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# The NSW Recreational Fisheries Monitoring Program – Charter Fishery Monitoring 2017/18

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# Non-technical summary

## *The NSW Recreational Fisheries Monitoring Program – Charter Fishery Monitoring 2017/18*

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### **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 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 the post-release condition and estimate post-capture survival of key species observed to be discarded by the fishery
- v) Describe observed interactions between threatened, endangered and protected (TEP) species and the fishery
- vi) Describe the demographic characteristics of nearshore charter fishery clientele

### **Key words**

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

## Summary

Recreational fishing is one of NSW's most popular pastimes with large proportions of the population participating in some type of recreational fishing during a typical year. Such high participation rates provide important social outcomes for the community via enhancement of social capital, stewardship for natural resources and mental and physical health benefits. Recreational fishing also accounts for substantial amounts of the total catch for many key species in NSW and for some species, recreational fishers are responsible for the majority of the catch. The economic value of the recreational sector is also significant and contributes an estimated \$3.4 billion into the NSW economy each year, supporting almost 14,000 fulltime jobs.

Due to the significance of the recreational fishery, the NSW Department of Primary Industries (NSW DPI) is committed to providing quality recreational fishing opportunities and ensuring sustainability of the State's fish stocks. To achieve these aims, regular and cost-effective monitoring of the recreational fishery is required to ensure effective management and ongoing health of our fisheries.

To meet these demands for a cost-effective, high-quality and regular monitoring program, NSW DPI developed the Recreational Fisheries Monitoring Program (RFMP). 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 rigorous scientific framework.

There are two components to the RFMP:

1) *Recreational Fishing Research Surveys*

State-wide 12-month surveys of long-term (1 or 3 years) recreational fishing licence holders and other members of their households; and,

2) *Charter Fishery Monitoring*

A logbook and on-board observer program to monitor the NSW Charter Fishery.

This report presents key results from the first year of the Charter Fishery Monitoring component of the RFMP. Outcomes from the Recreational Fishing Research Survey component are detailed in a separate report (Murphy *et al.* 2020).

## Background

A key component of the recreational fishery in NSW is the 'for hire' Charter Fishery. The Charter Fishery involves hundreds of vessels, caters to tens of thousands of fishers and operates over 10° of latitude. The fishery targets diverse species ranging from small-bodied finfish and crustaceans in estuaries, to large gamefish in offshore marine waters. By far the largest component of the Charter Fishery in terms of catch and effort is the fleet operating in nearshore marine waters (hereafter the 'nearshore charter fishery'), principally targeting various economically-important demersal and pelagic fish species. This fleet is monitored using a combination of mandatory industry logbook reporting and an on-board scientific observer program. The industry logbook collects spatio-temporal data on retained catch and fishing effort. The on-board observer program collects complementary data on the size composition of the catch, rates of discarding and post-release condition of discards, and also collects client demographic information and interactions with threatened, endangered and

protected (TEP) species. The data collected contributes variously to the assessment and monitoring of key species, state and national reporting frameworks, and socio-economic analyses of the recreational fishing industry.

### Industry Logbooks

State-wide, industry logbooks revealed that 88 charter vessels operated in the nearshore marine charter fishery undertaking 4,560 fishing trips with 33,766 clients in 2017/18. The number of clients per trip ranged from 1 to 28 (mean  $\pm$  SE,  $7.5 \pm 0.1$ ). Hours fished during trips ranged from 1 to 12 h with an average ( $\pm$  SE) of  $5.6 \pm 0.1$  h per trip.

State-wide, the nearshore charter fleet harvested 151,378 individual organisms of 146 different species in 2017/18 with just 30 species comprising 95% of the total retained catch. More than half of the catch were made up of five key recreational fish species: Bluespotted Flathead (22.5%), Snapper (13.6%), Grey Morwong (9.1%), Blue Mackerel (5.2%) and 'other' Flathead (4.7%).

An average ( $\pm$  SE) of  $33.2 \pm 0.4$  individuals were retained per nearshore charter trip in 2017/18 with a mean ( $\pm$  SE) species diversity of  $4.5 \pm 0.1$  species per trip. Retained catch rates per trip (mean  $\pm$  SE) for key species were  $7.5 \pm 0.2$  Bluespotted Flathead,  $4.6 \pm 0.1$  Snapper,  $3.0 \pm 0.1$  Grey Morwong and  $1.0 \pm 0.1$  Yellowtail Kingfish.

### On-board Observer Monitoring

On-board observers were present on 172 nearshore charter trips with 35 operators working out of 13 ports between Swansea and Narooma between October 2017 and September 2018. These trips represented 6.2% of the total number of nearshore charter trips reported in industry logbooks to have been undertaken in the sampling region during this period.

The number of clients per observed trip ranged from 2 to 14 (mean  $\pm$  SE,  $7.6 \pm 0.2$ ). Hours fished during observed trips ranged from 0.3 to 8.5 h with an average ( $\pm$  SE) of  $5.2 \pm 0.1$  h per trip.

On-board observers recorded the capture of 12,091 individual organisms of 105 different species with just 24 species comprising 95% of the total observed catch (kept and released). The species observed caught in the greatest numbers were Bluespotted Flathead (12.7%), Blue Mackerel (9.9%), Snapper (9.5%), Longspine Flathead (7.1%) and Yellowtail Scad (7.1%).

Of all organisms caught, most (66%) were kept with the remaining 34% released. Species observed to be kept in the greatest numbers were Bluespotted Flathead, Blue Mackerel, Yellowtail Scad, Grey Morwong and Snapper; these five species making up more than half of the kept catch. The species observed to be released in the greatest numbers were Longspine Flathead, Snapper, Sergeant Baker, Bluespotted Flathead and Yellowtail Kingfish; these five species comprised more than half of the released catch.

On-board observers recorded an average ( $\pm$  SE) of  $71.5 \pm 3.6$  individuals caught per trip. Of this, an average ( $\pm$  SE) of  $47.1 \pm 2.6$  individuals per trip were kept and  $24.4 \pm 1.8$  individuals per trip were subsequently released. Mean ( $\pm$  SE) species diversity of the total catch per trip was  $11.7 \pm 0.3$  species per trip with  $8.0 \pm 0.3$  species per trip kept and  $6.3 \pm 0.3$  species per trip released.

The overall mean ( $\pm$  SE) catch rate for Bluespotted Flathead was  $8.9 \pm 1.1$  fish per trip, of which  $7.4 \pm 0.9$  individuals per trip were kept and  $1.5 \pm 0.4$  fish per trip released. An overall

average ( $\pm$  SE) of  $6.7 \pm 0.7$  Snapper were caught per observed trip with similar numbers of fish kept ( $3.2 \pm 0.3$ ) and released ( $3.6 \pm 0.5$ ) per trip. The overall mean ( $\pm$  SE) catch rate for Grey Morwong was  $4.6 \pm 0.5$  fish per trip, of which almost all ( $4.5 \pm 0.5$ ) individuals per trip were kept with just  $0.2 \pm 0.1$  fish per trip released. An average ( $\pm$  SE) of  $2.1 \pm 0.5$  Yellowtail Kingfish were caught per trip with slightly fewer individuals kept per trip ( $0.9 \pm 0.3$ ) than were released ( $1.3 \pm 0.3$  fish per trip).

Of the 12,091 individual organisms observed caught, 4,125 (34%) were subsequently released. Species with high release rates included Longspine Flathead (98%), Mado (92%), Halfbanded Seaperch (86%), Eastern Red Scorpionfish (68%) Yellowtail Kingfish (59%) and Snapper (53%). Species with low release rates included Eastern Blackspot Pigfish (3%), Grey Morwong (4%), Ocean Jacket (9%), Yellowtail Scad (10%), Blue Mackerel (13%) and Bluespotted Flathead (17%).

The lengths of 9,460 individuals (78% of total) were measured by on-board observers prior to retention or release. The majority of key species (Bluespotted Flathead, Snapper, Grey Morwong and Yellowtail Kingfish) released after capture were a result of the mandated minimum legal lengths (MLLs) for each species. Most (75%) of the retained Bluespotted Flathead catch was within 10 cm of the MLL (33 cm total length – TL) with just 3% larger than 50 cm TL. Almost the entire retained Snapper catch (95%) was between the MLL of 30 cm TL (~26 cm fork length – FL) and 40 cm FL, with <1% of the retained catch larger than 40 cm FL. Most (63%) of the retained Grey Morwong catch was within 10 cm of the MLL of 30 cm TL (~25 cm FL), but a considerable proportion (36%) was also between 35 and 45 cm FL. Most Yellowtail Kingfish released after capture were smaller than the MLL for the species of 65 cm TL (~57 cm FL) and the majority (89%) of the retained catch were within 10 cm of this length with just 11% larger than 67 cm FL.

Observers collected information on the reason for release, and the post-release “condition” of 1,676 discarded individuals across 58 species. This included 592 Snapper, 211 Yellowtail Kingfish, 169 Bluespotted Flathead and 23 Grey Morwong. Most (74%) released individuals were discarded because they were smaller their respective MLL, with the remaining 26% discarded because the species or size was undesirable. Assessment of post-release condition of key species resulted in high post-capture survival (PCS) scores for Bluespotted Flathead (0.81) and Yellowtail Kingfish (0.72) and low PCS scores for Snapper (0.27) and Grey Morwong (0.22), primarily due to the varying susceptibility of each species to barotrauma.

On-board observers monitored wildlife interactions with charter fishing vessels on 80% of observed charter trips. A total of 482 observations recorded 3,635 individual animals across 28 species in the vicinity of charter vessels. These were dominated by seabirds (88% of the total) and marine mammals (dolphins, whales, seals; 11%). Seabirds from seven families were observed with the most common being Shearwaters, Albatrosses and Gulls/Terns. Only 33 direct interactions (involving 47 individuals) with the fishery were observed at a rate of 5.20 interactions per 100 h fishing. Marine mammals were recorded in 21 direct interactions, 11 interactions involved seabirds and a single interaction was recorded with a Shortfin Mako Shark. A single incidence of (seabird) bycatch was recorded representing a bycatch rate of 0.16 individuals per 100 h fishing.

Demographic data was collected from a total of 1,297 clients on observed charter trips. Charter clients were primarily male (89.8%), with 9.9% female and 0.3% of indeterminate sex. Charter clients ranged in age from 6 to 90 years; most (95%) were adults with the largest

number of clients (40%) between 20 and 39 years old. Most (81%) charter clients came from the area local to the charter operation, however 14% came from inland regions of NSW or from interstate and 5% of charter clients came from overseas, including 13 different countries. Seventy seven percent of charter clients fished in the previous 12 months and most of these (99%) had been on a charter trip.



# 1.0 Introduction

## 1.1 Background

### 1.1.1 Recreational Fishing in NSW

The publicly owned fisheries resources of New South Wales (NSW) are shared among recreational fishers, commercial fishers, charter operators and people practicing traditional Aboriginal fishing. Information from all harvesting sectors are therefore required to ensure effective management of sustainable shared fisheries resources (e.g. Ryan *et al.* 2016, Sutinen and Johnston 2003, Crowe *et al.* 2013, Fenichel *et al.* 2013). The recreational fishery represents an important sector and has been demonstrated to take a significant proportion of the catch of many key species such as Bream (*Acanthopagrus* spp.) Flatheads (Platycephalidae), Snapper (*Chrysophrys auratus*), Sand Whiting (*Sillago ciliata*), Mulloway (*Argyrosomus japonicus*), Tailor (*Pomatomus saltatrix*) and Yellowtail Kingfish (*Seriola lalandi*) (Henry and Lyle 2003, West *et al.* 2015, Murphy *et al.* 2020).

Fishing is a popular recreational activity in NSW, with 1 in 8 NSW residents participating in recreational fishing annually (Henry and Lyle 2003, West *et al.* 2015, Murphy *et al.* 2020). Such high participation rates deliver considerable value to the NSW community via enhancement of social capital, promotion of stewardship for natural resources, provision of numerous mental and physical health benefits (e.g. McPhee 2017, Hyder *et al.* 2018). In addition, the recreational sector is estimated to contribute \$3.4 billion into the NSW economy each year and supports the equivalent of almost 14,000 fulltime jobs (McIlgorm and Pepperell 2013).

Declines in commercial fishing catch and effort in NSW over recent decades has resulted in a reduction in the availability of data traditionally used to monitor and assess economically important fisheries resources (Murphy *et al.* 2020). In contrast, recreational catch and effort has remained comparably high over the same period (Henry and Lyle 2003, West *et al.* 2015), leaving data collected on recreational fishing as the primary source of information for many species and areas. Thus, effective and sustainable management of shared fisheries resources requires the collection of recreational fisheries information across broad spatial scales.

### 1.1.2 Charter Fishing in NSW

A key component of the recreational fishery in NSW is the 'for hire' charter sector. The Charter Fishery in NSW involves hundreds of vessels catering to tens of thousands of fishers and operates over 10° latitude in waterbodies ranging from estuaries to offshore marine waters, targeting species ranging from small-bodied finfish and crustaceans to large gamefish (Figure 1). The Charter Fishery provides clients with fishing expertise and vessels to maximise their fishing success across a range of fishing types 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, Gray and Kennelly 2017a).

The Charter Fishery provides an estimated annual \$50.2 m of output to the NSW economy from operators and their clients along with 188 fulltime jobs (McIlgorm and Pepperell 2014). The

Charter Fishery operates out of more than 30 coastal ports across NSW (Figure 1) with the economic impact of the fishery being greatest in regional areas. Despite being in existence since at least the 1950s, the Charter Fishery became a restricted access licenced fishery in 2000/01 with 276 businesses being issued with an NSW charter fishing licence. There are currently 204 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 nearshore marine waters – accessed by licenced charter operators holding a “Nearshore Bottom and Sportfishing” endorsement (hereafter, the “nearshore charter fishery”). There are currently 180 licenced charter operators in NSW with a “Nearshore Bottom and Sportfishing” endorsement.

The nearshore charter fishery targets a range of demersal and pelagic fish species primarily using hook and line methods. Most often, a ‘Paternoster’ rig is used to target demersal species by drifting across substrates such as reef, sand or gravel in depths of up to 130 m from vessels ranging in size from 10-30 m in length (Gray and Kennelly 2016). Operators also tow surface lures or baits to and from fishing grounds targeting seasonal pelagic species (known as “trolling”).

## 1.2 Need

### 1.2.1 The Recreational Fisheries Monitoring Program (RFMP)

The biological, economic and social importance of the recreational fishery in NSW (see 1.1.1) creates the need for regular and cost-effective broad-scale monitoring. This monitoring fulfils several objectives that underpin the sustainable management of NSW fisheries resources, providing data to assess trends in the fishery, and support stock assessment and associated reporting (e.g. Status of Australian Fish Stocks Reports). Monitoring also provides data to evaluate the impact of existing management regulations, and management changes under consideration.

The Recreational Fisheries Monitoring Program (RFMP) collects an ongoing time series of high quality information on recreational and charter fishing in NSW, to inform key indices of recreational fishery performance. Long-term monitoring of recreational fishing provides information on magnitude and variability of effort and catch, that contributes to the assessment of stocks, resource allocation and the setting of management controls. The data collected through the RFMP also complements monitoring of other fishing sectors and habitat assets, providing a holistic view of fisheries and aquatic ecosystems within NSW. This information is critical to managing the State’s aquatic resources more effectively and ensuring that the quality of recreational fishing in NSW is sustained.

The RFMP includes 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 main components to the RFMP:

#### 1) Recreational Fishing Research Surveys

State-wide 12-month Phone/Diary surveys of long-term (1 or 3-year duration) NSW recreational fishing licence holders undertaken on a biennial basis.

## 2) Charter Fishery Monitoring

A logbook and on-board observer program to monitor the NSW Charter Fishery undertaken on an on-going annual basis.

### 1.3 Charter Fishery Monitoring

Monitoring of the NSW Charter Fishery by the RFMP integrates several data sources, with a focus on key species exploited within the sector. The primary source of information is derived from logbook data, but this is complemented by targeted observer surveys to collect trip-specific information on effort, catch (including fish lengths), rates of discarding, post-capture survival, interactions with wildlife species, and demographic information on paying clients. The focal species for the 2017/18 survey were: Bluespotted Flathead (*Platycephalus caeruleopunctatus*), Grey Morwong (*Nemadactylus douglasii*), Snapper (*Chrysophrys auratus*), and Yellowtail Kingfish (*Seriola lalandi*) (Table 1). These species were selected due to their importance to recreational, commercial and charter sectors, requirement for data used in monitoring and stock assessment, evidence of declining catches, as well as the need for data to inform quota setting for some species (West et al. 2015, SAFS 2018, Hall 2018).

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, Gray and Kennelly 2017a). Mandatory logbooks typically involve the fisher or operator recording details of fishing activities and catch in a standardised format, which are then returned to management or regulatory bodies for incorporation into corporate databases. Logbooks thus represent a cost-effective means for monitoring the activities of a large number of fishers (Cotter and Pilling 2007, Chromy *et al.* 2009). Logbooks are mandatory in all commercial fisheries in Australia, as well as charter fisheries in Queensland, South Australia (SA), Western Australia (WA) and the Northern Territory (NT).

While logbook data often provides a reasonable overview of species composition and relative harvest, logbook data can be subject to several sources of bias (Cotter and Pilling 2007, Rotherham *et al.* 2007, Gray and Kennelly 2017a). Variable rates of fisher compliance with “compulsory” logbook reporting requirements is a common limitation, which means that the data collected does not actually reflect total fishing activity or catch. Within the NSW Charter Fishery, compliance with logbook reporting requirements is estimated at ~65% (McIlgorm and Pepperell 2014). As logbook data is self-reported by fishers, it can be subject to inaccurate species identification, and variable reporting of interactions with threatened, endangered and protected species (Cotter and Pilling 2007). Currently, the NSW Charter Fishing Monitoring Logbook (Figure 2) does not require the recording of data from discarded catches.

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, Uhlmann *et al.* 2014, Gray and Kennelly 2017a). 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 length composition of the catch, demographic information from charter clientele (for use in socio-economic analyses), and interactions with threatened, endangered or protected wildlife species. Observer data often represents the primary data source for assessing such interactions

(Pott and Weidenfeld 2017). This is particularly important for accurately defining the impacts of recreational fishing in the context of the broader threats and risks within the NSW Marine Estate (see MEMS 2018).

A combination of mandatory industry-based logbook and an on-board observer program was therefore used to monitor the nearshore charter fishery within the RFMP.

## 1.4 Objectives

The objectives of the Charter Fishery Monitoring component of the RFMP are to:

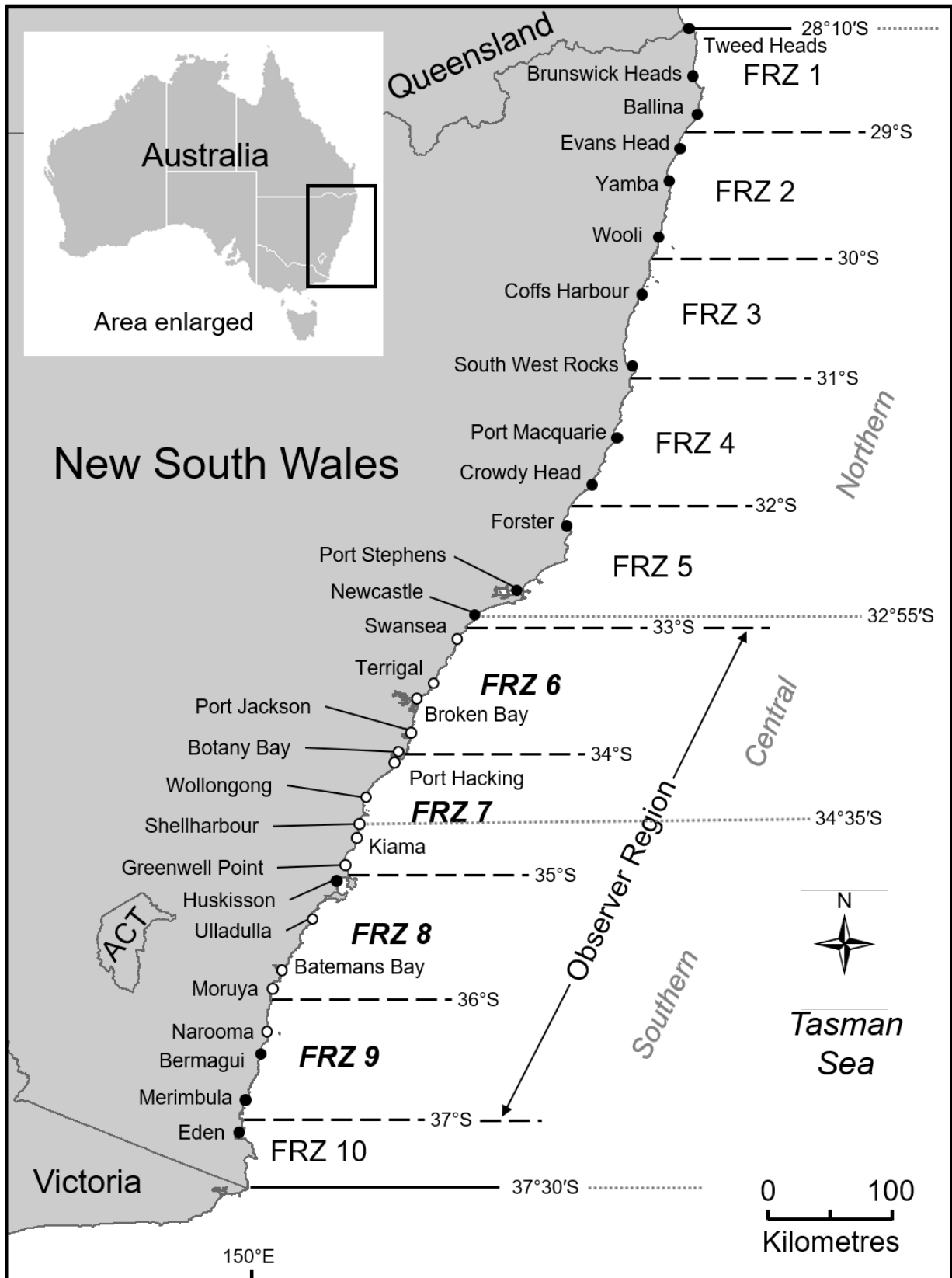
- i) Describe state-wide spatial and temporal patterns in retained catch and effort for the nearshore charter fishery from industry logbook data
- ii) Describe spatial and temporal patterns in catch (kept and released) and effort for the nearshore charter fishery from data collected by on-board observers in the southern half of the state (the 'Observer Region' – Figure 1)
- iii) Describe spatial and temporal patterns in discarded catch in the Observer Region
- iv) Describe the size composition of catches (retained and discarded) for key species caught in the Observer Region
- v) Describe the post-release condition and estimate post-capture survival of key species discarded in the Observer Region
- vi) Describe observed interactions between TEP species and the fishery in the Observer Region
- vii) Describe the demographic characteristics of nearshore charter fishery clientele in the Observer Region

## 1.5 Report Structure

This data report has been compiled to present the results for the first survey year of the Charter Fishery Monitoring component of the RFMP (from 1<sup>st</sup> October 2017 to 30<sup>th</sup> September 2018). The report summarises data at both a state-wide level, as well as providing a region-by-region breakdown of catch, effort and catch rates for the nearshore charter fishery. Additional data collected by on-board observers on discarding, post-release survival, size composition, wildlife abundance and interactions, and client demographics are also summarised here.

In accordance with the agreed reporting structure, results have generally been presented without interpretation or commentary – unless such information refers to important definitions or methodological issues.

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 (see Figure 2). Also shown are the 'Northern', 'Central' and 'Southern' MEMA management regions (bounded by horizontal dotted lines) and the region sampled by observers on-board nearshore charter vessels (the 'Observer Region'; latitudes 33-37°S; FRZ 6-9s – given in *italics*). Ports where the nearshore charter fishery operates (●) and ports where observed trips occurred (○) are also shown.



## 2.0 Methods

NSW Charter Fishing operators with a “Nearshore Bottom Fishing and Sportfishing” endorsement were monitored using data collected by their mandatory industry-based logbooks and by voluntarily hosting on-board scientific observers.

### 2.1 Industry Logbook

The mandatory industry NSW DPI Charter Fishing Logbook is required to be completed for each fishing trip undertaken by operators and submitted no more than one month later (Figure 2). The following data are recorded for each trip:

- Date
- Location
- Method
- Hours fished
- Number of fishers
- Retained catch (by species)
- Interactions with TEP species
- Lost and found fishing gear

Data is submitted by operators in paper form or online ([www.dpi.nsw.gov.au/fishing/commercial/fishonline](http://www.dpi.nsw.gov.au/fishing/commercial/fishonline)), before being entered into a corporate database. This database was interrogated for reported catch and effort data from the nearshore charter fishery for the 2017/18 period. Coastal and oceanic waters adjacent to the NSW coastline are divided into ten, one-degree-latitude Fisher Reporting Zones (FRZs; Figure 1); charter fishers are required to report against these zones on their daily catch returns (Figure 2). Logbook data from these latitudinal zones were aggregated to correspond with the three NSW Marine 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 (MEMS 2018). These regions are also used in the RFMP Recreational Fishing Research Survey (Murphy et al. 2020).



Figure 2. Logsheet template from the mandatory industry “NSW DPI Charter Fishing Logbook”, on which fishing data is recorded by the NSW Charter Fishery.

Log Sheet Number: **273541**

**NSW DPI Daily Catch and Effort Record (to be returned monthly)**

Department of Primary Industries

FB. Number		FB. Owner Name				FB. Owner Registration No.			
Month	Year								
Day	Location Code or Lat / Long		Fishing in Marine Park (Y/N)	Endorsement Code	Member Code	Hours Fished	No. of Anglers		

For each different area fished, endorsement activated and method used please record the effort details, anglers and number of fish retained.

Species Code, Kilogram and Number									
Sp. Code									
Kg									
Number									
Sp. Code									
Kg									
Number									
Sp. Code									
Kg									
Number									
Sp. Code									
Kg									
Number									
Sp. Code									
Kg									
Number									
Sp. Code									
Kg									
Number									

**Threatened and/or Protected Species Reporting**  
If you have interacted with threatened and/or protected species in the period of this return you must complete a 'Threatened and/or Protected Species Interaction Reporting Form' and attach to this form and tick this box.

**Lost/Found Gear**  
If you have lost or found any fishing gear in the period of this return you must complete a 'Lost/Found Gear Record' and attach to this form and tick this box.

**Nil Return**  
If you have not fished for this month please indicate a tick in the Nil Return box provided.

Please return original to: Fisheries NSW (Catch Records), PO Box 4157, Coffs Harbour Jetty NSW 2450. Keep duplicate for your own records.

I hereby certify that the information recorded on this log sheet is a true and accurate record.

Authorised Person's Signature \_\_\_\_\_

Date: \_\_\_\_\_

## 2.2 On-board Observer Monitoring

As noted above, the 2017/18 on-board observer component focused on collecting biological data on Bluespotted Flathead, Grey Morwong, Snapper and Yellowtail Kingfish (see 1.3). In order to maximize data collection explicitly for these key species, previously reported logbook catch data for these species was used to inform the spatial design of the observer program and define the “Observer Region” (Figure 1). Spatial variation in the catch for the previous two financial years (2015/16 and 2016/17; Table 1) showed that a large proportion of the charter catch for Bluespotted Flathead (74%), Grey Morwong (93%), Snapper (49%) and Yellowtail Kingfish (89%) occurred in FRZs 6, 7, 8 and 9. On-board observer monitoring of the nearshore charter fishery was therefore focussed on nearshore charters operating out of ports in these four FRZs (6-9) (Table 1), which corresponded with the abovementioned ‘Central’ and ‘Southern’ MEMA management regions (see 2.1; Figure 1), however due to the greater spatial resolution afforded, the following sections present data recorded by on-board observers stratified by FRZ within the Observer Region.

Table 1. Charter logbook catches (numbers of individuals retained) reported for key species in each Fisher Reporting Zone (FRZ – Figure 1) for the period 2015/16-2016/17.

Species	Fisher Reporting Zone										Total
	FRZ 1	FRZ 2	FRZ 3	FRZ 4	FRZ 5	FRZ 6	FRZ 7	FRZ 8	FRZ 9	FRZ 10	
Bluespotted Flathead	6	4404	1855	1277	2416	4978	8463	3743	11470	11	38623
Snapper	957	5699	4385	3541	2626	3741	5429	2327	4622	60	33387
Grey Morwong	9	138	567	198	258	4528	6459	1012	4582	22	17773
Yellowtail Kingfish	3	204	417	44	74	3253	353	29	2784	13	7174
<b>Total</b>	<b>975</b>	<b>10445</b>	<b>7224</b>	<b>5060</b>	<b>5374</b>	<b>16500</b>	<b>20704</b>	<b>7111</b>	<b>23458</b>	<b>106</b>	<b>96957</b>

### 2.2.1 Sampling design

On-board observer monitoring of the nearshore charter fishery was stratified according to a two-factor matrix which assigned available observer trips across the four one-degree-latitude FRZs in the Observer Region and four seasons between October 2017 and September 2018 (Table 2, Figure 1). Budgetary constraints dictated that a maximum of 202 observer trips were available.

On-board observer monitoring occurred on haphazardly selected vessels and ports within the Observer Region (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.

Table 2. Two-factor matrix used to assign available observer sampling effort across the four one-degree-latitude Fisher Reporting Zones (FRZs – Figure 1) and four seasons within the Observer Region. Sampling effort was determined by spatio-temporal fishing effort recorded in mandatory industry logbooks for 2015/16 and 2016/17.

Fisher Reporting Zone	Spring	Summer	Autumn	Winter	Total
FRZ 6	15	17	13	10	<b>55</b>
FRZ 7	19	23	15	13	<b>70</b>
FRZ 8	8	9	7	6	<b>30</b>
FRZ 9	13	15	11	8	<b>47</b>
<b>Total</b>	<b>55</b>	<b>64</b>	<b>46</b>	<b>37</b>	<b>202</b>

### 2.2.2 Catch, effort and biological data collection

On each charter trip observed, the observer identified and counted all individual fish caught and recorded whether they were kept or released. Where possible, all individuals caught were measured as either fork length (FL – for fish with a forked caudal fin) or total length (TL – for fish with a rounded or pointed caudal fin) to the nearest 0.5 cm below the actual length. Observers also collected operational information on the charter trip including the date, port of departure, departure and arrival times, vessel size and capacity, and the number of clients and crew.

For each fishing event, information was collected on start and finish times, GPS location, the number of clients fishing, depth, bottom topography, type of fishing (e.g. trolling, drifting, reef fishing), target species, fishing rig used, and bait type. Environmental data were also collected for



each event including water temperature, sky conditions (sun, cloud, rain), estimated wind direction and strength, estimated swell direction and size, and estimated current direction and strength.

### **2.2.3 Post-release condition of key species**

For individuals of key species prioritized for biological data collection, their physical condition immediately prior to release were recorded via visual assessment. Individuals were examined and given a score according to the 'Post-Capture Survival' (PCS) criteria outlined in Table 3 (modified from Braccini *et al.*, 2012). Three indicators were used to separately assess the physical damage resulting from 'barotrauma', 'wounds and hemorrhaging' and 'skin damage and bruising', which could subsequently affect post-capture survival, with one of four categorical scores selected for each indicator. An overall PCS score for each fish was derived by combining the four categorical scores for each individual. An overall PCS for each species was then calculated by averaging the PCS scores for all individuals of that species. Finally, the PCS scores for each species was scaled between 0 (low) and 1 (high). The reason for the release of each individual discarded was also recorded ('undersize' or 'undesirable') and length (FL or TL) recorded as described above (2.2.2).

### **2.2.4 Wildlife abundance and interactions with the fishery**

Wildlife observation data was collected during a randomly selected 5-minute period during each fishing event during a trip, in which all wildlife in the vicinity of charter fishing vessels were recorded (Weimerskirch *et al.* 2000). A fishing event was defined as the period of time when fishing gear was being actively deployed at each location and did not include traveling time, either to and from fishing grounds, or from one location to another. Observation data was collected during each fishing event in a trip, so there could be multiple events observed during a single trip. Wildlife observed at each fishing event were identified to species where possible. Where accurate identification to species level was not possible, identification to higher order taxonomic groups (family or order) were made. Abundance counts were made of observed individuals. Where accurate counts could not be made (e.g. when large numbers of individuals were present), abundances were estimated to the nearest 10 individuals.

Data was also collected on all interactions between wildlife and the fishing vessel that occurred during observed trips, including species identification, time of interaction, details of the interaction, contact point with the vessel and fate (including life status if known). Interactions were recorded as either 'direct' or 'indirect'. Direct interactions were defined as those where wildlife came into direct contact with the vessel or gear engaged in fishing (e.g. depredating hooked fish from lines, removing bait, eating released fish or discarded bait); all remaining interactions were defined as indirect interactions (e.g. observed searching near the vessel).

### **2.2.5 Demography of charter clientele**

Observers also collected demographic data on charter clientele voluntarily provided by participants during observed trips. This data included age, postcode or suburb of residence, observed sex, whether the charter was for a fishing club, and how often the person went fishing and participated in charter trips (over the previous 12 months). 'Local' was defined as a suburb or postcode within a 30 km radius of the departure port for regional areas, and within a 20 km

radius for urban areas. The number of clients who were unwilling or unable to provide information was also recorded.

## 3.0 Results

### 3.1 Industry Logbook

#### 3.1.1 Effort

State-wide, a total of 33,766 clients took 4,560 trips with 88 nearshore charter fishery operators in 2017/18, which included a total of 25,266 hours fishing. The number of clients per trip ranged from 1 to 28 (mean  $\pm$  SE,  $7.5 \pm 0.1$ ; Figure 3). Hours fished during trips ranged from 1 to 12 hours with an average ( $\pm$  SE) of  $5.6 \pm 0.1$  hours per trip (Figure 4).

Most state-wide charter trips (1,745; 38%) occurred in the Central region with less undertaken in the Northern (1,386 trips; 30%) and Southern regions (1,429 trips; 31%; Table 4, Appendix 1). Overall, more charter trips occurred in summer (1,593; 35%) and the least occurred in winter (793; 17%), with 1,134 (25%) recorded in autumn and 1,040 (23%) in spring (Table 4, Appendix 2).

The greatest seasonal variation in the number of charter trips occurred in the Southern region with 622 trips taken in summer, 385 in autumn, 288 in spring and just 134 in winter (Table 4; Appendices 1 & 2). The highest number of trips taken in the Central region also occurred in summer (582), but numerous trips also occurred in spring (419), autumn (435) and winter (309). In the Northern region, the number of trips taken were far more consistent year-round (spring 333, summer 389, autumn 314, winter 350; Table 4, Appendices 1 & 2).

The highest mean ( $\pm$  SE) number of clients per trip occurred in the Central region ( $8.1 \pm 0.1$ ) with smaller numbers of clients per trip recorded in the Northern and Southern regions ( $7.6 \pm 0.1$  &  $6.8 \pm 0.1$ , respectively; Figures 3B-D). Overall, the number of clients per trip was highest in summer ( $7.8 \pm 0.1$ ) and lowest in winter ( $7.1 \pm 0.1$ ) with a similar number of clients per trip recorded in spring and autumn ( $7.4 \pm 0.1$  for each; Figure 3A). This pattern was similar across regions, except in the Central region where most clients per trip occurred in autumn (Figures 3B-D).

Overall, the mean ( $\pm$  SE) number of hours fished per trip was roughly similar across all regions and seasons ( $5.6 \pm 0.1$  h per trip; Figure 4A) but was slightly higher in the Central region ( $5.8 \pm 0.1$ ) than in the Northern ( $5.6 \pm 0.1$ ) or Southern regions ( $5.3 \pm 0.1$  hours per trip; Figures 4B-D). Similarly, mean hours fished per trip was higher in winter ( $5.9 \pm 0.1$ ) than in the other seasons (mean  $5.5 \pm 0.1$  hours per trip; Figure 4).

Table 3. Description of the score values of the indices used for the estimation of post-capture survival (PCS) for four arbitrary survival categories.

Index	Description	Survival Category			
		High (score=1)	Moderate (score=0.66)	Low (score=0.33)	Nil (score=0)
Barotrauma	Presence of decompression injuries	No barotrauma observed	Mild barotrauma observed – distended abdomen, excessive buoyancy	Stomach eversion into buccal cavity, bloodshot cloaca, mild exophthalmia	Severe barotrauma observed – organ protrusion from the mouth or anus, pronounced exophthalmia, haemorrhaging or emphysema in gills or eyes
Wounds and haemorrhaging	Presence of wounds and haemorrhaging	No cuts or haemorrhaging observed	Small, shallow cuts or lacerations, some mild haemorrhaging	Multiple small cuts or one severe cut or wound, some haemorrhaging but not flowing profusely, little organ exposure and if exposed, organs are undamaged	Extensive small cuts or very severe wounds or missing body parts, excessive haemorrhaging flowing continuously, internal organs exposed and damaged, may be protruding
Skin damage and bruising	Skin damage and surface bruising by physical trauma	0% damaged skin, bruises or redness	<5% damaged skin, bruises or redness	5–50% damaged skin, bruises or redness	>50% damaged skin, bruises or redness

Figure 3. Seasonal variation in the mean ( $\pm$  SE) number of clients per trip in the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.

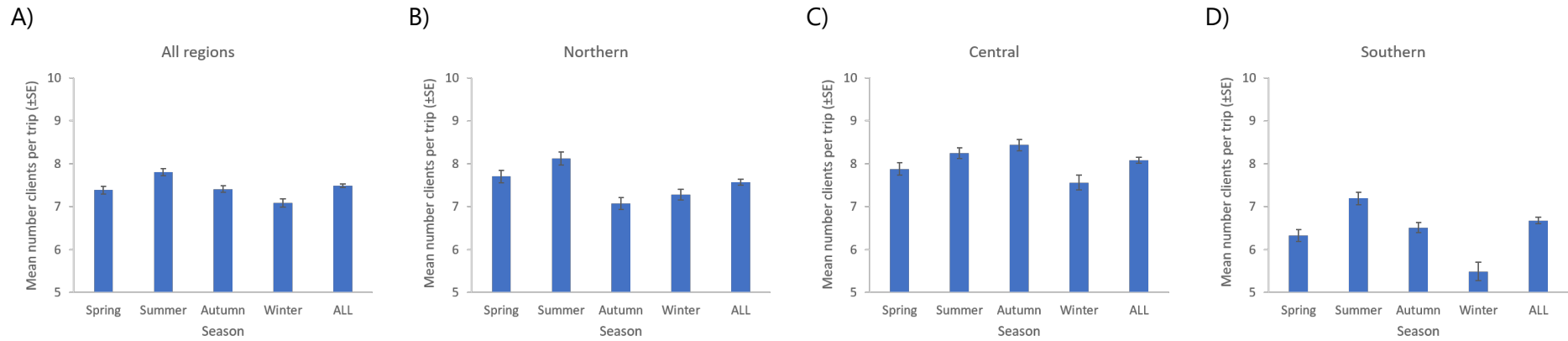


Figure 4. Seasonal variation in the mean ( $\pm$  SE) hours fished per trip by the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.

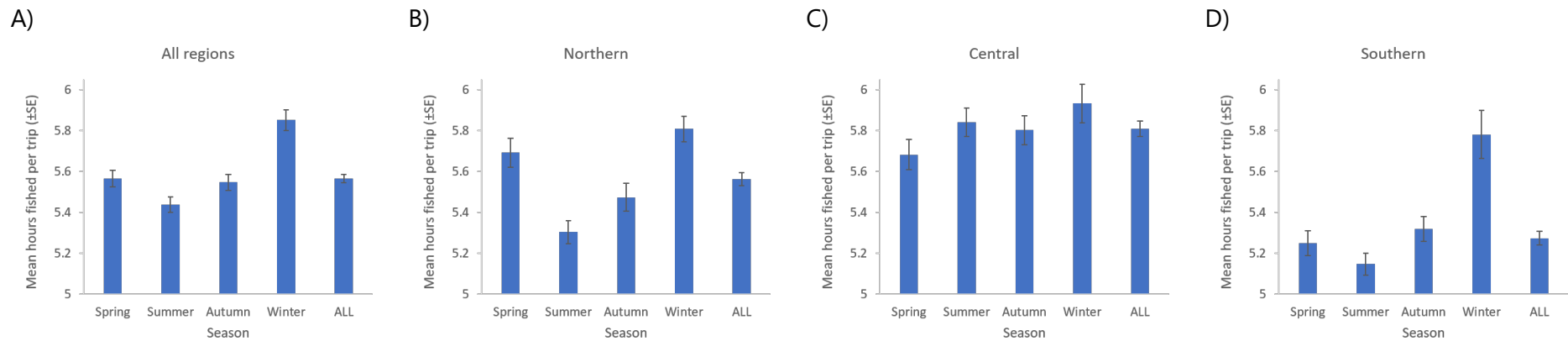


Table 4. The number of trips recorded, and top ten species retained in the Northern, Central and Southern MEMA regions (Figure 1) by the nearshore charter fishery as recorded in industry logbooks in each of four seasons during 2017/18. The catch of all species by region can be found in Appendix 1 and by season in Appendix 2.

<b>Northern Region</b>					
<b>Season</b>	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>	<b>Winter</b>	<b>Total</b>
<i>Number of trips</i>	333	389	314	350	1386
<b>Species</b>					
Snapper	2507	2071	2278	3352	10208
Bluespotted Flathead	1812	1375	1528	1658	6373
Teraglin	853	984	647	995	3479
Blue Mackerel	623	1379	903	339	3244
Pearl Perch	616	417	526	659	2218
Dusky Flathead	526	470	265	354	1615
Yellowtail Scad	830	130	86	-	1046
Venus Tuskfish	227	116	270	318	931
Grey Morwong	234	139	190	205	768
Flathead (other)	103	333	260	68	764
<b>Sub-total</b>	<b>9401</b>	<b>8875</b>	<b>8487</b>	<b>10587</b>	<b>37350</b>
<b>Central Region</b>					
<b>Season</b>	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>	<b>Winter</b>	<b>Total</b>
<i>Number of trips</i>	419	582	435	309	1745
<b>Species</b>					
Bluespotted Flathead	1816	3866	3486	1416	10584
Grey Morwong	2133	2000	1750	1164	7047
Snapper	1264	860	949	1059	4132
Sweep	882	869	543	1046	3340
Redfish	777	1012	676	403	2868
Ocean Jacket	595	414	753	601	2363
Yellowtail Kingfish	420	646	216	568	1850
Yellowtail Scad	241	1095	160	272	1768
Southern Maori Wrasse	561	521	260	419	1761
Dolphinfish	-	455	1240		1695
<b>Sub-total</b>	<b>12743</b>	<b>16629</b>	<b>13533</b>	<b>10075</b>	<b>52980</b>
<b>Southern Region</b>					
<b>Season</b>	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>	<b>Winter</b>	<b>Total</b>
<i>Number of trips</i>	288	622	385	134	1429
<b>Species</b>					
Bluespotted Flathead	3758	8676	3744	973	17151
Snapper	1646	2348	1623	621	6238
Flathead (other)	786	4057	1012	173	6028
Grey Morwong	1630	2148	1532	632	5942
Ocean Jacket	269	1582	1937	101	3889
Blue Mackerel	401	2023	943	66	3433
Tiger Flathead	606	1820	343	155	2924
Yellowtail Kingfish	60	1162	1238	4	2464
Yellowtail Scad	287	795	767	94	1943
Sweep	235	984	276	241	1736
<b>Sub-total</b>	<b>18279</b>	<b>35759</b>	<b>20471</b>	<b>8890</b>	<b>61048</b>
<i>Total number of trips</i>	1040	1593	1134	793	4560
<b>Grand Total</b>	<b>34643</b>	<b>54751</b>	<b>37325</b>	<b>24659</b>	<b>151378</b>

### 3.1.2 Catch

#### 3.1.2.1 Overall

State-wide, operators within the nearshore charter fishery retained 151,378 individual organisms of 146 different species in 2017/18 (Table 4, Appendices 1 & 2). Thirty species comprised 95% of the total retained catch; the other 116 species caught contributing the remaining 5% (Appendices 1 & 2). The species harvested in the greatest numbers state-wide were Bluespotted Flathead (34,108 individuals), Snapper (20,578), Grey Morwong (13,757), Blue Mackerel (*Scomber australasicus*; 7,833) and 'other' Flathead (Platycephalidae; 7,046); these five species making up approximately 55% of the total retained catch (Table 4, Appendices 1 & 2).

#### 3.1.2.2 Spatial variation

Catch varied between the reporting regions with the highest number of individuals retained in the Southern region (61,048) and the lowest in the Northern region (37,350) with 52,980 retained in the Central region (Table 4, Appendix 1). In contrast, species diversity of the retained catch was highest in the Central region (114 species) with fewer species recorded in the Northern and Southern regions (104 and 90 species, respectively; Table 4, Appendix 1).

The three most abundant species overall, Bluespotted Flathead, Snapper and Grey Morwong, made up a combined 46, 41 and 35% of the retained catch in the Northern, Central and Southern regions, respectively (Table 4, Appendix 1). Despite the overall dominance of these species, there was some variation in species contribution to retained catches across regions (Table 4).

Bluespotted Flathead dominated the catch year-round (22.5%), but made a higher contribution to the catch in the Southern region (28.1%) than in the Northern or Central regions (17.1 & 20.0%, respectively; Table 4, Appendix 1). This pattern was also seen for Snapper with contribution to recorded logbook catch in the Northern region (27.3%) far higher than in the Central or Southern regions (7.8 & 10.2%, respectively). For Grey Morwong, contribution to catches ranged from 2.1% in the Northern region to 9.7% in the Southern region and 13.3% in the Central region. For other species like Silver Sweep (*Scorpius lineolata*), Ocean Jackets (*Nelusetta ayraudi*), Redfish (*Centroberyx affinis*) and Yellowtail Kingfish, catches were lower in the Northern region (Table 4). Conversely, catches of Teraglin (*Atratoscion atelodus*), Pearl Perch (*Glaucosoma scapulare*) and Venus Tuskfish (*Choerodon venustus*) were greater in the Northern region than further south and 'other' and Tiger Flathead (*Neoplatycephalus richardsoni*) made a greater contribution to catches in the Southern region than further north (Table 4, Appendix 1).

#### 3.1.2.3 Temporal variation

Overall, the highest number of individuals were retained during summer (54,751) and the lowest during winter (24,659), with similar numbers of individuals retained in spring and autumn (34,643 & 37,325 individuals, respectively; Table 4, Appendix 2). Species diversity of the retained catch was higher in summer and autumn (112 & 113 species, respectively) than in winter or spring (102 & 95 species, respectively; Appendix 2). For most species, retained state-wide catches were highest in summer and autumn and lowest in winter and spring (Table 4, Appendix 2). Temporal variation in retained catch was highest for seasonal species like Dolphinfin (*Coryphaena hippurus*), Yellowtail Kingfish and Australian Bonito (*Sarda australis*), with catches substantially higher in summer-autumn than in winter-spring.

For the species which contributed most to overall logbook catches, there was considerable temporal variation between seasons. Bluespotted Flathead dominated the recorded catch recorded year-round (22.5%), however their seasonal contribution to recorded catches ranged from 16.4% in winter to 25.4% in summer (Table 4, Appendix 2). Similarly, Snapper was the most abundant species in logbook catches in winter contributing 20.4% to the recorded catch, but contributed just 9.6% to the recorded logbook catch in summer. The contribution of Grey Morwong to recorded logbook catches was more temporally-consistent ranging from 7.8% in summer to 11.4% in spring. Other species which showed considerable seasonal variation in contribution to logbook catches were Blue Mackerel, 'other' Flathead, Ocean Jackets and Yellowtail Scad (*Trachurus novaezelandiae*).

Other species made a smaller, but more consistent contribution to recorded logbook catches between seasons. These included Silver Sweep, Sergeant Baker (*Latropiscis purpurissatus*), Redfish and Southern Maori Wrasse (*Ophthalmolepis lineolatus*; Table 4, Appendix 2).

### 3.1.3 Catch rates

#### 3.1.3.1 Individual fish per trip

In the 4,560 nearshore charter fishing trips undertaken in NSW during 2017/18, logbook data showed that an average of  $33.2 \pm 0.4$  fish were retained per trip (Figure 5A). Overall, the mean number of individuals retained per trip were slightly higher in spring ( $33.3 \pm 0.8$ ), summer ( $34.4 \pm 0.7$ ) and autumn ( $32.9 \pm 0.8$ ) than in winter ( $31.1 \pm 0.8$ ; Figure 5A). The mean catch rate was also strongly influenced by region with overall more individuals retained per trip in the Southern region ( $42.7 \pm 0.8$ ) than in the Central or Northern regions ( $30.4 \pm 0.5$  and  $26.9 \pm 0.5$  individuals per trip, respectively; Figures 5B-D).

#### 3.1.3.2 Species per trip

State-wide mean species diversity in the retained catch per nearshore charter trip in 2017/18 was  $4.5 \pm 0.1$  species per trip (Figure 6A). The mean number of species retained per trip varied spatially with more species per trip retained in the Central region ( $4.7 \pm 0.1$  species per trip) than in the Northern or Southern regions ( $4.3 \pm 0.1$  in each; Figures 6B-D). On average, slightly more species made up the retained catch per trip in winter and spring ( $4.6 \pm 0.1$  &  $4.7 \pm 0.1$  species per trip, respectively) than in summer and autumn ( $4.2 \pm 0.1$  &  $4.5 \pm 0.1$  species per trip, respectively; Figure 6A), however this seasonal pattern was inconsistent across regions (Figures 6B-D). For example, in the Northern region, highest retained species catch per trip occurred in autumn and winter with lower species catch per trip evident in spring and summer (Figure 6B). In contrast, the highest species catch per trip in the Central and Southern regions occurred in spring ( $5.3 \pm 0.1$  &  $4.7 \pm 0.2$  species per trip, respectively; Figures 6C & D).

Figure 5. Seasonal variation in the mean ( $\pm$  SE) number of individuals retained per fishing trip in the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.

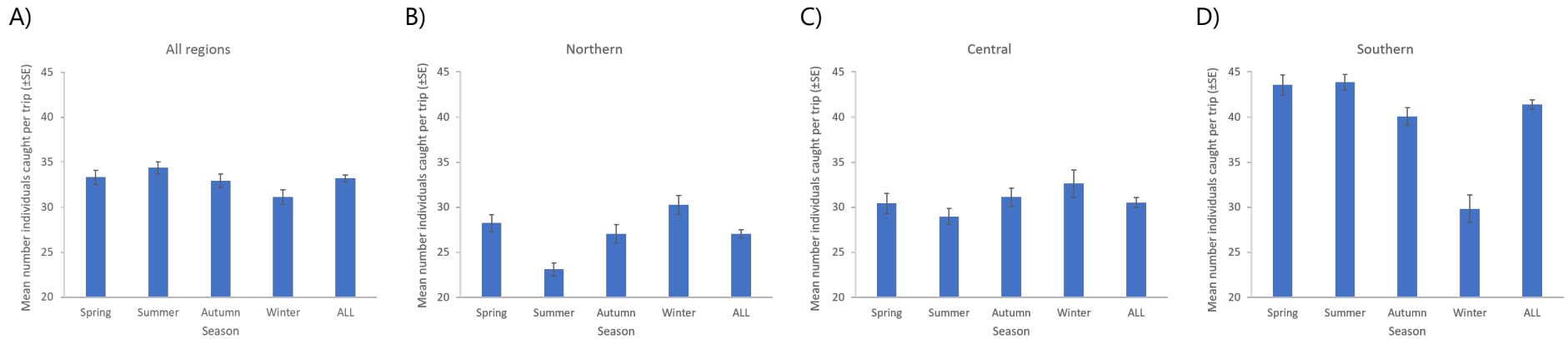
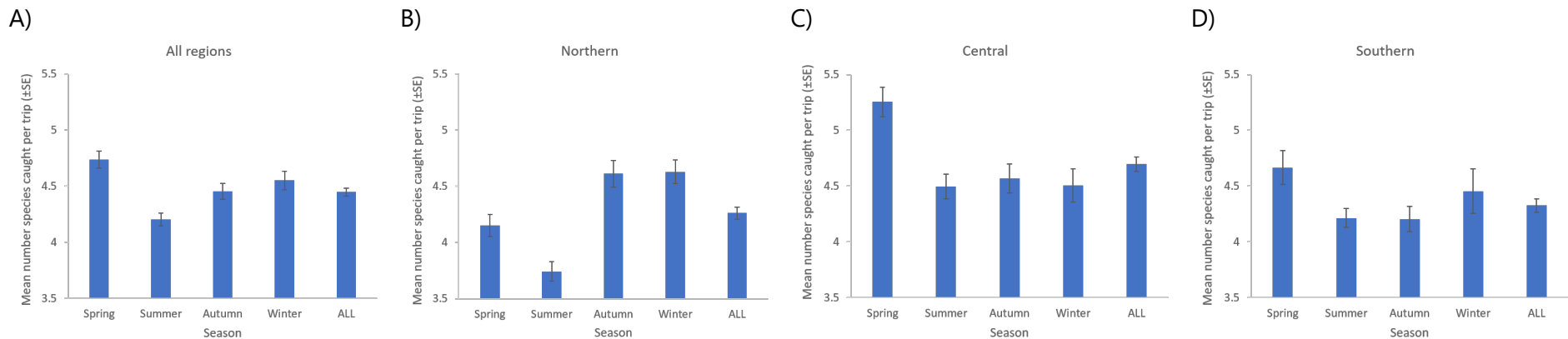


Figure 6. Seasonal variation in the mean ( $\pm$  SE) number of species retained per fishing trip in the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.





### 3.1.3.3 Catch of key species

The catch rates for key species (Bluespotted Flathead, Snapper, Grey Morwong and Yellowtail Kingfish) retained on nearshore charter trips in 2017/18 were also calculated from recorded logbook data (Figures 7-10).

The state-wide mean retained catch rate for Bluespotted Flathead was  $7.5 \pm 0.2$  fish per trip (Figure 7A). On average, more Bluespotted Flathead were retained per trip in summer ( $8.7 \pm 0.4$ ) than in spring, autumn or winter ( $7.1 \pm 0.4$ ,  $7.7 \pm 0.5$  &  $5.1 \pm 0.5$  fish per trip, respectively; Figure 7). Overall catch rates for retained Bluespotted Flathead were much greater in the Southern region ( $12.0 \pm 0.4$  fish per trip) than in the other two regions ( $4.6 \pm 0.3$  &  $6.1 \pm 0.4$  fish per trip in the Northern and Central regions, respectively; Figures 7B-D).

An overall average of  $4.6 \pm 0.1$  Snapper were retained per trip state-wide in 2017/18 (Figure 8A). On average, more Snapper were retained per trip in winter ( $6.3 \pm 0.3$ ) than in spring or autumn ( $5.2 \pm 0.2$  &  $4.7 \pm 0.2$  fish per trip, respectively; Figure 8). The lowest catch rate for retained Snapper occurred in summer ( $3.3 \pm 0.1$  fish per trip; Figure 8). There was also considerable variation in catch rates between regions with the number of Snapper retained per trip in the Northern region ( $7.4 \pm 0.2$ ) much higher than in the Southern or Central regions ( $4.4 \pm 0.1$  &  $2.4 \pm 0.2$  fish per trip, respectively; Figures 8B-D).

The overall state-wide mean catch rate for retained Grey Morwong was  $3.0 \pm 0.1$  fish per trip with highest retained catches per trip occurring in spring ( $3.8 \pm 0.2$ ) and winter ( $4.0 \pm 0.2$ ) with fewer retained per trip in summer and autumn ( $2.7 \pm 0.1$  &  $3.1 \pm 0.2$  per trip, respectively; Figure 9A). These overall patterns were driven by the large retained catch rates (and retained catches – see 3.1.2 above) recorded in the Central and Southern regions ( $4.0 \pm 0.2$  &  $4.2 \pm 0.2$  fish per trip, respectively) compared with much lower catch rates in the Northern region ( $0.6 \pm 0.0$  fish per trip; Figures 9B-D).

The state-wide mean retained catch rate for Yellowtail Kingfish was  $1.0 \pm 0.1$  fish per trip during 2017/18 (Figure 10A). On average, more Yellowtail Kingfish were retained per trip in summer and autumn ( $1.2 \pm 0.1$  &  $1.5 \pm 0.2$ , respectively) than in spring or winter ( $0.6 \pm 0.1$  &  $0.9 \pm 0.1$  fish per trip, respectively; Figure 10). Overall catch rates for retained Yellowtail Kingfish were much greater in the Southern region ( $1.7 \pm 0.2$  fish per trip) than in the other two regions ( $0.2 \pm 0.0$  &  $1.0 \pm 0.1$  fish per trip in the Northern and Central regions, respectively; Figures 10B-D)

Figure 7. Seasonal variation in the mean ( $\pm$  SE) number of individual Bluespotted Flathead retained per fishing trip in the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.

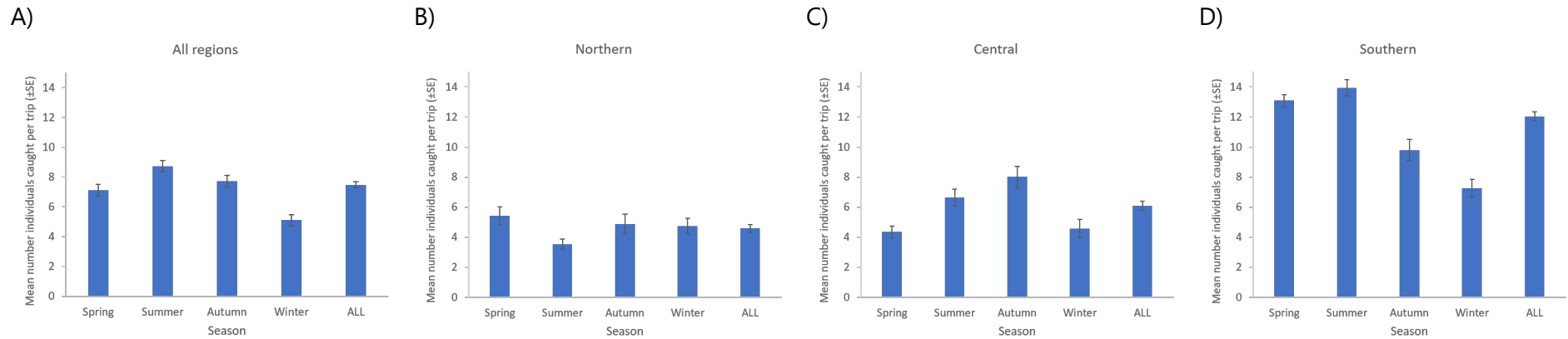


Figure 8. Seasonal variation in the mean ( $\pm$  SE) number of individual Snapper retained per fishing trip in the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.

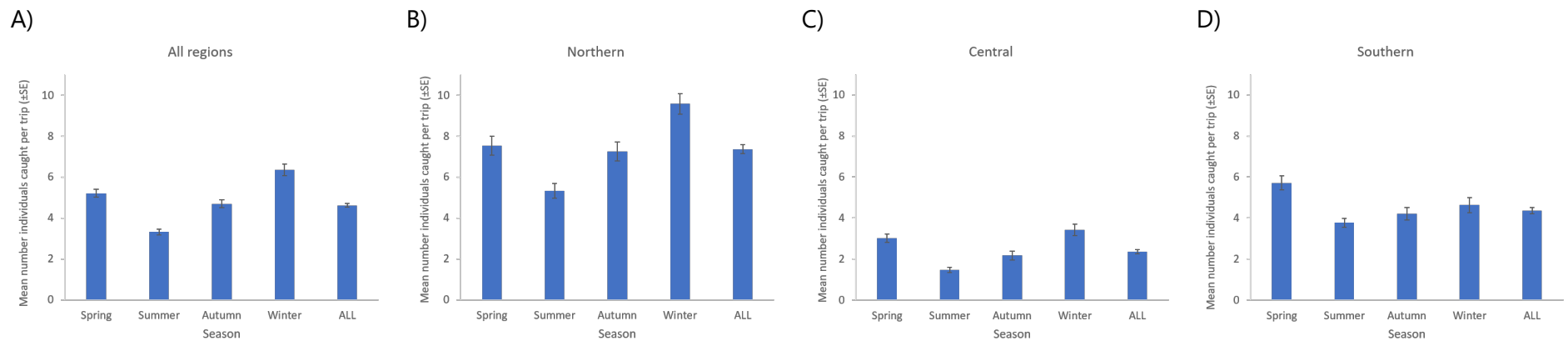


Figure 9. Seasonal variation in the mean ( $\pm$  SE) number of individual Grey Morwong retained per fishing trip in the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.

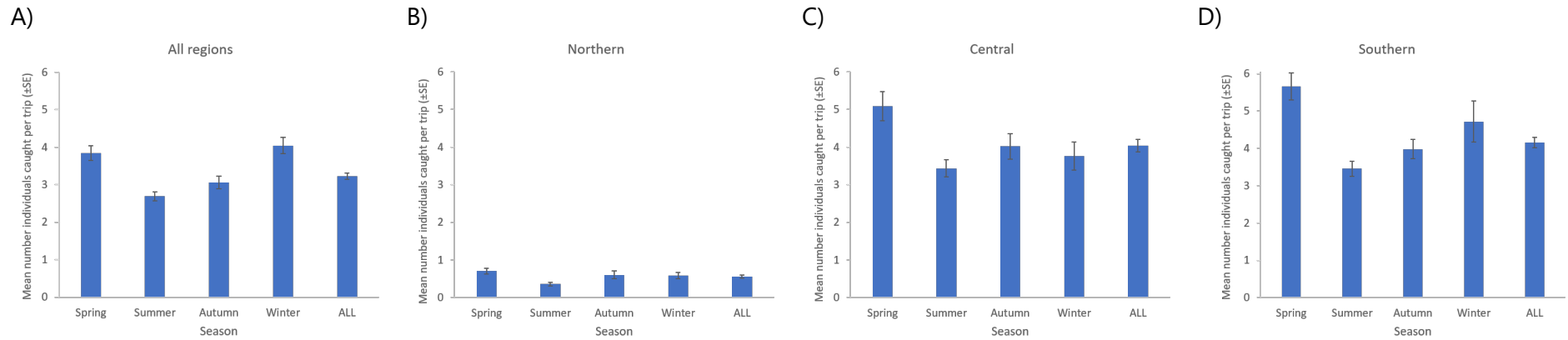
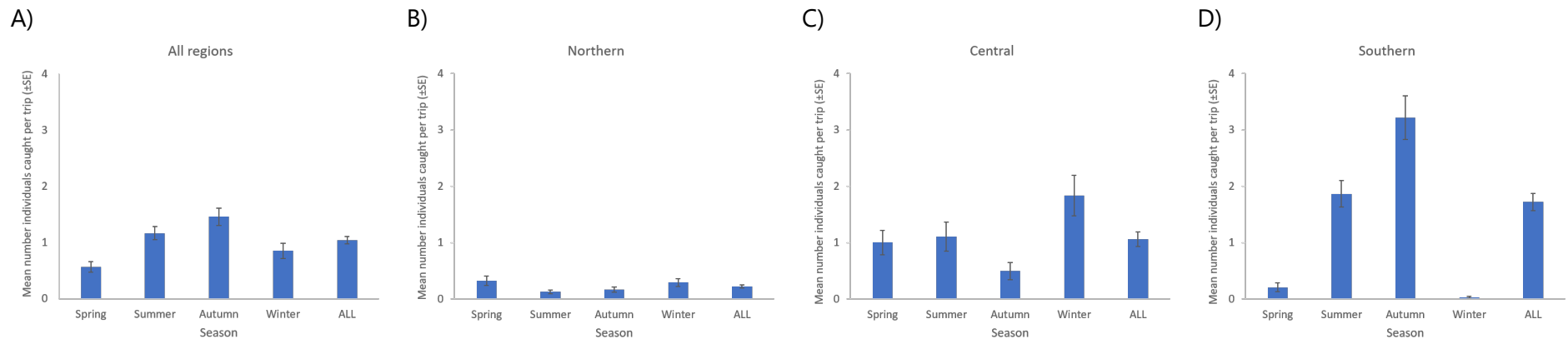


Figure 10. Seasonal variation in the mean ( $\pm$  SE) number of individual Yellowtail Kingfish retained per fishing trip in the nearshore charter fishery in each of the MEMA management regions across the four seasons recorded by industry logbooks in 2017/18: A) all regions combined, B) Northern region, C) Central region and D) Southern region. Number of trips per season and region can be found in Table 4.



## 3.2 On-board Observer Monitoring

### 3.2.1 Effort and adherence to sampling design

Of the 202 observer days planned in the two-factor sampling matrix (Table 2), 172 nearshore charter trips (85%) were successfully observed in the Observer Region between October 2017 and September 2018 (Table 5). Observer trips were taken with 35 individual charter operators working out of 13 ports between Swansea (33°05'S, 151°40'E) and Narooma (36°14'S, 150°09'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).

Table 5. Actual observed trips carried out across the four one-degree-latitude Fisher Reporting Zones (FRZs – Figure 1) and four seasons during 2017/18. Planned trips to be observed by FRZ and season are given in parentheses.

Fisher Reporting Zone	Spring	Summer	Autumn	Winter	Total
FRZ 6	9 (15)	14 (17)	21 (13)	15 (10)	59 (55)
FRZ 7	12 (19)	31 (23)	19 (15)	17 (13)	79 (70)
FRZ 8	1 (8)	4 (9)	1 (7)	3 (6)	9 (30)
FRZ 9	0 (13)	11 (15)	12 (11)	2 (8)	25 (47)
<b>Total</b>	<b>22 (55)</b>	<b>60 (64)</b>	<b>53 (46)</b>	<b>37 (37)</b>	<b>172 (202)</b>

Within the Observer Region, more than 100% of the planned observer trips were carried out in FRZs 6 and 7 (107 and 113%, respectively, Table 5), however a smaller proportion of planned trips in FRZs 8 and 9 were observed (30 and 53%, respectively). The number of charter trips observed in summer (94%), autumn (115%) and winter (100%) were close to, or in excess, of those trips originally planned, however only 40% of planned trips were able to be observed in spring (Table 5).

The number of charter clients present on observer trips in the Observer Region ranged between 2 and 14 with an average of  $7.6 \pm 0.2$  clients per trip. The highest average number of clients per observed trip occurred in FRZs 6 and 7 ( $8.0 \pm 0.3$  clients per trip in each FRZ) with fewer in FRZs 8 and 9 ( $4.6 \pm 0.6$  and  $6.2 \pm 0.4$  clients per trip, respectively; Figure 11). Overall, the mean number of clients per observer trip was slightly higher in spring ( $8.4 \pm 0.6$  clients per trip) than in summer, autumn and winter ( $7.4 \pm 0.3$ ,  $7.7 \pm 0.4$  and  $7.4 \pm 0.5$  clients per trip, respectively; Figure 11A). However, this seasonal pattern was not consistent across regions (Figures 11B-E).

The number of hours fished on observed trips in the Observer Region ranged between 0.25 (curtailed due to poor weather) and 8.5 hours with an average of  $5.2 \pm 0.1$  hours fished per trip (Figure 12). The highest number of hours fished per trip occurred in FRZ 7 ( $5.5 \pm 0.2$ ) and the lowest in FRZ 8 ( $4.4 \pm 0.2$ ) with  $5.0 \pm 0.2$  and  $4.8 \pm 0.2$  hours fished per trip in FRZs 6 and 9, respectively (Figure 12). Overall, the mean number of hours fished per trip was slightly higher in the spring ( $5.6 \pm 0.2$ ) than in summer ( $5.1 \pm 0.2$ ), autumn ( $5.1 \pm 0.2$ ) or winter ( $5.0 \pm 0.2$  hours per trip; Figure 12). This seasonal pattern was also inconsistent among regions (Figures 12B-E).

Figure 11. Seasonal variation in the mean ( $\pm$  SE) number of clients per trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips per season and region can be found in Table 7.

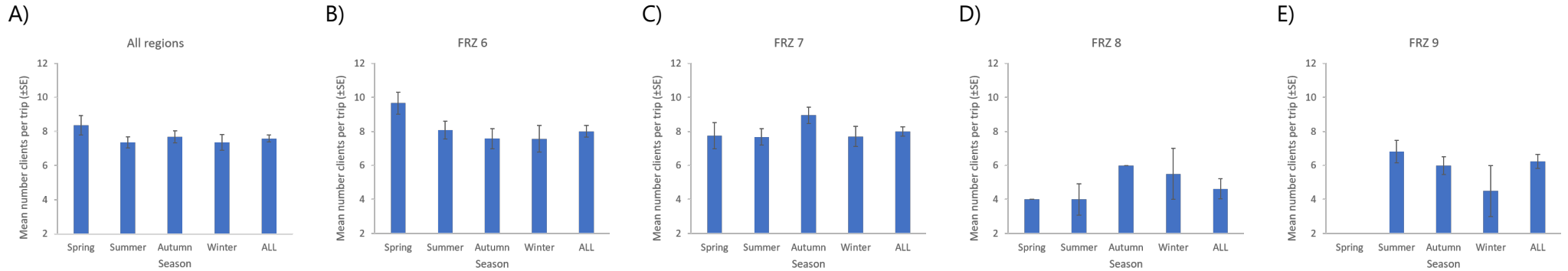
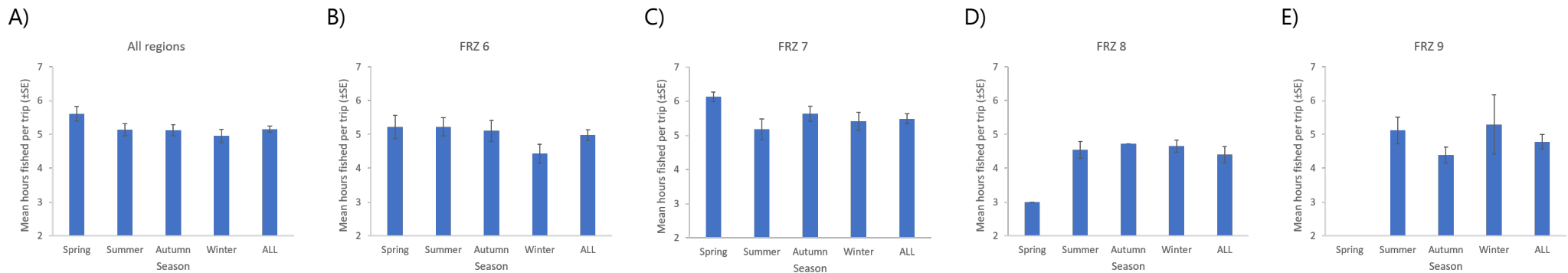


Figure 12. Seasonal variation in the mean ( $\pm$  SE) number of hours fished per trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips per season and region can be found in Table 7.



### 3.2.2 Proportion of reported charter trips observed

Overall, observed trips accounted for 6.3% of the total number of nearshore charter trips reported to have been undertaken in the Observer Region between October 2017 and September 2018 from information recorded in industry logbooks (Table 6). Observer coverage was lowest in spring (4.8% of trips), and highest in winter when 8.9% of charter trips had an observer on-board. Even though the most observed trips occurred in summer (60), the proportion observed was only 5.5% of the total trips taken (1,099). Fifty-three trips were observed in autumn at a rate of 6.8% of reported trips. The highest proportion (10.6%) of charter trips observed occurred in FRZ 7, with a smaller proportion observed in FRZs 6, 8 and 9 (6.1, 2.4 & 3.7%, respectively; Table 6).

Table 6. Percentage of reported nearshore charter trips observed across the four one-degree-latitude Fisher Reporting Zones (FRZs – Figure 1) between October 2017 and September 2018. Total trips reported by the nearshore charter fishery were derived from information recorded in industry logbooks (see 2.1). The number of observed trips by region and season is given in Table 5.

Season FRZ	Spring		Summer		Autumn		Winter		Total	
	No. trips	Observed (%)	No. trips	Observed (%)	No. trips	Observed (%)	No. trips	Observed (%)	No. trips	Observed (%)
FRZ 6	158	5.70	356	3.93	279	7.53	178	8.43	971	6.08
FRZ 7	161	7.45	249	12.45	196	9.69	139	12.23	745	10.60
FRZ 8	45	2.22	177	2.26	103	0.97	45	6.67	370	2.43
FRZ 9	100	-	317	3.47	204	5.88	56	3.57	677	3.69
<b>Total</b>	<b>464</b>	<b>4.74</b>	<b>1,099</b>	<b>5.46</b>	<b>782</b>	<b>6.78</b>	<b>418</b>	<b>8.85</b>	<b>2,763</b>	<b>6.23</b>

### 3.2.3 Catch – total, kept and released

#### 3.2.3.1 Overall

On-board observers recorded the capture of 12,091 individual organisms of 105 different species in the Observer Region (Table 7, Appendices 3 & 4). Just 24 species comprised 95% of the total observed catch; the other 81 species caught contributing the remaining 5% (Table 7, Appendices 3 & 4). The species observed caught in the greatest numbers in the sampling region were Bluespotted Flathead (1,537 individuals), Blue Mackerel (1,199), Snapper (1,153), Longspine Flathead (*Platycephalus grandispinis*; 861) and Yellowtail Scad (858); these five species making up approximately 46% of the total observed catch.

Of the organisms caught, most (65.9%) were kept (7,966 individuals consisting of 75 species; Table 7, Appendices 3 & 4). Just 22 species comprised 95% of the total kept catch; the other 53 species caught contributing the remaining 5% (Table 7, Appendices 3 & 4). The species observed to be kept in the greatest numbers were Bluespotted Flathead (1,273 individuals), Blue Mackerel (1,038), Yellowtail Scad (770), Grey Morwong (767) and Snapper (546); these five species making up approximately 55% of the kept catch.

The remaining 34.1% (4,125 individuals comprising 73 species) were subsequently released. Just 16 species comprised 95% of the total released catch; the other 57 species caught contributing

the remaining 5% (Table 7, Appendices 3 & 4). The species observed to be released in the greatest numbers were Longspine Flathead (845 individuals), Snapper (607), Sergeant Baker (422), Bluespotted Flathead (264) and Yellowtail Kingfish (546); these five species making up approximately 57% of the released catch.

### 3.2.3.2 Spatial variation

Observed total catch varied between the reporting regions with highest number of individuals recorded in FRZ 7 (6,637 individuals) consisting of 79 different species (Table 7, Appendix 3). The lowest number of individuals (305) and species (28) were recorded in FRZ 8. The number of individuals recorded in FRZs 6 and 9 were similar (2,761 and 2,388, respectively); comprised of 71 species in FRZ 6 but only 40 species in FRZ 9 (Table 7, Appendix 3).

The observed kept catch varied similarly between the reporting regions with highest number of individuals kept recorded in FRZ 7 (4,444 individuals) consisting of 60 different species (Table 7, Appendix 3). The lowest number of individuals (131) and species (17) kept were recorded in FRZ 8. The number of individuals kept recorded in FRZs 6 and 9 were similar (1,839 and 1,552, respectively); comprised of 53 species in FRZ 6 but only 27 species in FRZ 9 (Table 7, Appendix 3).

The observed released catch also varied between the reporting regions with highest number of released individuals recorded in FRZ 7 (2,193 individuals) consisting of 58 different species (Table 7, Appendix 3). The lowest number of released individuals (174) and species (24) were recorded in FRZ 8. The number of released individuals recorded in FRZs 6 and 9 were again similar (922 and 836, respectively); comprised of 49 species in FRZ 6 but only 31 species in FRZ 9 (Table 7, Appendix 3).

Very few species were shown to make a relatively consistent contribution to catches recorded across all regions. For example, Snapper made a high contribution to the catch in FRZ 7 (10.9%) where it was the most abundant species observed, but was also observed to make a high contribution to the catches of the other three regions (mean 8.8%, range 7.6-11.1%; Table 7, Appendix 4). Other species which made a relatively consistent contribution to observed catches across all regions were Redfish, Southern Maori Wrasse, Eastern Red Scorpionfish (*Scorpaena cardinalis*) and Eastern Blackspot Pigfish (*Bodianus unimaculatus*; Table 7, Appendix 3).

However, for most species there was considerable spatial variation in their contribution to observed catches between regions. Despite Bluespotted Flathead contributing most to the overall observed catch (12.7%), its contribution was just 7.5% in FRZ 8 but an average of 18.0% across the other three regions (Table 7, Appendix 3). Similarly, Blue Mackerel made a high contribution to the observed catches taken from FRZs 7 and 9 (10.9 & 16.1%, respectively), but a much smaller contribution to catches from FRZs 6 and 8 (2.8 & 4.6%, respectively; Table 7, Appendix 3). Yellowtail Scad also contributed 20.3% of the observed catch in FRZ 9, with an average of just 3.8% across the rest of the observed regions. Yellowtail Kingfish made a high contribution to the observed catch in FRZ 9 (12.1%), however contributed only 0.9% across the other three regions. Southern Bluespotted Flathead (*Platycephalus speculator*) were the second-most abundant species recorded in FRZ 9 contributing 12.8% to the observed catch, but were not recorded in any other region (Table 7, Appendix 3).

Table 7. Top ten species caught, % of catch released and number of trips taken in each Fisher Reporting Zone (FRZ – Figure 1) recorded by on-board observers between October 2017 and September 2018. The catch of all species recorded by observers can be found in Appendix 2.

<b>FRZ 6</b>										
<b>Season</b>	<b>Spring</b>		<b>Summer</b>		<b>Autumn</b>		<b>Winter</b>		<b>Overall</b>	
<i>No. trips observed</i>	9		14		21		15		59	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Bluespotted Flathead	62	14.5	80	16.3	276	6.2	101	5.0	519	8.5
Longspine Flathead	31	90.3	54	100.0	173	92.5	74	100.0	332	95.2
Yellowtail Scad	25	4.0	123	0.0	36	5.6	45	0.0	229	1.3
Snapper	33	60.6	65	78.5	66	63.6	46	37.0	210	61.9
Sergeant Baker	24	58.3	68	91.2	43	44.2	35	48.6	170	65.9
Ocean Jacket			7	0.0	136	5.9	23	4.3	166	5.4
Grey Morwong	50	4.0	43	2.3	32	0.0	33	0.0	158	1.9
Redfish	53	43.4	33	33.3	34	26.5	29	13.8	149	31.5
Blue Mackerel			65	0.0	6	0.0	7	0.0	78	0.0
Yellowtail Kingfish	6	100.0	32	28.1	2	0.0	28	0.0	68	22.1
...										
<b>Total</b>	<b>412</b>	<b>39.6</b>	<b>685</b>	<b>35.5</b>	<b>1044</b>	<b>33.1</b>	<b>620</b>	<b>27.4</b>	<b>2761</b>	<b>33.4</b>

<b>FRZ 7</b>										
<b>Season</b>	<b>Spring</b>		<b>Summer</b>		<b>Autumn</b>		<b>Winter</b>		<b>Overall</b>	
<i>No. trips observed</i>	12		31		19		17		79	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Snapper	121	47.1	236	64.8	168	56.5	200	55.5	725	57.4
Blue Mackerel	193	18.7	355	19.2	119	5.0	56	0.0	723	15.2
Grey Morwong	128	3.9	146	0.7	138	4.3	173	5.2	585	3.6
Bluespotted Flathead	143	7.0	101	16.8	141	10.6	115	20.9	500	13.2
Sergeant Baker	73	49.3	230	58.7	85	38.8	105	56.2	493	53.3
Redfish	187	36.9	151	13.2	74	16.2	65	33.8	477	25.8
Silver Sweep	52	15.4	177	13.0	162	61.1	75	8.0	466	29.2
Longspine Flathead	106	100.0	106	100.0	89	100.0	93	100.0	394	100.0
Reef Ocean Perch	68	79.4	145	7.6	112	10.7	48	62.5	373	28.7
Southern Maori Wrasse	23	30.4	116	9.5	91	7.7	82	3.7	312	9.0
...										
<b>Total</b>	<b>1353</b>	<b>35.6</b>	<b>2348</b>	<b>32.1</b>	<b>1666</b>	<b>30.4</b>	<b>1270</b>	<b>35.5</b>	<b>6637</b>	<b>33.0</b>



Table 7 continued

<b>FRZ 8</b>										
<b>Season</b>	<b>Spring</b>		<b>Summer</b>		<b>Autumn</b>		<b>Winter</b>		<b>Overall</b>	
<i>No. trips observed</i>	1		4		1		3		9	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Bluespotted Flathead			32	53.1	14	35.7	2	50.0	48	47.9
Southern Bluespotted Flathead	12	16.7	27	70.4					39	53.8
Longspine Flathead			16	100.0	21	100.0	1	100.0	38	100.0
Sergeant Baker	1	0.0	13	92.3	12	75.0	8	75.0	34	79.4
Snapper			19	57.9	5	20.0	10	0.0	34	35.3
Southern Maori Wrasse			7	85.7	9	44.4	1	0.0	17	58.8
Redfish	3	0.0	4	75.0			9	33.3	16	37.5
Blue Mackerel			14	35.7					14	35.7
Grey Morwong			4	0.0			8	0.0	12	0.0
Tiger Flathead	2	0.0	3	100.0					5	60.0
...										
<b>Total</b>	<b>20</b>	<b>20.0</b>	<b>157</b>	<b>63.7</b>	<b>74</b>	<b>67.6</b>	<b>54</b>	<b>37.0</b>	<b>305</b>	<b>57.0</b>

<b>FRZ 9</b>										
<b>Season</b>	<b>Spring</b>		<b>Summer</b>		<b>Autumn</b>		<b>Winter</b>		<b>Overall</b>	
<i>No. trips observed</i>	0		11		12		2		25	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Yellowtail Scad			171	0.0	312	12.2	2	0.0	485	7.8
Bluespotted Flathead			222	35.6	218	22.9	30	6.7	470	27.9
Blue Mackerel			289	0.0	54	85.2	41	0.0	384	12.0
Yellowtail Kingfish			191	72.8	90	51.1	8	87.5	289	66.4
Snapper			83	28.9	76	32.9	25	0.0	184	26.6
Longspine Flathead			42	100.0	39	100.0	16	100.0	97	100.0
Eastern Red Scorpionfish			35	80.0	47	89.4	5	100.0	87	86.2
Redfish			32	12.5	4	0.0	6	16.7	42	11.9
Silver Sweep			18	100.0	19	100.0	4	100.0	41	100.0
Southern Maori Wrasse			23	26.1	16	56.3	1	0.0	40	37.5
...										
<b>Total</b>			<b>1201</b>	<b>33.1</b>	<b>1027</b>	<b>38.7</b>	<b>160</b>	<b>26.3</b>	<b>2388</b>	<b>35.0</b>
<i>Total no. trips observed</i>	22		60		53		37		172	
<b>Grand Total</b>	<b>1785</b>	<b>36.4</b>	<b>4391</b>	<b>34.0</b>	<b>3811</b>	<b>34.1</b>	<b>2104</b>	<b>32.5</b>	<b>12091</b>	<b>34.1</b>

### 3.2.3.3 Temporal variation

Considerable temporal variation in the observed catch was also evident with the highest number of individuals recorded in summer (2,898 individuals) and autumn (2,511) with lower catches observed in winter (1,421) and spring (1,136; Table 7, Appendix 4). The species diversity of observed kept catches was also highest in summer (64 species) and autumn (67 species) with fewer species recorded in winter and spring (53 & 58 species, respectively; Table 7, Appendix 4).

Temporal variation in the observed kept catch similarly occurred with the highest number of individuals kept recorded in summer (4,186 individuals) and autumn (3,811) with lower catches observed in winter (2,104) and spring (1,990; Table 7, Appendix 4). The species diversity of observed kept catches was highest in autumn (54 species) with fewer species recorded in summer, winter and spring (48, 42 & 45 species, respectively; Table 7, Appendix 4).

The observed released catch also showed temporal variation with the highest number of individuals recorded in summer (1,493 individuals) and autumn (1,300) with lower catches observed in winter (683) and spring (649; Table 7, Appendix 4). The species diversity of observed released catches was also highest in summer (49 species) and autumn (45 species) with fewer species recorded in winter and spring (42 & 41 species, respectively; Table 7, Appendix 4).

Several species were observed to make a consistently high contribution to observed catches recorded across all seasons (Table 7, Appendix 4). Bluespotted Flathead dominated the observed catch recorded year-round (12.7% overall) and were one of the two most abundant species recorded in all four seasons (Table 7, Appendix 4). Snapper was the most abundant species observed in catches in winter contributing 13.4% to the observed catch, but also made a high contribution to the observed catches in the other three seasons (mean 8.7%). Grey Morwong also made a consistently high contribution (6.6%) to observed catches throughout the year. Other species which made a consistently high contribution to observed catches across all four seasons were Longspine Flathead, Sergeant Baker, Silver Sweep, Reef Ocean Perch (*Helicolenus percoides*) and Southern Maori Wrasse (Table 7, Appendix 4).

For other species however, there was considerable temporal variation in their contribution to observed catches between seasons (Table 7, Appendix 4). Blue Mackerel made a much larger contribution to observed catches in autumn (16.5%) in comparison with the rest of the year (mean 6.8%; Table 7, Appendix 4). Similarly, Yellowtail Scad made a higher contribution to observed catches in summer and autumn (8.4 & 10.7%, respectively), but contributed much less in winter and spring (3.8 & 1.7%, respectively). Redfish was the most abundant species recorded in spring contributing 13.6% to the observed catch, but contributed an average of only 4.4% through the rest of the year. Yellowtail Kingfish contributed 5.2% to the observed catch in summer, but contributed an average of only 1.2% through the rest of the year (Table 7, Appendix 4).

## 3.2.4 Catch rates – total, kept and released

### 3.2.4.1 Individuals per trip

In the 172 fishing trips observed in the Observer Region, an average of  $71.5 \pm 3.6$  individuals was caught per trip between October 2017 and September 2018 (Figure 13A). Of this, an average of  $47.1 \pm 2.6$  individuals per trip were kept and  $24.4 \pm 1.8$  individuals per trip were subsequently released.

Overall, the mean number of individuals caught per trip were higher in FRZs 7 and 9 ( $86.2 \pm 5.5$  and  $95.5 \pm 8.9$  individuals per trip, respectively) than in FRZs 6 and 8 ( $46.8 \pm 4.2$  and  $38.1 \pm 10.4$  individuals per trip, respectively; Figures 13B-E). Catch rate was also strongly influenced by season with the mean number of individuals caught per trip higher in spring ( $71.4 \pm 9.7$ ), summer ( $78.4 \pm 6.5$ ) and autumn ( $73.3 \pm 7.0$ ) than in winter ( $58.4 \pm 5.8$ ; Figure 13A) with the catch rate for kept and released individuals following the same pattern. This temporal pattern of lowest catch per trip occurring in winter was consistent across all regions (Figures 13B-E).

#### 3.2.4.2 Species per trip

In the Observer Region, mean species diversity of the total catch per nearshore charter trip was  $11.7 \pm 0.3$  species per trip (Figure 14). Of this, an average of  $8.0 \pm 0.3$  species per trip were kept and  $6.3 \pm 0.3$  species per trip were released. This pattern of higher mean number of species kept than released per trip was consistent across all seasons and regions observed, except for FRZs 8 and 9 where similar number of species were kept and released per trip (Figures 14B-E).

Overall, the mean number of species caught per trip were higher in FRZs 7 and 9 ( $13.8 \pm 0.4$  &  $11.9 \pm 0.7$  species per trip, respectively) than in FRZs 6 and 8 ( $9.3 \pm 0.5$  &  $8.5 \pm 1.3$  species per trip, respectively; Figures 14B-E). Average number of species kept and released per trip were consistent with this pattern across all regions (Figures 14B-E).

There was very little temporal variation in the average number of species caught per trip with total species per trip slightly higher in spring ( $12.8 \pm 0.7$  species per trip) than in summer, autumn and winter overall ( $11.8 \pm 0.5$ ,  $11.0 \pm 0.9$  &  $11.7 \pm 0.9$  species per trip, respectively; Figure 14A). This pattern was not consistent for all regions (Figures 14B-E).

#### 3.2.4.3 Key species

The catch rates for key species (Bluespotted Flathead, Snapper, Grey Morwong and Yellowtail Kingfish) on observed trips between October 2017 and September 2018 were also calculated (Figures 15-18). The overall mean catch rate for Bluespotted Flathead was  $8.9 \pm 1.1$  fish per trip, of which  $7.4 \pm 0.9$  individuals per trip were kept with very few fish per trip released ( $1.5 \pm 0.4$ ; Figure 13A). This pattern was consistent across regions and seasons (Figure 15). On average, more Bluespotted Flathead were caught per trip in autumn ( $12.3 \pm 2.2$ ) than in spring, summer or winter ( $9.3 \pm 3.5$ ,  $7.3 \pm 1.8$  &  $6.7 \pm 1.6$  fish per trip, respectively; Figure 15). Overall catch rates for Bluespotted Flathead were greater in FRZ 9 ( $18.8 \pm 4.1$  fish per trip) than in the other three regions ( $8.9 \pm 1.7$ ,  $6.7 \pm 7.3$  &  $6.0 \pm 3.9$  fish per trip in FRZs 6, 7 & 8, respectively; Figures 15B-E).

Figure 13. Mean ( $\pm$ SE) number of individuals discarded and retained per fishing trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips observed per season and FRZ can be found in Table 7.

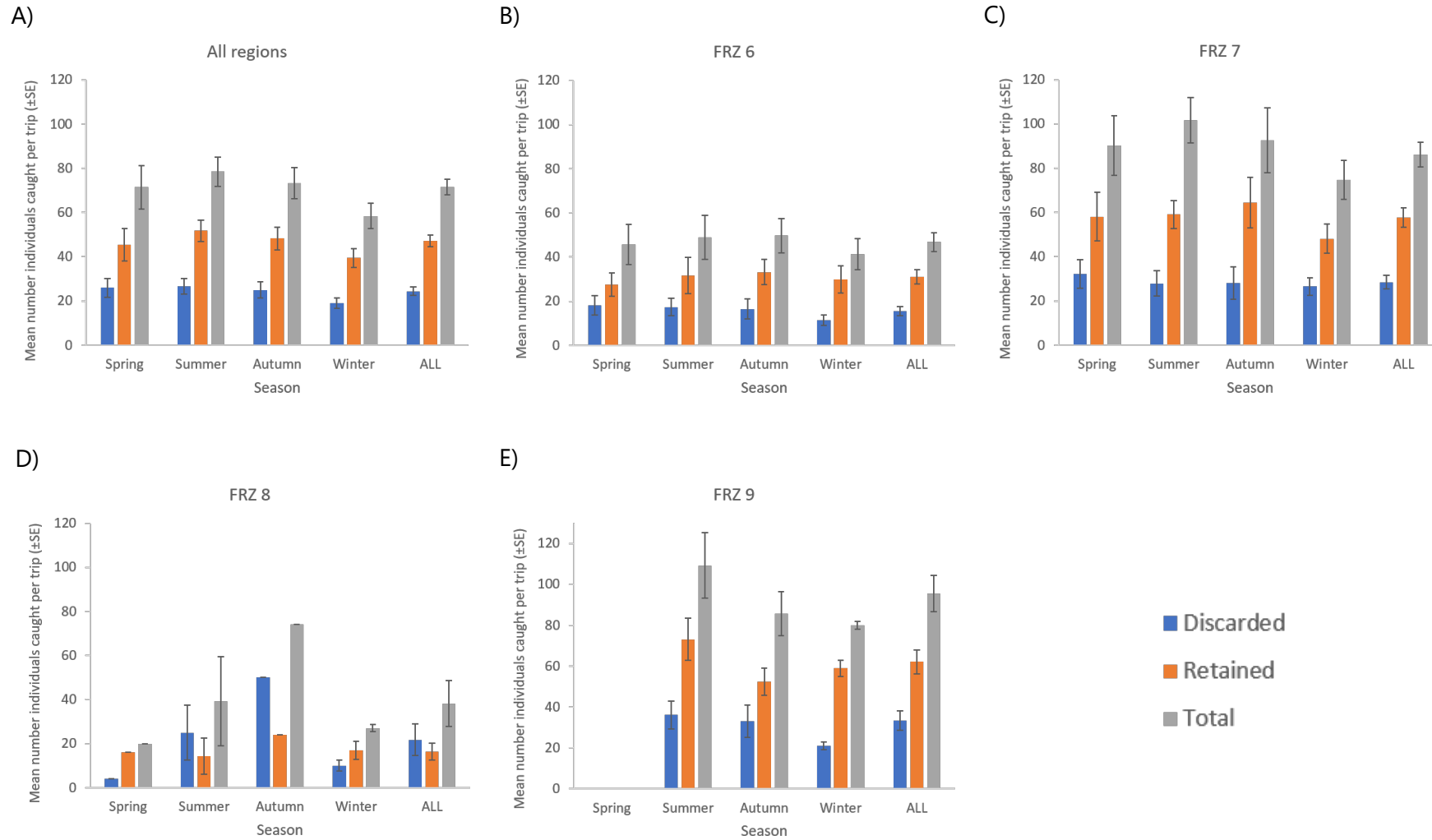


Figure 14. Mean ( $\pm$ SE) number of species discarded and retained per fishing trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips observed per season and FRZ can be found in Table 7.

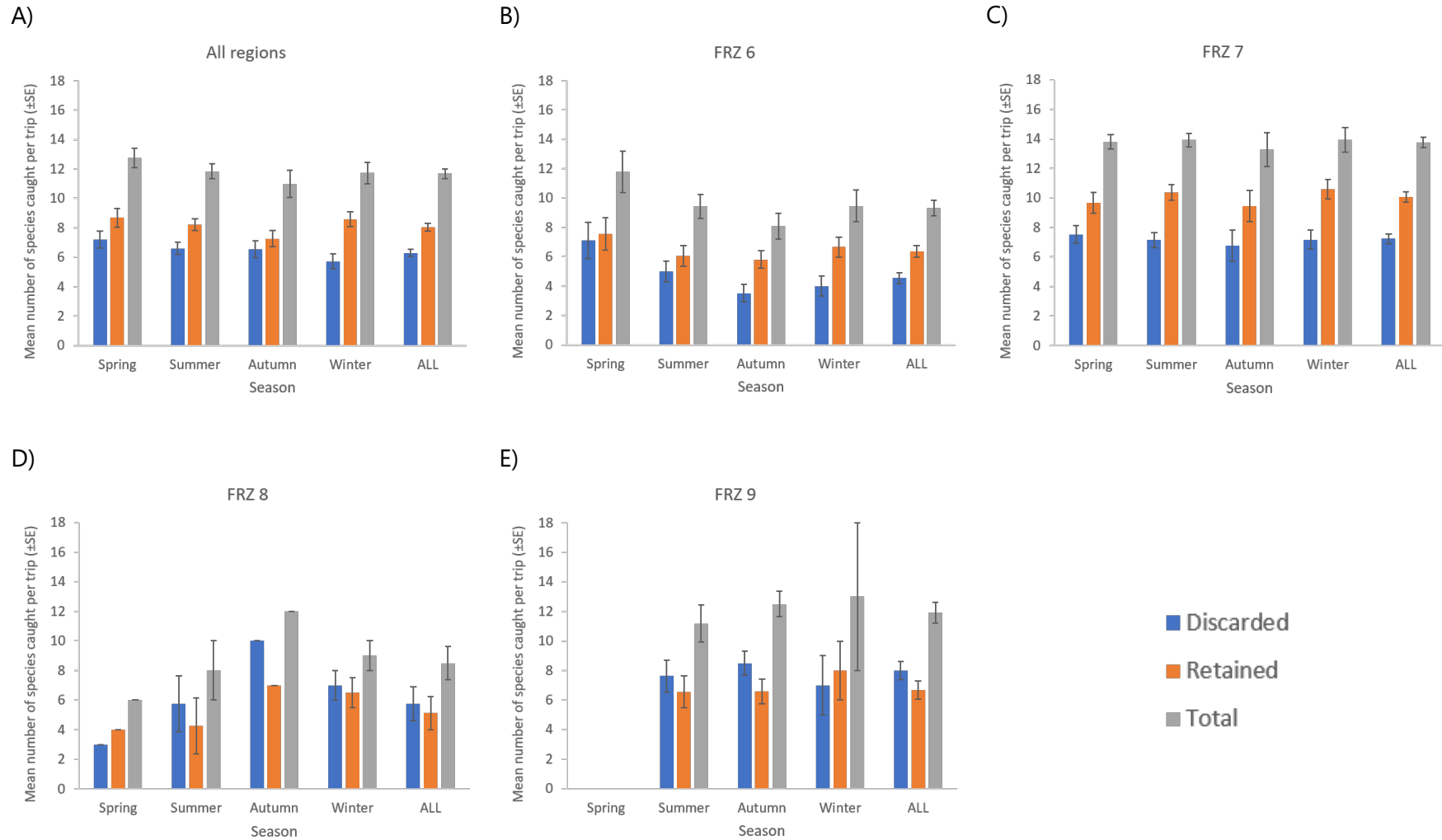


Figure 15. Mean ( $\pm$ SE) number of Bluespotted Flathead discarded and retained per fishing trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips observed per season and FRZ can be found in Table 7.

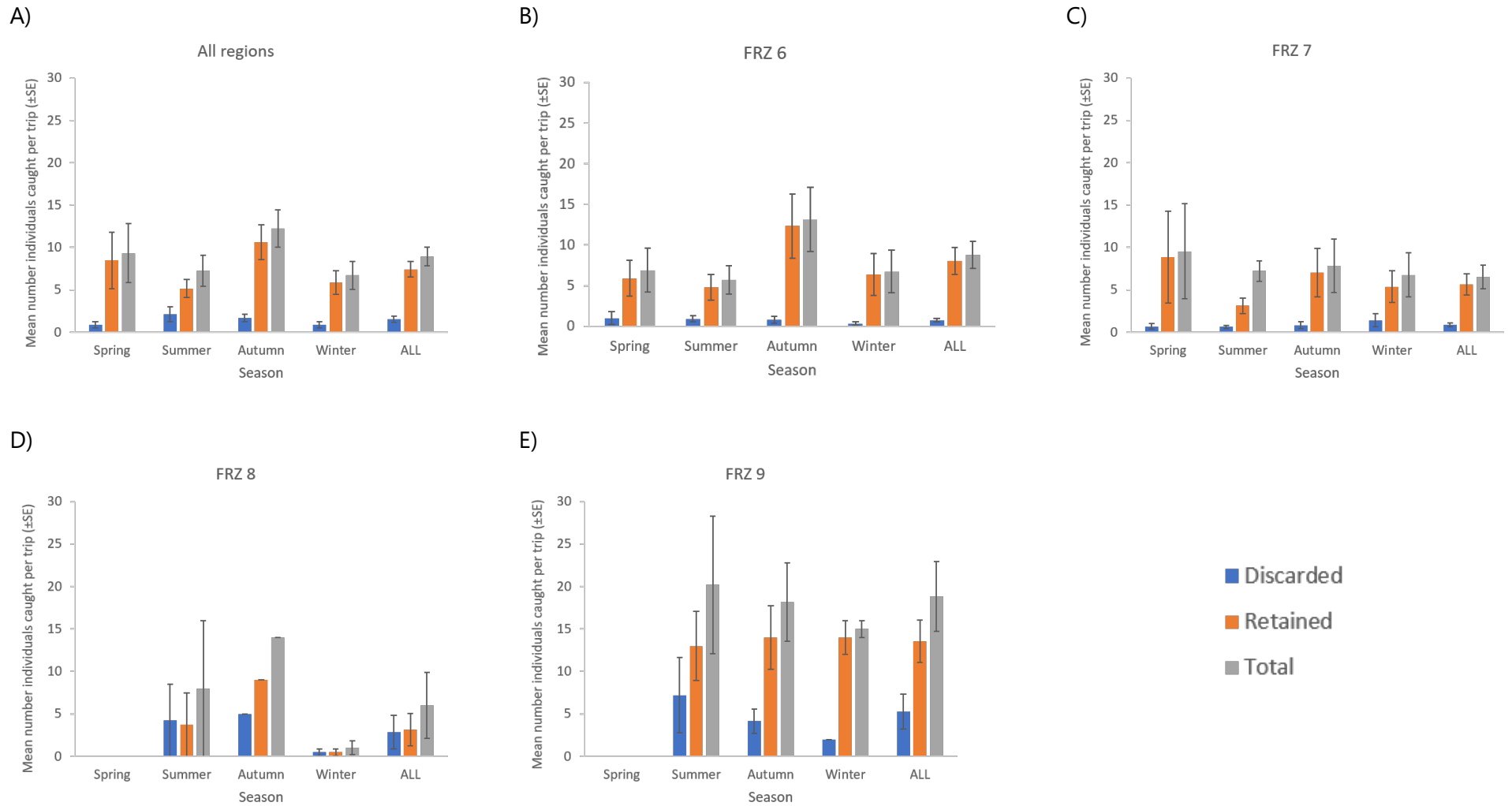
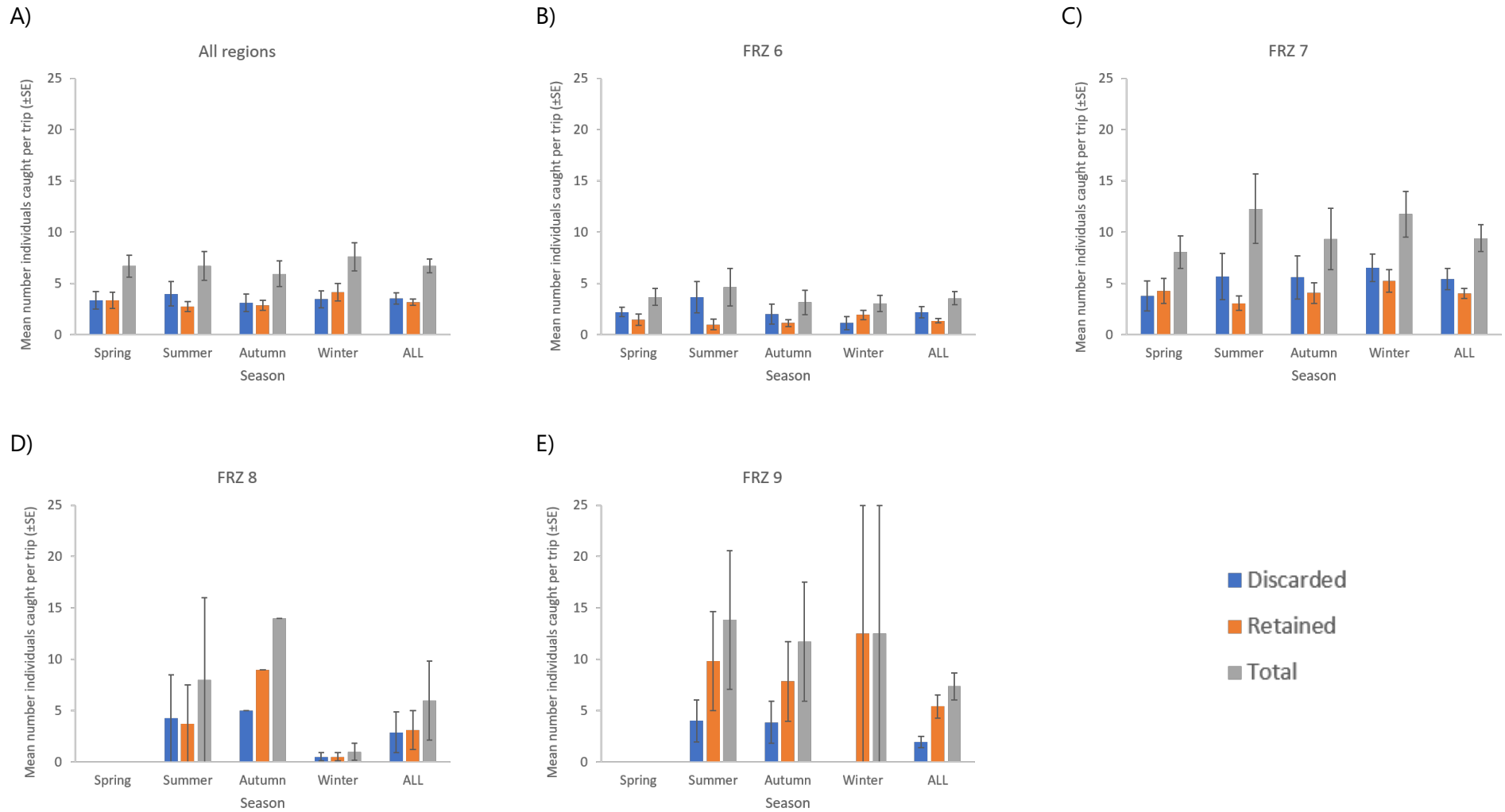


Figure 16. Mean ( $\pm$ SE) number of Snapper discarded and retained per fishing trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips observed per season and FRZ can be found in Table 7.



An overall average of  $6.7 \pm 0.7$  Snapper were caught per observed trip with similar numbers of fish kept ( $3.2 \pm 0.3$ ) and released ( $3.6 \pm 0.5$ ) per trip; a pattern that was consistent between seasons (Figure 16). However, among regions the catch rate for released fish compared with kept fish was highly variable (Figures 16B-E). There was also considerable variation in catch rates between regions with the number of total Snapper caught per trip in FRZ 7 ( $9.4 \pm 1.3$ ) higher than that for FRZs 6, 8 and 9 ( $3.6 \pm 0.6$ ,  $4.3 \pm 1.9$ ,  $7.4 \pm 1.3$  fish per trip, respectively; Figures 16B-E).

The overall mean catch rate for Grey Morwong was  $4.6 \pm 0.5$  fish per trip, of which almost all ( $4.5 \pm 0.5$ ) individuals per trip were kept with very few fish released – just 28 individuals across all observed trips – at a rate of  $0.2 \pm 0.0$  fish per trip (Figure 17A). This pattern was consistent across all regions and seasons (Figure 17). Highest Grey Morwong catches per trip occurred in spring ( $7.7 \pm 1.4$ ) and winter ( $5.9 \pm 1.4$ ) with fewer caught per trip in summer and autumn ( $3.4 \pm 0.6$  &  $3.7 \pm 0.7$  per trip, respectively; Figure 17A). These overall patterns were driven by the large catch rates (and catches – see 3.2.3 above) recorded in FRZ 7 ( $8.0 \pm 0.9$  fish per trip) compared with much lower catch rates in FRZs 6, 8 & 9 ( $2.7 \pm 0.5$ ,  $1.5 \pm 0.7$  &  $1.6 \pm 0.3$  fish per trip, respectively; Figures 17B-E).

An average of  $2.1 \pm 0.5$  Yellowtail Kingfish were caught per trip between October 2017 and September 2018 (Figure 18A). Overall slightly more individuals were released per trip ( $1.3 \pm 0.3$ ) than were kept ( $0.9 \pm 0.3$  fish per trip; Figure 18A), however this pattern was highly variable across seasons and regions (Figures 18A-E). Total catch rates were highest in summer and autumn ( $3.8 \pm 1.3$  and  $1.8 \pm 0.8$  fish per trip, respectively), but lower in winter and spring ( $1.0 \pm 0.6$  and  $0.3 \pm 0.3$ ; Figure 18A). These overall patterns were driven by the large catch rates (and catches – see 3.2.3 above) recorded for Yellowtail Kingfish in FRZ 9 ( $11.6 \pm 2.6$  fish per trip) compared with much lower catch rates in FRZs 6, 8 & 9 (Figures 18B-E).

### 3.3 Discarding

#### 3.3.1 Overall

Overall, of the 12,091 individual organisms caught in the Observer Region between October 2017 and September 2018, 4,125 (34%) were subsequently released (Table 7, 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 (98%), Mado (*Atipichthys strigatus*; 92%), Halfbanded Seaperch (*Hypoplectrodes maccullochi*; 86%), Eastern Red Scorpionfish (68%), Yellowtail Kingfish (59%), Sergeant Baker (58%), Longfin Pike (*Dinolestes lewini*; 54%) and Snapper (53%) (Table 7, Appendices 3 & 4). In comparison, species with low release rates included Eastern Blackspot Pigfish (3%), Grey Morwong (4%), Ocean Jacket (9%), Yellowtail Scad (10%), Blue Mackerel (13%), Southern Maori Wrasse (15%) and Bluespotted Flathead (17%) (Table 7, Appendices 3 & 4).



Figure 17. Mean ( $\pm$ SE) number of Grey Morwong discarded and retained per fishing trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips observed per season and FRZ can be found in Table 7.

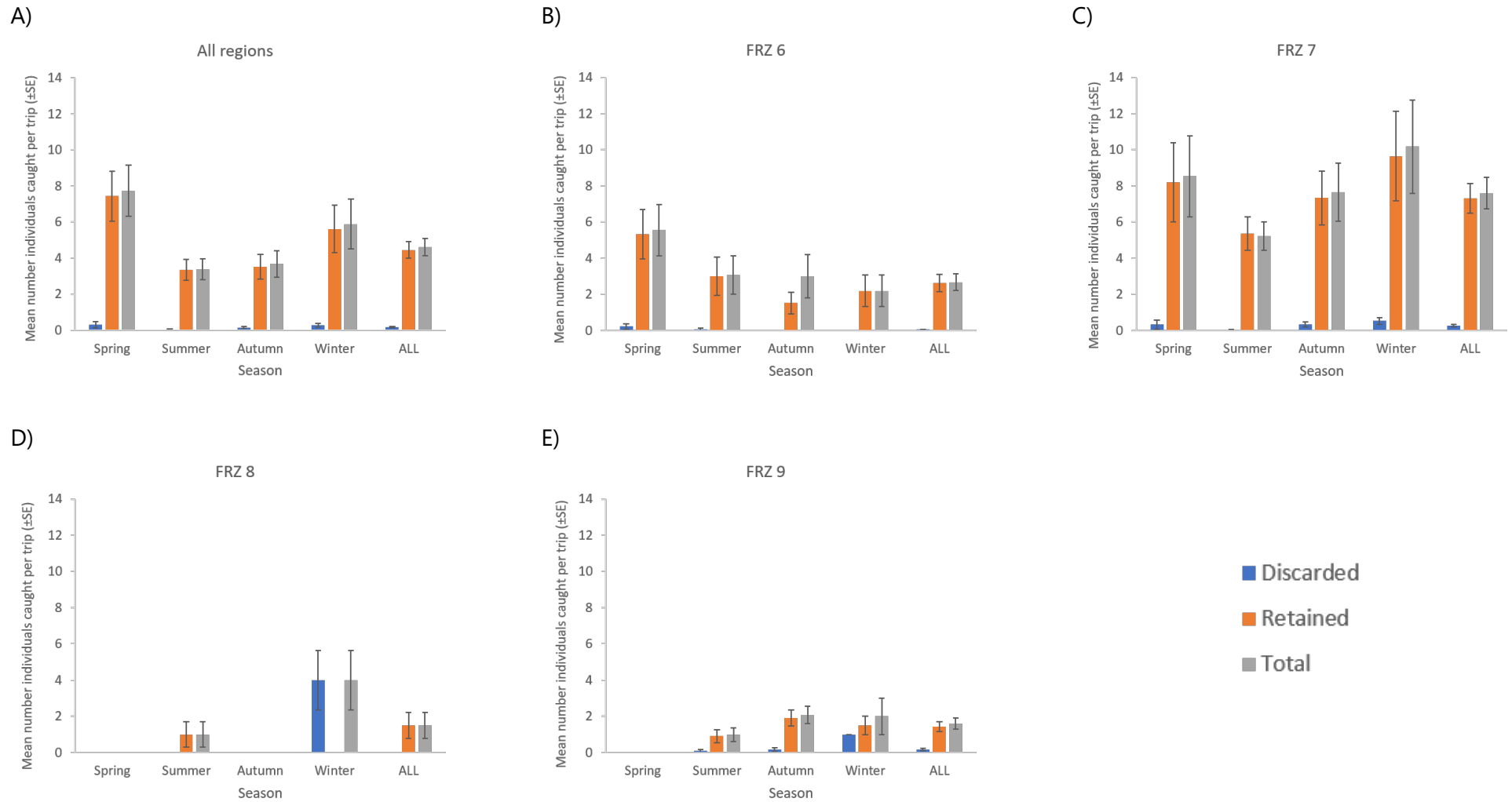
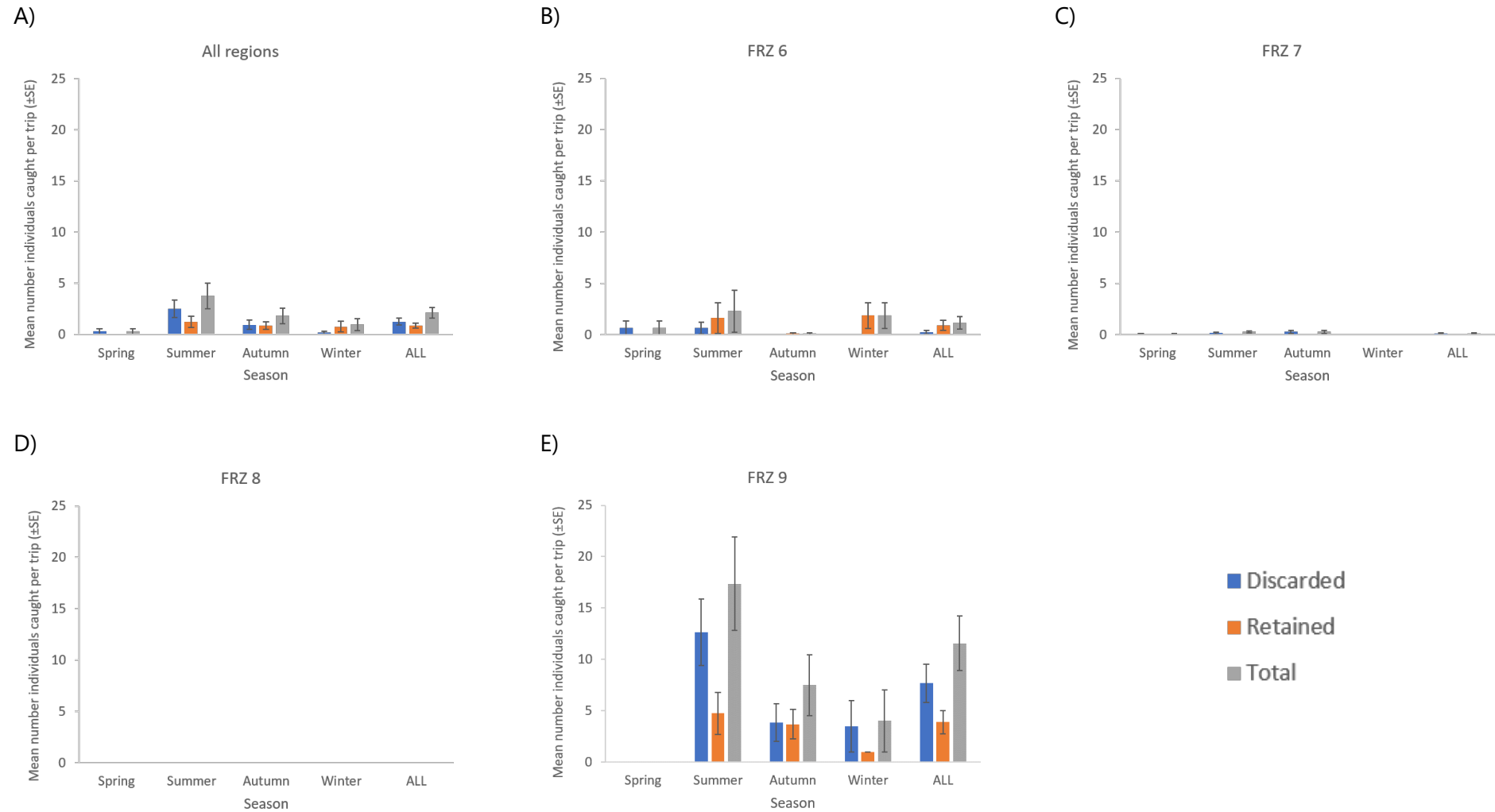


Figure 18. Mean ( $\pm$ SE) number of Yellowtail Kingfish discarded and retained per fishing trip in each of the four Fisher Reporting Zones (FRZs) across the four seasons observed between October 2017 and September 2018: A) all FRZs combined, B) FRZ 6, C) FRZ 7, D) FRZ 8 and E) FRZ 9. Number of trips observed per season and FRZ can be found in Table 7.



### 3.3.2 Spatial & temporal variation

The percentage of the recorded catch released after capture did not vary substantially with season with 36.4, 34.0, 34.1 and 32.5% released in spring, summer, autumn and winter, respectively (Table 7, Appendix 4). There was, however, some spatial variability in the proportion of the catch released by FRZ (Table 7, Appendix 3). In FRZs 6, 8 and 9, the percentage of the catch released was similar at 33.4, 33.0 and 35.0%, respectively, however in FRZ 8 more than half (57%) of the catch was subsequently released (Table 7, Appendix 3).

### 3.3.3 Key species

For the key species (Bluespotted Flathead, Snapper, Grey Morwong and Yellowtail Kingfish), the percentage of the catch released after capture varied both spatially and temporally (Table 7, Appendices 3 & 4). The percentage of the Bluespotted Flathead catch released was considerably higher in summer (29.0%) than over the rest of the year (spring 9.3%, autumn 13.4%, winter 12.9%; Table 7, Appendix 4). A much greater percentage of the Bluespotted Flathead catch was released in FRZs 8 and 9 (47.9% & 27.9%, respectively) compared with just 8.5% in FRZ 6 and 13.2% in FRZ 7 (Table 7, Appendix 3).

Approximately 50% of the Snapper catch was released after capture and this was relatively consistent across seasons ranging between 45.6% in winter to 59.3% in spring (Table 7, Appendix 4). In contrast, the percentage of Snapper released varied considerably by region with 61.9 and 57.4% of Snapper released in FRZs 6 and 7, but just 35.3 and 26.6% released in FRZs 8 and 9 (Table 7, Appendix 3).

The percentage of Grey Morwong released after capture was consistently low (<5%) across all seasons and most regions, the only exception being in FRZ 9 where 10% of Grey Morwong were released (Table 7, Appendices 3 & 4).

Approximately 60% of Yellowtail Kingfish were released after capture overall, with a greater percentage released in summer and autumn (67.0 & 52.6%, respectively) than in winter (19.4%; Table 7, Appendix 4). Only seven individuals were caught in spring. The percentage of Yellowtail Kingfish released also varied spatially with 22.1% released in FRZ 6 and 66.4% released in FRZ 9 (Table 7, Appendix 3). Only 10 individuals were caught in FRZ 7 and none in FRZ 8.

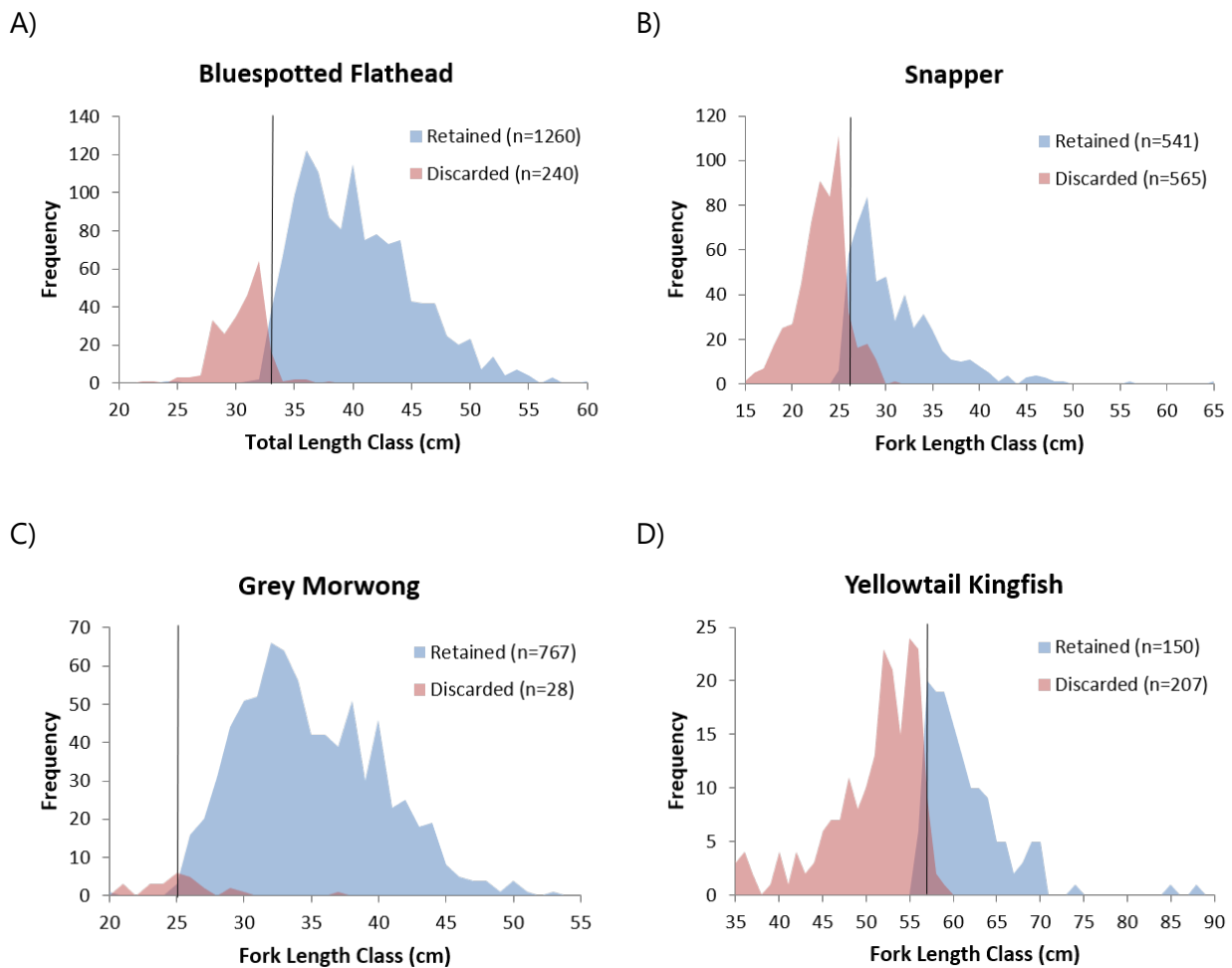
## 3.4 Length composition of observed catches

Overall, of the 12,091 individual organisms observed caught between October 2017 and September 2018 in the Observer Region, the lengths of 9,460 (78%) were measured by on-board observers prior to retention or release. High percentages of the four key species caught were measured with 99% of the 1,537 Bluespotted Flathead caught, 96% of 1,153 Snapper caught, 100% of 765 Grey Morwong caught and 99% of the 367 Yellowtail Kingfish caught (Appendix 5). Of the other species contributing 95% of the total observed catch (Appendix 5), the size composition of some were recorded in high percentages and large numbers (e.g. 69% of the 861 Longspine Flathead, 90% of the 722 Sergeant Baker, 98% of the 456 Ocean Jackets, 78% of the 570 Silver Sweep and 97% of the 684 Redfish). Due primarily to in situ use for bait, some species also caught in large numbers had a much smaller percentage of their catch measured. For example, only 37% of 1,199 Blue Mackerel and 11% of 858 Yellowtail Scad caught, were subsequently measured.

### 3.4.1 Key species

The length compositions of the retained and released components of the catch of key species is shown in Figure 19. The majority of the 240 Bluespotted Flathead released after capture (17% of total; see 3.2.5) were a result of the mandated minimum legal length (MLL) of 33 cm TL for the species. Consequently, the majority (75%) of the retained catch was within 10 cm of this length with just 3% larger than 50 cm TL (Figure 19A). The largest Bluespotted Flathead recorded was 60 cm TL.

**Figure 19. Length frequency distributions of the retained (blue) and discarded (red) catch for key species recorded by on-board observers between October 2017 and September 2018 in the Observer Region: A) Bluespotted Flathead, B) Snapper, C) Grey Morwong and D) Yellowtail Kingfish. n is sample size. Vertical black lines are the MLL.**



More than half (53%; see 3.2.5) of the Snapper caught were subsequently released, again primarily because of the MLL of 30 cm TL (~26 cm FL) for the species. As a result, almost the entire retained catch (95%) was between 26 and 40 cm FL. Less than 1% of the retained catch (24 individuals) was recorded to be larger than 40 cm FL – up to the largest Snapper caught of 65 cm FL (Figure 19B).

Very few Grey Morwong were released after capture (just 28 individuals, 4%; see 3.2.5), mostly those smaller than the MLL of 30 cm TL (~25 cm FL). A large proportion of the retained catch (63%) was within 10 cm of this length, but a considerable proportion of the retained catch (36%)

greater than this length was also recorded (Figure 19C). The largest Grey Morwong recorded was 53 cm FL.

More Yellowtail Kingfish were released after capture than were retained (59%; see 3.2.5) as a result of being smaller than the MLL for the species of 65 cm TL (~57 cm FL; Figure 19D). The smallest Yellowtail Kingfish recorded were just 35 cm FL and 37% of the released catch were <50 cm FL (Figure 19D). The majority (89%) of the retained catch were within 10 cm of the MLL with the remainder >67 cm FL. The largest Yellowtail Kingfish recorded was 88 cm FL.

### 3.4.2 Other species

The length composition of other species recorded by observers in sufficient numbers (n>250 individuals) are given in Appendix 6. These included Blue Mackerel, Longspine Flathead, Yellowtail Scad, Sergeant Baker, Redfish, Silver Sweep, Ocean Jacket, Reef Ocean Perch, Southern Maori Wrasse, Eastern Red Scorpionfish and Eastern Blackspot Pigfish.

## 3.5 Post-release condition of key species

Information on the reason for release ('undersize' or 'undesirable') and post-release condition of a total of 1,676 discarded individuals of 58 species was collected on the 172 observed trips undertaken between October 2017 and September 2018 in the Observer Region (Tables 7 & 8, Appendices 3 & 4). This consisted of all individuals of key species, including 592 Snapper, 211 Yellowtail Kingfish, 169 Bluespotted Flathead and 23 Grey Morwong. In addition to key species, other species where post-release information was recorded for sufficient numbers of individuals to be robust included Longspine Flathead (211), Sergeant Baker (80) and Redfish (66) (Table 8).

### 3.5.1 Reasons for release

Overall, most (74%) released individuals were discarded because they were smaller than mandated minimum legal lengths (MLLs), with the remainder (26%) discarded because the species or size was undesirable (Table 8). However, the reasons for release varied substantially by species with 100% of Snapper and Yellowtail Kingfish, and the majority of Bluespotted Flathead and Grey Morwong (99 and 96%, respectively), released because they were undersize. In contrast, 100% of released Sergeant Baker and most Redfish (96%) were discarded because they were undesirable.

Table 8. Proportions of individuals released due to being 'undersize' (<minimum legal length) or 'undesirable', post-release mortality descriptor scores, and overall post-capture survival (PCS) indices for selected species observed. *n* is sample size

Common name	<i>n</i>	Proportions of released individuals		Post-release mortality descriptor scores			Post-capture survival index
		<i>Undersize</i>	<i>Undesirable</i>	<i>Barotrauma</i>	<i>Wounds &amp; haemorrhaging</i>	<i>Skin damage &amp; bruising</i>	
Snapper	592	1.000	0.000	0.867	0.948	0.965	0.27
Yellowtail Kingfish	211	1.000	0.000	1.000	0.942	0.973	0.72
Longspine Flathead	211	0.877	0.123	0.976	0.957	0.979	0.71
Bluespotted Flathead	169	0.988	0.012	0.984	0.970	0.988	0.81
Sergeant Baker	80	0.000	1.000	1.000	0.946	0.966	0.71
Redfish	66	0.045	0.955	0.970	0.979	0.980	0.76
Grey Morwong	23	0.957	0.043	0.883	0.898	0.985	0.22
...							
<b>Total</b>	<b>1676</b>	<b>0.737</b>	<b>0.263</b>	<b>0.912</b>	<b>0.951</b>	<b>0.966</b>	<b>0.43</b>

### 3.5.2 Post-release condition

The overall post-capture survival (PCS) estimate for all individuals from all species assessed was 0.43 (Table 8). PCS varied from 0.81 for Bluespotted Flathead to 0.22 for Grey Morwong. PCS was estimated to be similarly high for Yellowtail Kingfish (0.72), Longspine Flathead (0.71), Sergeant Baker (0.71) and Redfish (0.76) but was considerably lower for Snapper (0.27). The 'barotrauma' index was the most variable descriptor of PCS, with scores ranging from 0.867 for Snapper and 0.883 for Grey Morwong, to 1.000 for Yellowtail Kingfish and Sergeant Baker (Table 8), reflecting the variable susceptibility of different species to decompression injuries. The 'barotrauma' index was also similarly high for Longspine Flathead (0.976), Bluespotted Flathead (0.984) and Redfish (0.970). All species had 'wounds and haemorrhaging' index scores of between 0.942 and 0.979 with the exception of Grey Morwong which had a score of 0.898, reflecting the higher proportion of Grey Morwong released with these injuries. 'Skin damage and bruising' was similar across species with an overall index score of 0.966.

## 3.6 Wildlife abundance and interactions

Of the 172 observer trips undertaken between October 2017 and September 2018 in the Observer Region, wildlife observations and records of interactions with charter fishing vessels were made on 135 trips (79%; Tables 9-11). Overall, a total of 482 observations were made from charter fishing vessels recording a total of 3,635 individuals consisting of 28 species (Tables 9 & 10, Appendix 7). The most commonly observed group were seabirds (3,183 individuals or 88% of the total; Table 9), followed by marine mammals (dolphins, whales, seals; 446 individuals or 11% of the total; Table 10), along with four sharks (one Grey Nurse *Carcharias taurus* and three Shortfin Mako *Isurus oxyrinchus*), one marine reptile (Green Turtle *Chelonia mydas*) and one teleost (Ocean Sunfish *Mola mola*) (Appendix 7). The number of fishing events per trip ranged from 2 to 6 with an average ( $\pm$  SE) of  $3.3 \pm 0.1$  events per trip and was similar across the four seasons observed (ANOVA;  $F_{3, 131}=0.99$ ,  $P=0.40$ ).

### 3.6.1 Seabirds

Eleven species of seabirds from seven families were positively identified, including Black-browed Albatross (*Thalassarche melanophrys*) and Shy Albatross (*T. cauta*) [Diomedidae], Great Skua (*Catharacta Skua*), Crested Tern (*Sterna bergii*) and Silver Gull (*Chroicocephalus novaehollandiae*) [Laridae], Australian Pelican (*Pelecanus conspicillatus*) [Pelecanidae], Cormorants (*Phalacrocorax* spp.) [Phalacrocoracidae], Fairy Prion (*Pachyptila turtur*) and Fluttering Shearwater (*Puffinus gavia*) [Procellariidae], Little Penguin (*Eudyptula minor*) [Spheniscidae] and Australian Gannet (*Morus serrator*) [Sulidae] (Table 9).

The majority of the most commonly encountered and abundant seabirds observed were identified to family level only (Diomedidae, Laridae and Procellariidae). Shearwaters (Procellariidae) were the most abundant seabirds recorded with 2,402 individuals recorded from 161 observations and encountered on 53% of trips (Table 9). The most commonly encountered family however, were Albatrosses (Diomedidae), observed on 57% of trips, but were far less abundant with 254 individuals recorded from 122 observations. Gulls and Terns (Laridae) were encountered on 38% of trips with 301 individuals recorded from 84 observations, including the most abundant species identified, Silver Gull (247 individuals recorded from 49 observations and

encountered on 18% of trips). In comparison, all other seabird species and families recorded were much more infrequently encountered (Table 9).



Table 9. Number of observations, abundance (*N*) and frequency of occurrence (FO%) of seabirds recorded by observers from nearshore charter vessels over four seasons between October 2017 and September 2018 in the Observer Region.

Species	Spring ( <i>n</i> = 15 trips)			Summer ( <i>n</i> = 49 trips)			Autumn ( <i>n</i> = 42 trips)			Winter ( <i>n</i> = 29 trips)		
	Number of observations	<i>N</i>	FO (%)	Number of observations	<i>N</i>	FO (%)	Number of observations	<i>N</i>	FO (%)	Number of observations	<i>N</i>	FO (%)
<b>Diomedidae (Albatrosses)</b>	<b>8</b>	<b>16</b>	<b>46.7</b>	<b>35</b>	<b>69</b>	<b>44.9</b>	<b>46</b>	<b>112</b>	<b>61.9</b>	<b>33</b>	<b>57</b>	<b>75.9</b>
Black-browed Albatross <i>Thalassarche melanophrys</i>							14	23	23.8	3	5	10.4
Shy Albatross <i>T. cauta</i>							1	2	2.4	3	3	6.9
Unidentified Albatross	8	16	46.7	35	69	44.9	31	87	35.7	27	49	58.6
<b>Laridae (Gulls, Skuas, Noddies &amp; Terns)</b>	<b>8</b>	<b>30</b>	<b>40.0</b>	<b>11</b>	<b>40</b>	<b>16.3</b>	<b>37</b>	<b>104</b>	<b>50.0</b>	<b>28</b>	<b>127</b>	<b>55.1</b>
Great Skua <i>Catharacta Skua</i>							3	4	7.1	3	5	10.3
Silver Gull <i>Chroicocephalus novaehollandiae</i>	6	26	26.7	6	31	10.2	20	83	19.1	17	107	27.6
Crested Tern <i>Sterna bergii</i>	1	3	6.7	1	1	2.0	9	12	16.7	4	10	6.9
Unidentified Tern	1	1	6.7	4	8	4.1	5	5	7.1	4	5	10.4
<b>Pelecanidae (Pelicans)</b>	<b>1</b>	<b>1</b>	<b>6.7</b>	<b>2</b>	<b>2</b>	<b>4.1</b>				<b>3</b>	<b>3</b>	<b>10.4</b>
Australian Pelican <i>Pelecanus conspicillatus</i>				1	1	2.0						
Unidentified Pelican	1	1	6.7	1	1	2.0				3	3	10.4
<b>Phalacrocoracidae (Cormorants &amp; Shags)</b>	<b>1</b>	<b>1</b>	<b>6.7</b>	<b>2</b>	<b>3</b>	<b>2.0</b>						
Unidentified Cormorant	1	1	6.7	2	3	2.0						
<b>Procellariidae (Petrels, Prions &amp; Shearwaters)</b>	<b>41</b>	<b>728</b>	<b>80.0</b>	<b>78</b>	<b>1378</b>	<b>67.4</b>	<b>36</b>	<b>272</b>	<b>52.4</b>	<b>6</b>	<b>24</b>	<b>13.8</b>
Fairy Prion <i>Pachyptila turtur</i>										4	4	6.9
Fluttering Shearwater <i>Puffinus gavia</i>				1	1	2.0						
Unidentified Shearwater	41	728	80.0	77	1377	65.3	36	272	52.4	2	20	6.9
<b>Spheniscidae (penguins)</b>	<b>1</b>	<b>1</b>	<b>6.7</b>	<b>1</b>	<b>1</b>	<b>2.0</b>						
Little Penguin <i>Eudyptula minor</i>	1	1	6.7	1	1	2.0						
<b>Sulidae (Gannets &amp; Boobies)</b>				<b>2</b>	<b>9</b>	<b>2.0</b>	<b>8</b>	<b>14</b>	<b>16.7</b>	<b>6</b>	<b>35</b>	<b>20.1</b>
Australian Gannet <i>Morus serrator</i>							7	13	14.3	5	5	17.2
Unidentified Gannets & Boobies				2	9	2.0	1	1	2.4	1	30	3.5
Unidentified Birds	1	6	6.7							2	150	3.5
<b>Total</b>	<b>61</b>	<b>783</b>	<b>100.0</b>	<b>131</b>	<b>1502</b>	<b>87.8</b>	<b>127</b>	<b>502</b>	<b>85.7</b>	<b>78</b>	<b>396</b>	<b>89.7</b>

Table 10. Number of observations, abundance (N) and frequency of occurrence (FO%) of marine mammals recorded by observers from nearshore charter vessels over four seasons between October 2017 and September 2018 in the Observer Region.

Species	Spring (n = 15 trips)			Summer (n = 49 trips)			Autumn (n = 42 trips)			Winter (n = 29 trips)		
	Number of observations	N	FO (%)	Number of observations	N	FO (%)	Number of observations	N	FO (%)	Number of observations	N	FO (%)
<b>Delphinidae (Oceanic Dolphins)</b>	<b>4</b>	<b>87</b>	<b>26.7</b>	<b>8</b>	<b>162</b>	<b>16.3</b>	<b>4</b>	<b>62</b>	<b>9.5</b>	<b>4</b>	<b>45</b>	<b>13.8</b>
Common Dolphin <i>Delphinus delphis</i>	1	50	6.7				2	43	4.8			
Bottlenose Dolphin <i>Tursiops truncatus</i>	1	30	6.7				1	4	2.4			
Pygmy Killer Whale <i>Feresa attenuata</i>							1	15	2.4			
Unidentified Dolphin	2	7	13.3	8	162	16.3				4	45	14.0
<b>Balaenopteridae (Rorquals)</b>	<b>4</b>	<b>17</b>	<b>26.7</b>	<b>1</b>	<b>2</b>	<b>2.0</b>				<b>10</b>	<b>16</b>	<b>34.5</b>
Humpback Whale <i>Megaptera novaeangliae</i>	4	17	26.7	1	2	2.0				10	16	34.5
<b>Otariidae (Eared Seals)</b>	<b>1</b>	<b>1</b>	<b>6.7</b>	<b>13</b>	<b>22</b>	<b>26.5</b>	<b>11</b>	<b>24</b>	<b>26.2</b>	<b>6</b>	<b>8</b>	<b>20.7</b>
Australian Fur Seal <i>Arctocephalus pusillus doriferus</i>										1	1	3.5
Unidentified Seal	1	1	6.7	13	22	26.5	11	24	26.2	5	7	17.2
<b>Total</b>	<b>9</b>	<b>105</b>	<b>40.0</b>	<b>22</b>	<b>186</b>	<b>36.7</b>	<b>15</b>	<b>86</b>	<b>30.6</b>	<b>20</b>	<b>69</b>	<b>51.7</b>

### 3.6.2 Marine Mammals

Five species of marine mammals from three families were positively identified, including Common Dolphins (*Delphinus delphis*), Bottlenose Dolphins (*Tursiops truncatus*) and Pygmy Killer Whales (*Feresa attenuata*) [Delphinidae], Humpback Whales (*Megaptera novaeangliae*) [Balaenopteridae] and Australian Fur Seals (*Arctocephalus pusillus doriferus*) [Otariidae] (Table 10).

The majority of the most commonly encountered and abundant marine mammals observed were identified to family level only (Delphinidae, Balaenopteridae and Otariidae). Dolphins (Delphinidae) were the most abundant marine mammals recorded with 356 individuals recorded from 20 observations and encountered on 15% of trips (Table 10). The most commonly encountered family however, were Seals (Otariidae), observed on 23% of trips, but were far less abundant with just 55 individuals recorded from 31 observations. Whales (Balaenopteridae) were encountered on 11% of trips with 35 individuals recorded from 15 observations. The most abundant species identified were Common Dolphins, but all 93 individuals were recorded from just three observations (2% of trips; Table 10).

### 3.6.3 Interactions

Overall, 3,635 individual animals were observed in the vicinity of charter fishing vessels during the study period in the Observer Region, however only 33 direct interactions (involving 47 individuals) with the fishery were observed at a rate of 5.20 interactions per 100 h fishing. These interactions occurred on 26 trips out of the 135 observed at a rate of 19.3% of trips. Direct interactions with the fishery were recorded in summer (11 occasions), autumn (16 occasions) and winter (6 occasions), but none were recorded in spring (Table 11). Marine mammals were recorded in 21 direct interactions, 11 interactions involved seabirds and a single interaction was recorded with a Shortfin Mako Shark *Isurus oxyrinchus* (Lamnidae; Table 11). The only recorded incidence of bycatch recorded was a Shearwater (Procellariidae) which was observed to swallow a baited hook, before being released alive after the line was cut. This represents a bycatch rate of 0.16 individuals per 100 h fishing.

#### 3.6.3.1 Seabirds

Overall, 3,183 individual seabirds were observed in the vicinity of charter fishing vessels during the study period in the Observer Region, however only eleven direct interactions (21 individuals) with the fishery were observed at a rate of 1.74 interactions per 100 h fishing. These interactions occurred on 10 trips out of the 135 observed at a rate of 7.4% of trips. Direct interactions with the fishery were recorded only in autumn (6 occasions) and winter (5 occasions) (Table 11). The family most commonly recorded in direct interactions were Albatrosses (Diomedidae) with 7 individuals (on 6 trips) observed primarily eating discards (5 occasions), but were also recorded depredating hooked fish or removing bait from hooks on one occasion each. Pelicans (Pelecanidae) were also recorded eating discards on three consecutive days in winter. Despite the large numbers of Gulls and Terns (Laridae) observed in attendance at fishing vessels (Table 9), not a single direct interaction was observed.

Table 11. List of the 33 direct interactions between wildlife and nearshore charter vessels recorded by observers between October 2017 and September 2018 in the Observer Region. \* denotes the single incidence of bycatch recorded.

Season	Event date	Species	Family	Count	Details
Summer	18-Dec-17	Unidentified Seal	Otariidae	1	Depredation of hooked fish
Summer	30-Dec-17	Unidentified Seal	Otariidae	1	Depredation of hooked fish
Summer	30-Dec-17	Unidentified Seal	Otariidae	3	Depredation of hooked fish
Summer	30-Dec-17	Unidentified Seal	Otariidae	2	Depredation of hooked fish
Summer	7-Feb-18	Unidentified Seal	Otariidae	1	Eating discards
Summer	7-Feb-18	Unidentified Seal	Otariidae	2	Eating discards
Summer	8-Feb-18	Unidentified Seal	Otariidae	1	Eating discards
Summer	8-Feb-18	Unidentified Seal	Otariidae	1	Eating discards
Summer	9-Feb-18	Unidentified Seal	Otariidae	1	Eating discards
Summer	10-Feb-18	Unidentified Seal	Otariidae	2	Eating discards
Summer	23-Feb-18	Unidentified Seal	Otariidae	2	Eating discards
Autumn	2-Apr-18	Unidentified Albatross	Diomedidae	4	Eating discards
Autumn	16-Apr-18	Unidentified Seal	Otariidae	2	Depredation of hooked fish
Autumn	16-Apr-18	Unidentified Seal	Otariidae	2	Depredation of hooked fish
Autumn	16-Apr-18	Unidentified Seal	Otariidae	2	Depredation of hooked fish
Autumn	19-Apr-18	Unidentified Seal	Otariidae	1	Depredation of hooked fish
Autumn	29-Apr-18	Unidentified Albatross	Diomedidae	1	Depredation of hooked fish
Autumn	30-Apr-18	Unidentified Seal	Otariidae	1	Eating discards
Autumn	2-May-18	Unidentified Albatross	Diomedidae	1	Eating discards
Autumn	2-May-18	Unidentified Albatross	Diomedidae	1	Eating discards
Autumn	5-May-18	Unidentified Seal	Otariidae	1	Eating discards
Autumn	5-May-18	Unidentified Seal	Otariidae	1	Eating discards
Autumn	6-May-18	Unidentified Seal	Otariidae	1	Eating discards
Autumn	19-May-18	Unidentified Albatross	Diomedidae	1	Eating discards
Autumn	26-May-18	Unidentified Shearwater	Procellariidae	1*	Baited hook swallowed, released alive
Autumn	27-May-18	Unidentified Seal	Otariidae	1	Depredation of hooked fish
Autumn	27-May-18	Unidentified Seal	Otariidae	1	Depredation of hooked fish, removing bait
Winter	22-Jun-18	Unidentified Albatross	Diomedidae	1	Removing bait
Winter	24-Jun-18	Unidentified Albatross	Diomedidae	3	Eating discards
Winter	18-Jul-18	Shortfin Mako Shark	Lamnidae	1	Depredation of hooked fish
Winter	11-Aug-18	Unidentified Pelican	Pelecanidae	1	Eating discards
Winter	12-Aug-18	Unidentified Pelican	Pelecanidae	1	Eating discards
Winter	13-Aug-18	Unidentified Pelican	Pelecanidae	1	Eating discards
<b>Totals</b>	<b>33 events</b>	<b>5 species</b>	<b>5 families</b>	<b>47 individuals</b>	

### 3.6.3.2 Marine mammals

Overall, 446 individuals were observed in the vicinity of charter fishing vessels during the study period in the Observer Region with 21 direct interactions involving 30 individuals recorded at a rate of 3.31 interactions per 100 h fishing. These interactions occurred on 15 trips out of the 135 observed at a rate of 11.1% of trips. Direct interactions with the fishery were recorded only in summer (11 occasions) and autumn (10 occasions) (Table 11). All direct interactions recorded involved Seals (Otariidae) with 30 individuals (on 13 trips) observed primarily eating discards (11 occasions) or depredating hooked fish (10 occasions) (Table 11). There were no recorded incidences of marine mammal bycatch observed.

## 3.7 Demography of charter clientele

Demographic data on the number of clients per trip, their sex and whether they were a member of a fishing club was collected via direct observation and trip booking information from a total of 1,297 clients on the 172 nearshore charter trips observed between October 2017 and September 2018 in the Observer Region (Tables 12 & 13). Additional demographic data specific to client age, recreational and charter fishing activities and residence was collected during interviews with observers from 1,081 clients (83% of total). Non-participation in interviews with observers was primarily due to motion sickness or an inability to communicate in English.

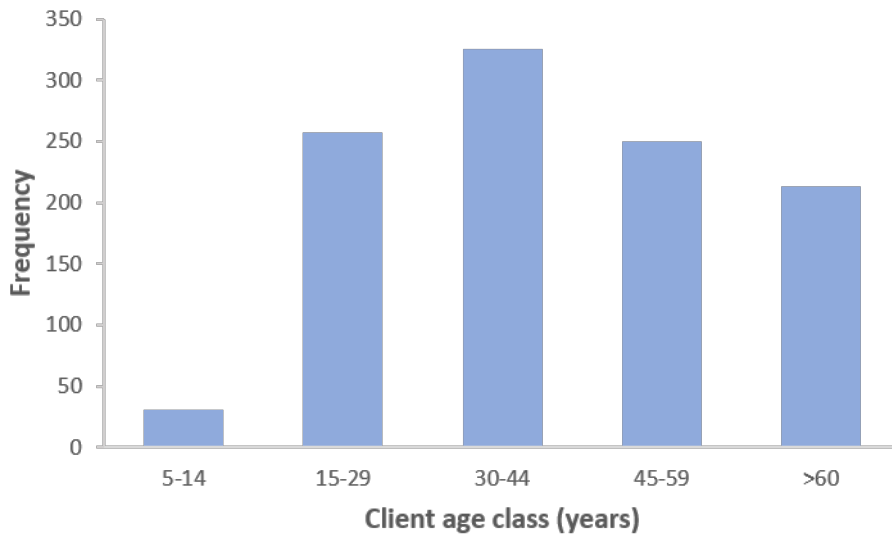
Overall, charter clients were primarily male (89.8%), with 9.9% female and 0.3% of indeterminate sex ('unknown' – Table 12). This ratio was consistent across regions except for FRZ 9 where slightly more (14%) of observed charter clients were female.

Table 12. The total number of charter clients, number of trips, clients per trip and sex ratios of charter clients recorded by on-board observers by Fisher Reporting Zone (FRZ – Figure 1).

FRZ	Total clients	Number of trips	Clients per trip ( $\pm$ SE)	Proportion female	Proportion male	Proportion 'unknown'
FRZ 6	472	59	8.0 (0.3)	0.100	0.894	0.006
FRZ 7	632	79	8.0 (0.3)	0.089	0.910	0.002
FRZ 8	37	9	4.6 (0.6)	0.081	0.919	-
FRZ 9	156	25	6.2 (0.4)	0.141	0.859	-
<b>Total</b>	<b>1,297</b>	<b>172</b>	<b>7.6 (0.2)</b>	<b>0.099</b>	<b>0.898</b>	<b>0.003</b>

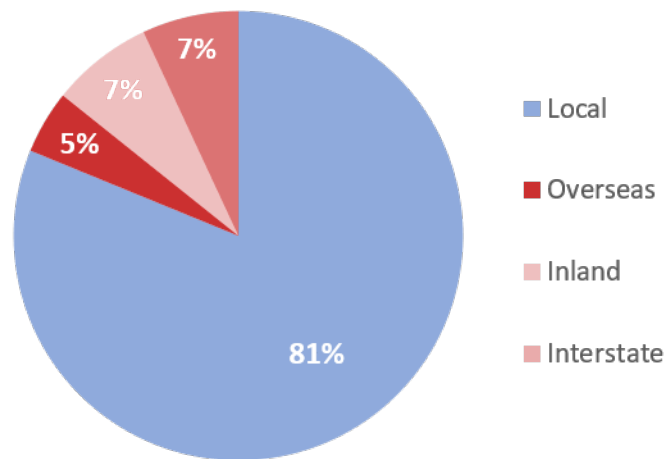
Charter clients ranged in age from 6 to 90 years with the majority (95%) being adults ( $\geq$  18 years old) (Figure 20). Thirty percent of charter clients were between 30 and 44 years old, with fewer between 15 and 29 years old (24%) or between 45 and 59 years old (23%). Twenty percent of clients were older than 60 years of age.

Figure 20. The age of charter clients recorded in interviews with on-board observers during the study period in the Observer Region (n = 1,081).



Most (81%) charter clients came from the area local to the charter operation, however 14% came from inland regions of NSW or from interstate (Figure 21). Five percent of charter clients came from overseas, including from 13 different countries (namely Canada, China, England, Fiji, France, Ireland, New Zealand, The Philippines, Scotland, Singapore, and the United States). Thirty one percent of charter clients were members of one of 30 different fishing clubs recorded.

Figure 21. The residence of charter clients recorded in interviews with on-board observers during the study period in the Observer Region (n = 1,081).



Seventy seven percent of charter clients fished in the previous 12 months and most of these (99%) had been on a charter trip. Of these clients who had fished in the previous 12 months, half had fished for more than 20 days (Table 13). A further 33% fished for between 5 and 19 days with just 17% saying that they had fished for less than 5 days in the previous year. In terms of charter fishing, 45% said they had spent less than 5 days charter fishing in the previous 12 months (Table 13) with almost 50% charter fishing for between 5 and 14 days. Just 5.5% said they had been charter fishing for more than 15 days in the previous year. The average number of charter days fished by clients in the previous 12 months was  $7.1 \pm 0.3$  days with a maximum of 50 days.

Table 13. The number of days charter clients had been recreational fishing and charter fishing in the previous 12 months in interviews with on-board observers during the study period in the Observer Region.

<b>Number of days fished</b>	<b>Recreational fishing (%)</b>	<b>Charter fishing (%)</b>
<5	16.8	45.4
5-9	12.3	19.6
10-14	11.6	29.5
15-19	9.5	1.7
>20	49.9	3.8

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## 5.0 Appendices

### Appendix 5.1

State-wide numbers of individuals of each species retained by the nearshore charter fishery in each MEMA management region as recorded in industry logbooks during 2017/18.

Species	No. trips	Region			Total
		Northern	Central	Southern	
		1386	1745	1429	4560
Bluespotted Flathead		6373	10584	17151	34108
Snapper		10208	4132	6238	20578
Grey Morwong		768	7047	5942	13757
Blue Mackerel		3244	1156	3433	7833
Flathead (other)		764	254	6028	7046
Ocean Jacket		464	2363	3889	6716
Sweep		248	3340	1736	5324
Yellowtail Scad		1046	1768	1943	4757
Yellowtail Kingfish		314	1850	2464	4628
Redfish		274	2868	1468	4610
Tiger Flathead		149	1391	2924	4464
Teraglin		3479	726		4205
Southern Maori Wrasse		249	1761	1051	3061
Pearl Perch		2218	210	107	2535
Silver Trevally		681	1341	243	2265
Dolphinfish		499	1695	48	2242
Dusky Flathead		1615	353	141	2109
Eastern Pigfish		98	1054	879	2031
LeatherJacket (other)		759	504	445	1708
Sergeant Baker		87	1154	457	1698
Sweetlips		5	1075	413	1493
Eastern Red Scorpionfish		140	417	783	1340
Venus Tuskfish		931	1		932
Australian Bonito		276	424	153	853
Sixspine LeatherJacket		38	308	396	742
Barracouta		18	542	158	718
Longfin Pike		13	443	168	624
Reef Ocean Perch		42	350	209	601
Tailor		332	184	75	591
Moses' Snapper		333	173	83	589
School Mackerel		1	379	149	529
Eastern School Whiting		86	379	13	478
Goldspot Pigfish		124	219	129	472
Marbled Flathead		143	164	115	422
Longfin Perch		3	182	221	406
Deepsea Ocean Perch		42	153	188	383
Jackass Morwong		1	46	259	306

Species	No. trips	Region			Total
		Northern 1386	Central 1745	Southern 1429	
Sand Whiting		2	283		285
Eastern Orange Perch		44	13	219	276
Unidentified		19	201	52	272
Yellowfin Pigfish			137	97	234
Tarwhine		145	75	1	221
Crimsonband Wrasse		40	91	76	207
Southern Calamari			115	86	201
Samson fish		156	28	11	195
Red Gurnard		2	129	43	174
Mulloway		136	29		165
Spotted Mackerel		142	3		145
Gummy Shark		55	30	58	143
Sea Mullet			111		111
Blue-Eye Trevalla		3	107		110
Banded Rockcod		8	94	2	104
Flounders		18	76	2	96
Mackerel Tuna		42	31	15	88
Skipjack Tuna		10	34	23	67
Maori Rockcod		62	1		63
Estuary LeatherJacket (rough/fanbelly)			2	60	62
Blacksaddle Goatfish		42	11		53
Australian Salmon			40	10	50
Common Blacktip Shark		42			42
Bar Rockcod		15	14	12	41
Fusiliers, Tropical Snappers & Slopefishes		40			40
Amberjack		20	14	4	38
Latchet			23	12	35
Yellowfin Bream		5	20	7	32
Gemfish		2	26	3	31
Freespine Flathead		30			30
Parrotfish		26	2		28
Jack Mackerel			4	23	27
Goldspot Mullet			25		25
Bastard Red Cod		7	14	1	22
Rock Ling		1	20	1	22
Blue Swimmer Crab		20	2	0	22
Cobia		19	1		20
Eastern Wirrah		4	16		20
John Dory		5	7	8	20
Black Bream		18	2		20
Bluestriped Goatfish			15	3	18
Red Morwong		1		17	18
Redbait			18		18
Shortfin Mako		1	9	6	16
Fantail Mullet			15		15
Spanish Mackerel		9	5		14
Bluespotted Goatfish		4	10		14

Species	Region			Total	
	No. trips	Northern 1386	Central 1745		Southern 1429
Bluethroat Wrasse			3	10	13
Rosy Snapper	9			4	13
Crimson Snapper			3	9	12
Bronze Whaler	9		1	1	11
Banded Morwong			3	8	11
Cuttlefish (other)	3		6	1	10
Albacore				10	10
Bastard Trumpeter			6	3	9
Leaping Bonito			3	5	8
King George Whiting				8	8
Eastern Blue Groper	2		4	2	8
Spotted Armour Gurnard	2		2	4	8
School Shark	5		1	2	8
Green Jobfish	7				7
Largehead Hairtail	3		4		7
Sandy Sprat (Whitebait)				7	7
Black Marlin	5		1		6
Gould's Squid (Arrow)			3	3	6
Largetooth Beardie			6		6
Ornate Snapper				6	6
Bass Groper			4	2	6
Yellowfin Tuna	5				5
Longtail Tuna	5				5
Striped Marlin	3			1	4
Silver Warehou			4		4
Blue Shark	4				4
Hussar	4				4
Silver Dory			4		4
Smooth Hammerhead	1		3		4
Mangrove Jack	3				3
Eastern Fiddler Ray	2		1		3
Snook				3	3
Mirror Dory			3		3
Painted Grinner			3		3
Eastern Shovelnose Ray			3		3
Red Mullet			3		3
Red Bullseye	3				3
Frigate Mackerel			2	1	3
Ruby Snapper	1		1		2
Rainbow Runner	2				2
Spangled Emperor	2				2
Pink Ling			1	1	2
Bigeye Ocean Perch			2		2
Longfin Mako			1	1	2
Stout Whiting			2		2
Forktail Catfishes	2				2
Blue Warehou			1	1	2

Species	No. trips	Region			Total
		Northern 1386	Central 1745	Southern 1429	
Wahoo		1			1
Bull Shark		1			1
White-tailed Dogfishes				1	1
Oriental Bonito			1		1
Blue Marlin		1			1
Silver Drummer				1	1
Whitespotted Guitarfish		1			1
Eastern Rock Lobster		1			1
Hapuku		1			1
Common Sawshark				1	1
Sole (other)		1			1
Giant Cuttlefish			1		1
Mado				1	1
Lemon Tongue Sole		1			1
Lizardfish			1		1
<b>Total</b>		<b>37350</b>	<b>52980</b>	<b>61048</b>	<b>151378</b>

## Appendix 5.2

State-wide numbers of individuals of each species retained by the nearshore charter fishery in each season as recorded in industry logbooks during 2017/18.

Species	Season					Total
	<i>No. trips</i>	Spring 1040	Summer 1593	Autumn 1134	Winter 793	
Bluespotted Flathead		7386	13917	8758	4047	34108
Snapper		5417	5279	4850	5032	20578
Grey Morwong		3997	4287	3472	2001	13757
Blue Mackerel		1256	3887	1998	692	7833
Flathead (other)		959	4452	1317	318	7046
Ocean Jacket		902	2015	2730	1069	6716
Sweep		1188	1920	897	1319	5324
Yellowtail Scad		1358	2020	1013	366	4757
Yellowtail Kingfish		588	1858	1507	675	4628
Redfish		1300	1681	1044	585	4610
Tiger Flathead		1073	2243	733	415	4464
Teraglin		941	1188	952	1124	4205
Southern Maori Wrasse		891	1041	536	593	3061
Pearl Perch		704	564	588	679	2535
Silver Trevally		504	411	478	872	2265
Dolphinfish		70	835	1337		2242
Dusky Flathead		619	660	384	446	2109
Eastern Pigfish		634	555	498	344	2031
LeatherJacket (other)		298	367	262	781	1708
Sergeant Baker		507	579	358	254	1698
Sweetlips		530	660	43	260	1493
Eastern Red Scorpionfish		453	549	203	135	1340
Venus Tuskfish		227	116	270	319	932
Australian Bonito		131	261	376	85	853
Sixspine LeatherJacket		452	115	104	71	742
Barracouta		308	55	6	349	718
Longfin Pike		184	228	172	40	624
Reef Ocean Perch		125	302	123	51	601
Tailor		27	137	245	182	591
Moses' Snapper		32	99	196	262	589
School Mackerel		149	315	31	34	529
Eastern School Whiting		67	146	220	45	478
Goldspot Pigfish		170	134	76	92	472
Marbled Flathead		138	117	72	95	422
Longfin Perch		69	153	66	118	406
Deepsea Ocean Perch		53	187	58	85	383
Jackass Morwong		83	108	74	41	306
Sand Whiting		54	115	67	49	285
Eastern Orange Perch		75	69	61	71	276
Unidentified		60	119	39	54	272
Yellowfin Pigfish		77	82	49	26	234
Tarwhine		30	35	83	73	221
Crimsonband Wrasse		57	31	77	42	207
Southern Calamari		21	5	86	89	201
Samson fish		63	60	35	37	195

Species	Season					Total 4560
	No. trips	Spring 1040	Summer 1593	Autumn 1134	Winter 793	
Red Gurnard		39	70	49	16	174
Mulloway		50	30	35	50	165
Spotted Mackerel		1	16	123	5	145
Gummy Shark		51	39	44	9	143
Sea Mullet			107	4		111
Blue-Eye Trevalla		4	64	39	3	110
Banded Rockcod		21	31	39	13	104
Flounder		22	43	25	6	96
Mackerel Tuna		10	53	22	3	88
Skipjack Tuna		3	36	27	1	67
Maori Rockcod		6	7	14	36	63
Estuary LeatherJacket (rough/fanbelly)			8	50	4	62
Blacksaddle Goatfish		7	7	12	27	53
Australian Salmon		21	6	15	8	50
Common Blacktip Shark		19	3	8	12	42
Bar Rockcod		15	7	17	2	41
Fusiliers, Tropical Snappers & Slopefishes			2	7	31	40
Amberjack		8	4	10	16	38
Latchet		12	3	15	5	35
Yellowfin Bream		3	16	11	2	32
Gemfish		7	4	15	5	31
Freespine Flathead				30		30
Parrotfish		4	16	4	4	28
Jack Mackerel		4	20	2	1	27
Goldspot Mullet			25			25
Bastard Red Cod		1	12	1	8	22
Rock Ling		10	8	3	1	22
Blue Swimmer Crab		2	12	8		22
Cobia		2	6	4	8	20
Eastern Wirrah		2	15	1	2	20
John Dory		9	8	2	1	20
Black Bream			3	14	3	20
Bluestriped Goatfish		5	5	7	1	18
Red Morwong			17		1	18
Redbait			18			18
Shortfin Mako		3	4	4	5	16
Fantail Mullet		15				15
Spanish Mackerel			2	12		14
Bluespotted Goatfish		1	4	6	3	14
Bluethroat Wrasse		3	1	9		13
Rosy Snapper			5	4	4	13
Crimson Snapper			2	10		12
Bronze Whaler		3	4	2	2	11
Banded Morwong		4	4	3		11
Cuttlefish (other)				8	2	10
Albacore				7	3	10
Bastard Trumpeter		2		1	6	9
Leaping Bonito				8		8
King George Whiting		8				8
Eastern Blue Groper		3	2		3	8
Spotted Armour Gurnard			2	5	1	8

Species	Season					Total 4560
	No. trips	Spring 1040	Summer 1593	Autumn 1134	Winter 793	
School Shark			2	5	1	8
Green Jobfish		5	1		1	7
Largehead Hairtail		1	3		3	7
Sandy Sprat (Whitebait)		7				7
Black Marlin			6			6
Gould's Squid (Arrow)				6		6
Large-tooth Beardie			4	1	1	6
Ornate Snapper		6				6
Bass Groper		4	2			6
Yellowfin Tuna		1		1	3	5
Longtail Tuna				2	3	5
Striped Marlin			4			4
Silver Warehou		3	1			4
Blue Shark		2		1	1	4
Hussar		2		2		4
Silver Dory				4		4
Smooth Hammerhead			1	1	2	4
Mangrove Jack			3			3
Eastern Fiddler Ray					3	3
Snook				2	1	3
Mirror Dory		1		2		3
Painted Grinner			2	1		3
Eastern Shovel-nose Ray			1	2		3
Red Mullet (Goatfish-undifferentiated)			1	2		3
Red Bullseye				3		3
Frigate Mackerel				3		3
Ruby Snapper			2			2
Rainbow Runner			1		1	2
Spangled Emperor				1	1	2
Pink Ling			1	1		2
Bigeye Ocean Perch					2	2
Longfin Mako			1	1		2
Stout Whiting			2			2
Forktail Catfishes		1		1		2
Blue Warehou			1	1		2
Wahoo			1			1
Bull Shark			1			1
White-tailed Dogfishes					1	1
Oriental Bonito					1	1
Blue Marlin			1			1
Silver Drummer				1		1
Whitespotted Guitarfish					1	1
Eastern Rock Lobster		1				1
Hapuku					1	1
Common Sawshark					1	1
Sole (other)			1			1
Giant Cuttlefish					1	1
Mado		1				1
Lemon Tongue Sole		1				1
Lizardfish				1		1
<b>Total</b>		<b>34643</b>	<b>54751</b>	<b>37325</b>	<b>24659</b>	<b>151378</b>



## Appendix 5.3

All species caught, % of catch released and number of trips taken by on-board observers by Fisher Reporting Zone (FRZ – Figure 1) between October 2017 and September 2018 in the Observer Region.

<b>Fisher Reporting Zone</b>	<b>FRZ 6</b>		<b>FRZ 7</b>		<b>FRZ 8</b>		<b>FRZ 9</b>		<b>Overall</b>	
<i>No. trips observed</i>	59		79		9		25		172	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Bluespotted Flathead	519	8.5	500	13.2	48	47.9	470	27.9	1537	17.2
Blue Mackerel	78	0.0	723	15.2	14	35.7	384	12.0	1199	13.4
Snapper	210	61.9	725	57.4	34	35.3	184	26.6	1153	52.6
Longspine Flathead	332	95.2	394	100.0	38	100.0	97	100.0	861	98.1
Yellowtail Scad	229	1.3	141	32.6	3	33.3	485	7.8	858	10.3
Grey Morwong	158	1.9	585	3.6	12	0.0	40	10.0	795	3.5
Sergeant Baker	170	65.9	493	53.3	34	79.4	25	80.0	722	58.4
Redfish	149	31.5	477	25.8	16	37.5	42	11.9	684	26.5
Silver Sweep	59	30.5	466	29.2	4	100.0	41	100.0	570	34.9
Ocean Jacket	166	5.4	269	6.3	2	50.0	19	84.2	456	9.4
Reef Ocean Perch	12	75.0	373	28.7	3	100.0	13	92.3	401	32.7
Southern Maori Wrasse	20	20.0	312	9.0	17	58.8	40	37.5	389	14.7
Yellowtail Kingfish	68	22.1	10	100.0			289	66.4	367	59.1
Eastern Red Scorpionfish	45	73.3	113	52.2	5	40.0	87	86.2	250	67.6
Eastern Blackspot Pigfish	33	3.0	198	3.5	4	0.0	6	0.0	241	3.3
Mado	37	89.2	155	90.3	5	100.0	29	100.0	226	91.6
Longfin Pike	30	60.0	93	52.7			10	50.0	133	54.1
Tiger Flathead	48	12.5	39	28.2	5	60.0	26	42.3	118	26.3
Longfin Perch	3	33.3	109	12.8			2	50.0	114	14.0
Eastern School Whiting	47	8.5	43	11.6	2	100.0	1	100.0	93	12.9
Marbled Flathead	40	12.5	32	43.8	1	0.0	1	0.0	74	25.7
Silver Trevally	26	26.9	36	22.2	4	25.0	5	20.0	71	23.9
Eastern Orange Perch	60	13.3	5	20.0					65	13.8

<b>Fisher Reporting Zone</b>	<b>FRZ 6</b>		<b>FRZ 7</b>		<b>FRZ 8</b>		<b>FRZ 9</b>		<b>Overall</b>	
<i>No. trips observed</i>	59		79		9		25		172	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Halfbanded Seaperch	10	40.0	42	95.2			6	100.0	58	86.2
Sharpfin Barracuda	2	100.0	48	66.7	4	100.0	3	0.0	57	66.7
Sixspine LeatherJacket	3	0.0	43	4.7	3	0.0	3	0.0	52	3.8
Australian Bonito	13	0.0	7	0.0			28	0.0	48	0.0
Teraglin	46	0.0							46	0.0
Southern Bluespotted Flathead					39	53.8			39	53.8
Banded Seaperch	9	100.0	27	14.8	1	100.0			37	37.8
Crimsonband Wrasse	2	50.0	27	25.9	3	33.3	5	100.0	37	37.8
Velvet LeatherJacket			16	81.3			5	100.0	21	85.7
Red Gurnard	7	14.3	5	60.0	1	100.0	8	62.5	21	47.6
Butterfly Perch	2	100.0	18	22.2					20	30.0
Eastern Fiddler Ray	4	100.0	1	100.0	1	100.0	12	100.0	18	100.0
Three-barred Porcupinefish	16	100.0							16	100.0
Barracouta	6	50.0	8	50.0	1	100.0			15	53.3
Pearl Perch	9	0.0	5	20.0					14	7.1
Giant Cuttlefish	3	0.0	5	40.0			3	33.3	11	27.3
Blackbanded Seaperch	4	100.0	7	42.9					11	63.6
Bluestriped Goatfish	3	66.7	8	12.5					11	27.3
Eastern Wirrah	3	66.7	4	50.0			3	100.0	10	70.0
Tarwhine	6	33.3	3	33.3	1	100.0			10	40.0
LeatherJacket (undifferentiated)	10	70.0							10	70.0
Starry Toado	9	100.0							9	100.0
Gummy Shark	1	0.0	5	60.0			3	0.0	9	33.3
Jack Mackerel			9	0.0					9	0.0
Smooth Golden Toadfish			2	100.0			6	100.0	8	100.0
Latchet	5	0.0	2	0.0					7	0.0
Mulloway	4	0.0	2	0.0					6	0.0
Red Morwong	5	100.0							5	100.0
Port Jackson Shark	3	100.0	2	100.0					5	100.0
Toadfishes unspecified	4	100.0	1	100.0					5	100.0

<b>Fisher Reporting Zone</b>	<b>FRZ 6</b>		<b>FRZ 7</b>		<b>FRZ 8</b>		<b>FRZ 9</b>		<b>Overall</b>	
<i>No. trips observed</i>	59		79		9		25		172	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Rough LeatherJacket	1	100.0	3	100.0					4	100.0
Sea Mullet	4	100.0							4	100.0
Surf Bream	4	100.0							4	100.0
Jackass Morwong	1	0.0	3	0.0					4	0.0
Tailor	3	0.0	1	0.0					4	0.0
Gould's Squid	2	0.0	2	0.0					4	0.0
Skipjack Tuna	1	0.0	3	0.0					4	0.0
Eastern Shovelnose Ray	2	100.0	1	100.0					3	100.0
Blacksaddle Goatfish			3	0.0					3	0.0
Dolphinfish			3	33.3					3	33.3
Smalltooth Flounder			2	0.0					2	0.0
John Dory			2	100.0					2	100.0
Opah			2	100.0					2	100.0
Common Jack Mackerel			2	50.0					2	50.0
Shortfin Mako	1	0.0	1	0.0					2	0.0
Dusky Flathead	1	0.0	1	0.0					2	0.0
Mosaic LeatherJacket							2	100.0	2	100.0
Blind Shark			2	100.0					2	100.0
Samson Fish	1	0.0	1	0.0					2	0.0
Eastern Sea Garfish			2	0.0					2	0.0
Pink Ling							1	0.0	1	0.0
Frigate Mackerel	1	0.0							1	0.0
School Shark			1	100.0					1	100.0
Shark Sucker			1	100.0					1	100.0
Barred Grubfish	1	100.0							1	100.0
Largetooth Beardie			1	0.0					1	0.0
Striped Marlin	1	100.0							1	100.0
Eastern Blue Groper			1	0.0					1	0.0
Northern Sand Flathead			1	100.0					1	100.0
Largetooth Flounder							1	0.0	1	0.0

<b>Fisher Reporting Zone</b>	<b>FRZ 6</b>		<b>FRZ 7</b>		<b>FRZ 8</b>		<b>FRZ 9</b>		<b>Overall</b>	
<i>No. trips observed</i>	59		79		9		25		172	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Onespot Puller			1	100.0					1	100.0
Eastern Frogfish	1	100.0							1	100.0
Yellowfin LeatherJacket			1	0.0					1	0.0
Blue Warehou			1	0.0					1	0.0
Amberjack	1	100.0							1	100.0
Bearded Rock Cod			1	0.0					1	0.0
Bronze Whaler							1	0.0	1	0.0
Australian Blackspot Catshark			1	100.0					1	100.0
Fan-bellied LeatherJacket			1	100.0					1	100.0
Bigscale Bullseye			1	100.0					1	100.0
Thetis Fish			1	0.0					1	0.0
Goldspot Pigfish			1	0.0					1	0.0
Octopus							1	100.0	1	100.0
Mackerel Tuna	1	0.0							1	0.0
Variegated Catshark							1	100.0	1	100.0
Broad Squid	1	0.0							1	0.0
White-ear			1	100.0					1	100.0
Southern Sand Flathead	1	0.0							1	0.0
Bar Rockcod	1	0.0							1	0.0
Spangled Emperor	1	0.0							1	0.0
Rock ling	1	0.0							1	0.0
Splendid Perch	1	100.0							1	100.0
<b>Total</b>	<b>2761</b>	<b>33.4</b>	<b>6637</b>	<b>33.0</b>	<b>305</b>	<b>57.0</b>	<b>2388</b>	<b>35.0</b>	<b>12091</b>	<b>34.1</b>

## Appendix 5.4

All species caught, % of catch released and number of trips taken by season recorded by on-board observers in FRZs 6-9 (Figure 1) between October 2017 and September 2018 in the Observer Region.

<b>Season</b>	<b>Spring</b>		<b>Summer</b>		<b>Autumn</b>		<b>Winter</b>		<b>Overall</b>	
<i>No. trips observed</i>	22		60		53		37		172	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Bluespotted Flathead	205	9.3	435	29.0	649	13.4	248	12.9	1537	17.2
Blue Mackerel	193	18.7	723	10.1	179	29.1	104	0.0	1199	13.4
Snapper	154	50.0	403	59.3	315	51.7	281	45.6	1153	52.6
Longspine Flathead	137	97.8	218	100.0	322	96.0	184	100.0	861	98.1
Yellowtail Scad	31	19.4	369	9.8	406	10.8	52	3.8	858	10.3
Grey Morwong	178	3.9	204	1.5	195	4.1	218	4.6	795	3.5
Sergeant Baker	98	51.0	318	67.6	151	47.7	155	54.8	722	58.4
Redfish	243	37.9	220	17.3	112	18.8	109	27.5	684	26.5
Silver Sweep	62	22.6	208	23.6	201	61.7	99	12.1	570	34.9
Ocean Jacket	30	0.0	118	11.0	272	10.3	36	5.6	456	9.4
Reef Ocean Perch	73	80.8	154	12.3	114	12.3	60	65.0	401	32.7
Southern Maori Wrasse	25	32.0	149	15.4	121	18.2	94	4.3	389	14.7
Yellowtail Kingfish	7	100.0	227	67.0	97	52.6	36	19.4	367	59.1
Eastern Red Scorpionfish	37	48.6	92	63.0	78	82.1	43	67.4	250	67.6
Eastern Blackspot Pigfish	48	2.1	68	1.5	52	1.9	73	6.8	241	3.3
Mado	17	100.0	72	81.9	102	96.1	35	94.3	226	91.6
Longfin Pike	35	60.0	61	55.7	28	53.6	9	22.2	133	54.1
Tiger Flathead	40	32.5	42	40.5	17	5.9	19	0.0	118	26.3
Longfin Perch	6	16.7	20	15.0	76	2.6	12	83.3	114	14.0
Eastern School Whiting	28	14.3	19	21.1	28	3.6	18	16.7	93	12.9
Marbled Flathead	9	55.6	29	27.6	9	11.1	27	18.5	74	25.7
Silver Trevally	10	40.0	12	33.3	19	31.6	30	10.0	71	23.9

<b>Season</b> <i>No. trips observed</i>	<b>Spring</b> <i>22</i>		<b>Summer</b> <i>60</i>		<b>Autumn</b> <i>53</i>		<b>Winter</b> <i>37</i>		<b>Overall</b> <i>172</i>	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Eastern Orange Perch			4	25.0	22	18.2	39	10.3	65	13.8
Halfbanded Seaperch	1	100.0	28	100.0	18	55.6	11	100.0	58	86.2
Sharpfin Barracuda	30	96.7	7	28.6	4	0.0	16	43.8	57	66.7
Sixspine LeatherJacket	10	0.0	12	16.7	11	0.0	19	0.0	52	3.8
Australian Bonito	2	0.0	11	0.0	35	0.0			48	0.0
Teraglin	1	0.0	19	0.0	26	0.0			46	0.0
Southern Bluespotted Flathead	12	16.7	27	70.4					39	53.8
Banded Seaperch	1	100.0	29	31.0	3	33.3	4	75.0	37	37.8
Crimsonband Wrasse	3	0.0	15	26.7	11	63.6	8	37.5	37	37.8
Velvet LeatherJacket	2	0.0			15	100.0	4	75.0	21	85.7
Red Gurnard	5	20.0	6	66.7	6	33.3	4	75.0	21	47.6
Butterfly Perch	11	9.1	3	66.7	2	50.0	4	50.0	20	30.0
Eastern Fiddler Ray			3	100.0	15	100.0			18	100.0
Three-barred Porcupinefish					16	100.0			16	100.0
Barracouta	5	80.0	6	33.3			4	50.0	15	53.3
Pearl Perch	2	0.0	8	12.5	1	0.0	3	0.0	14	7.1
Giant Cuttlefish	1	0.0	1	0.0	7	42.9	2	0.0	11	27.3
Blackbanded Seaperch	1	100.0	1	100.0	5	80.0	4	25.0	11	63.6
Bluestriped Goatfish	2	50.0	2	100.0	3	0.0	4	0.0	11	27.3
Eastern Wirrah	3	33.3	3	66.7	3	100.0	1	100.0	10	70.0
Tarwhine	1	100.0	2	50.0	3	33.3	4	25.0	10	40.0
LeatherJacket (undifferentiated)	2	50.0	1	100.0			7	71.4	10	70.0
Starry Toado					9	100.0			9	100.0
Gummy Shark	3	66.7					6	16.7	9	33.3
Jack Mackerel			9	0.0					9	0.0
Smooth Golden Toadfish					8	100.0			8	100.0
Latchet			1	0.0	4	0.0	2	0.0	7	0.0
Mulloway	2	0.0	4	0.0					6	0.0

<b>Season</b>	<b>Spring</b>		<b>Summer</b>		<b>Autumn</b>		<b>Winter</b>		<b>Overall</b>	
<i>No. trips observed</i>	22		60		53		37		172	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Red Morwong					5	100.0			5	100.0
Port Jackson Shark			1	100.0			4	100.0	5	100.0
Toadfishes unspecified	1	100.0			4	100.0			5	100.0
Rough LeatherJacket	1	100.0	3	100.0					4	100.0
Sea Mullet			4	100.0					4	100.0
Surf Bream	3	100.0	1	100.0					4	100.0
Jackass Morwong	1	0.0	1	0.0	1	0.0	1	0.0	4	0.0
Tailor					4	0.0			4	0.0
Gould's Squid			2	0.0	2	0.0			4	0.0
Skipjack Tuna	1	0.0			3	0.0			4	0.0
Eastern Shovelnose Ray					2	100.0	1	100.0	3	100.0
Blacksaddle Goatfish					1	0.0	2	0.0	3	0.0
Dolphinfish					3	33.3			3	33.3
Smalltooth Flounder	2	0.0							2	0.0
John Dory			2	100.0					2	100.0
Opah					2	100.0			2	100.0
Common Jack Mackerel					1	0.0	1	100.0	2	50.0
Shortfin Mako			1	0.0	1	0.0			2	0.0
Dusky Flathead	1	0.0	1	0.0					2	0.0
Mosaic LeatherJacket			2	100.0					2	100.0
Blind Shark	2	100.0							2	100.0
Samson Fish			2	0.0					2	0.0
Eastern Sea Garfish					2	0.0			2	0.0
Pink Ling							1	0.0	1	0.0
Frigate Mackerel			1	0.0					1	0.0
School Shark	1	100.0							1	100.0
Shark Sucker					1	100.0			1	100.0
Barred Grubfish							1	100.0	1	100.0

<b>Season</b>	<b>Spring</b>		<b>Summer</b>		<b>Autumn</b>		<b>Winter</b>		<b>Overall</b>	
<i>No. trips observed</i>	22		60		53		37		172	
<b>Species</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>	<b>Total</b>	<b>Release %</b>
Largetooth Beardie			1	0.0					1	0.0
Striped Marlin			1	100.0					1	100.0
Eastern Blue Groper							1	0.0	1	0.0
Northern Sand Flathead							1	100.0	1	100.0
Largetooth Flounder			1	0.0					1	0.0
Onespot Puller					1	100.0			1	100.0
Eastern Frogfish							1	100.0	1	100.0
Yellowfin LeatherJacket			1	0.0					1	0.0
Blue Warehou					1	0.0			1	0.0
Amberjack			1	100.0					1	100.0
Bearded Rock Cod	1	0.0							1	0.0
Bronze Whaler					1	0.0			1	0.0
Australian Blackspot Catshark					1	100.0			1	100.0
Fan-bellied LeatherJacket			1	100.0					1	100.0
Bigscale Bullseye	1	100.0							1	100.0
Thetis Fish	1	0.0							1	0.0
Goldspot Pigfish					1	0.0			1	0.0
Octopus			1	100.0					1	100.0
Mackerel Tuna					1	0.0			1	0.0
Variegated Catshark							1	100.0	1	100.0
Broad Squid					1	0.0			1	0.0
White-ear	1	100.0							1	100.0
Southern Sand Flathead	1	0.0							1	0.0
Bar Rockcod					1	0.0			1	0.0
Spangled Emperor					1	0.0			1	0.0
Rock Ling	1	0.0							1	0.0
Splendid Perch							1	100.0	1	100.0
<b>Total</b>	<b>1785</b>	<b>36.4</b>	<b>4391</b>	<b>34.0</b>	<b>3811</b>	<b>34.1</b>	<b>2104</b>	<b>32.5</b>	<b>12091</b>	<b>34.1</b>



## Appendix 5.5

Raw numbers of each species caught, numbers measured, and percentage measured by on-board observers in the nearshore charter fishery in FRZs 6-9 (Figure 1) between October 2017 and September 2018 in the Observer Region.

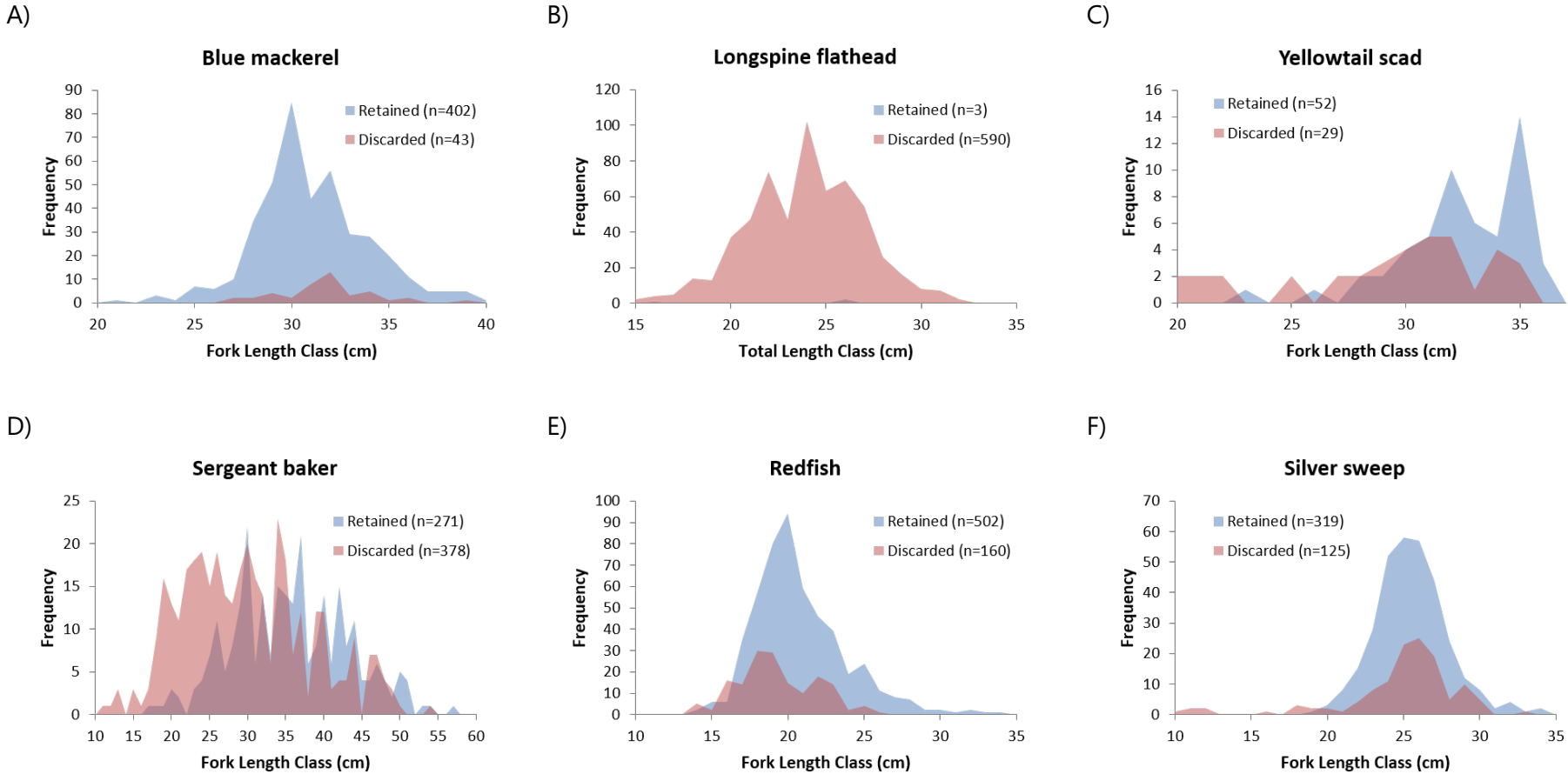
Species	No. caught	No. measured	% measured
Bluespotted Flathead	1537	1519	98.8
Blue Mackerel	1199	445	37.1
Snapper	1153	1111	96.4
Longspine Flathead	861	593	68.9
Yellowtail Scad	858	90	10.5
Grey Morwong	795	795	100.0
Sergeant Baker	722	649	89.9
Redfish	684	662	96.8
Silver Sweep	570	444	77.9
Ocean Jacket	456	445	97.6
Reef Ocean Perch	401	263	65.6
Southern Maori Wrasse	389	351	90.2
Yellowtail Kingfish	367	363	98.9
Eastern Red Scorpionfish	250	224	89.6
Eastern Blackspot Pigfish	241	241	100.0
Mado	226	51	22.6
Longfin Pike	133	124	93.2
Tiger Flathead	118	118	100.0
Longfin Perch	114	114	100.0
Eastern School Whiting	93	91	97.8
Marbled Flathead	74	74	100.0
Silver Trevally	71	71	100.0
Eastern Orange Perch	65	49	75.4
Halfbanded Seaperch	58	10	17.2
Sharpfin Barracuda	57	25	43.9
Sixspine LeatherJacket	52	52	100.0
Australian Bonito	48	48	100.0
Teraglin	46	46	100.0
Southern Bluespotted Flathead	39	39	100.0
Banded Seaperch	37	34	91.9
Crimsonband Wrasse	37	36	97.3
Velvet LeatherJacket	21	18	85.7
Red Gurnard	21	20	95.2
Butterfly Perch	20	20	100.0
Eastern Fiddler Ray	18	13	72.2
Three-barred Porcupinefish	16	15	93.8
Barracouta	15	11	73.3
Pearl Perch	14	14	100.0

Species	No. caught	No. measured	% measured
Giant Cuttlefish	11	7	63.6
Blackbanded Seaperch	11	9	81.8
Bluestriped Goatfish	11	11	100.0
Eastern Wirrah	10	7	70.0
Tarwhine	10	10	100.0
LeatherJacket (undifferentiated)	10	10	100.0
Starry Toado	9	0	0.0
Gummy Shark	9	8	88.9
Jack Mackerel	9	9	100.0
Smooth Golden Toadfish	8	1	12.5
Latchet	7	7	100.0
Mulloway	6	6	100.0
Red Morwong	5	5	100.0
Port Jackson Shark	5	5	100.0
Toadfishes unspecified	5	1	20.0
Rough LeatherJacket	4	4	100.0
Sea Mullet	4	4	100.0
Surf Bream	4	4	100.0
Jackass Morwong	4	4	100.0
Tailor	4	4	100.0
Gould's Squid	4	2	50.0
Skipjack Tuna	4	4	100.0
Eastern Shovelnose Ray	3	1	33.3
Blacksaddle Goatfish	3	3	100.0
Dolphinfish	3	3	100.0
Smalltooth Flounder	2	2	100.0
John Dory	2	2	100.0
Opah	2	0	0.0
Common Jack Mackerel	2	2	100.0
Shortfin Mako	2	2	100.0
Dusky Flathead	2	2	100.0
Mosaic LeatherJacket	2	2	100.0
Blind Shark	2	0	0.0
Samson Fish	2	2	100.0
Eastern Sea Garfish	2	0	0.0
Pink Ling	1	1	100.0
Frigate Mackerel	1	1	100.0
School Shark	1	1	100.0
Shark Sucker	1	1	100.0
Barred Grubfish	1	1	100.0
Largetooth Beardie	1	1	100.0
Striped Marlin	1	1	100.0
Eastern Blue Groper	1	1	100.0
Northern Sand Flathead	1	1	100.0
Largetooth Flounder	1	1	100.0

Species	No. caught	No. measured	% measured
Onespot Puller	1	0	0.0
Eastern Frogfish	1	1	100.0
Yellowfin LeatherJacket	1	1	100.0
Blue Warehou	1	1	100.0
Amberjack	1	1	100.0
Bearded Rock Cod	1	1	100.0
Bronze Whaler	1	1	100.0
Australian Blackspot Catshark	1	1	100.0
Fan-bellied LeatherJacket	1	1	100.0
Bigscale Bullseye	1	1	100.0
Thetis Fish	1	1	100.0
Goldspot Pigfish	1	1	100.0
Octopus	1	0	0.0
Mackerel Tuna	1	1	100.0
Variegated Catshark	1	1	100.0
Broad Squid	1	0	0.0
White-ear	1	1	100.0
Southern Sand Flathead	1	1	100.0
Bar Rockcod	1	1	100.0
Spangled Emperor	1	1	100.0
Rock Ling	1	1	100.0
Splendid Perch	1	1	100.0
<b>Total</b>	<b>12091</b>	<b>9460</b>	<b>78.2</b>

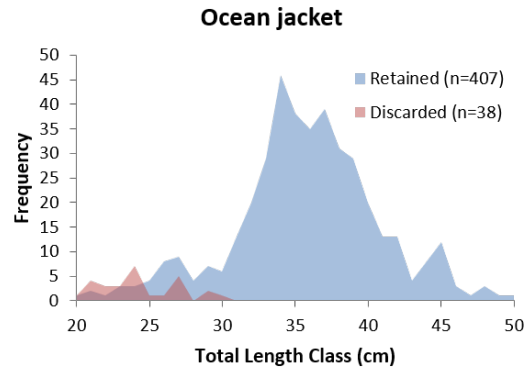
### Appendix 5.6

Length frequency distributions of the retained (blue) and discarded (red) catch for additional species recorded by on-board observers (in sufficient numbers for presentation) from charter vessels in FRZs 6-9 (Figure 1) between October 2017 and September 2018 in the Observer Region.

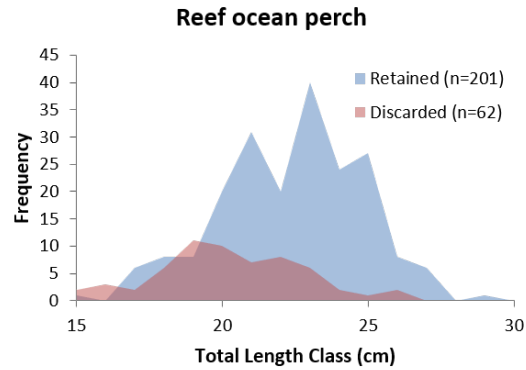


Appendix 5.6 continued

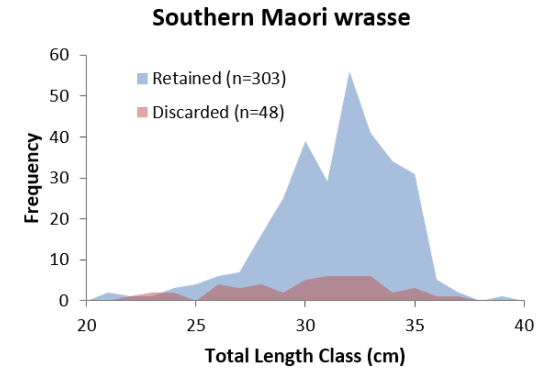
G)



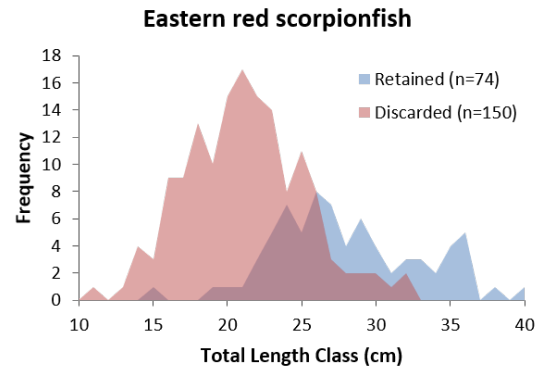
H)



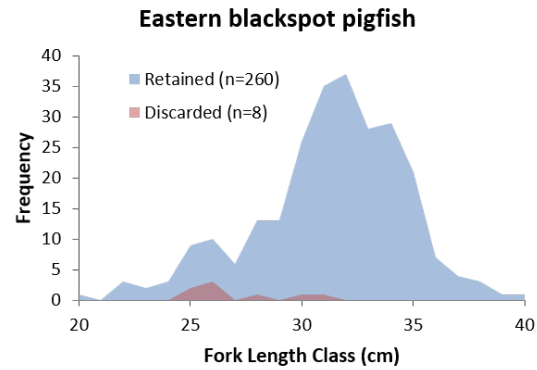
I)



J)



K)



## Appendix 5.7

The number of individuals of all wildlife recorded by on-board observers from charter vessels in FRZs 6-9 (Figure 1) between October 2017 and September 2018 in the Observer Region. Details of specific observations for seabirds and marine mammals can be found in Tables 9 & 10, respectively.

Taxon	Individuals observed
<b>Mammalia (Mammals)</b>	<b>446</b>
<b>Balaenopteridae (Rorquals)</b>	<b>35</b>
Humpback Whale <i>Megaptera novaeangliae</i>	35
<b>Dephinidae (Oceanic Dolphins)</b>	<b>356</b>
Common Dolphin <i>Delphinus delphis</i>	93
Bottlenose Dolphin <i>Tursiops truncatus</i>	34
Pygmy Killer Whale <i>Feresa attenuata</i>	15
Unidentified Dolphin	214
<b>Otariidae (Eared Seals)</b>	<b>55</b>
Australian Fur Seal <i>Arctocephalus pusillus dorsiferus</i>	1
Unidentified Seal	54
<b>Aves (Birds)</b>	<b>3,183</b>
<b>Diomedeidae (Albatrosses)</b>	<b>254</b>
Black-browed Albatross <i>Thalassarche melanophrys</i>	28
Shy Albatross <i>T. cauta</i>	5
Unidentified Albatross	221
<b>Laridae (Gulls, Skuas, Noddies &amp; Terns)</b>	<b>301</b>
Great Skua <i>Catharacta Skua</i>	9
Silver Gull <i>Chroicocephalus novaehollandiae</i>	247
Crested Tern <i>Sterna bergii</i>	26
Unidentified Tern	19
<b>Pelecanidae (Pelicans)</b>	<b>6</b>
Australian Pelican <i>Pelecanus conspicillatus</i>	1
Unidentified Pelican	5
<b>Phalacrocoracidae (Cormorants &amp; Shags)</b>	<b>4</b>
Unidentified Cormorant	4
<b>Procellariidae (Petrels, Prions &amp; Shearwaters)</b>	<b>2,402</b>
Fairy Prion <i>Pachyptila turtur</i>	4
Fluttering Shearwater <i>Puffinus gavia</i>	1

<b>Taxon</b>	<b>Individuals observed</b>
Unidentified Shearwater	2,397
<b>Spheniscidae (Penguins)</b>	<b>2</b>
Little Penguin <i>Eudyptula minor</i>	2
<b>Sulidae (Gannets &amp; Boobies)</b>	<b>58</b>
Australian Gannet <i>Morus serrator</i>	18
Unidentified Gannets and Boobies	40
Unidentified Birds	156
<b>Reptilia (Reptiles)</b>	<b>1</b>
<b>Cheloniidae (Sea Turtles)</b>	<b>1</b>
Green Turtle <i>Chelonia mydas</i>	1
<b>Elasmonbrachii (Sharks, Skates &amp; Rays)</b>	<b>4</b>
<b>Lamnidae (Mackerel Sharks)</b>	<b>3</b>
Shortfin Mako Shark <i>Isurus oxyrinchus</i>	3
<b>Carcharinidae (Whaler Sharks)</b>	<b>1</b>
Grey Nurse Shark <i>Carcharias taurus</i>	1
<b>Teleostei (Bony Fishes)</b>	<b>1</b>
<b>Molidae (Ocean Sunfishes)</b>	<b>1</b>
Ocean Sunfish <i>Mola mola</i>	1
<b>Total</b>	<b>3,635</b>

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