> & <i>Monacanthus chinensis</i>		30	43	73
Skipjack Tuna	<i>Katsuwonus pelamis</i>	15	3	54	72
Sand Whiting	<i>Sillago ciliata</i>		16	49	65
Bluethroat Wrasse	<i>Notolabrus tetricus</i>	7	4	51	62
Bar Rockcod	<i>Epinephelus septemfasciatus</i>	51	7	2	60
Spotted Mackerel	<i>Scomberomorus munroi</i>	55			55
Barracouta	<i>Thyrstites atun</i>		10	45	55
John Dory	<i>Zeus faber</i>	5	44	3	52
Sea Mullet	<i>Mugil cephalus</i>	17	31		48
Leaping Bonito	<i>Cybiosarda elegans</i>	16	5	21	42
Hussar	<i>Lutjanus adetii</i>	11		27	38

MEMA Region		Northern	Central	Southern	Total
Number of trips		1168	1038	1114	3320
Number of species		90	89	85	128
Common name	Species name/s				
Blacksaddle Goatfish	<i>Parupeneus spilurus</i>	33	3	2	38
Blue-Eye Trevalla	<i>Hyperoglyphe antarctica</i>	14	19		33
Spanish Mackerel	<i>Scomberomorus commerson</i>	25			25
Flounders	Paralichthyidae - undifferentiated	2	20	2	24
Cobia	<i>Rachycentron canadum</i>	23	1		24
Large-tooth Beardie	<i>Lotella rhacina</i>		1	22	23
Banded Rockcod	<i>Epinephelus ergastularius</i>	1		21	22
Yellowfin Tuna	<i>Thunnus albacares</i>	15		6	21
Gemfish	<i>Rexea solandri</i>		17	1	18
Frigate Mackerel	<i>Auxis thazard</i>		15	2	17
Albacore	<i>Thunnus alalunga</i>			16	16
Red Mullet	Mullidae - undifferentiated	12	3		15
Unidentified	Unidentified	2	13		15
Southern Bluefin Tuna	<i>Thunnus maccoyii</i>			13	13
Mado	<i>Atypichthys strigatus</i>		5	7	12
Parrotfish	Scaridae - undifferentiated	12			12
Longtail Tuna	<i>Thunnus tonggol</i>	11			11
Eastern Wirrah	<i>Acanthistius ocellatus</i>	1	2	8	11
Cuttlefish (other)	Sepiida - undifferentiated		10		10
Gould's Squid (Arrow)	<i>Nototodarus gouldi</i>		9		9
Striped Marlin	<i>Kajikia audax</i>			8	8
Shortfin Mako	<i>Isurus oxyrinchus</i>	2	2	4	8
Silky Shark	<i>Carcharhinus falciformis</i>	7			7
Mirror Dory	<i>Zenopsis nebulosa</i>		6	1	7
Rock Ling	<i>Genypterus tigerinus</i>	1	3	1	5
Pink Ling	<i>Genypterus blacodes</i>	3		2	5
Spotted Armour Gurnard	<i>Satyrichthys rieffeli</i>		5		5
Crimson Snapper	<i>Lutjanus erythropterus</i>	4			4
Silver Dory	<i>Cyttus australis</i>		3	1	4
Orange Roughy	<i>Hoplostethus atlanticus</i>	4			4
Mangrove Jack	<i>Lutjanus argentimaculatus</i>	4			4
Tilefish	<i>Branchiostegus</i> spp.		3		3
Spangled Emperor	<i>Lethrinus nebulosus</i>	3			3
Bronze Whaler	<i>Carcharhinus brachyurus</i>		1	2	3
Oriental Bonito	<i>Sarda orientalis</i>		3		3
Painted Grinner	<i>Trachinocephalus trachinus</i>	1	2		3

MEMA Region		Northern	Central	Southern	Total
Number of trips		1168	1038	1114	3320
Number of species		90	89	85	128
Common name	Species name/s				
Smooth Flutemouth	<i>Fistularia commersonii</i>		3		3
Eastern Blue Groper	<i>Achoerodus viridus</i>		1	1	2
Giant Cuttlefish	<i>Sepia apama</i>		2		2
Bluespotted Goatfish	<i>Upeneichthys vlamingii</i>	1		1	2
Blue Grenadier	<i>Macruronus novaezelandiae</i>	2			2
Black Marlin	<i>Istiompax indica</i>		2		2
Freespine Flathead	<i>Ratabulus diversidens</i>	1	1		2
Eeltail Catfish (cobblers)	<i>Cnidoglanis macrocephalus</i>			2	2
Shark Mackerel	<i>Grammatocygnus bicarinatus</i>	2			2
Wahoo	<i>Acanthocybium solandri</i>	2			2
Hapuku	<i>Polyprion oxygeneios</i>			2	2
Bignose Shark	<i>Carcharhinus altimus</i>	2			2
Bluestriped Goatfish	<i>Upeneichthys lineatus</i>		1	1	2
Blue Marlin	<i>Makaira nigricans</i>			1	1
Bass Groper	<i>Polyprion americanus</i>	1			1
Gloomy Octopus	<i>Octopus tetricus</i>		1		1
Largehead Hairtail	<i>Trichiurus lepturus</i>	1			1
Smooth Hammerhead	<i>Sphyrna zygaena</i>			1	1
Giant Boarfish	<i>Paristiopterus labiosus</i>	1			1
Black Bream	<i>Acanthopagrus butcheri</i>			1	1
Tiger Shark	<i>Galeocerdo cuvier</i>	1			1
Golden Trevally	<i>Gnathodon speciosus</i>	1			1
Red Morwong	<i>Cheilodactylus fuscus</i>			1	1
Trumpeter Whiting	<i>Sillago maculata</i>		1		1
Blue Shark	<i>Prionace glauca</i>	1			1
Lizardfish	<i>Synodus</i> spp.		1		1
Total		29754	32668	37909	100331

Appendix 2

State-wide numbers of individuals of each species retained by the nearshore charter fishery in each season as recorded in industry logbooks during 2021/22.

MEMA Region		Spring	Summer	Autumn	Winter	Total
Number of trips		566	1411	899	444	3320
Number of species		82	100	100	81	128
Common name	Species name/s					
Snapper	<i>Chrysophrys auratus</i>	3798	7413	6737	3424	21372
Bluespotted Flathead	<i>Platycephalus caeruleopunctatus</i>	2574	8235	4594	1949	17352
Grey Morwong	<i>Nemadactylus douglasii</i>	1511	4595	2834	747	9687
Yellowtail Scad	<i>Trachurus novaezelandiae</i>	841	2008	1714	579	5142
Blue Mackerel	<i>Scomber australasicus</i>	425	3880	533	208	5046
Teraglin	<i>Atractoscion atelodus</i>	1116	1809	810	691	4426
Tiger Flathead	<i>Platycephalus richardsoni</i>	376	2595	895	106	3972
Redfish	<i>Centroberyx affinis</i>	520	1168	587	115	2390
Southern Maori Wrasse	<i>Ophthalmolepis lineolatus</i>	305	932	644	306	2187
Yellowtail Kingfish	<i>Seriola lalandi</i>	363	564	663	411	2001
Silver Sweep	<i>Scorpius lineolata</i>	301	853	525	181	1860
Australian Bonito	<i>Sarda australis</i>	4	484	1189	114	1791
Silver Trevally	<i>Pseudocaranx georgianus</i>	198	884	462	148	1692
Flathead (other)	Platycephalidae - undifferentiated	293	762	243	390	1688
Pearl Perch	<i>Glaucosoma scapulare</i>	401	481	403	354	1639
Ocean Reef Perch	<i>Helicolenus percoides</i>	176	863	367	156	1562
Ocean Jacket	<i>Nelusetta ayraud</i>	294	354	426	441	1515
Eastern Pigfish	<i>Bodianus unimaculatus</i>	264	548	366	176	1354
Mahi Mahi	<i>Coryphaena hippurus</i>		744	533	18	1295
Venus Tuskfish	<i>Choerodon venustus</i>	455	372	120	259	1206
Sergeant Baker	<i>Latropiscis purpurissatus</i>	156	387	283	100	926
Longfin Pike	<i>Dinolestes lewini</i>	151	497	152	48	848
Sweetlips	Haemulidae - undifferentiated	98	410	206	114	828
Eastern Red Scorpionfish	<i>Scorpaena jacksoniensis</i>	49	268	321	84	722
Leatherjacket (other)	Monacanthidae - undifferentiated	102	148	46	266	562
Tailor	<i>Pomatomus saltatrix</i>	10	98	263	151	522
Jackass Morwong	<i>Nemadactylus macropterus</i>	31	283	142	57	513
Moses' Snapper	<i>Lutjanus russellii</i>	74	128	160	43	405
Fusiliers, Tropical Snappers & Slopefishes	Caesionidae, Lutjanidae & Symphysanodontidae - undifferentiated	14	246	114	9	383
Deepsea Ocean Perch	<i>Helicolenus</i> spp.	8	211	158	6	383
Marbled Flathead	<i>Platycephalus marmoratus</i>	121	175	45	37	378
Longfin Perch	<i>Caprodon longimanus</i>	41	226	30		297
Dusky Flathead	<i>Platycephalus fuscus</i>	45	74	60	76	255

MEMA Region		Spring	Summer	Autumn	Winter	Total
Number of trips		566	1411	899	444	3320
Number of species		82	100	100	81	128
Common name	Species name/s					
Crimsonband Wrasse	<i>Notolabrus gymnogenis</i>	19	71	105	39	234
Southern Calamari	<i>Sepioteuthis australis</i>	25	40	83	40	188
Red Gurnard	<i>Chelidonichthys kumu</i>	8	115	51	12	186
Common Blacktip Shark	<i>Carcharhinus limbatus</i>	35	114	1	35	185
School Mackerel	Scombridae - undifferentiated	46	109	20	4	179
Mulloway	<i>Argyrosomus japonicus</i>	57	33	20	68	178
Goldspot Pigfish	<i>Bodianus perditio</i>	54	65	29	25	173
Samson fish	<i>Seriola hippos</i>	44	77	15	36	172
Eastern School Whiting	<i>Sillago flindersi</i>	72	59	19	15	165
Sixspine Leatherjacket	<i>Meuschenia freycineti</i>	12	74	41	17	144
Eastern Orange Perch	<i>Lepidoperca pulchella</i>	42	33	44	10	129
Yellowfin Pigfish	<i>Bodianus flavipinnis</i>	4	47	40	26	117
Gummy Shark	<i>Mustelus antarcticus</i>	25	46	35	10	116
Amberjack	<i>Seriola dumerili</i>	48	18	13	27	106
Latchet	<i>Pterygotrigla polyommata</i>	5	68	30	2	105
Yellowfin Bream	<i>Acanthopagrus australis</i>	22	38	3	39	102
Australian Salmon	<i>Arripis trutta</i>	15	27	59		101
Maori Rockcod	<i>Epinephelus undulatostratus</i>	24	48	11	15	98
Tarwhine	<i>Rhabdosragus sarba</i>	22	42	13	14	91
Bastard Red Cod	<i>Pseudophycis breviuscula</i>	9	29	26	27	91
Mackerel Tuna	<i>Euthynnus affinis</i>	3	27	52	6	88
Jack Mackerel	<i>Trachurus declivis</i>	4		73		77
Estuary Leatherjacket (rough/fanbelly)	<i>Scobinichthys granulatus</i> & <i>Monacanthus chinensis</i>		48	25		73
Skipjack Tuna	<i>Katsuwonus pelamis</i>	1	29	32	10	72
Sand Whiting	<i>Sillago ciliata</i>		43	7	15	65
Bluethroat Wrasse	<i>Notolabrus tetricus</i>	11	38	6	7	62
Bar Rockcod	<i>Epinephelus septemfasciatus</i>	28	15	1	16	60
Spotted Mackerel	<i>Scomberomorus munroi</i>		41	14		55
Barracouta	<i>Thyrsites atun</i>	4	11	26	14	55
John Dory	<i>Zeus faber</i>	26	15	6	5	52
Sea Mullet	<i>Mugil cephalus</i>		3	21	24	48
Leaping Bonito	<i>Cybiosarda elegans</i>		17	13	12	42
Hussar	<i>Lutjanus adetii</i>	1	28	1	8	38
Blacksaddle Goatfish	<i>Parupeneus spilurus</i>	1	20	14	3	38
Blue-Eye Trevalla	<i>Hyperoglyphe antarctica</i>		30	3		33
Spanish Mackerel	<i>Scomberomorus commerson</i>		17	8		25

MEMA Region		Spring	Summer	Autumn	Winter	Total
Number of trips		566	1411	899	444	3320
Number of species		82	100	100	81	128
Common name	Species name/s					
Flounders	Paralichthyidae - undifferentiated	2	13	7	2	24
Cobia	<i>Rachycentron canadum</i>	4	14		6	24
Large-tooth Beardie	<i>Lotella rhacina</i>		18	5		23
Banded Rockcod	<i>Epinephelus ergastularius</i>	9	3	3	7	22
Yellowfin Tuna	<i>Thunnus albacares</i>	1	13	7		21
Gemfish	<i>Rexea solandri</i>		18			18
Frigate Mackerel	<i>Auxis thazard</i>		6	9	2	17
Albacore	<i>Thunnus alalunga</i>	16				16
Red Mullet	Mullidae - undifferentiated	11	1	2	1	15
Unidentified	Unidentified		1	13	1	15
Southern Bluefin Tuna	<i>Thunnus maccoyii</i>	13				13
Mado	<i>Atypichthys strigatus</i>			11	1	12
Parrotfish	Scaridae - undifferentiated	8	4			12
Longtail Tuna	<i>Thunnus tonggol</i>			11		11
Eastern Wirrah	<i>Acanthistius ocellatus</i>		6	5		11
Cuttlefish (other)	Sepiida - undifferentiated			10		10
Gould's Squid (Arrow)	<i>Nototodarus gouldi</i>	2	7			9
Striped Marlin	<i>Kajikia audax</i>		6	2		8
Shortfin Mako	<i>Isurus oxyrinchus</i>	1	3	3	1	8
Silky Shark	<i>Carcharhinus falciformis</i>	2	4		1	7
Mirror Dory	<i>Zenopsis nebulosa</i>		5	1	1	7
Rock Ling	<i>Genypterus tigerinus</i>		3	2		5
Pink Ling	<i>Genypterus blacodes</i>	1	4			5
Spotted Armour Gurnard	<i>Satyrichthys rieffeli</i>		3	2		5
Crimson Snapper	<i>Lutjanus erythropterus</i>	2		2		4
Silver Dory	<i>Cyttus australis</i>	2	1	1		4
Orange Roughy	<i>Hoplostethus atlanticus</i>		4			4
Mangrove Jack	<i>Lutjanus argentimaculatus</i>				4	4
Tilefish	<i>Branchiostegus</i> spp.			3		3
Spangled Emperor	<i>Lethrinus nebulosus</i>			2	1	3
Bronze Whaler	<i>Carcharhinus brachyurus</i>			2	1	3
Oriental Bonito	<i>Sarda orientalis</i>			3		3
Painted Grinner	<i>Trachinocephalus trachinus</i>		2		1	3
Smooth Flutemouth	<i>Fistularia commersonii</i>		3			3
Eastern Blue Groper	<i>Achoerodus viridis</i>	1		1		2
Giant Cuttlefish	<i>Sepia apama</i>	1			1	2

MEMA Region		Spring	Summer	Autumn	Winter	Total
Number of trips		566	1411	899	444	3320
Number of species		82	100	100	81	128
Common name	Species name/s					
Bluespotted Goatfish	<i>Upeneichthys vlamingii</i>		1		1	2
Blue Grenadier	<i>Macruronus novaezelandiae</i>	2				2
Black Marlin	<i>Istiompax indica</i>			2		2
Freespine Flathead	<i>Ratabulus diversidens</i>	1	1			2
Eeltail Catfish (cobblers)	<i>Cnidoglanis macrocephalus</i>		2			2
Shark Mackerel	<i>Grammatorcynus bicarinatus</i>			2		2
Wahoo	<i>Acanthocybium solandri</i>			2		2
Hapuku	<i>Polyprion oxygeneios</i>	1	1			2
Bignose Shark	<i>Carcharhinus altimus</i>			2		2
Bluestriped Goatfish	<i>Upeneichthys lineatus</i>				2	2
Blue Marlin	<i>Makaira nigricans</i>		1			1
Bass Groper	<i>Polyprion americanus</i>		1			1
Gloomy Octopus	<i>Octopus tetricus</i>			1		1
Largehead Hairtail	<i>Trichiurus lepturus</i>				1	1
Smooth Hammerhead	<i>Sphyrna zygaena</i>			1		1
Giant Boarfish	<i>Paristiopterus labiosus</i>		1			1
Black Bream	<i>Acanthopagrus butcheri</i>			1		1
Tiger Shark	<i>Galeocerdo cuvier</i>	1				1
Golden Trevally	<i>Gnathodon speciosus</i>		1			1
Red Morwong	<i>Cheilodactylus fuscus</i>		1			1
Trumpeter Whiting	<i>Sillago maculata</i>	1				1
Blue Shark	<i>Prionace glauca</i>				1	1
Lizardfish	<i>Synodus</i> spp.			1		1
Total		15864	44382	27704	12381	100331

Appendix 3

All species caught, % of catch released, number of species recorded and number of trips taken by on-board observers by MEMA management region (Figure 1) between November 2021 and February 2023.

MEMA Region		Northern		Central		Southern		State-wide	
Number of trips		94		27		69		190	
Number of species		82		53		75		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Snapper	<i>Chrysophrys auratus</i>	1384	63.8	251	71.3	1215	37.0	2850	53.0
Bluespotted Flathead	<i>Platycephalus caeruleopunctatus</i>	343	16.6	87	12.6	1252	17.4	1682	17.0
Blue Mackerel	<i>Scomber australasicus</i>	173	1.2	99	2.0	697	25.7	969	18.9
Yellowtail Scad	<i>Trachurus novaezelandiae</i>	671	2.2	39	12.8	168	29.2	878	7.9
Longspine Flathead	<i>Platycephalus grandispinis</i>	54	100.0	299	100.0	391	99.7	744	99.9
Eastern Red Scorpionfish	<i>Scorpaena jacksoniensis</i>	339	100.0	58	53.4	323	79.9	720	87.2
Grey Morwong	<i>Nemadactylus douglasii</i>	62	14.5	144	4.9	494	6.5	700	6.9
Sergeant Baker	<i>Latropiscis purpurissatus</i>	190	88.4	169	49.7	294	67.7	653	69.1
Silver Sweep	<i>Scorpius lineolata</i>	128	98.4	64	54.7	408	65.9	600	71.7
Redfish	<i>Centroberyx affinis</i>	157	90.4	114	57.0	185	31.9	456	58.3
Southern Maori Wrasse	<i>Ophthalmolepis lineolatus</i>	23	52.2	29	34.5	400	18.0	452	20.8
Mahi Mahi	<i>Coryphaena hippurus</i>	326	68.1	0		30	76.7	356	68.8
Teraglin	<i>Atractoscion atelodus</i>	277	13.0	8	0.0	2	100.0	287	13.2
Yellowtail Kingfish	<i>Seriola lalandi</i>	133	35.3	6	66.7	117	91.5	256	61.7
Mado	<i>Atypichthys strigatus</i>	57	100.0	25	96.0	137	100.0	219	99.5
Barracouta	<i>Thyrsites atun</i>	18	100.0	5	40.0	184	69.6	207	71.5
Reef Ocean Perch	<i>Helicolenus percoides</i>	3	0.0	13	92.3	189	50.3	205	52.2
Pearl Perch	<i>Glaucosoma scapulare</i>	183	26.2	1	0.0	0		184	26.1
Eastern Blackspot Pigfish	<i>Bodianus unimaculatus</i>	39	2.6	29	3.4	103	0.0	171	1.2
Silver Trevally	<i>Pseudocaranx georgianus</i>	23	78.3	28	25.0	104	18.3	155	28.4
Longfin Pike	<i>Dinolestes lewini</i>	20	35.0	31	41.9	63	77.8	114	60.5
Marbled Flathead	<i>Platycephalus marmoratus</i>	53	50.9	22	18.2	35	28.6	110	37.3
Tiger Flathead	<i>Platycephalus richardsoni</i>	13	46.2	4	0.0	74	33.8	91	34.1
Venus Tuskfish	<i>Choerodon venustus</i>	82	1.2	0		0		82	1.2
Eastern School Whiting	<i>Sillago flindersi</i>	3	100.0	19	10.5	57	24.6	79	24.1
Ocean Jacket	<i>Nelusetta ayraud</i>	7	0.0	3	66.7	63	39.7	73	37.0
Southern Sand Flathead	<i>Platycephalus bassensis</i>	0		0		70	38.6	70	38.6
Tailor	<i>Pomatomus saltatrix</i>	21	52.4	1	0.0	26	19.2	48	33.3
Australian Bonito	<i>Sarda australis</i>	26	34.6	6	0.0	15	0.0	47	19.1
Longfin Perch	<i>Caprodon longimanus</i>	5	20.0	2	0.0	32	6.3	39	7.7
Mackerel Tuna	<i>Euthynnus affinis</i>	16	0.0	3	33.3	16	0.0	35	2.9
Common Blacktip Shark	<i>Carcharhinus limbatus</i>	35	0.0	0		0		35	0.0
Skipjack Tuna	<i>Katsuwonus pelamis</i>	1	0.0	0		34	0.0	35	0.0

MEMA Region		Northern		Central		Southern		State-wide	
Number of trips		94		27		69		190	
Number of species		82		53		75		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Dusky Whaler	<i>Carcharhinus obscurus</i>	30	0.0	0		1	100.0	31	3.2
Halfbanded Seaperch	<i>Hypoplectrodes maccullochi</i>	0		10	100.0	19	100.0	29	100.0
Wirrah	<i>Acanthistius</i> spp.	11	100.0	4	100.0	13	92.3	28	96.4
Sixspine Leatherjacket	<i>Meuschenia freycineti</i>	1	0.0	4	0.0	23	21.7	28	17.9
Crimsonband Wrasse	<i>Notolabrus gymnogenis</i>	11	90.9	1	0.0	9	77.8	21	81.0
Red Bigeye	<i>Priacanthus macracanthus</i>	21	0.0	0		0		21	0.0
Velvet Leatherjacket	<i>Meuschenia scaber</i>	1	100.0	7	85.7	12	75.0	20	80.0
Sea Pikes	Sphyracidae - undifferentiated	10	0.0	0		10	10.0	20	5.0
Blackbanded Seaperch	<i>Hypoplectrodes annulatus</i>	3	100.0	5	80.0	9	55.6	17	70.6
Red Gurnard	<i>Chelidonichthys kumu</i>	0		3	66.7	14	64.3	17	64.7
Moses' Snapper	<i>Lutjanus russellii</i>	16	12.5	0		0		16	12.5
Snook	<i>Sphyracna novaehollandiae</i>	16	0.0	0		0		16	0.0
Lizardfish	<i>Synodus</i> spp.	14	78.6	0		0		14	78.6
Mulloway	<i>Argyrosomus japonicus</i>	13	23.1	0		0		13	23.1
Smooth Golden Toadfish	<i>Lagocephalus inermis</i>	1	100.0	2	100.0	9	100.0	12	100.0
Tarwhine	<i>Rhabdosragus sarba</i>	11	90.9	0		1	100.0	12	91.7
Jackass Morwong	<i>Nemadactylus macropterus</i>	0		0		12	16.7	12	16.7
Samsonfish	<i>Seriola hippos</i>	9	0.0	1	0.0	2	0.0	12	0.0
Spotted Mackerel	<i>Scomberomorus munroi</i>	10	0.0	0		0		10	0.0
Eastern Orange Perch	<i>Lepidoperca pulchella</i>	0		9	100.0	0		9	100.0
Snakefish	<i>Trachinocephalus trachinus</i>	9	55.6	0		0		9	55.6
Deepwater Flathead	<i>Platycephalus conatus</i>	9	22.2	0		0		9	22.2
Blacktip Bullseye	<i>Pempheris affinis</i>	9	11.1	0		0		9	11.1
Latchet	<i>Pterygotrigla polyommata</i>	0		1	0.0	8	0.0	9	0.0
Eastern Fiddler Ray	<i>Trygonorrhina fasciata</i>	1	100.0	3	66.7	4	100.0	8	87.5
Banded Seaperch	<i>Hypoplectrodes nigroruber</i>	0		0		8	37.5	8	37.5
Surf Bream	<i>Acanthopagrus australis</i>	7	71.4	0		0		7	71.4
Bigeyes	Priacanthidae - undifferentiated	7	0.0	0		0		7	0.0
Maori Rockcod	<i>Epinephelus undulatostratus</i>	7	0.0	0		0		7	0.0
Spanish Mackerel	<i>Scomberomorus commerson</i>	7	0.0	0		0		7	0.0
Bluespotted Goatfish	<i>Upeneichthys vlamingii</i>	4	0.0	0		2	50.0	6	16.7
Hussar	<i>Lutjanus adetii</i>	5	40.0	0		0		5	40.0
Gummy Shark	<i>Mustelus antarcticus</i>	0		0		4	75.0	4	75.0
Blue Morwong	<i>Nemadactylus valenciennesi</i>	1	100.0	0		3	0.0	4	25.0
Large-tooth Flounder	<i>Pseudorhombus arsius</i>	0		4	0.0	0		4	0.0
Southern Fiddler Ray	<i>Trygonorrhina dumerilii</i>	2	100.0	0		1	100.0	3	100.0

MEMA Region		Northern		Central		Southern		State-wide	
Number of trips		94		27		69		190	
Number of species		82		53		75		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Sweeps	Scorpididae - undifferentiated	0		0		3	100.0	3	100.0
Three-Barred Porcupinefish	<i>Dicotylichthys punctulatus</i>	0		3	100.0	0		3	100.0
Rosy Perch	<i>Callanthis allporti</i>	0		1	100.0	2	50.0	3	66.7
Butterfly Perch	<i>Caesioperca lepidoptera</i>	1	100.0	0		2	0.0	3	33.3
Mud Flathead	<i>Ambiserrula jugosa</i>	0		3	33.3	0		3	33.3
Flying Gurnards	Triglidae - undifferentiated	2	0.0	0		1	0.0	3	0.0
Herring	Clupeidae - undifferentiated	3	0.0	0		0		3	0.0
Theodore's Threadfin Bream	<i>Nemipterus theodorei</i>	3	0.0	0		0		3	0.0
Black Marlin	<i>Istiompax indica</i>	2	100.0	0		0		2	100.0
Catsharks	Pentanchidae - undifferentiated	1	100.0	0		1	100.0	2	100.0
Eastern Shovelnose Ray	<i>Aptychotrema rostrata</i>	1	100.0	1	100.0	0		2	100.0
Eastern Wirrah	<i>Acanthistius ocellatus</i>	0		2	100.0	0		2	100.0
Giant Sea Catfish	<i>Netuma thalassina</i>	2	100.0	0		0		2	100.0
Goatfishes	Mullidae - undifferentiated	2	100.0	0		0		2	100.0
Grinners	<i>Saurida</i> sp.	2	100.0	0		0		2	100.0
Orange Spotted Catshark	<i>Asymbolus rubiginosus</i>	0		0		2	100.0	2	100.0
Rough Leatherjacket	<i>Scobinichthys granulatus</i>	0		0		2	100.0	2	100.0
Silver Toadfish	<i>Lagocephalus sceleratus</i>	0		2	100.0	0		2	100.0
Smooth Hammerhead	<i>Sphyrna zygaena</i>	2	100.0	0		0		2	100.0
Amberjack	<i>Seriola dumerili</i>	2	0.0	0		0		2	0.0
Bigeye Ocean Perch	<i>Helicolenus barathri</i>	0		0		2	0.0	2	0.0
Blacksaddle Goatfish	<i>Parupeneus spilurus</i>	0		0		2	0.0	2	0.0
Bluestriped Goatfish	<i>Upeneichthys lineatus</i>	0		1	0.0	1	0.0	2	0.0
Pink Ling	<i>Genypterus blacodes</i>	0		0		2	0.0	2	0.0
African Pompano	<i>Alectis ciliaris</i>	1	100.0	0		0		1	100.0
Bar Cod	<i>Epinephelus septemfasciatus</i>	1	100.0	0		0		1	100.0
Bronze Whaler	<i>Carcharhinus brachyurus</i>	1	100.0	0		0		1	100.0
Brushtooth Lizardfish	<i>Saurida undosquamis</i>	1	100.0	0		0		1	100.0
Comb Wrasse	<i>Coris picta</i>	1	100.0	0		0		1	100.0
Common Gurnard Perch	<i>Neosebastes scorpaenoides</i>	0		0		1	100.0	1	100.0
Dogfishes	Squalidae - undifferentiated	1	100.0	0		0		1	100.0
Green Moray	<i>Gymnothorax prasinus</i>	1	100.0	0		0		1	100.0
Moray Eels	Muraenidae - undifferentiated	1	100.0	0		0		1	100.0
Stout Whiting	<i>Sillago robusta</i>	0		1	100.0	0		1	100.0
Jack Mackerel	<i>Trachurus declivis</i>	0		0		1	100.0	1	100.0
Yellowstriped Leatherjacket	<i>Meuschenia flavolineata</i>	0		0		1	100.0	1	100.0

MEMA Region		Northern		Central		Southern		State-wide	
Number of trips		94		27		69		190	
Number of species		82		53		75		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Australian Salmon	<i>Arripis trutta</i>	0		0		1	0.0	1	0.0
Australian Sardine	<i>Sardinops sagax</i>	0		1	0.0	0		1	0.0
Banded Rockcod	<i>Epinephelus ergastularius</i>	0		0		1	0.0	1	0.0
Black Rockcod	<i>Epinephelus daemeli</i>	0		0		1	0.0	1	0.0
Blind Shark	<i>Brachaelurus waddi</i>	0		0		1	0.0	1	0.0
Blue Warehou	<i>Seriola lalandi</i>	0		0		1	0.0	1	0.0
Cobia	<i>Rachycentron canadum</i>	1	0.0	0		0		1	0.0
Dusky Flathead	<i>Platycephalus fuscus</i>	0		1	0.0	0		1	0.0
Eastern Blue Groper	<i>Achoerodus viridus</i>	0		0		1	0.0	1	0.0
Eastern King Wrasse	<i>Coris sandeyeri</i>	0		0		1	0.0	1	0.0
Flounders & Soles	Paralichthyidae & Soleidae - undifferentiated	0		0		1	0.0	1	0.0
Large-toothed Beardie	<i>Lotella rhacina</i>	0		0		1	0.0	1	0.0
Leaping Bonito	<i>Cybiosarda elegans</i>	0		1	0.0	0		1	0.0
Maori Snapper	<i>Lutjanus rivulatus</i>	1	0.0	0		0		1	0.0
Mirror Dory	<i>Zenopsis nebulosa</i>	0		0		1	0.0	1	0.0
Rainbow Runner	<i>Elagatis bipinnulata</i>	1	0.0	0		0		1	0.0
Sharpnose Sevenspotted Shark	<i>Heptranchias perlo</i>	0		0		1	0.0	1	0.0
Shortfin Mako	<i>Isurus paucus</i>	0		0		1	0.0	1	0.0
Silver Dory	<i>Cyttus australis</i>	0		1	0.0	0		1	0.0
Squids	Decapodiformes - undifferentiated	0		0		1	0.0	1	0.0
Total		5145	46.9	1631	52.1	7378	39.9	14154	43.9

Appendix 4

All species caught, % of catch released, number of species recorded and number of trips taken by on-board observers by season between November 2021 and February 2023.

MEMA Region		Spring		Summer		Autumn		Winter		State-wide	
Number of trips		35		70		47		38		190	
Number of species		60		89		62		66		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Snapper	<i>Chrysophrys auratus</i>	446	41.5	821	52.7	961	60.6	622	50.0	2850	53.0
Bluespotted Flathead	<i>Platycephalus caeruleopunctatus</i>	136	22.1	931	18.8	383	13.8	232	12.1	1682	17.0
Blue Mackerel	<i>Scomber australasicus</i>	96	28.1	556	19.8	128	0.0	189	24.3	969	18.9
Yellowtail Scad	<i>Trachurus novaezelandiae</i>	280	4.3	359	7.8	47	25.5	192	8.9	878	7.9
Longspine Flathead	<i>Platycephalus grandispinis</i>	45	100.0	410	100.0	193	100.0	96	99.0	744	99.9
Eastern Red Scorpionfish	<i>Scorpaena jacksoniensis</i>	172	91.3	340	85.3	90	83.3	118	89.8	720	87.2
Grey Morwong	<i>Nemadactylus douglasii</i>	81	7.4	295	7.1	192	5.7	132	7.6	700	6.9
Sergeant Baker	<i>Latropiscis purpurissatus</i>	103	76.7	222	70.7	157	58.0	171	72.5	653	69.1
Silver Sweep	<i>Scorpius lineolata</i>	99	73.7	186	78.0	182	64.8	133	70.7	600	71.7
Redfish	<i>Centroberyx affinis</i>	118	61.9	173	60.1	108	54.6	57	52.6	456	58.3
Southern Maori Wrasse	<i>Ophthalmolepis lineolatus</i>	37	16.2	198	29.3	135	9.6	82	20.7	452	20.8
Mahi Mahi	<i>Coryphaena hippurus</i>	17	5.9	82	68.3	257	73.2	0		356	68.8
Teraglin	<i>Atractoscion atelodus</i>	82	9.8	56	12.5	35	5.7	114	18.4	287	13.2
Yellowtail Kingfish	<i>Seriola lalandi</i>	102	30.4	58	94.8	61	80.3	35	65.7	256	61.7
Mado	<i>Atypichthys strigatus</i>	22	100.0	75	100.0	104	99.0	18	100.0	219	99.5
Barracouta	<i>Thyrsites atun</i>	64	57.8	30	93.3	45	40.0	68	95.6	207	71.5
Reef Ocean Perch	<i>Helicolenus percoides</i>	29	93.1	54	77.8	113	26.5	9	88.9	205	52.2
Pearl Perch	<i>Glaucosoma scapulare</i>	56	19.6	38	31.6	69	30.4	21	19.0	184	26.1
Eastern Blackspot Pigfish	<i>Bodianus unimaculatus</i>	32	0.0	46	0.0	37	5.4	56	0.0	171	1.2
Silver Trevally	<i>Pseudocaranx georgianus</i>	11	45.5	71	12.7	43	37.2	30	46.7	155	28.4
Longfin Pike	<i>Dinolestes lewini</i>	24	79.2	46	58.7	16	43.8	28	57.1	114	60.5
Marbled Flathead	<i>Platycephalus marmoratus</i>	20	25.0	64	40.6	17	35.3	9	44.4	110	37.3
Tiger Flathead	<i>Platycephalus richardsoni</i>	16	43.8	42	31.0	3	0.0	30	36.7	91	34.1
Venus Tuskfish	<i>Choerodon venustus</i>	27	0.0	37	2.7	7	0.0	11	0.0	82	1.2
Eastern School Whiting	<i>Sillago flindersi</i>	13	23.1	24	29.2	23	21.7	19	21.1	79	24.1
Ocean Jacket	<i>Nelusetta ayraud</i>	12	50.0	22	50.0	14	35.7	25	20.0	73	37.0
Southern Sand Flathead	<i>Platycephalus bassensis</i>	0		0		0		70	38.6	70	38.6
Tailor	<i>Pomatomus saltatrix</i>	4	75.0	8	37.5	22	27.3	14	28.6	48	33.3
Australian Bonito	<i>Sarda australis</i>	0		21	42.9	19	0.0	7	0.0	47	19.1
Longfin Perch	<i>Capricon longimanus</i>	5	20.0	6	0.0	23	8.7	5	0.0	39	7.7
Common Blacktip Shark	<i>Carcharhinus limbatus</i>	4	0.0	31	0.0	0		0		35	0.0
Mackerel Tuna	<i>Euthynnus affinis</i>	0		13	0.0	12	8.3	10	0.0	35	2.9
Skipjack Tuna	<i>Katsuwonus pelamis</i>	0		34	0.0	1	0.0	0		35	0.0

MEMA Region		Spring		Summer		Autumn		Winter		State-wide	
Number of trips		35		70		47		38		190	
Number of species		60		89		62		66		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Dusky Whaler	<i>Carcharhinus obscurus</i>	0		30	0.0	0		1	100.0	31	3.2
Halfbanded Seaperch	<i>Hypoplectrodes maccullochi</i>	2	100.0	19	100.0	4	100.0	4	100.0	29	100.0
Sixspine Leatherjacket	<i>Meuschenia freycineti</i>	4	0.0	10	0.0	8	50.0	6	16.7	28	17.9
Wirrah	<i>Acanthistius</i> spp.	5	100.0	6	100.0	8	87.5	9	100.0	28	96.4
Crimsonband Wrasse	<i>Notolabrus gymnogenis</i>	5	100.0	7	71.4	3	66.7	6	83.3	21	81.0
Red Bigeye	<i>Priacanthus macracanthus</i>	21	0.0	0		0		0		21	0.0
Sea Pikes	Sphyracidae - undifferentiated	0		19	0.0	0		1	100.0	20	5.0
Velvet Leatherjacket	<i>Meuschenia scaber</i>	4	100.0	4	75.0	7	57.1	5	100.0	20	80.0
Blackbanded Seaperch	<i>Hypoplectrodes annulatus</i>	3	100.0	3	100.0	7	71.4	4	25.0	17	70.6
Red Gurnard	<i>Chelidonichthys kumu</i>	0		9	66.7	5	60.0	3	66.7	17	64.7
Moses' Snapper	<i>Lutjanus russellii</i>	2	0.0	10	20.0	1	0.0	3	0.0	16	12.5
Snook	<i>Sphyracna novaehollandiae</i>	1	0.0	15	0.0	0		0		16	0.0
Lizardfish	<i>Synodus</i> spp.	2	0.0	4	100.0	0		8	87.5	14	78.6
Mulloway	<i>Argyrosomus japonicus</i>	1	100.0	0		0		12	16.7	13	23.1
Jackass Morwong	<i>Nemadactylus macropterus</i>	1	0.0	8	12.5	2	50.0	1	0.0	12	16.7
Samsonfish	<i>Seriola hippos</i>	2	0.0	0		10	0.0	0		12	0.0
Smooth Golden Toadfish	<i>Lagocephalus inermis</i>	0		5	100.0	5	100.0	2	100.0	12	100.0
Tarwhine	<i>Rhabdosragus sarba</i>	2	100.0	6	100.0	1	0.0	3	100.0	12	91.7
Spotted Mackerel	<i>Scomberomorus munroi</i>	0		0		10	0.0	0		10	0.0
Blacktip Bullseye	<i>Pempheris affinis</i>	0		9	11.1	0		0		9	11.1
Deepwater Flathead	<i>Platycephalus conatus</i>	4	0.0	4	50.0	0		1	0.0	9	22.2
Eastern Orange Perch	<i>Lepidoperca pulchella</i>	0		1	100.0	8	100.0	0		9	100.0
Latchet	<i>Pterygotrigla polyommata</i>	1	0.0	0		0		8	0.0	9	0.0
Snakefish	<i>Trachinocephalus trachinus</i>	0		9	55.6	0		0		9	55.6
Banded Seaperch	<i>Hypoplectrodes nigroruber</i>	2	50.0	0		3	66.7	3	0.0	8	37.5
Eastern Fiddler Ray	<i>Trygonorrhina fasciata</i>	1	100.0	5	80.0	0		2	100.0	8	87.5
Bigeyes	Priacanthidae - undifferentiated	0		7	0.0	0		0		7	0.0
Maori Rockcod	<i>Epinephelus undulatostratus</i>	1	0.0	4	0.0	1	0.0	1	0.0	7	0.0
Spanish Mackerel	<i>Scomberomorus commerson</i>	0		0		7	0.0	0		7	0.0
Surf Bream	<i>Acanthopagrus australis</i>	0		3	100.0	0		4	50.0	7	71.4
Bluespotted Goatfish	<i>Upeneichthys vlamingii</i>	2	0.0	2	50.0	0		2	0.0	6	16.7
Hussar	<i>Lutjanus adetii</i>	0		5	40.0	0		0		5	40.0
Blue Morwong	<i>Nemadactylus valenciennesi</i>	0		1	100.0	0		3	0.0	4	25.0
Gummy Shark	<i>Mustelus antarcticus</i>	0		1	0.0	1	100.0	2	100.0	4	75.0
Large-tooth Flounder	<i>Pseudorhombus arsius</i>	0		4	0.0	0		0		4	0.0
Butterfly Perch	<i>Caesioperca lepidoptera</i>	1	100.0	1	0.0	0		1	0.0	3	33.3

MEMA Region		Spring		Summer		Autumn		Winter		State-wide	
Number of trips		35		70		47		38		190	
Number of species		60		89		62		66		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Flying Gurnards	Triglidae - undifferentiated	0		2	0.0	0		1	0.0	3	0.0
Herring	Clupeidae - undifferentiated	0		3	0.0	0		0		3	0.0
Mud Flathead	<i>Ambiserrula jugosa</i>	2	0.0	1	100.0	0		0		3	33.3
Rosy Perch	<i>Callanthis allporti</i>	0		0		3	66.7	0		3	66.7
Southern Fiddler Ray	<i>Trygonorrhina dumerilii</i>	0		1	100.0	1	100.0	1	100.0	3	100.0
Sweeps	Scorpididae - undifferentiated	3	100.0	0		0		0		3	100.0
Theodore'S Threadfin Bream	<i>Nemipterus theodorei</i>	1	0.0	1	0.0	1	0.0	0		3	0.0
Three-Barred Porcupinefish	<i>Dicotylichthys punctulatus</i>	0		3	100.0	0		0		3	100.0
Amberjack	<i>Seriola dumerili</i>	0		0		0		2	0.0	2	0.0
Bigeye Ocean Perch	<i>Helicolenus barathri</i>	0		0		0		2	0.0	2	0.0
Black Marlin	<i>Istiompax indica</i>	0		2	100.0	0		0		2	100.0
Blacksaddle Goatfish	<i>Parupeneus spilurus</i>	0		0		2	0.0	0		2	0.0
Bluestriped Goatfish	<i>Upeneichthys lineatus</i>	0		2	0.0	0		0		2	0.0
Catsharks	Pentanchidae - undifferentiated	1	100.0	0		1	100.0	0		2	100.0
Eastern Shovelnose Ray	<i>Aptychotrema rostrata</i>	0		2	100.0	0		0		2	100.0
Eastern Wirrah	<i>Acanthistius ocellatus</i>	0		0		2	100.0	0		2	100.0
Giant Sea Catfish	<i>Netuma thalassina</i>	0		0		0		2	100.0	2	100.0
Goatfishes	Mullidae - undifferentiated	0		2	100.0	0		0		2	100.0
Grinner	<i>Saurida</i> spp.	2	100.0	0		0		0		2	100.0
Orange Spotted Catshark	<i>Asymbolus rubiginosus</i>	2	100.0	0		0		0		2	100.0
Pink Ling	<i>Genypterus blacodes</i>	0		2	0.0	0		0		2	0.0
Rough Leatherjacket	<i>Scobinichthys granulatus</i>	0		2	100.0	0		0		2	100.0
Silver Toadfish	<i>Lagocephalus scleratus</i>	0		2	100.0	0		0		2	100.0
Smooth Hammerhead	<i>Sphyrna zygaena</i>	0		2	100.0	0		0		2	100.0
African Pompano	<i>Alectis ciliaris</i>	0		0		1	100.0	0		1	100.0
Australian Salmon	<i>Arripis trutta</i>	0		1	0.0	0		0		1	0.0
Australian Sardine	<i>Sardinops sagax</i>	0		0		0		1	0.0	1	0.0
Banded Rockcod	<i>Epinephelus ergastularius</i>	0		0		0		1	0.0	1	0.0
Bar Cod	<i>Epinephelus septemfasciatus</i>	0		1	100.0	0		0		1	100.0
Black Rockcod	<i>Epinephelus daemeli</i>	0		1	0.0	0		0		1	0.0
Blind Shark	<i>Brachaelurus waddi</i>	0		0		1	0.0	0		1	0.0
Blue Warehou	<i>Seriola brama</i>	0		0		0		1	0.0	1	0.0
Bronze Whaler	<i>Carcharhinus brachyurus</i>	1	100.0	0		0		0		1	100.0
Brushtooth Lizardfish	<i>Saurida undosquamis</i>	0		0		1	100.0	0		1	100.0
Cobia	<i>Rachycentron canadum</i>	0		0		0		1	0.0	1	0.0
Comb Wrasse	<i>Coris picta</i>	1	100.0	0		0		0		1	100.0

MEMA Region		Spring		Summer		Autumn		Winter		State-wide	
Number of trips		35		70		47		38		190	
Number of species		60		89		62		66		124	
Common name	Species name/s	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %	Total	Rel %
Common Gurnard Perch	<i>Neosebastes scorpaenoides</i>	0		1	100.0	0		0		1	100.0
Dogfishes	Squalidae - undifferentiated	0		1	100.0	0		0		1	100.0
Dusky Flathead	<i>Platycephalus fuscus</i>	0		1	0.0	0		0		1	0.0
Eastern Blue Groper	<i>Achoerodus viridus</i>	0		0		1	0.0	0		1	0.0
Eastern King Wrasse	<i>Coris sandeyeri</i>	1	0.0	0		0		0		1	0.0
Flounders & Soles	Paralichthyidae & Soleidae - undifferentiated	0		1	0.0	0		0		1	0.0
Green Moray	<i>Gymnothorax prasinus</i>	0		0		0		1	100.0	1	100.0
Large-tooth Bearded	<i>Lotella rhacina</i>	0		1	0.0	0		0		1	0.0
Leaping Bonito	<i>Cybiosarda elegans</i>	0		1	0.0	0		0		1	0.0
Maori Snapper	<i>Lutjanus rivulatus</i>	0		1	0.0	0		0		1	0.0
Mirror Dory	<i>Zenopsis nebulosa</i>	0		1	0.0	0		0		1	0.0
Moray Eels	Muraenidae - undifferentiated	0		1	100.0	0		0		1	100.0
Rainbow Runner	<i>Elagatis bipinnulata</i>	0		1	0.0	0		0		1	0.0
Sharpnose Sevengill Shark	<i>Heptranchias perlo</i>	1	0.0	0		0		0		1	0.0
Shortfin Mako	<i>Isurus oxyrinchus</i>	0		0		0		1	0.0	1	0.0
Silver Dory	<i>Cyttus australis</i>	0		0		1	0.0	0		1	0.0
Squids	Decapodiformes - undifferentiated	0		0		1	0.0	0		1	0.0
Stout Whiting	<i>Sillago robusta</i>	0		1	100.0	0		0		1	100.0
Jack Mackerel	<i>Trachurus declivis</i>	0		1	100.0	0		0		1	100.0
Yellow-striped Leatherjacket	<i>Meuschenia flavolineata</i>	0		0		1	100.0	0		1	100.0
Total		2235	40.9	5602	43.1	3605	47.8	2712	42.6	14154	43.9