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Fish bycatch in New Zealand tuna longline fisheries 2010–11 to 2014–15

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We used Observer Programme data to assess the species composition of the New Zealand tuna longline fisheries, and to estimate the catch per unit effort (CPUE) and the number of fish caught by observed vessels during the 2010–11 to 2014−15 fishing years. Data were summarised by fishing fleet (Foreign Charter vessels and New Zealand Domestic vessels), and geographical region (north and south). For the main non-target species, we used observer data to estimate the proportions of fish that were alive and dead on recovery, and the proportions that were retained and discarded. The size distribution, sex composition, and maturity composition of blue, porbeagle, and mako sharks and Ray's bream were determined.

The total number of hooks set by longline vessels fishing in the New Zealand Exclusive Economic Zone (EEZ) and adjacent waters declined from a maximum of 27 million in 1980–81 to less than 4 million in the mid-1990s when foreign licensed vessels ceased fishing in New Zealand. The Domestic fishing fleet has been dominant since 1993–94 and the number of hooks set by this fleet increased rapidly in the late 1990s to a peak of almost 10 million in 2001–02. Total effort dropped substantially from 2002–03 onwards, and reached an all-time low of 2.2 million hooks in 2007–08, of which 1.7 million hooks were set by the Domestic fleet. Effort then increased to around 3 million hooks in 2008–09 and 2009–10. A slight increase was seen in the total effort in 2010–11 with a total of 3.2 million hooks set, but since then there has been a gradual decline in both total hooks set and hooks set by the Domestic vessels. The total number of hooks set in 2014–15 was 2.4 million, with nearly 1.8 million hooks set by the Domestic fleet.

Observer coverage on Charter vessels continued to be high, averaging 80% of hooks observed over the past five fishing years. Domestic coverage was 6–7% during that time, except in 2012–13 when it fell to 3%.

From 2010−11 to 2014–15, 137 492 fish and invertebrates from at least 60 species or species groups were observed. Most species were rarely observed, with only 37 species (or species groups) exceeding 100 observations between 1988–89 and 2010–15. The most commonly observed species over all years were blue shark, Ray's bream, and albacore tuna, with these three making up nearly 70% of the catch by numbers. Blue shark and Ray's bream were the most abundant and second most abundant species respectively in each of the five fishing years 2010–11 to 2014−15, except in 2013−14 when the observed catch of southern bluefin tuna was higher than that of Ray's bream. Other important non-target species were albacore, lancetfish, porbeagle shark, deepwater dogfish, dealfish, mako shark, moonfish, escolar, sunfish, and butterfly tuna. The catch composition varied with fleet and region fished. Over the whole time series (1988–89 to 2014–15), the three main target species (southern bluefin tuna, bigeye tuna, and swordfish) made up 11.1% of the catch by number, with the rest being bycatch.

Fishing effort and observed catches were stratified by fleet (Charter and Domestic) and region (North and South) for estimating CPUE and numbers caught. For most species there were large differences in CPUE between fleets and between regions. CPUE could be reliably determined only for the Charter fleet and there were differences in temporal and spatial fishing patterns in some years. Shorter fishing seasons have coincided with higher CPUE for southern bluefin tuna in the South in the most recent years. There was an increase in CPUE for blue sharks and porbeagle sharks in the South, while CPUE for mako sharks in the South continued to be similar to previous years. Deepwater dogfish CPUE in the South remains relatively high. Ray's bream CPUE increased in 2010–11, has fluctuated since then but remained quite high, while bigscale pomfret catch rates have declined. Reported and estimated catches are presented and compared.

Length frequency data combined with length-at-maturity information indicated that most blue, porbeagle, and mako sharks caught in New Zealand fishery waters were immature. Greater proportions of mature

male blue sharks were found in the North while few were mature in the South. Most female Ray's bream were probably mature in 2010–11 to 2014–15.

In 2010–11 to 2014–15, most sharks were alive when landed or brought to the vessel, with the highest percentage alive for blue sharks, pelagic rays and deepwater dogfish, and the lowest for porbeagle sharks. Percentage alive varied with fleet and region, and tended to be lower in the North than in the South. Most of the albacore, swordfish and butterfly tuna were landed dead. There were large fleet differences for these three species. Few yellowfin tuna and striped marlin were caught and most were alive. Most Ray's bream, moonfish, bigscale pomfret, escolar, oilfish, rudderfish, and almost all sunfish were alive when recovered. Most dealfish and lancetfish were recovered dead, with variation between years and fleets.

Prior to the introduction of the ban on shark finning in October 2014, most blue, porbeagle, mako, and school sharks were processed in some way, either being finned or retained for their flesh, but there were significant fleet differences. In 2014–15, most of these sharks were discarded by both fleets, except for more than half of mako sharks that were retained for the flesh by the Charter fleet and a third of porbeagle sharks kept by the Domestic fleet. Most albacore, swordfish, moonfish, and Ray's bream were retained by both fleets. Few yellowfin tuna were caught, all on Domestic vessels, and all were kept. Charter vessels retained most of their butterfly tuna, while the proportion retained by the Domestic fleet varied from year to year. All 38 observed striped marlin were returned to the sea. Domestic vessels retained more of the non-quota fish bycatch species than Charter vessels did. Domestic vessels retained most escolar and oilfish, while practices of Charter vessels varied from year to year. Charter vessels retained most bigscale pomfret overall, and discarded rudderfish, and while less were observed on Domestic vessels, they were kept. Dealfish, lancetfish, sunfish, and deepwater dogfish were almost all discarded by both fleets.

Few conclusions could be drawn from the CPUE and catch data from the Domestic fleet due to low observer coverage rates that are not spatially and temporally representative of fishing effort, especially in southern New Zealand waters. We recommend that observer coverage of the Domestic fleet be increased and that efforts are made to ensure that the coverage is representative of the spatial and temporal distribution of the fishing effort in order to better quantify the catch.

1. INTRODUCTION

The New Zealand longline fishery comprises about 40 New Zealand flagged vessels targeting bigeye and southern bluefin tuna and swordfish, and a small Foreign Charter fleet (4 vessels) targeting southern bluefin tuna. Fisheries New Zealand (formerly MPI, Ministry of Fisheries) is responsible for managing all New Zealand fisheries, including target and non-target fish species. To fulfil this responsibility, it is necessary to obtain regular estimates of the catch and catch rates of non-target fish species taken as bycatch during normal fishing operations. Estimates of target and non-target discard quantities are also required. These quantities provide an estimate of the level of removals from the population.

Many of the fish bycatch species taken in longline fisheries are highly migratory species (HMS) which are managed under Regional Fisheries Management Organisations (RFMOs). New Zealand has an obligation to provide estimates of the numbers of non-target fish species taken in the tuna longline fishery as part of its contribution to the Ecologically Related Species (ERS) Working Group under the Convention for the Conservation of Southern Bluefin Tuna (CCSBT), and to the Western and Central Pacific Fisheries Commission (WCPFC).

New Zealand developed a National Plan of Action (NPOA) on sharks, as part of the Food and Agriculture Organisation of the United Nations (FAO) initiated International Plan of Action for the Conservation and Management of Sharks (IPOA–Sharks), to improve the assessment and management of shark fisheries worldwide. New Zealand's NPOA was approved in 2008 (Anon. 2008) and reviewed and revised in 2013 (Ministry for Primary Industries 2013). Information on the shark bycatch from New Zealand tuna longline fisheries is crucial ongoing input into the NPOA.

Tuna longline fishing is often considered a highly specific, environmentally sound fishing technique compared with other methods (e.g., trawling and pelagic driftnet fishing). However, for some target species, regions, and seasons, bycatch levels can be high (Griggs & Baird 2013). In the New Zealand Exclusive Economic Zone (EEZ) and adjacent waters more than 70 non-target fish species have been recorded by scientific observers in the bigeye tuna, southern bluefin tuna, and swordfish fisheries. Many species were rarely observed, with only 37 species (or species groups) exceeding 100 observations between 1988–89 and 2009–10 (Griggs & Baird 2013). The most commonly observed species over all years (1988–89 and 2009–10) were blue shark (*Prionace glauca*), albacore tuna (*Thunnus alalunga*), and Ray's bream (*Brama brama*), with these three species making up 67% of the catch by numbers.

Oceanic sharks are an important bycatch throughout the Pacific Ocean, and the demand for shark fins in Asia has led to an increase in their catch over the last few decades (Bonfil 1994, Hayes 1996, Stevens 2000). More recently, bans on shark finning in many countries have resulted in many sharks being discarded rather than finned, but the post-release mortality rate of such discarded sharks is poorly understood. Oceanic sharks generally have low reproductive rates, long life spans, and possibly slow growth, and they segregate by size and sex (Cortés 2008, Dulvy et al. 2008). These features make them vulnerable to overfishing (Cortés 2008, Dulvy et al. 2008, Cortés et al. 2010). Shark bycatch on tuna longlines in temperate South Pacific waters has been analysed in the Australian Fisheries Zone (Stevens 1992, Stevens & Wayte 1999), and in New Zealand waters (Francis et al. 1999, 2000, 2001, 2004, Ayers et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013). The collection by scientific observers of improved information on longline catch rates, and species-, size- and sex-composition of catches, has enabled the calculation of a series of stock status indicators for blue, porbeagle and mako sharks (Clarke et al. 2013, Francis et al. 2014, Francis & Large 2017), providing insight into their response to fishing pressure. At a larger spatial scale, the population status of porbeagle shark in its entire Southern Hemisphere range has also been assessed recently (Hoyle et al. 2017).

Billfish species are commonly caught in longline fisheries targeting tunas. The species caught in tuna longline fisheries vary with region and fishery. Blue marlin are the most commonly reported billfish species in the western tropical Pacific longline fishery (Bailey et al. 1996, Molony 2005). In New Zealand, swordfish are targeted, striped marlin are occasionally taken, and other marlins are rarely caught (Griggs & Baird 2013). Only swordfish can be retained and this species is managed under the Quota Management System (QMS). Within the EEZ, commercial fishers are obliged by regulation to release all billfish, except

swordfish, whether the fish is alive or dead upon capture. This regulation includes a provision that live billfish should be tagged if possible, and tagged marlin recaptured by commercial fishers are allowed to be landed and brought to port for scientific study (Holdsworth & Saul 2017).

In addition to tunas, billfishes, and sharks, a number of other bony fishes are caught in pelagic longline fisheries. Most of these fish bycatch species are highly migratory and many of the species commonly caught in New Zealand waters are reported in Australian catches (Stobutzki et al. 2006) and in the Western Central Pacific Ocean and beyond (Bailey et al. 1996, Clarke et al. 2014, SPC-OFP 2010). Catch data for these species are often limited due to a number of factors including difficulties of species identification, low commercial value, under-reporting, and frequent discarding.

Less than 10% of the annual Domestic tuna longline fishing effort in the New Zealand fishery has been observed, and this is the only independent source of information on the scale of bycatch and discarding in the fishery.

In 2003 a new Tuna Longlining Catch Effort Return (TLCER) form was introduced, and fishers were required to record discarded fish. In October 2004, several tuna and longline-caught bycatch species were introduced into the Quota Management System (QMS), namely southern bluefin tuna, Pacific bluefin tuna, bigeye tuna, swordfish, blue shark, porbeagle shark, mako shark, moonfish, and Ray's bream.

NIWA has reported the results of previous Ministry of Fisheries and MPI projects that investigated the bycatch of the New Zealand tuna longline fleet (Francis et al. 1999, 2000, 2004, Ayers et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013). The present study updates and extends those previous analyses for five more years which extend the time series to 27 years.

This report addresses the objective: To estimate the catches, catch rates, and discards of non-target fish in tuna longline fisheries data from the Observer Programme and commercial fishing returns for the 2010–11 to 2014–15 fishing years, and to describe bycatch trends in tuna longline fisheries using data from this project and the results of previous similar projects.

2. METHODS

2.1 Data sources and data treatment

Tuna longline vessels submit information on their fish catch to Fisheries New Zealand on TLCER forms, and a small amount has historically been reported on Catch Effort Landing Returns (CELRs). These returns underestimate bycatch because much of it is discarded at sea and not recorded (Francis et al. 2000, Griggs & Baird 2013). The newer TLCER form includes a section for reporting of discards.

More reliable data on the amount of bycatch are available from the Fisheries New Zealand Observer Programme, in which observers on board commercial vessels identify and count all of the bycatch during the time they are observing. Observers also record whether fish are alive or dead on recovery, their subsequent fate, and lengths, weights, and sex of individual fish. Observer data can therefore provide a good independent source of information on the scale of bycatch and discarding in the fishery. We used observer data to determine which non-target fish species are caught, and to estimate unstandardised CPUE, the total number of fish caught, the proportion of the catch alive and dead on recovery, and the proportion of fish processed and discarded.

New Zealand tuna longline fishery data for the 2010–11 to 2014–15 fishing years were obtained from two sources: commercial fishing records and observer data. Observer data were extracted from the centralised observer database (*cod*), and groomed commercial surface longline data from TLCER and CELR forms were extracted from the database *tuna*.

Further grooming was carried out before analysis as follows.

- Data were checked to ensure that there were no records with missing hook number or very low hook numbers (less than 100).
- Records with no set position (latitude and longitude) were compared with sets on adjacent days for that vessel and assigned to region North or South (see below) as appropriate.

Five duplicate sets were deleted from the 2010–11 to 2014–15 dataset. Corrections were made to twenty-eight records with low or missing hook numbers, based on comparison with adjacent sets or reversal of transposed hook and float numbers.

Commercial and observer data prior to 2010–11 were obtained from the studies by Francis et al. (1999, 2000, 2004), Ayers et al. (2004), Griggs et al. (2007, 2008), and Griggs & Baird 2013.

Data were stratified by fishing year, fleet, and region for analysis. Three fleets have routinely fished in New Zealand waters: foreign licensed vessels (mainly Japanese but also some Korean), foreign vessels chartered by New Zealand companies, and New Zealand Domestic owner-operated vessels. Foreign licensed vessels have not fished in New Zealand waters since 1995. Foreign licensed and chartered vessels have been grouped together for analysis because they fished similar regions with similar gear (Francis et al. 2004, Ayers et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013), and this grouping is used to present a time series of trends in fishing effort. One large New Zealand Domestic vessel fished with this fleet in the same region and with the same methods up until 2004 and was included in this group. Australian Charter vessels fished in New Zealand only during 2005–06 and 2006–07 and were also treated as a separate fourth fleet due to differences in their fishing methods and region fished.

From 2010–11 to 2014–15, only two surface longline fleets fished in New Zealand waters: the Japanese Charter fleet and the New Zealand Domestic fleet, and these fleets are referred to as "Charter" and "Domestic" respectively in this report.

Two geographic strata are used: "North" and "South". The North region is defined as sets that began north of latitude 39.5° S on the west coast and north of 43.75° S on east coast, these being the same boundaries as used previously by Ayers et al. (2004). The South region has previously been subdivided into south-west and south-east regions (Ayers et al. 2004), but no sets have been made in the south-east region since

2003–04, so this separation was not made. Thirty three sets outside the New Zealand EEZ in the North region were included, making up 0.3% of the sets in the North.

As with previous years (Francis et al. 2004, Ayers et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013), some species were grouped together. "Deepwater dogfish" included those recorded as DWD (species unknown), Owston's dogfish (*Centroscymnus owstonii*), leafscale gulper shark (*Centrophorus squamosus*), seal shark (*Dalatias licha*), longnose velvet dogfish (*Centroselachus crepidater*), lantern shark (*Etmopterus* spp.), cookie-cutter shark (*Isistius brasiliensis*), and spiny dogfish (*Squalus acanthias*).

Shortnose and longnose lancetfish, *Alepisaurus ferox* and *A. brevirostris*, were combined. Deepwater dogfish and lancetfish were usually cut off the lines and observers often did not have the opportunity to identify them to the species level. Hapuku and bass (*Polyprion oxygeneios* and *P. americanus*) were combined as they were often not separated to the species level for reporting.

2.2 Estimation of catch per unit effort and total numbers

CPUE was expressed as the number of fish observed caught per 1000 hooks set. The basic unit of sampling was an individual set; a set i has information on the number of fish caught (ci) and the amount of effort expended (u_i the number of hooks). All hooks on a set may not be observed. In the calculation of CPUE we used the estimated number of observed hooks; this estimate was derived from the proportion of the haul observed (based on the haul duration and the time recorded as unobserved in the observer events logs) multiplied by the number of hooks set.

For the main catch species, CPUE values ($\hat{y}$) were calculated for each stratum (fishing year, fleet and region) in 2010–11 to 2014–15 by use of a ratio of means estimator (see Bradford 2002, Ayers et al. 2004):

$$\hat{y} = \frac{\sum_{i=1}^{n} c_i / n}{\sum_{i=1}^{n} u_i / n} = \frac{\sum_{i=1}^{n} c_i}{\sum_{i=1}^{n} u_i}$$

where n is the number of observed sets.

Ayers et al. (2004) compared the use of two analytical and one bootstrap variance estimators and found the difference was negligible. These authors reported estimates of variance based on the sample means, which have better statistical properties (Thompson 1992):

$$\hat{\text{var}}(\hat{y}) = \frac{1}{\mu_u^2}\left(\frac{N-n}{N}\right)\frac{s_{\hat{y}}^2}{n}$$

$$\text{where} \quad s_{\hat{y}}^2 = \frac{1}{n-1}\sum_{i=1}^{n}(c_i - \hat{y}u_i)^2$$

and μ_u is the population mean of the effort variable. There has been some indication that the estimator $\hat{\text{var}}(\hat{y})$ is correlated with the mean of the effort variable ($\bar{u}$). An adjusted estimator,

$$\tilde{\text{var}}(\hat{y}) = \left(\frac{\mu_u}{\bar{u}}\right)^2 \hat{\text{var}}(\hat{y})$$

has been suggested to alleviate this problem (Thompson 1992). This was used in the present study to provide analytical estimates of confidence intervals.

The total number of each species caught in each stratum was estimated by scaling up the CPUE to the total number of hooks set (N): thus, $\hat{T} = N\hat{y}$. These numbers were then summed across strata to give total annual catch estimates. The estimated variance of these totals was given by $\hat{\text{var}}(\hat{T}) = N^2\,\tilde{\text{var}}(\hat{y})$.

CPUE values are provided below for all strata having more than 10 sets and more than 2% observer coverage. These filters were applied to avoid presenting estimated catches that were based on grossly

inadequate observer coverage. Estimated catches are also provided if the strata that passed the above CPUE filters accounted for more than 85% of the hooks set in that year. The years that were excluded were as follows: 1988–89, 1990–91, 1993–94, 1994–95, 1998–99, 1999–00, 2001–02, 2002–03, and 2012–13.

CPUE values and catch estimates are provided for 2010–11 to 2014–15 and added to the time series for 1988–89 to 2009–10 (Francis et al. 2004, Ayers et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013). Catch numbers estimated from observer data were compared with catch numbers reported by commercial fishers on their TLCER forms.

2.3 Status of fish on recovery and subsequent treatment

The status of the fish at time of recovery (i.e., retrieval to the side of the vessel) and the subsequent treatment (i.e., whether processed or discarded), were analysed from observer data for 2010–11 to 2014–15 for each of the main non-target species plus swordfish. Fish status was recorded as alive, dead, killed by crew, or unobserved. Fish recorded as killed by crew were treated as alive on recovery. Fish treatment was recorded as retained, finned, discarded, lost, or unobserved. Retained and finned fish were grouped as fish that were processed in some way, whereas the discarded and lost fish were categorised as not processed.

During 2015, observers began to record a more detailed 'life status on landing' and a 'fate' code for its subsequent status after a specimen is landed or brought alongside the vessel. Life status on landing is recorded as alive, dead, or unobserved, but with additional information, where possible, on whether a live specimen was uninjured or injured, and if injured if it can be expected to survive or not. The fate code is a processed state for fish that are retained, or a life status on release for non-retained specimens using the same criteria as for life status on landing. Life status codes and fate codes used by observers are shown in Appendix 1.

2.4 Length frequency analysis

Observer length data were extracted for blue, mako, and porbeagle sharks, Ray's bream, and striped marlin, and length frequency distributions were summarised by sex and region.

3. RESULTS

3.1 Fishing effort and observer coverage

The New Zealand tuna longline fishery was dominated by the foreign licensed fleet during the 1980s (Francis et al. 2004). Most effort came from Japanese vessels, but Korean vessels were also involved. The total number of hooks set declined from a maximum of 27 million in 1980–81 to less than 4 million in the mid-1990s when the foreign licensed vessels ceased fishing in New Zealand (Figure 1).

Chartered Japanese vessels fished in New Zealand waters mainly from 1986 onwards and their effort (including effort by one large New Zealand vessel) peaked at 2.2 million hooks during 1990–91. During the past 20 years Charter effort has been lower, averaging 0.9 million hooks annually. The Philippine fleet fished under charter arrangements in 2002–03 only, setting almost 1 million hooks. Australian vessels fished in New Zealand waters under charter arrangements, contributing 16 550 hooks in 2005–06 (0.45% of the total set in that year) and 72 160 hooks in the 2006–07 fishing year (1.9% of the total set).

The Domestic fleet has increased its effort since 1991–92 and has been dominant since 1993–94 (Table 1, Figure 1). Domestic effort peaked at almost 10 million hooks in 2001–02, producing a second fishery peak of almost 11 million total hooks. Domestic and total effort have dropped substantially since then. The introduction of pelagic species into the QMS in October 2004 resulted in a change in fishing practices and a reduction in the number of Domestic boats in the fishery, but Domestic effort had been declining since 2002–03. In 2007–08, total effort dropped to an all-time low of 2.2 million hooks, of which 1.7 million hooks were set by the Domestic fleet. Effort then increased to around 3 million in 2008–09 and then gradually declined to 2.4 million in 2014–15, with nearly 1.8 million hooks set by the Domestic fleet, close to the all-time low in 2007–08.

The numbers of observed trips and sets, observed hooks and reported hooks by fleet and the percentage of reported hooks on CELR forms are shown in Table 1. Use of CELR forms for reporting longline fishing has ceased. The last use of CELR forms on longline vessels was in 2005–06.

Observed hooks as a percentage of those set by the fishery are shown in Table 2, and by fleet and region in Figure 2, for all years. Observer coverage on Charter vessels continued to be high, at 74−84% over the most recent five fishing years. Domestic coverage over the last five fishing years was over 6%, except in 2012–13 when the coverage was 3%, and over the past nine years appears to be more spatially representative than in previous years.

The percentages of hooks observed per set during 2010–11 to 2014–15 are shown in Table 3. Most Domestic sets were fully observed, but this was not possible on Charter vessels where hauls often exceeded 12 hours and observers needed to take breaks. Most (66%) sets on Charter vessels were in the range 70–89% observed. The numbers of reported sets and hooks, and the percentages observed, are shown for North and South regions by fleet and fishing year in Table 4.

Fishing positions of reported and observed sets in 2010–11 to 2014–15 are shown in Figure 3. In previous years, the Domestic fleet fished mainly in the North and the Foreign and Charter vessels fished predominantly in the South (Ayers et al. 2004, Francis et al. 2004, Griggs et al. 2007, 2008). This trend continued during 2006–07, and then changed during the next three years, particularly for the Charter vessels. Up until 2006–07 Japanese vessels fished an extensive range of the West Coast of the South Island (WCSI) over a duration of 3–3.5 months, then during 2007–08, 2008–09, and 2009–10 fishing was confined to a smaller part of the southern WCSI west of Fiordland and the fishing season was much shorter than in previous years (Griggs & Baird 2013). During 2010–11, the Japanese Charter fleet fished off the WCSI, again west of Fiordland, then during 2011–12 to 2014–15 they fished a more extensive range off the West Coast from Fiordland north. A small number of sets were also made in the far northern region near North Cape targeting bigeye tuna (Figure 3).

In 2010–11, 6% of Domestic sets were in the South region, increasing to 20–24% during 2011–12 to 2014–15. During 2010–11 to 2014–15, most of the sets in the North were concentrated on the East Coast

and targeted bigeye tuna, southern bluefin tuna, swordfish, and Pacific bluefin tuna, while most of the sets in the South were in a fairly concentrated area off central WCSI where they mainly targeted southern bluefin tuna with some sets for swordfish (Figure 3).

The duration of the fishing season for the Charter fleet was from late April/early May to mid-late June (Figure 4). Domestic vessels fished for a variety of target species year round, but with most effort between February and August (Figure 4).

A comparison of the spatial distributions of commercial and observed sets for the past 15 years is shown in Figures 5 and 6. Observer coverage of the Charter fleet represented the spatial distribution of the fishery extremely well in 2010–11 to 2014–15 (Figures 3, 5, and 6), because every vessel carried an observer. Coverage of the Domestic fleet was better than in earlier years, although a bit sparse, especially in 2012–13 when there was only 3% observer coverage. There was no coverage of the Domestic effort in the South in 2010–11 and very little in 2012–13. Observer coverage of the Charter fleet represented the temporal distribution of the fishery well but Domestic coverage did not adequately represent effort in many months (Figures 4 and 7).

3.2 Species composition

Between 2010–11 and 2014–15, 137 492 fish and invertebrates from at least 60 species were observed (Appendix 2). Non-fish bycatch (seabirds, marine mammals, and turtles) were excluded from this analysis. The most commonly observed species since 1988–89 were blue shark, Ray's bream and albacore tuna, which constituted nearly 70% of the catch by numbers (Appendix 2). Most species were rarely observed, with only 37 species (or species groups) exceeding 100 recorded fish since 1988–89.

Observed catches by fleet and region in 2010–11 to 2014–15 are shown in Table 5. These data provide a useful within-stratum comparison of relative species abundance, but should not be compared among strata because of the different numbers of observed hooks in each stratum.

In the five year period 2010–11 to 2014–15 blue shark was the most abundant species in the observed catches, followed by Ray's bream (Appendix 2). These two species were also the two most abundant species observed in each of the five fishing years, except 2013–14 when the observed catch of southern bluefin tuna was higher than Ray's bream. The next most abundant species varied from year to year, but over the five year period combined these were southern bluefin tuna, albacore, lancetfish, porbeagle shark, swordfish, deepwater dogfish, dealfish, mako shark, moonfish, escolar, sunfish, bigeye tuna, butterfly tuna, and pelagic stingray.

Observed catches of rudderfish, bigscale pomfret, oilfish, and school shark, and were next highest, but had in earlier years been in the top 15 most abundant species, and were comparatively less abundant (Ayers et al. 2004, Francis et al. 2004, Griggs et al. 2007, 2008). A difference in trends compared with earlier years is that southern bluefin tuna was in the top three most abundant observed species in the four most recent years, 2011–12 to 2014–15.

Most (99.6%) of the deepwater dogfish identified to species were Owston's dogfish. There were 780 unidentified fish observed in 2010–11 to 2014–15. Most of these were cut off the line at the side of the vessel or lost and not seen by the observer.

The catch varied with region and fleet. The Charter vessels fishing in the South caught mainly blue shark, Ray's bream and southern bluefin tuna, with smaller amounts of deepwater dogfish, dealfish, albacore tuna, porbeagle shark, and bigscale pomfret. The Charter fleet fished fifteen sets in the North during 2010–11 to 2012–13 and caught mainly blue shark, albacore and escolar. The Domestic fleet caught mainly blue shark and albacore, followed by lancetfish, southern bluefin tuna, Ray's bream, swordfish, porbeagle and mako sharks in the North. Domestic vessels were observed in the South in all years except 2010–11, and caught mainly blue shark, followed by southern bluefin tuna, and Ray's bream (Table 5).

3.3 Catch per unit effort

CPUE estimates were calculated for each fleet and region stratum in which 10 or more sets were observed and at least 2% of the hooks were observed. The number of hooks and sets used in the CPUE calculations are shown in Table 4. CPUE estimates were calculated by species for each fleet and region in 2010–11 to 2014–15 and added to the time series for 1988–89 to 2009–10 (Griggs & Baird 2013) and these are shown in Figure 8.

The CPUE results from the Domestic fleet should be interpreted with caution due to the lower observer coverage of this fleet. CPUE estimates for the Charter fleet can be considered reliable from 1992–93 onwards (Griggs et al. 2007). Charter vessels fished in the North region in three of the last five fishing years, but there were few sets in two of these years, so we do not interpret Charter North trends. Trends in the Charter South CPUE are affected by spatial and temporal variation of the fishing effort.

Some trends of the Charter South fleet during 2010−11 to 2014–15:

- CPUE of blue sharks and porbeagle sharks showed some increase in the South
- CPUE of mako sharks continued to be similar in the South to previous years
- Increase of CPUE for deepwater dogfish in the South to a 2012–13 peak followed by a decrease
- CPUE has remained high for southern bluefin tuna in the South
- Ray's bream South CPUE increased in 2010−11 and has fluctuated since then but remained quite high
- Bigscale pomfret catch rates have declined
- Decrease in CPUE of dealfish in South in 2010−11 followed by a slow increase.

Over the full time-series the following trends were apparent:

- After a peak in 1994–95, blue shark CPUE in the North dropped, but has been rising again for the last decade in both regions
- CPUE of mako sharks was higher in the North than the South, and is higher now in the North than it was in the early 2000s
- Porbeagle CPUE in the Charter South stratum declined in the late 1990s and has remained low. Domestic vessels have higher but quite variable CPUE in both regions
- CPUE of school sharks was higher in the South than the North, and much higher in the South for deepwater dogfish
- CPUE of southern bluefin tuna was usually higher in the South than the North
- Yellowfin tuna CPUE has remained very low
- Catch rates of albacore, bigeye tuna, butterfly tuna, yellowfin tuna, swordfish, striped marlin, and lancetfish were greatest in the North, and for the Domestic fleet
- Moonfish, oilfish, and escolar had higher catch rates in the North, and were caught by both fleets
- Escolar CPUE was variable and high in some years
- CPUE of Ray's bream, bigscale pomfret, and dealfish were highest in the South and for the Charter fleet
- CPUE of Ray's bream remained high over recent years
- Bigscale pomfret reached a peak in 2006−07 and has declined since
- Butterfly tuna CPUE has decreased in the South, and increased in the North over recent years
- Very high CPUEs were recorded for bigeye tuna in 2006−07, and swordfish in 2005−06 and 2006−07, for the Australian fleet in the North.

3.4 Total numbers of fish caught

The reported and estimated numbers of fish caught in 2010–11 to 2014–15 were added to the time series generated previously for 1988–89 to 2009–10 (Griggs & Baird 2013) and these are shown in Figure 9.

CELR data were not included because either fish number or fish weight is reported, so the data for fish numbers are incomplete. This will cause a negative bias, especially in the mid 1990s when a significant

proportion of the catch was reported on CELR forms (see Table 1). CELR forms have not been used since 2005–06, so the recent numbers will not be affected by this.

Trends during 2010–11 to 2014–15:

- Reported catches of blue, mako, and porbeagle sharks continued to increase slowly until 2010–11 or 2011–12, and then declined.
- Deepwater dogfish catches followed a similar trend with a small peak in 2011–12
- Southern bluefin tuna catches further have increased steadily
- Albacore catches were low over the last nine years
- Yellowfin tuna have declined consistently through the 2000s to extremely low levels, with a slight re-appearance in 2014–15
- Reported catches of butterfly tuna were below estimated catches for the past eleven years suggesting they may be under-reported
- Swordfish catches have remained quite high with some decrease since 2010–11
- Catches of Ray's bream dropped from 2010–11 to 2013–14 and increased in 2014–15
- Bigscale pomfret peaked in 2006–07, and catches since 2010–11 have been very low
- Catches of striped marlin, oilfish and rudderfish have been relatively low over the last ten years.
- Escolar catches decreased from 2010–11 to 2014–15
- Reported dealfish catches increased to the highest level yet in 2008–09 but were well below estimated catches during the 1990s. Reported catches have been variable since 2009–10
- Reported catches of lancetfish were below estimated catches suggesting they were under-reported. Estimated catches have declined in recent years.

Reported catches of each species caught in 2010–11 to 2014–15 are shown in Appendix 3.

3.5 Length-frequency distributions

Observed length frequency distributions of blue, porbeagle, and mako sharks, and Ray's bream by region and sex are shown in Figures 10–13 for fish measured in 2010–11 to 2014–15. Striped marlin is not presented as only one was measured in the five year time period.

Length frequency distributions of blue sharks showed differences in size and sex composition between North and South regions (Figure 10). More blue sharks were measured in the South than in the North. More female blue sharks (64.2% over the five-year period) were caught than males, with a higher proportion of females in the South (71.1% over the five years) than in the North (35.6 %). Based on the length-frequency distributions and approximate median lengths at maturity of 192.5 cm fork length for males and 180 cm for females (Francis & Duffy 2005), most blue sharks were immature (93.5% of males and 92.9% of females, overall). Greater proportions of mature male blue sharks were found in the North (17.7% mature) than in the South (0.4%), while similar proportions of mature females were found in both the North and South (8.4% and 7.0% respectively).

More porbeagles were measured in the South than in the North. Based on length-frequencies and median lengths at maturity of 145 cm FL for males and 175 cm fork length for females (Francis & Duffy 2005), most porbeagle sharks were immature (79.9% of males and 97.7% of females, overall). Proportions by sex were similar in both North and South regions, but sample sizes were often small and the sex ratios in each year and region may be unrepresentative.

Few mako sharks were measured in either region. With median lengths at maturity of 182.5 cm FL for males and 280 cm fork length for females (Francis & Duffy 2005), most mako sharks were immature (76.7% of males and 98.7% of females, overall). Sex ratios in each year and region may be unrepresentative.

Two species of *Brama* occur in New Zealand waters (Ray's bream and Southern Ray's bream (*Brama australis*)), but it is not known if observers are distinguishing the two. It is possible that the length data contain both species. Ray's bream were often kept whole and not sexed. Most were not sexed in 2010–11

to 2013–14 and almost all fish were not sexed in 2014–15. Distributions of measured fish are shown by region and sex, where available and most of these fish were from the South region. North/South distributions are also shown in Figure 13 for all measured fish combined. Differences in the North/South distributions have been shown previously, with South fish being larger, but the distributions for males and females were similar (Griggs & Baird 2013). Female Ray's bream mature at about 43 cm (Francis et al. 2004), and most females were probably mature (77.2% over the five year period). In South region in 2014–15, there were two strong, clear length modes.

3.6 Status of fish on recovery and discards

The percentages of the main non-target species recorded alive or dead, by year, fleet, and region, are shown in Table 6. The top 15 most abundant species in 2010–11 to 2014–15 (combined) are included in this table, along with school shark, bigscale pomfret, oilfish, yellowfin tuna and striped marlin, which have been included in previous bycatch reports (Ayers et al. 2004, Francis et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013). Sunfish and pelagic ray were more abundant during 2010–11 to 2014–15 than seen previously and are included in Table 6.

In 2010–11 to 2014–15, most sharks were alive when landed or brought to the vessel, with the highest percentage alive for blue sharks (92% overall), pelagic rays (97%) and deepwater dogfish (86%), and lowest for porbeagle sharks (63%). Percentage alive varied with fleet and region, and tended to be lower in the North than in the South.

Most of the albacore, swordfish and butterfly tuna were landed dead. There were large fleet differences for these three species. Most of the albacore and swordfish landed by the Charter fleet were landed alive while those landed by the Domestic fleet were dead (Table 6), as seen previously (Griggs et al. 2008, Griggs & Baird 2013). Butterfly tuna showed the same trend but with much lower survival. Few yellowfin tuna and striped marlin were caught and most were alive.

Most Ray's bream, moonfish, bigscale pomfret, escolar, oilfish, rudderfish, and almost all sunfish were alive when recovered, as seen previously (Ayers et al. 2004, Francis et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013). Most dealfish and lancetfish were recovered dead, with variation between years for both species, and also between fleets for lancetfish, where more landed by the Domestic fleets were dead (Table 6).

The number of fish retained (i.e. processed in some way), discarded, and lost or unknown, for each year (2010–11 to 2014–15), fleets combined, are shown in Figure 14. For each year, the upper graph shows the main bycatch species, and the three most abundant species are excluded from the lower graph.

The proportions of each species retained and discarded, by fleet, are shown in Table 7. The previous trend for sharks continued during 2010–11 to 2012–13, with most blue, mako, porbeagle, and school sharks processed in some way. Blue shark and porbeagle shark were mostly finned by the Charter fleet in 2010–11 to 2012–13, mostly discarded in 2013–14, and all porbeagle sharks and almost all blue sharks were discarded in 2014–15. Practices were more variable for Domestic vessels with increasingly higher proportions of blue shark discarded each year, and most porbeagle sharks were discarded particularly in 2014–15. Mako sharks were mostly retained for flesh by Charter vessels, and mostly discarded by Domestic vessels particularly in 2014–15. School shark were mostly retained for their flesh by the Charter vessels during 2010–11 to 2013–14, then most were discarded in 2014–15. Few were caught by the observed Domestic vessels and most were retained for their flesh. Almost all deepwater dogfish and pelagic rays were discarded.

Most albacore and swordfish were retained by both fleets. Few yellowfin tuna were caught, all on Domestic vessels, and all were kept. Charter vessels retained most of their butterfly tuna, while the proportion retained by the Domestic fleet varied from year to year. Over the five-year period Domestic vessels retained nearly 60% of their butterfly tuna. Domestic vessels discarded 37 striped marlin. One

striped marlin was caught by a Charter vessel and it was discarded. Most moonfish and Ray's bream were retained by both the Charter and Domestic fleets.

Domestic vessels retained more of the non-quota fish bycatch species than Charter vessels did. Domestic vessels retained most escolar and oilfish, while Charter vessels discarded them from 2010–11 to 2012–13 and mostly kept them in 2013–14 and 2014–15. Charter vessels retained most bigscale pomfret during 2010–11 to 2013–14, and discarded most in 2014–15. They discarded most of their rudderfish. Few of both species were observed on Domestic vessels, but most were kept. Dealfish, lancetfish and sunfish were almost all discarded by Charter and Domestic vessels.

Life status of discarded fish in 2010–11 to 2014–15 is shown in Table 8. Prior to 2015, observers recorded life status on landing, but did not record life status of fish that were discarded. Most discarded sharks were alive when recovered and could be Sixth Schedule releases. The proportion of live discarded blue, mako and porbeagle sharks was higher for the Charter fleet than the Domestic fleet. Most of the discarded albacore and butterfly tuna were dead on recovery. No yellowfin tuna were discarded.

Overall nearly half of the swordfish, one third of the moonfish and most of the Ray's bream discards were dead, and this varied between fleets. Non-QMS bycatch species are shown in Table 8 as well.

Discarding of some QMS species can be explained by damage, which applies to only a few dead sharks (0.5% blue sharks, 1.6% mako sharks and 2.0% porbeagle sharks), and a higher proportion of swordfish (31.50%), moonfish (40.9%) and Ray's bream (77.5%).

Part way through 2015, observers started to record life status on release. They recorded if a released specimen was released alive uninjured, alive with injuries that the observer considered survivable, near death and unlikely to survive, or dead. The number of fish that were brought to the vessel alive, then released or discarded with a known subsequent fate are shown in Table 9. Sufficient information about life status on release was recorded for blue sharks, mako sharks and porbeagle sharks to indicate that most (over 90%) of these species of sharks were released uninjured or with injuries that would not be expected to be fatal. The percentage of the sharks released alive with injuries considered to be survivable is shown in Table 9. This suggests that more blue and porbeagle sharks were able to survive if caught by the Charter fleet than if caught by the Domestic fleet, despite being more likely to be injured (Table 9).

Few tuna and billfish were released alive. Life status on release was not known or not recorded for many of the bycatch species, especially those that were knocked off at the side of the vessel and not landed, such as dealfish and lancetfish.

4. DISCUSSION

Changes occurred in the New Zealand tuna longline fishery in recent years, including use of a TLCER form with better reporting of discarded species, and a ban on shark finning. There has been a decline in fishing effort since 2002−03, particularly for the Domestic fleet, and total effort has been low for the last 11 years. Fishing seasons for the Charter vessels were shorter since 2007–08 and this appears to reflect earlier high catch rates of southern bluefin tuna and reaching fishing quota limits sooner. After a slight increase in both the total and Domestic effort in 2010–11 there was a gradual decline in both total hooks and Domestic hooks set, and in 2014–15 both were close to the all-time low in 2007–08.

The species most commonly observed on tuna longlines in previous years were blue shark, Ray's bream, and albacore tuna, (Francis et al. 1999, 2000, 2004, Ayers et al. 2004, Griggs et al. 2007, 2008, Griggs & Baird 2013), and this was still the case in 2010–11. However, in 2011–12 to 2014–15, southern bluefin tuna were in the top three most abundant observed species. Over the five recent years combined, blue shark was still most abundant, followed by Ray's bream. Catch composition varied with region fished and fleet. The Japanese Charter vessels fished together on the WCSI and the region they fished in was less extensive during 2007–08 to 2010–11 than in previous years or subsequent years. In 2010–11 to 2012–13 Charter vessels fished near North Cape area at the end of their season.

Differences in CPUE trends in the Charter fleet in both the North and South regions may reflect different spatial distribution or varying abundance of species in different regions.

We have not been able to adequately quantify changes in catch made by the Domestic fleet due to low and non-representative observer coverage of this fleet, which contributed most of the effort. However, coverage has improved over recent years and appears to be more spatially representative of the fishing effort.

During 2010–11 to 2014–15, southern bluefin tuna catch rates by the Charter fleet fishing in the South remained high. CPUE of blue sharks and porbeagle sharks showed some increase in the South. There were high catch rates for other southern species caught by this fleet, including Ray's bream, while bigscale pomfret CPUE declined.

Discard practices varied according to fleet and vessel, and may also vary with the presence of an observer on board. It is difficult to determine true practices in discarding of shark quota species in particular. When observers are on board, practices may change, and observers can provide 'Authority to Discard' forms which are signed by vessel personnel and the observer. Some fishers also admit that they do not report discards of non-quota species (Observer Programme observers, pers. comm.), another practice claimed to be widespread, so many of the fish bycatch species can be considered to be under-reported.

Prior to the ban on shark finning, some vessels finned or retained sharks according to QMS requirements, but quite a lot of vessels, particularly Domestic vessels, were discarding QMS sharks (blue, porbeagle and mako sharks). Discard rates of these sharks increased in 2013–14, the year prior to the ban on finning, and then were much higher in 2014–15. Most sharks were recovered alive and most of the discards of blue, mako and porbeagle sharks could be Sixth Schedule releases, but quite a few of these quota species were discarded dead. Discard of some QMS can be explained by damage, but that applies to only a few dead sharks, and most swordfish.

No sharks were observed finned as a primary state in 2014–15 after the ban on finning when most blue, porbeagle and mako sharks were discarded except for over half of makos caught by the Charter vessels which were retained for their flesh. QMS fish species (swordfish, moonfish and Rays bream) were mostly retained.

The proportion of each species recovered alive varied with fleet and region, and tended to be lower in the North than in the South. There were large fleet differences for some species, especially albacore, swordfish and butterfly tuna, where more were landed dead than alive, and the proportion landed alive was much less for the Domestic vessels than the Charter vessels.

Indicator analyses have shown that the populations of blue, porbeagle and mako sharks have been responding well to the reduced levels of fishing effort present around New Zealand during the last decade. Over the period 2005–2015, standardised CPUE indicators for both commercial and observer datasets, and distribution indicators, which quantify the spatial distribution of areas of high CPUE, were consistent for all three species in showing either increasing trends, or an increasing trend followed by stabilisation at a constant level (Francis et al. 2014, Francis & Large 2017). There was some inconsistency among trends identified for porbeagle shark by the distribution and CPUE indicators, and by the standardised CPUE indices for the North and South fisheries (Francis & Large 2017). Some year-to-year CPUE variations were too large to represent changes in population biomass, and may instead reflect changes in availability to the fishery. Furthermore, some CPUE models fitted the data poorly and may be unreliable. Nevertheless, when taken as a group, the indicators suggest that the porbeagle population around New Zealand has been stable or increasing during the last decade. That conclusion has been supported by a stock status assessment of the entire Southern Hemisphere range of the porbeagle population, which found that the impact of fishing on the population is low (Hoyle et al. 2017).

The goal of the NPOA is 'to ensure the conservation and management of sharks and their long-term sustainable use'. Part of the NPOA's plan of action is to strengthen existing research and monitoring programmes, which includes monitoring stock status and wastage. The detailed information that observers record on catches, discards and landed states is critical for determining the impact of fishing on both QMS and non-QMS species. Continued review of observer allocation is important to ensure improvements in observer coverage (Anon 2008).

Francis et al. (2014) analysed trends in the median length and sex ratio of blue, porbeagle and mako sharks measured by observers aboard tuna longliners up to 2012–13. They noted that:
"Blue sharks showed no temporal trends in median length in either region. Male porbeagles in both regions and female porbeagles in South region, showed reduced median lengths in the second part of the time series. Similarly, mako sharks of both sexes in North region showed a decline in median length through time. However, the interpretation of shark length-frequency distributions obtained from observer data is unfortunately confounded by trends in fisher and observer practices".
In particular, pelagic sharks have increasingly been released alive or discarded dead by fishers following a ban on shark finning, to the extent that few sharks are now hauled aboard or processed by tuna longliners (Francis 2015, 2016; Francis & Ó Maolagáin 2016). This compromises the utility of observer data for monitoring trends in size composition and sex ratio.

It is difficult to assess the impacts of the longline fishery on stocks of non-target bony fish. There is considerable variation between fleets and within fleets in fishing gear and fishing methods, variation in reporting, and discard practices, especially in the wider range of the stock and other fisheries in the Western Central Pacific Ocean and beyond, and in Areas Beyond National Jurisdiction (ABNJ) (Clarke et al. 2014, Clarke 2015). Some of the most commonly encountered species are important as local food supplies and should be safeguarded for that reason (Clarke et al. 2014, Clarke 2015). In many of these species there is little knowledge of handling or post release mortality. All of the information on non-target bony fish species available to WCPFC is from observer data from member countries. In some areas there was little or no observer coverage particularly in Pacific nations. With more focus on tunas, billfish, sharks and non-fish bycatch, there is little focus on other non-target bony fish species. Limited quantity and quality of data leads to high uncertainty about protection of bycatch from depletion. There are also issues of identification, fish of low or no market value therefore are considered unimportant, there is frequent discarding and non/under-reporting, and little is known about handling and post-release mortality. Efforts are being made to address standardisation of reporting of bycatch by different countries, and to explore possible mitigation options (Clarke at al. 2014, Clarke 2015, Chapman 2001).

We recommend that observer coverage of the Domestic fleet be further increased and that efforts are made to ensure that the coverage is representative of the spatial and temporal distribution of the fishing effort and therefore the catch. While 90% of the total effort is made by the Domestic fleet, less than 10% of the effort of the Domestic fleet is observed.

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Table 1: Number of tuna longline trips, sets and hooks observed, and number of hooks reported on TLCER and CELR forms by tuna longline vessels fishing in New Zealand. "Foreign and Charter" vessels are predominantly Japanese, with some Korean effort in the 1980s, Philippine effort in 2002–03, Australian effort in 2005–06 and 2006–07, and the effort of one large Domestic vessel that fished with the Japanese Charter fleet.

	Observed		Observed hooks			Set hooks			
Fishing year	Trips	Sets	Domestic	Foreign+ Charter	Total	Domestic	Foreign+ Charter	Total	% on CELR
1988–89	5	86	0	234 826	234 826	11 800	9 953 745	9 965 545	0.1
1989–90	6	154	0	447 239	447 239	117 562	8 553 288	8 670 850	1.3
1990–91	3	150	0	421 808	421 808	350 897	15 316 845	15 667 742	2.0
1991–92	8	192	19 525	508 629	528 154	544 658	10 362 346	10 907 004	1.9
1992–93	17	373	0	1 057 985	1 057 985	996 293	5 970 648	6 966 941	1.8
1993–94	9	246	2 418	693 262	695 680	1 798 970	1 763 343	3 562 313	11.2
1994–95	12	339	65 694	815 807	881 501	3 003 260	1 641 585	4 644 845	15.7
1995–96	5	147	162 922	0	162 922	3 048 663	258 203	3 306 866	21.2
1996–97	15	424	79 991	882 763	962 754	2 336 462	1 455 906	3 792 368	6.9
1997–98	15	438	70 835	989 566	1 060 401	2 943 762	1 277 666	4 221 428	4.6
1998–99	9	402	35 264	1 052 721	1 087 985	5 394 338	1 504 271	6 898 609	3.6
1999–00	13	274	38 458	659 923	698 381	7 143 042	1 150 085	8 293 127	2.9
2000–01	23	474	240 979	818 744	1 059 723	8 907 172	943 018	9 850 190	1.3
2001–02	17	398	144 716	773 443	918 159	9 973 801	984 695	10 958 496	0.3
2002–03	9	610	0	1 887 816	1 887 816	8 650 712	2 216 292	10 867 004	0.2
2003–04	16	549	128 399	1 336 066	1 464 465	5 924 227	1 471 454	7 395 681	0.1
2004–05	14	343	150 574	562 825	713 399	3 091 477	642 074	3 733 551	0.6
2005–06	16	265	89 983	548 653	638 036	3 095 479	625 160	3 720 639	<0.1
2006–07	21	446	169 592	786 327	955 919	2 292 222	1 453 370	3 745 592	0.0
2007–08	18	226	141 489	254 208	395 697	1 664 974	568 285	2 233 259	0.0
2008–09	17	384	147 196	657 535	804 731	2 309 003	809 230	3 118 233	0.0
2009–10	21	325	179 700	387 285	571 994	2 507 977	478 558	2 986 535	0.0
2010–11	18	324	172 502	370 072	542 574	2 701 559	503 370	3 204 929	0.0
2011–12	16	337	173 078	463 493	636 571	2 552 937	554 940	3 107 877	0.0
2012–13	13	233	71 053	380 335	451 388	2 393 152	487 520	2 880 672	0.0
2013–14	17	343	129 289	545 265	674 554	1 877 847	653 330	2 531 177	0.0
2014–15	17	304	107 508	502 755	610 263	1 785 086	622 300	2 407 386	0.0

Table 2: Percentage of hooks observed.

Fishing year	Domestic	Foreign+ Charter	Total
1988–89	0.0	2.4	2.4
1989–90	0.0	5.2	5.2
1990–91	0.0	2.8	2.7
1991–92	3.6	4.9	4.8
1992–93	0.0	17.7	15.2
1993–94	0.1	39.3	19.5
1994–95	2.2	49.7	19.0
1995–96	5.3	0.0	4.9
1996–97	3.4	60.6	25.4
1997–98	2.4	77.5	25.1
1998–99	0.7	70.0	15.8
1999–00	0.5	57.4	8.4
2000–01	2.7	86.8	10.8
2001–02	1.5	78.5	8.4
2002–03	0.0	85.2	17.4
2003–04	2.2	90.8	19.8
2004–05	4.9	87.7	19.1
2005–06	2.9	87.8	17.1
2006–07	7.4	54.1	25.5
2007–08	8.5	44.7	17.7
2008–09	6.4	81.3	25.8
2009–10	7.2	80.9	19.2
2010–11	6.4	73.5	16.9
2011–12	6.8	83.5	20.5
2012–13	3.0	78.0	15.7
2013–14	6.9	83.5	26.6
2014–15	6.0	80.8	25.3
Total	2.9	25.0	12.9

Table 3: Percentage of hooks observed on observed sets in 2010–11 to 2014–15. Values are the numbers of sets in each category.

Fishing year	% hooks observed	Number of sets		
		Domestic	Foreign+ Charter	Total
2010–11	40–49		1	1
	50–59		2	2
	60–69		43	43
	70–79		87	87
	80–89		15	15
	90–99		3	3
	100	173		173
	Total	173	151	324
2011–12	60–69		14	14
	70–79		59	59
	80–89		41	41
	90–99		21	21
	100	173	29	202
	Total	173	164	337
2012–13	40–49		2	2
	50–59	1	2	3
	60–69	1	14	15
	70–79	1	70	71
	80–89	1	51	52
	90–99		6	6
	100	81	3	84
	Total	85	148	233
2013–14	50–59		1	1
	60–69		11	11
	70–79		77	77
	80–89		44	44
	90–99		3	3
	100	157	50	207
	Total	157	186	343
2014–15	30–39		1	1
	50–59		1	1
	60–69		20	20
	70–79		80	80
	80–89		22	22
	90–99	4	47	51
	100	119	10	129
	Total	123	181	304

Table 4: Number of sets and hooks available for estimating CPUE and numbers of fish caught, by fishing year, fleet and region. Hook numbers are in thousands. See text for criteria used to omit years where observer coverage was insufficient to use for reliable estimates. The years that were excluded were as follows: 1988–89, 1990–91, 1993–94, 1994–95, 1998–99, 1999–00, 2001–02, 2002–03, and 2012–13 (shaded). North region.

		Foreign and Charter fleet				Domestic fleet			
Fishing year	Area	Reported sets	% sets observed	Reported hooks	% hooks observed	Reported sets	% sets observed	Reported hooks	% hooks observed
1988–89	N	1 284	3.7	3 701	3.3	12	0.0	12	0.0
1989–90	N	1 294	6.0	3 752	6.0	265	0.0	117	0.0
1990–91	N	2 052	5.9	6 032	5.6	447	0.0	319	0.0
1991–92	N	1 550	5.4	4 500	5.4	691	0.0	540	0.0
1992–93	N	445	28.8	1 207	27.5	1 117	0.0	944	0.0
1993–94	N	49	65.3	137	63.4	1 978	0.0	1 649	0.0
1994–95	N	23	56.5	61	44.9	2 705	1.8	2 210	3.0
1995–96	N	0	–	0	–	3 154	2.1	2 775	2.3
1996–97	N	48	91.7	136	87.0	2 792	3.6	2 328	3.4
1997–98	N	123	76.4	328	73.9	3 267	2.4	2 930	2.4
1998–99	N	53	54.7	167	50.0	5 383	0.7	5 376	0.7
1999–00	N	46	54.3	134	50.5	6 547	0.0	7 087	0.0
2000–01	N	31	100.0	83	93.5	7 731	2.6	8 842	2.7
2001–02	N	4	100.0	12	97.9	8 196	1.5	9 683	1.5
2002–03	N	27	100.0	80	86.0	7 120	0.0	8 539	0.0
2003–04	N	16	100.0	52	79.6	4 722	2.1	5 487	2.2
2004–05	N	42	100.0	138	84.8	2 754	4.9	3 017	4.7
2005–06	N	18	100.0	50	82.1	2 769	2.3	2 992	2.6
2006–07	N	82	68.3	274	61.0	2 275	7.2	2 289	7.4
2007–08	N	0	–	0	–	1 675	8.5	1 572	9.0
2008–09	N	23	100.0	73	80.5	2 233	6.6	2 150	6.6
2009–10	N	0	–	0	–	2 454	6.7	2 307	6.9
2010–11	N	2	100.0	7	71.1	2 582	6.7	2 538	6.8
2011–12	N	2	100.0	7	72.2	2 080	6.4	1 997	6.5
2012–13	N	11	100.0	37	83.5	2 006	4.0	1 904	3.6
2013–14	N	0	–	0	–	1 641	6.7	1 425	6.0
2014–15	N	0	–	0	–	1 565	6.3	1 291	6.6

Table 4 *(continued)*: Number of sets and hooks available for estimating CPUE and numbers of fish caught, by fishing year, fleet and region. Hook numbers are in thousands. South region.

		Foreign and Charter fleet				Domestic fleet			
Fishing year	Area	Reported sets	% sets observed	Reported hooks	% hooks observed	Reported sets	% sets observed	Reported hooks	% hooks observed
1988–89	S	2 137	1.8	6 253	1.8	0	–	0	–
1989–90	S	1 628	4.7	4 801	4.6	2	0.0	<1	0.0
1990–91	S	3 127	0.9	9 285	0.9	23	0.0	31	0.0
1991–92	S	1 995	4.6	5 862	4.6	7	0.0	5	0.0
1992–93	S	1 563	15.7	4 763	15.2	29	0.0	53	0.0
1993–94	S	560	37.7	1 626	37.3	129	0.0	150	0.0
1994–95	S	540	51.1	1 580	49.9	798	0.0	793	0.0
1995–96	S	96	0.0	258	0.0	323	25.1	274	35.9
1996–97	S	457	61.1	1 320	57.9	14	0.0	9	0.0
1997–98	S	318	82.7	950	78.7	16	0.0	14	0.0
1998–99	S	436	77.1	1 338	72.5	34	0.0	19	0.0
1999–00	S	334	63.8	1 016	58.3	60	0.0	56	0.0
2000–01	S	277	87.0	860	86.2	79	0.0	65	0.0
2001–02	S	320	84.7	973	78.3	283	0.0	291	0.0
2002–03	S	348	100.0	1 134	92.7	150	0.0	137	0.0
2003–04	S	431	100.0	1 420	91.2	410	1.2	448	1.4
2004–05	S	157	100.0	504	88.4	107	7.5	97	7.9
2005–06	S	164	100.0	556	89.9	109	11.0	104	11.2
2006–07	S	321	59.5	1 107	53.1	3	0.0	3	0.0
2007–08	S	167	49.7	568	44.7	101	0.0	93	0.0
2008–09	S	216	96.8	736	81.3	160	3.1	159	3.9
2009–10	S	144	100.0	479	80.9	238	7.1	204	10.0
2010–11	S	149	100.0	497	73.6	172	0.0	164	0.0
2011–12	S	162	100.0	548	83.7	542	7.2	556	7.6
2012–13	S	137	100.0	450	77.6	490	0.8	489	0.4
2013–14	S	186	100.0	653	83.5	473	9.9	453	9.6
2014–15	S	181	100.0	622	80.8	484	5.0	494	4.5

Table 4 *(continued)*: Philippine and Australian fleets.

		Philippine fleet			
Fishing year	Area	Reported sets	% sets observed	Reported hooks	% hooks observed
2002–03	N	241	96.7	1002	76.6

		Australian fleet			
Fishing year	Area	Reported sets	% sets observed	Reported hooks	% hooks observed
2005–06	N	15	53.3	17	52.4
2006–07	N	79	45.6	72	42.9

Table 5: Numbers of the most common species observed during 2010–11 by fleet and region. Species are shown in descending order of total abundance. Also shown is the percentage of these species that were retained, and the percentage of the discarded fish that were dead on landing (n/a, none discarded).

	Charter		Domestic	Total	% of	%	discards
Species	North	South	North	number	catch	retained	% dead
Rays bream	6	7 424	1 242	8 672	30.0	98.5	60.2
Blue shark	25	2 729	3 770	6 524	22.6	66.0	1.9
Albacore tuna	10	59	3 767	3 836	13.3	97.8	85.5
Southern bluefin tuna		2 607	532	3 139	10.9	98.2	13.0
Lancetfish			1 684	1 684	5.8	0.0	85.4
Swordfish	8	8	918	934	3.2	96.6	58.1
Porbeagle shark	3	83	715	801	2.8	36.2	15.2
Mako shark		18	598	616	2.1	31.1	11.3
Deepwater dogfish		403		403	1.4	0.5	12.8
Moonfish		22	344	366	1.3	98.6	60.0
Escolar	76		289	365	1.3	74.6	20.5
Sunfish		6	257	263	0.9	0.0	2.8
Pelagic stingray			226	226	0.8	0.0	3.6
Bigeye tuna			198	198	0.7	96.4	14.3
Dealfish		164		164	0.6	0.0	66.9
Unidentified fish			125	125	0.4	0.0	0.0
Butterfly tuna		22	79	101	0.3	53.1	93.5
Big scale pomfret		86	3	89	0.3	60.7	22.9
Oilfish	2		69	71	0.2	85.7	20.0
Rudderfish		48	18	66	0.2	18.0	18.0
Dolphinfish	1		45	46	0.2	93.2	0.0
School shark		28	1	29	0.1	100.0	n/a
Shark, unidentified			24	24	0.1	0.0	12.5
Thresher shark		4	17	21	0.1	33.3	7.1
Skipjack tuna			19	19	0.1	78.9	75.0
Fanfish		12		12	<0.1	0.0	8.3
Flathead pomfret		12		12	<0.1	8.3	18.2
Pacific bluefin tuna			11	11	<0.1	100.0	n/a
Striped marlin			9	9	<0.1	0.0	33.3
Bronze whaler shark			6	6	<0.1	33.3	0.0
Slender tuna		6		6	<0.1	20.0	50.0
Hoki		5		5	<0.1	100.0	n/a
Kingfish			5	5	<0.1	40.0	0.0
Black barracouta	2	1	1	4	<0.1	0.0	100.0
Hake		3		3	<0.1	100.0	n/a
Hapuku and bass			3	3	<0.1	100.0	n/a
Yellowfin tuna			3	3	<0.1	100.0	n/a
Bluntnose skate			2	2	<0.1	0.0	0.0
Gemfish			2	2	<0.1	100.0	n/a

Table 5: (*continued*). 2010–11 continued.

	Charter		Domestic	Total	% of	%	discards
Species	North	South	North	number	catch	retained	% dead
Shortbill spearfish			2	2	<0.1	0.0	50.0
Barracouta		1		1	<0.1	100.0	n/a
Bigeye thresher			1	1	<0.1	0.0	0.0
Cubehead			1	1	<0.1	0.0	0.0
Globefish			1	1	<0.1	0.0	0.0
Snake mackerel			1	1	<0.1	0.0	100.0
Hammerhead shark			1	1	<0.1	0.0	100.0
Manta rays and devil rays			1	1	<0.1	0.0	100.0
Snipe eel		1		1	<0.1	0.0	0.0
Oceanic whitetip shark			1	1	<0.1	0.0	0.0
Pelagic stargazer			1	1	<0.1	100.0	n/a
Pomfret, unidentified			1	1	<0.1	100.0	n/a
Remora			1	1	<0.1	0.0	100.0
Wingfish		1		1	<0.1	0.0	0.0
Total	133	13 753	14 994	28 880			

Table 5: (*continued*). 2011–12.

	Charter		Domestic		Total	% of	%	discards
Species	North	South	North	South	number	catch	retained	% dead
Blue shark	10	5 795	7 074	1 620	14 499	48.3	69.5	3.7
Rays bream	2	3 088	1 256	267	4 613	15.4	97.8	90.8
Southern bluefin tuna	1	3 273	438	520	4 232	14.1	97.5	4.9
Lancetfish	4	1	1 522	2	1 529	5.1	0.1	96.1
Albacore tuna	52	99	963	212	1 326	4.4	98.7	100.0
Porbeagle shark		84	482	128	694	2.3	41.1	18.4
Swordfish	3	26	500	90	619	2.1	98.4	60.0
Deepwater dogfish		545			545	1.8	0.8	16.2
Mako shark	3	22	306	8	339	1.1	53.6	4.7
Dealfish		237	1	3	241	0.8	0.5	74.4
Escolar	42		163	5	210	0.7	76.9	45.7
Sunfish	1	10	160	11	182	0.6	0.6	0.0
Moonfish	1	25	130	4	160	0.5	99.4	100.0
Unidentified fish			154	6	160	0.5	0.0	0.0
Bigeye tuna	14		143		157	0.5	98.1	33.3
Butterfly tuna		17	63	7	87	0.3	76.2	100.0
Big scale pomfret		84	1		85	0.3	83.1	64.3
Oilfish	4		69	12	85	0.3	93.8	0.0
Pelagic stingray	12		50		62	0.2	0.0	0.0
Rudderfish	1	29	11	4	45	0.1	32.6	10.3
School shark		25	10	4	39	0.1	100.0	n/a
Thresher shark		2	18	2	22	0.1	22.7	29.4
Flathead pomfret		14		1	15	<0.1	0.0	46.7
Hapuku and bass			13		13	<0.1	58.3	0.0
Hake		10			10	<0.1	90.0	100.0
Dolphinfish			8		8	<0.1	100.0	n/a
Pacific bluefin tuna		1	6	1	8	<0.1	87.5	0.0
Kingfish			7		7	<0.1	14.3	0.0
Gemfish			7		7	<0.1	66.7	100.0
Bigeye thresher			4	2	6	<0.1	40.0	33.3
Skipjack tuna			3	3	6	<0.1	100.0	n/a
Striped marlin			5	1	6	<0.1	0.0	16.7
Bluenose			5		5	<0.1	100.0	n/a
Slender tuna		5			5	<0.1	0.0	60.0
Snipe eel		4			4	<0.1	0.0	75.0
Cubehead		1	2		3	<0.1	33.3	50.0
Hoki		3			3	<0.1	100.0	n/a
Yellowfin tuna			3		3	<0.1	100.0	n/a
Black barracouta	1	1			2	<0.1	0.0	100.0
Bronze whaler shark			2		2	<0.1	50.0	100.0
Fanfish				1	1	<0.1	100.0	n/a
Hammerhead shark			1		1	<0.1	0.0	100.0
Trevally			1		1	<0.1	100.0	n/a
Wingfish		1			1	<0.1	0.0	100.0
Total	151	13 402	13 581	2 914	30 048			

Table 5: (*continued*). 2012–13.

	Charter		Domestic		Total	% of	%	discards
Species	North	South	North	South	number	catch	retained	% dead
Blue shark	256	5 149	5 076	180	10 661	45.6	47.2	2.5
Rays bream	9	4 423	193	12	4 637	19.8	97.4	95.8
Southern bluefin tuna	10	2 638	603	24	3 275	14.0	95.9	4.2
Albacore tuna	449	115	922	6	1 492	6.4	98.5	81.0
Lancetfish	39	2	565		606	2.6	0.0	54.1
Deepwater dogfish		577			577	2.5	1.2	11.5
Porbeagle shark	10	112	161	27	310	1.3	34.8	19.9
Swordfish	33	38	224	1	296	1.3	95.5	23.1
Escolar	178		70		248	1.1	27.9	23.2
Mako shark	26	54	126	3	209	0.9	39.7	13.7
Dealfish		184			184	0.8	1.7	74.9
Moonfish	42	51	87		180	0.8	98.8	100.0
Unidentified fish	6	73	23		102	0.4	16.7	60.0
Bigeye tuna	73		24		97	0.4	100.0	n/a
Pelagic stingray	52	1	31		84	0.4	0.0	2.4
Sunfish	24	7	53		84	0.4	2.5	0.0
Rudderfish	2	57	12		71	0.3	13.4	19.0
Butterfly tuna		13	42	1	56	0.2	48.1	85.7
Big scale pomfret		52			52	0.2	88.2	0.0
Oilfish	33	2	15		50	0.2	26.5	27.8
Thresher shark	2	7	11		20	0.1	35.0	23.1
Black barracouta	8	11			19	0.1	0.0	57.9
School shark		16			16	0.1	100.0	n/a
Skipjack tuna	3		10		13	0.1	100.0	n/a
Striped marlin	1		8		9	<0.1	0.0	55.6
Flathead pomfret	1	8			9	<0.1	22.2	42.9
Dolphinfish			8		8	<0.1	100.0	n/a
Pacific bluefin tuna	1	2	5		8	<0.1	100.0	n/a
Hoki		5			5	<0.1	80.0	100.0
Bigeye thresher	1		3		4	<0.1	0.0	25.0
Bronze whaler shark			4		4	<0.1	25.0	0.0
Hapuku and bass		2	2		4	<0.1	75.0	0.0
Black marlin	2				2	<0.1	0.0	100.0
Cubehead			2		2	<0.1	50.0	0.0
Hake		2			2	<0.1	50.0	100.0
Ray unspecified			2		2	<0.1	0.0	0.0
Slender tuna		2			2	<0.1	0.0	100.0
Wingfish		2			2	<0.1	0.0	50.0
Fanfish		1			1	<0.1	0.0	0.0
Gemfish			1		1	<0.1	100.0	n/a
Tuna, unspecified			1		1	<0.1	100.0	n/a
Total	1 261	13 606	8 284	254	23 405			

Table 5: (*continued*). 2013–14.

	Charter	Domestic		Total	% of	%	discards
Species	South	North	South	number	catch	retained	% dead
Blue shark	7 757	4 391	2 146	14 294	50.4	15.8	5.8
Southern bluefin tuna	3 197	638	367	4 202	14.8	96.8	14.4
Rays bream	2 301	35	129	2 465	8.7	96.1	91.6
Albacore tuna	533	1 535	205	2 273	8.0	93.9	92.4
Porbeagle shark	319	256	198	773	2.7	30.5	25.7
Lancetfish	10	749	3	762	2.7	0.1	73.4
Swordfish	28	451	139	618	2.2	2.9	0.7
Dealfish	584		20	604	2.1	0.4	75.1
Deepwater dogfish	493		1	494	1.7	1.2	19.1
Mako shark	21	219	39	279	1.0	31.3	21.7
Moonfish	114	137	16	267	0.9	97.3	0.0
Unidentified fish		180		180	0.6	0.0	1.0
Sunfish	18	116	10	144	0.5	0.0	0.0
Rudderfish	117	11	5	133	0.5	10.6	17.3
Butterfly tuna	64	60	4	128	0.5	77.3	93.1
Dolphinfish		119		119	0.4	8.5	19.6
Bigeye tuna		116		116	0.4	92.2	0.0
Big scale pomfret	89		6	95	0.3	74.5	25.0
Black barracouta	52	3		55	0.2	1.9	69.8
Flathead pomfret	50	1		51	0.2	0.0	17.4
School shark	43		7	50	0.2	72.0	0.0
Pelagic stingray	2	44		46	0.2	2.2	4.5
Escolar		45		45	0.2	89.5	100.0
Oilfish		29		29	0.1	81.5	60.0
Thresher shark	4	13	4	21	0.1	0.0	0.0
Fanfish	15			15	0.1	0.0	21.4
Pacific bluefin tuna	1	4	6	11	<0.1	0.0	n/a
Broadnose seven gill shark	1	1	8	10	<0.1	0.0	10.0
Cubehead		6	1	7	<0.1	14.3	33.3
Hapuku and bass	4	2		6	<0.1	83.3	0.0
Skipjack tuna		5		5	<0.1	80.0	100.0
Striped marlin		5		5	<0.1	0.0	20.0
Kingfish		4		4	<0.1	0.0	0.0
Bronze whaler shark		3		3	<0.1	0.0	0.0
Hake	3			3	<0.1	100.0	n/a
Snipe eel	2		1	3	<0.1	0.0	33.3
Pomfret, unidentified			3	3	<0.1	0.0	100.0
Slender tuna	3			3	<0.1	0.0	33.3
Barracouta	2			2	<0.1	100.0	n/a

Table 5: (*continued*). 2013–14 continued.

	Charter	Domestic		Total	% of	%	discards
Species	South	North	South	number	catch	retained	% dead
Bigeye thresher		2		2	<0.1	0.0	0.0
Yellowfin tuna		2		2	<0.1	0.0	n/a
Bluenose		1		1	<0.1	100.0	n/a
Deepwater eel	1			1	<0.1	100.0	n/a
Spine-tailed devil ray		1		1	<0.1	0.0	0.0
Remora		1		1	<0.1	0.0	0.0
Gemfish		1		1	<0.1	0.0	0.0
Sea perch		1		1	<0.1	100.0	n/a
Shortbill spearfish		1		1	<0.1	0.0	0.0
Wingfish	1			1	<0.1	0.0	0.0
Total	15 829	9 188	3 318	28 335			

Table 5: (*continued*). 2014–15.

	Charter	Domestic		Total	% of	%	discards
Species	South	North	South	number	catch	retained	% dead
Blue shark	7 762	3 237	935	11 934	44.5	0.3	9.6
Rays bream	5 741	20	279	6 040	22.5	95.2	89.5
Southern bluefin tuna	3 359	734	209	4 302	16.0	97.8	15.1
Albacore tuna	228	439	113	780	2.9	97.3	81.0
Lancetfish	26	648	1	675	2.5	0.3	65.9
Dealfish	564		4	568	2.1	0.4	76.7
Porbeagle shark	248	182	50	480	1.8	5.5	31.8
Deepwater dogfish	440			440	1.6	2.3	9.5
Swordfish	35	265	101	401	1.5	97.0	58.3
Mako shark	27	167	23	217	0.8	14.9	22.9
Unidentified fish	129	81	3	213	0.8	100.0	n/a
Butterfly tuna	44	83	11	138	0.5	86.9	88.9
Moonfish	50	38	9	97	0.4	92.6	28.6
Bigeye tuna		95		95	0.4	98.9	100.0
Sunfish	24	41	8	73	0.3	1.4	0.0
Pelagic stingray	1	42	14	57	0.2	0.0	0.0
Rudderfish	35	10	10	55	0.2	25.5	18.4
Big scale pomfret	39	1		40	0.1	32.5	0.0
Escolar		24	3	27	0.1	80.0	20.0
School shark	19		4	23	0.1	43.5	23.1
Oilfish	7	14		21	0.1	50.0	22.2
Yellowfin tuna		21		21	0.1	0.0	0.0
Flathead pomfret	18		1	19	0.1	10.5	29.4
Thresher shark	3	13		16	0.1	0.0	46.2
Dolphinfish		9	2	11	<0.1	90.0	0.0
Striped marlin		6	3	9	<0.1	0.0	44.4
Broadnose seven gill shark	1		8	9	<0.1	0.0	11.1
Hapuku and bass	2	6		8	<0.1	100.0	n/a
Hoki	7			7	<0.1	100.0	n/a
Shark, unidentified	5	1	1	7	<0.1	0.0	100.0
Skipjack tuna		7		7	<0.1	100.0	n/a
Bigeye thresher		4	1	5	<0.1	0.0	80.0
Black barracouta	4			4	<0.1	0.0	25.0
Hake	4			4	<0.1	25.0	100.0
Slender tuna	4			4	<0.1	0.0	75.0
Pacific bluefin tuna	1	3		4	<0.1	0.0	0.0
Kingfish		2	1	3	<0.1	66.7	0.0
Snipe eel	2			2	<0.1	50.0	0.0
Barracudina		1		1	<0.1	0.0	100.0
Short-tailed black ray	1			1	<0.1	0.0	0.0
Bronze whaler shark		1		1	<0.1	0.0	100.0
Cubehead	1			1	<0.1	0.0	100.0
Ray unspecified	1			1	<0.1	0.0	0.0
Gemfish			1	1	<0.1	100.0	n/a
Total	18 832	6 195	1 795	26 822			

Table 6: Percentage of main non-target species (including discards) that were alive or dead when observed during 2010–11 to 2014–15, by fishing year, fleet and region. Small sample sizes (number observed < 20) omitted. 1. Sharks

Species	Year	Fleet	Region	% Alive	% Dead	Number
Blue shark	**2010–11**	Charter	North	100.0	0.0	25
			South	95.9	4.1	2 650
		Domestic	North	92.8	7.2	3 553
		Total		**94.1**	**5.9**	**6 228**
	2011–12		South	93.0	7.0	5 394
		Domestic	North	93.5	6.5	5 672
			South	93.2	6.8	1 592
		Total		**93.2**	**6.8**	**12 668**
	2012–13	Charter	North	96.1	3.9	256
			South	89.3	10.7	5 087
		Domestic	North	95.5	4.5	4 831
			South	95.6	4.4	180
		Total		**92.5**	**7.5**	**10 354**
	2013–14	Charter	South	89.5	10.5	7 752
		Domestic	North	91.9	8.1	3 719
			South	93.8	6.2	2 146
		Total		**90.8**	**9.2**	**13 617**
	2014–15	Charter	South	93.3	6.7	5 961
		Domestic	North	85.5	14.5	3 127
			South	92.2	7.8	922
		Total		**90.8**	**9.2**	**10 010**
	Total all strata			**92.1**	**7.9**	**52 877**
Mako shark	**2010–11**	Domestic	North	73.0	27.0	515
		Total		**73.8**	**26.2**	**530**
	2011–12		South	86.4	13.6	22
		Domestic	North	67.6	32.4	296
		Total		**68.9**	**31.1**	**328**
	2012–13	Charter	North	80.8	19.2	26
			South	79.6	20.4	49
		Domestic	North	79.0	21.0	119
		Total		**78.7**	**21.3**	**197**
	2013–14	Domestic	North	68.6	31.4	188
			South	64.1	35.9	39
		Total		**68.7**	**31.3**	**246**
	2014–15	Charter	South	88.9	11.1	27
		Domestic	North	76.7	23.3	163
			South	69.6	30.4	23
		Total		**77.5**	**22.5**	**213**
	Total all strata			**73.1**	**26.9**	**1 514**

Table 6 (*continued*). Sharks (*continued*)

Species	Year	Fleet	Region	% Alive	% Dead	Number
Porbeagle shark	**2010–11**		South	75.6	24.4	82
		Domestic	North	62.0	38.0	686
		Total		**63.2**	**36.8**	**771**
	2011–12	Charter	South	75.0	25.0	84
		Domestic	North	64.1	35.9	415
			South	37.1	62.9	124
		Total		**60.2**	**39.8**	**623**
	2012–13	Charter	South	82.0	18.0	111
		Domestic	North	72.3	27.7	155
			South	33.3	66.7	27
		Total		**70.6**	**29.4**	**303**
	2013–14	Charter	South	73.8	26.2	313
		Domestic	North	66.5	33.5	206
			South	28.3	71.7	198
		Total		**59.1**	**40.9**	**717**
	2014–15	Charter	South	84.9	15.1	245
		Domestic	North	48.6	51.4	175
			South	32.0	68.0	50
		Total		**65.7**	**34.3**	**470**
	Total all strata			**62.7**	**37.3**	**2 884**
School shark	**2010–11**	Charter	South	78.6	21.4	28
		Total		**75.9**	**24.1**	**29**
	2011–12	Charter	South	68.2	31.8	22
		Total		**66.7**	**33.3**	**36**
	2012–13	**Total**				**14**
	2013–14	Charter	South	82.5	17.5	40
		Total		**76.6**	**23.4**	**47**
	2014–15	**Total**		**73.9**	**26.1**	**23**
	Total all strata			**75.8**	**24.2**	**149**

Table 6 (*continued*). Sharks (*continued*)

Species	Year	Fleet	Region	% Alive	% Dead	Number
Deepwater dogfish	**2010–11**	Charter	South	87.3	12.7	394
		Total		**87.3**	**12.7**	**394**
	2011–12	Charter	South	84.0	16.0	525
		Total		**84.0**	**16.0**	**525**
	2012–13	Charter	South	88.5	11.5	573
		Total		**88.5**	**11.5**	**573**
	2013–14	Charter	South	81.1	18.9	493
		Total		**81.0**	**19.0**	**494**
	2014–15	Charter	South	90.6	9.4	438
		Total		**90.6**	**9.4**	**438**
	Total all strata			**86.2**	**13.8**	**2 424**
Pelagic stingray	**2010–11**	Domestic	North	96.2	3.8	213
		Total		**96.2**	**3.8**	**213**
	2011–12	Domestic	North	100.0	0.0	50
		Total		**100.0**	**0.0**	**62**
	2012–13	Charter	North	98.1	1.9	52
		Domestic	North	96.8	3.2	31
		Total		**97.6**	**2.4**	**84**
	2013–14	Domestic	North	95.3	4.7	43
		Total		**95.6**	**4.4**	**45**
	2014–15	Domestic	North	100.0	0.0	42
		Total		**100.0**	**0.0**	**57**
	Total all strata			**97.4**	**2.6**	**461**

Table 6 (*continued*). 2. Tuna and billfish

Species	Year	Fleet	Region	% Alive	% Dead	Number
Albacore	**2010–11**	Charter	South	87.0	13.0	54
		Domestic	North	25.8	74.2	3 717
		Total		**26.8**	**73.2**	**3 781**
	2011–12	Charter	North	70.8	29.2	48
			South	78.0	22.0	91
		Domestic	North	33.8	66.2	942
			South	42.2	57.8	211
		Total		**39.6**	**60.4**	**1 292**
	2012–13	Charter	North	61.8	38.2	408
			South	84.0	16.0	100
		Domestic	North	27.8	72.2	905
		Total		**41.4**	**58.6**	**1 419**
	2013–14	Charter	South	85.7	14.3	482
		Domestic	North	16.7	83.3	1464
			South	28.3	71.7	205
		Total		**33.2**	**66.8**	**2 151**
	2014–15	Charter	South	81.9	18.1	216
		Domestic	North	19.1	80.9	435
			South	8.9	91.1	112
		Total		**35.4**	**64.6**	**763**
	Total all strata			**32.9**	**67.1**	**9 406**
Butterfly tuna	**2010–11**	Charter	South	47.6	52.4	21
		Domestic	North	11.7	88.3	77
		Total		**19.4**	**80.6**	**98**
	2011–12	Domestic	North	3.3	96.7	61
		Total		**19.1**	**81.0**	**84**
	2012–13	Domestic	North	7.5	92.5	40
		Total		**14.8**	**85.2**	**54**
	2013–14	Charter	South	35.0	65.0	60
		Domestic	North	5.1	94.9	59
		Total		**19.5**	**80.5**	**123**
	2014–15	Charter	South	44.2	55.8	43
		Domestic	North	6.0	94.0	83
		Total		**18.4**	**81.6**	**136**
	Total all strata			**18.6**	**81.4**	**495**

Table 6 (*continued*). Tuna and billfish (*continued*)

Species	Year	Fleet	Region	% Alive	% Dead	Number
Yellowfin tuna	**2010–11**	**Total**				**3**
	2011–12	**Total**				**3**
	2012–13	**Total**				**0**
	2013–14	**Total**				**2**
	2014–15	**Domestic**	North	81.0	19.0	21
		Total		**81.0**	**19.0**	**21**
	Total all strata			**82.8**	**17.2**	**29**
Swordfish	**2010–11**	Domestic	North	23.1	76.9	904
		Total		**23.9**	**76.1**	**918**
	2011–12	Charter	South	66.7	33.3	24
		Domestic	North	27.5	72.5	494
			South	27.8	72.2	90
		Total		**29.2**	**70.8**	**610**
	2012–13	Charter	North	39.4	60.6	33
			South	63.9	36.1	36
		Domestic	North	27.4	72.6	223
		Total		**33.1**	**66.9**	**293**
	2013–14	Charter	South	70.8	29.2	24
		Domestic	North	23.1	76.9	451
			South	34.5	65.5	139
		Total		**27.5**	**72.5**	**614**
	2014–15	Charter	South	70.6	29.4	34
		Domestic	North	31.6	68.4	263
			South	26.0	74.0	96
		Total		**33.6**	**66.4**	**393**
	Total all strata			**28.1**	**71.9**	**2 828**
Striped marlin	**2010–11**	**Total**				**8**
	2011–12	**Total**				**6**
	2012–13	**Total**				**9**
	2013–14	**Total**				**5**
	2014–15	**Total**				**9**
	Total all strata			**62.2**	**37.8**	**37**

Table 6: (*continued*). 3. Teleosts

Species	Year	Fleet	Region	% Alive	% Dead	Number
Ray's bream	**2010–11**	Charter	South	97.4	2.6	5 689
		Domestic	North	83.2	16.8	967
		Total		**95.3**	**4.7**	**6 662**
	2011–12	Charter	South	92.2	7.8	2 965
		Domestic	North	97.1	2.9	693
			South	83.9	16.1	255
		Total		**92.5**	**7.5**	**3 915**
	2012–13	Charter	South	96.0	4.0	4 377
		Domestic	North	87.8	12.2	180
		Total		**95.6**	**4.4**	**4 578**
	2013–14	Charter	South	92.8	7.2	2 295
		Domestic	North	76.5	23.5	34
			South	69.0	31.0	129
		Total		**91.3**	**8.7**	**2 458**
	2014–15	Charter	South	92.8	7.2	4 746
		Domestic	North	45.0	55.0	20
			South	75.2	24.8	226
		Total		**91.8**	**8.2**	**4 992**
	Total all strata			**93.7**	**6.3**	**22 605**
Moonfish	**2010–11**	Charter	South	90.5	9.5	21
		Domestic	North	76.5	23.5	341
		Total		**77.3**	**22.7**	**362**
	2011–12	Charter	South	91.7	8.3	24
		Domestic	North	63.0	37.0	127
		Total		**67.7**	**32.3**	**155**
	2012–13	Charter	North	85.7	14.3	42
			South	90.5	9.5	42
		Domestic	North	67.8	32.2	87
		Total		**77.8**	**22.2**	**171**
	2013–14	Charter	South	93.8	6.3	96
		Domestic	North	67.4	32.6	132
		Total		**76.2**	**23.8**	**244**
	2014–15	Charter	South	95.8	4.2	48
		Domestic	North	60.5	39.5	38
		Total		**76.8**	**23.2**	**95**
	Total all strata			**75.7**	**24.3**	**1 027**

Table 6 (*continued*). Teleosts (*continued*)

Species	Year	Fleet	Region	% Alive	% Dead	Number
Bigscale pomfret	**2010–11**	Charter	South	89.4	10.6	85
		Total		**89.8**	**10.2**	**88**
	2011–12	Charter	South	87.5	12.5	80
		Total		**87.7**	**12.3**	**81**
	2012–13	Charter	South	96.1	3.9	51
		Total		**96.1**	**3.9**	**51**
	2013–14	Charter	South	82.6	17.4	86
		Total		**82.6**	**17.4**	**92**
	2014–15	Charter	South	97.4	2.6	39
		Total		**97.5**	**2.5**	**40**
	Total all strata			**89.2**	**10.8**	**352**
Dealfish	**2010–11**	Charter	South	33.8	66.2	157
		Total		**33.8**	**66.2**	**157**
	2011–12	Charter	South	26.4	73.6	216
		Total		**26.4**	**73.6**	**220**
	2012–13	Charter	South	27.7	72.3	184
		Total		**27.7**	**72.3**	**184**
	2013–14	Charter	South	22.4	77.6	584
		Domestic	South	35.0	65.0	20
		Total		**22.8**	**77.2**	**604**
	2014–15	Charter	South	22.6	77.4	544
		Total		**22.8**	**77.2**	**548**
	Total all strata			**24.8**	**75.2**	**1 713**
Lancetfish	**2010–11**	Domestic	North	14.2	85.8	1 337
		Total		**14.2**	**85.8**	**1 337**
	2011–12	Domestic	North	3.1	96.9	1 067
		Total		**3.5**	**96.5**	**1 074**
	2012–13	Charter	North	23.1	76.9	39
		Domestic	North	47.3	52.7	560
		Total		**45.8**	**54.2**	**601**
	2013–14	Domestic	North	26.3	73.7	749
		Total		**26.8**	**73.2**	**762**
	2014–15	Charter	South	76.9	23.1	26
		Domestic	North	28.2	71.8	599
		Total		**30.2**	**69.8**	**626**
	Total all strata			**20.4**	**79.6**	**4 400**

Table 6 *(continued)*. Teleosts (*continued*)

Species	Year	Fleet	Region	% Alive	% Dead	Number
Escolar	**2010–11**	Charter	North	89.5	10.5	76
		Domestic	North	76.8	23.2	285
		Total		**79.5**	**20.5**	**361**
	2011–12	Charter	North	59.5	40.5	42
		Domestic	North	81.6	18.4	163
		Total		**77.1**	**22.9**	**210**
	2012–13	Charter	North	77.0	23.0	178
		Domestic	North	72.9	27.1	70
		Total		**75.8**	**24.2**	**248**
	2013–14	Domestic	North	65.9	34.1	41
		Total		**65.9**	**34.1**	**41**
	2014–15	Domestic	North	75.0	25.0	24
		Total		**75.0**	**25.0**	**24**
	Total all strata			**77.1**	**22.9**	**884**
Oilfish	**2010–11**	Domestic	North	75.4	24.6	69
		Total		**76.1**	**23.9**	**71**
	2011–12	Domestic	North	91.3	8.7	69
		Total		**91.8**	**8.2**	**85**
	2012–13	Charter	North	69.7	30.3	33
		Total		**70.0**	**30.0**	**50**
	2013–14	Domestic	North	59.3	40.7	27
		Total		**59.3**	**40.7**	**27**
	2014–15	**Total**		**75.0**	**25.0**	**20**
	Total all strata			**78.3**	**21.7**	**253**
Rudderfish	**2010–11**	Charter	South	83.3	16.7	48
		Total		**86.4**	**13.6**	**66**
	2011–12	Charter	South	89.7	10.3	29
		Total		**88.6**	**11.4**	**44**
	2012–13	Charter	South	82.5	17.5	57
		Total		**80.0**	**20.0**	**70**
	2013–14	Charter	South	85.3	14.7	116
		Total		**82.6**	**17.4**	**132**
	2014–15	Charter	South	85.7	14.3	35
		Total		**78.8**	**21.2**	**52**
	Total all strata			**83.0**	**17.0**	**364**

Table 6 *(continued)*. Teleosts (*continued*)

Species	Year	Fleet	Region	% Alive	% Dead	Number
Sunfish	**2010–11**	Domestic	North	97.4	2.6	234
		Total		**97.1**	**2.9**	**240**
	2011–12	Domestic	North	100.0	0.0	150
		Total		**100.0**	**0.0**	**172**
	2012–13	Charter	North	100.0	0.0	24
		Domestic	North	100.0	0.0	52
		Total		**100.0**	**0.0**	**83**
	2013–14	Domestic	North	100.0	0.0	110
		Total		**99.3**	**0.7**	**138**
	2014–15	Charter	South	100.0	0.0	23
		Domestic	North	100.0	0.0	40
		Total		**100.0**	**0.0**	**71**
	Total all strata			**98.9**	**1.1**	**704**

Table 7: Percentage of main non-target species that were retained, or discarded or lost, when observed during 2010–11 to 2014–15, by fishing year and fleet. Small sample sizes (number observed < 20) omitted. 1. Sharks

Species	Year	Fleet	% retained or finned	% discarded or lost	Number
Blue shark	**2010–11**	Charter	89.0	11.0	2 675
		Domestic	43.0	57.0	3 736
		Total	**62.2**	**37.8**	**6 411**
	2011–12	Charter	86.1	13.9	5 404
		Domestic	53.1	46.9	7 947
		Total	**66.4**	**33.6**	**13 351**
	2012–13	Charter	76.8	23.2	5 344
		Domestic	12.7	87.3	5 233
		Total	**45.1**	**54.9**	**10 577**
	2013–14	Charter	25.9	74.1	7 755
		Domestic	1.2	98.8	6 535
		Total	**14.6**	**85.4**	**14 290**
	2014–15	Charter	0.4	99.6	6 218
		Domestic	0.1	99.9	4 163
		Total	**0.3**	**99.7**	**10 381**
	Total all strata		**35.9**	**64.1**	**55 010**
Mako shark	**2010–11**	Domestic	27.9	72.1	580
		Total	**30.1**	**69.9**	**598**
	2011–12	Charter	96.0	4.0	25
		Domestic	47.1	52.9	314
		Total	**50.7**	**49.3**	**339**
	2012–13	Charter	80.0	20.0	75
		Domestic	13.2	86.8	129
		Total	**37.7**	**62.3**	**204**
	2013–14	Charter	95.2	4.8	21
		Domestic	24.0	76.0	258
		Total	**29.4**	**70.6**	**279**
	2014–15	Charter	59.3	40.7	27
		Domestic	6.8	93.2	190
		Total	**13.4**	**86.6**	**217**
	Total all strata		**33.0**	**67.0**	**1 637**

Table 7 (*continued*). Sharks (*continued*)

	Year	Fleet	% retained or finned	% discarded or lost	Number
Porbeagle shark	**2010–11**	Charter	73.3	26.7	86
		Domestic	30.8	69.2	714
		Total	**35.4**	**64.6**	**800**
	2011–12	Charter	64.3	35.7	84
		Domestic	32.8	67.2	609
		Total	**36.7**	**63.3**	**693**
	2012–13	Charter	60.3	39.7	121
		Domestic	15.4	84.6	188
		Total	**33.0**	**67.0**	**309**
	2013–14	Charter	24.8	75.2	318
		Domestic	31.1	68.9	454
		Total	**28.5**	**71.5**	**772**
	2014–15	Charter	0.0	100.0	248
		Domestic	11.2	88.8	232
		Total	**5.4**	**94.6**	**480**
	Total all strata		**29.0**	**71.0**	**3 054**
School shark	**2010–11**	Charter	100.0	0.0	28
		Total	**100.0**	**0.0**	**29**
	2011–12	Charter	100.0	0.0	25
		Total	**100.0**	**0.0**	**39**
	2012–13	**Total**			**14**
	2013–14	Charter	69.8	30.2	43
		Total	**72.0**	**28.0**	**50**
	2014–15	**Total**	**43.5**	**56.5**	**23**
	Total all strata		**82.6**	**17.4**	**155**

Table 7 (*continued*). Sharks (*continued*)

	Year	Fleet	% retained or finned	% discarded or lost	Number
Deepwater dogfish	**2010–11**	Charter	0.5	99.5	394
		Total	**0.5**	**99.5**	**394**
	2011–12	Charter	0.8	99.2	525
		Total	**0.8**	**99.2**	**525**
	2012–13	Charter	1.2	98.8	575
		Total	**1.2**	**98.8**	**575**
	2013–14	Charter	1.2	98.8	493
		Total	**1.2**	**98.8**	**494**
	2014–15	Charter	2.3	97.7	440
		Total	**2.3**	**97.7**	**440**
	Total all strata		**1.2**	**98.8**	**2 428**
Pelagic stingray	**2010–11**	Domestic	0.0	100.0	222
		Total	**0.0**	**100.0**	**222**
	2011–12	Domestic	0.0	100.0	50
		Total	**0.0**	**100.0**	**62**
	2012–13	Charter	0.0	100.0	53
		Domestic	0.0	100.0	31
		Total	**0.0**	**100.0**	**84**
	2013–14	Domestic	2.3	97.7	44
		Total	**2.2**	**97.8**	**46**
	2014–15	Domestic	0.0	100.0	56
		Total	**0.0**	**100.0**	**57**
	Total all strata		**0.2**	**99.8**	**471**

Table 7: (*continued*). 2. Tuna and billfish

	Year	Fleet	% retained	% discarded or lost	Number
Albacore	**2010–11**	Charter	100.0	0.0	68
		Domestic	96.6	3.4	3 755
		Total	**96.7**	**3.3**	**3 823**
	2011–12	Charter	100.0	0.0	151
		Domestic	95.8	4.2	1 175
		Total	**96.3**	**3.7**	**1 326**
	2012–13	Charter	97.6	2.4	509
		Domestic	96.1	3.9	925
		Total	**96.7**	**3.3**	**1 434**
	2013–14	Charter	98.5	1.5	532
		Domestic	87.0	13.0	1 739
		Total	**89.7**	**10.3**	**2 271**
	2014–15	Charter	98.2	1.8	226
		Domestic	95.5	4.5	551
		Total	**96.3**	**3.7**	**777**
	Total all strata		**95.0**	**5.0**	**9 631**
Butterfly tuna	**2010–11**	Charter	95.5	4.5	22
		Domestic	39.2	60.8	79
		Total	**51.5**	**48.5**	**101**
	2011–12	Domestic	70.6	29.4	68
		Total	**76.2**	**23.8**	**84**
	2012–13	Domestic	30.2	69.8	43
		Total	**46.4**	**53.6**	**56**
	2013–14	Charter	96.9	3.1	64
		Domestic	57.8	42.2	64
		Total	**77.3**	**22.7**	**128**
	2014–15	Charter	93.2	6.8	44
		Domestic	83.0	17.0	94
		Total	**86.2**	**13.8**	**138**
	Total all strata		**71.0**	**29.0**	**507**

Table 7 (*continued*). Tuna and billfish (*continued*)

	Year	Fleet	% retained	% discarded or lost	Number
Yellowfin tuna	**2010–11**	**Total**			**3**
	2011–12	**Total**			**3**
	2012–13	**Total**			**0**
	2013–14	**Total**			**2**
	2014–15	Domestic	100.0	0.0	21
		Total	**100.0**	**0.0**	**21**
	Total all strata		**100.0**	**0.0**	**29**
Swordfish	**2010–11**	Domestic	94.5	5.5	917
		Total	**94.6**	**5.4**	**932**
	2011–12	Charter	100.0	0.0	29
		Domestic	96.8	3.2	590
		Total	**96.9**	**3.1**	**619**
	2012–13	Charter	98.6	1.4	69
		Domestic	92.9	7.1	225
		Total	**94.2**	**5.8**	**294**
	2013–14	Charter	96.4	3.6	28
		Domestic	95.8	4.2	590
		Total	**95.8**	**4.2**	**618**
	2014–15	Charter	100.0	0.0	35
		Domestic	96.2	3.8	365
		Total	**96.5**	**3.5**	**400**
	Total all strata		**95.6**	**4.4**	**2 863**
Striped marlin	**2010–11**	**Total**			**9**
	2011–12	**Total**			**6**
	2012–13	**Total**			**9**
	2013–14	**Total**			**5**
	2014–15	**Total**			**9**
	Total all strata		**0.0**	**100.0**	**38**

Table 7: (*continued*). 3. Teleosts

	Year	Fleet	% retained	% discarded or lost	Number
Ray's bream	**2010–11**	Charter	98.7	1.3	5 705
		Domestic	96.7	3.3	996
		Total	**98.4**	**1.6**	**6 701**
	2011–12	Charter	97.1	2.9	2 973
		Domestic	93.8	6.2	1 006
		Total	**96.3**	**3.7**	**3 979**
	2012–13	Charter	97.2	2.8	4 389
		Domestic	93.2	6.8	205
		Total	**97.0**	**3.0**	**4 594**
	2013–14	Charter	95.5	4.5	2 300
		Domestic	97.6	2.4	164
		Total	**95.6**	**4.4**	**2 464**
	2014–15	Charter	93.5	6.5	4 774
		Domestic	94.0	6.0	299
		Total	**93.5**	**6.5**	**5 073**
	Total all strata		**96.4**	**3.6**	**22 811**
Moonfish	**2010–11**	Charter	100.0	0.0	22
		Domestic	97.1	2.9	343
		Total	**97.3**	**2.7**	**365**
	2011–12	Charter	100.0	0.0	26
		Domestic	96.3	3.7	134
		Total	**96.9**	**3.1**	**160**
	2012–13	Charter	97.6	2.4	84
		Domestic	97.7	2.3	87
		Total	**97.7**	**2.3**	**171**
	2013–14	Charter	96.5	3.5	114
		Domestic	90.8	9.2	153
		Total	**93.3**	**6.7**	**267**
	2014–15	Charter	94.0	6.0	50
		Domestic	87.2	12.8	47
		Total	**90.7**	**9.3**	**97**
	Total all strata		**95.7**	**4.3**	**1 060**

Table 7 (*continued*). Teleosts (*continued*)

	Year	Fleet	% retained	% discarded or lost	Number
Bigscale pomfret	**2010–11**	Charter	60.5	39.5	86
		Total	**60.7**	**39.3**	**89**
	2011–12	Charter	84.1	15.9	82
		Total	**83.1**	**16.9**	**83**
	2012–13	Charter	88.2	11.8	51
		Total	**88.2**	**11.8**	**51**
	2013–14	Charter	73.0	27.0	89
		Total	**73.7**	**26.3**	**95**
	2014–15	Charter	33.3	66.7	39
		Total	**32.5**	**67.5**	**40**
	Total all strata		**70.1**	**29.9**	**358**
Dealfish	**2010–11**	Charter	0.0	100.0	157
		Total	**0.0**	**100.0**	**157**
	2011–12	Charter	0.5	99.5	216
		Total	**0.5**	**99.5**	**220**
	2012–13	Charter	1.6	98.4	184
		Total	**1.6**	**98.4**	**184**
	2013–14	Charter	0.3	99.7	584
		Domestic	0.0	100.0	20
		Total	**0.3**	**99.7**	**604**
	2014–15	Charter	0.4	99.6	557
		Total	**0.4**	**99.6**	**561**
	Total all strata		**0.5**	**99.5**	**1 726**
Lancetfish	**2010–11**	Domestic	0.0	100.0	1 355
		Total	**0.0**	**100.0**	**1 355**
	2011–12	Domestic	0.1	99.9	1 078
		Total	**0.1**	**99.9**	**1 083**
	2012–13	Charter	0.0	100.0	41
		Domestic	0.0	100.0	564
		Total	**0.0**	**100.0**	**605**
	2013–14	Domestic	0.1	99.9	752
		Total	**0.1**	**99.9**	**762**
	2014–15	Charter	0.0	100.0	25
		Domestic	0.3	99.7	647
		Total	**0.3**	**99.7**	**672**
	Total all strata		**0.1**	**99.9**	**4 477**

Table 7 (*continued*). Teleosts (*continued*)

	Year	Fleet	% retained	% discarded or lost	Number
Escolar	**2010–11**	Charter	0.0	100.0	76
		Domestic	90.2	9.8	287
		Total	**71.3**	**28.7**	**363**
	2011–12	Charter	0.0	100.0	42
		Domestic	91.1	8.9	168
		Total	**72.9**	**27.1**	**210**
	2012–13	Charter	1.1	98.9	178
		Domestic	90.0	10.0	70
		Total	**26.2**	**73.8**	**248**
	2013–14	Domestic	75.6	24.4	45
		Total	**75.6**	**24.4**	**45**
	2014–15	Domestic	74.1	25.9	27
		Total	**74.1**	**25.9**	**27**
	Total all strata		**59.5**	**40.5**	**893**
Oilfish	**2010–11**	Domestic	87.0	13.0	69
		Total	**84.5**	**15.5**	**71**
	2011–12	Domestic	92.6	7.4	81
		Total	**88.2**	**11.8**	**85**
	2012–13	Charter	0.0	100.0	35
		Total	**26.0**	**74.0**	**50**
	2013–14	Domestic	75.9	24.1	29
		Total	**75.9**	**24.1**	**29**
	2014–15	**Total**	**42.9**	**57.1**	**21**
	Total all strata		**69.9**	**30.1**	**256**
Rudderfish	**2010–11**	Charter	0.0	100.0	48
		Total	**16.7**	**83.3**	**66**
	2011–12	Charter	3.3	96.7	30
		Total	**31.1**	**68.9**	**45**
	2012–13	Charter	3.4	96.6	59
		Total	**12.7**	**87.3**	**71**
	2013–14	Charter	3.4	96.6	117
		Total	**9.8**	**90.2**	**133**
	2014–15	Charter	0.0	100.0	35
		Domestic	65.0	35.0	20
		Total	**23.6**	**76.4**	**55**
	Total all strata		**16.2**	**83.8**	**370**

Table 7 (*continued*). Teleosts (*continued*)

	Year	Fleet	% retained	% discarded or lost	Number
Sunfish	**2010–11**	Domestic	0.0	100.0	248
		Total	**0.0**	**100.0**	**254**
	2011–12	Domestic	0.6	99.4	171
		Total	**0.5**	**99.5**	**182**
	2012–13	Charter	0.0	100.0	31
		Domestic	3.8	96.2	53
		Total	**2.4**	**97.6**	**84**
	2013–14	Domestic	3.2	96.8	126
		Total	**2.8**	**97.2**	**144**
	2014–15	Charter	4.2	95.8	24
		Domestic	0.0	100.0	49
		Total	**1.4**	**98.6**	**73**
	Total all strata		**1.1**	**98.9**	**737**

Table 8: Percentage of discarded main non-target species that were alive or dead when recovered during 2010–11 to 2014–15, by fishing year and fleet. Small sample sizes (number observed < 20) omitted.
1. Sharks

Species	Year	Fleet	% Alive	% Dead	Number
Blue shark	**2010–11**	Charter	99.4	0.6	175
		Domestic	97.8	2.2	1796
		Total	**98.0**	**2.0**	**1971**
	2011–12	Charter	99.6	0.4	514
		Domestic	95.8	4.2	3366
		Total	**96.3**	**3.7**	**3880**
	2012–13	Charter	97.4	2.6	1061
		Domestic	97.6	2.4	4257
		Total	**97.5**	**2.5**	**5318**
	2013–14	Charter	94.1	5.9	4842
		Domestic	93.8	6.2	5754
		Total	**93.9**	**6.1**	**10596**
	2014–15	Charter	92.9	7.1	5502
		Domestic	86.5	13.5	3895
		Total	**90.3**	**9.7**	**9397**
	Total all strata		**94.0**	**6.0**	**31162**
Mako shark	**2010–11**	Domestic	86.9	13.1	344
		Total	**86.9**	**13.1**	**344**
	2011–12	Domestic	95.9	4.1	148
		Total	**95.3**	**4.7**	**149**
	2012–13	Domestic	88.3	11.7	103
		Total	**86.2**	**13.8**	**116**
	2013–14	Domestic	75.9	24.1	162
		Total	**75.9**	**24.1**	**162**
	2014–15	Domestic	75.2	24.8	153
		Total	**76.5**	**23.5**	**162**
	Total all strata		**84.5**	**15.5**	**933**

Table 8 (*continued*). Sharks (*continued*)

Species	Year	Fleet	% Alive	% Dead	Number
Porbeagle shark	**2010–11**	Charter	100.0	0.0	23
		Domestic	83.6	16.4	464
		Total	**84.4**	**15.6**	**487**
	2011–12	Charter	100.0	0.0	30
		Domestic	79.8	20.2	331
		Total	**81.4**	**18.6**	**361**
	2012–13	Charter	87.5	12.5	48
		Domestic	77.6	22.4	143
		Total	**80.1**	**19.9**	**191**
	2013–14	Charter	89.6	10.4	221
		Domestic	59.4	40.6	261
		Total	**73.2**	**26.8**	**482**
	2014–15	Charter	84.9	15.1	238
		Domestic	47.0	53.0	198
		Total	**67.7**	**32.3**	**436**
	Total all strata		**77.0**	**23.0**	**1957**
School shark	**2010–11**	**Total**			**0**
	2011–12	**Total**			**0**
	2012–13	**Total**			**0**
	2013–14	**Total**			**11**
	2014–15	**Total**			**13**
	Total all strata		87.5	12.5	**24**
Deepwater dogfish	**2010–11**	Charter	87.2	12.8	392
		Total	**87.2**	**12.8**	**392**
	2011–12	Charter	83.8	16.2	519
		Total	**83.8**	**16.2**	**519**
	2012–13	Charter	88.5	11.5	565
		Total	**88.5**	**11.5**	**565**
	2013–14	Charter	81.1	18.9	486
		Total	**80.9**	**19.1**	**487**
	2014–15	Charter	90.4	9.6	428
		Total	**90.4**	**9.6**	**428**
	Total all strata		**86.1**	**13.9**	**2391**

Table 8 (*continued*). Sharks (*continued*)

Species	Year	Fleet	% Alive	% Dead	Number
Pelagic stingray	**2010–11**	Domestic	96.2	3.8	213
		Total	**96.2**	**3.8**	**213**
	2011–12	Domestic	100.0	0.0	49
		Total	**100.0**	**0.0**	**61**
	2012–13	Charter	98.1	1.9	53
		Domestic	96.8	3.2	31
		Total	**97.6**	**2.4**	**84**
	2013–14	Domestic	95.1	4.9	41
		Total	**95.3**	**4.7**	**43**
	2014–15	Domestic	100.0	0.0	56
		Total	**100.0**	**0.0**	**57**
	Total all strata		**97.4**	**2.6**	**458**

Table 8 (*continued*) 2. Tuna and billfish

Species	Year	Fleet	% Alive	% Dead	Number
Albacore	**2010–11**	Domestic	13.4	86.6	82
		Total	**13.4**	**86.6**	**82**
	2011–12	**Total**			**17**
	2012–13	**Total**	**19.0**	**81.0**	**21**
	2013–14	Domestic	5.5	94.5	128
		Total	**7.6**	**92.4**	**132**
	2014–15	**Total**	**19.0**	**81.0**	**21**
	Total all strata		**10.6**	**89.4**	**273**
Butterfly tuna	**2010–11**	Domestic	6.7	93.3	45
		Total	**6.5**	**93.5**	**46**
	2011–12	Domestic	0.0	100.0	20
		Total	**0.0**	**100.0**	**20**
	2012–13	Domestic	11.1	88.9	27
		Total	**11.1**	**88.9**	**27**
	2013–14	Domestic	3.8	96.2	26
		Total	**3.6**	**96.4**	**28**
	2014–15	**Total**			**18**
	Total all strata		**6.5**	**93.5**	**139**
Yellowfin tuna	**Total all strata**				**0**
Swordfish	**2010–11**	Domestic	41.9	58.1	31
		Total	**41.9**	**58.1**	**31**
	2011–12	**Total**			**10**
	2012–13	**Total**			**13**
	2013–14	Domestic	86.4	13.6	22
		Total	**82.6**	**17.4**	**23**
	2014–15	**Total**			**12**
	Total all strata		**57.3**	**42.7**	**89**
Striped marlin	**2010–11**	**Total**			**8**
	2011–12	**Total**			**6**
	2012–13	**Total**			**9**
	2013–14	**Total**			**5**
	2014–15	**Total**			**9**
	Total all strata		**62.2**	**37.8**	**37**

Table 8 (*continued*) 3. Teleosts

Species	Year	Fleet	% Alive	% Dead	Number
Ray's bream	**2010–11**	Charter	16.7	83.3	72
		Total	**16.2**	**83.8**	**74**
	2011–12	Charter	6.0	94.0	83
		Total	**9.2**	**90.8**	**87**
	2012–13	Charter	2.6	97.4	117
		Total	**3.4**	**96.6**	**118**
	2013–14	Charter	7.6	92.4	92
		Total	**8.4**	**91.6**	**95**
	2014–15	Charter	8.9	91.1	225
		Total	**9.8**	**90.2**	**235**
	Total all strata		**9.0**	**91.0**	**609**
Moonfish	**2010–11**	**Total**			**5**
	2011–12	**Total**			**1**
	2012–13	**Total**			**2**
	2013–14	**Total**			**7**
	2014–15	**Total**			**7**
	Total all strata		**63.6**	**36.4**	**22**
Bigscale pomfret	**2010–11**	Charter	76.5	23.5	34
		Total	**77.1**	**22.9**	**35**
	2011–12	**Total**			**14**
	2012–13	**Total**			**6**
	2013–14	Charter	73.9	26.1	23
		Total	**75.0**	**25.0**	**24**
	2014–15	Charter	100.0	0.0	26
		Total	**100.0**	**0.0**	**27**
	Total all strata		**78.3**	**21.7**	**106**

Table 8 (*continued*). Teleosts (*continued*)

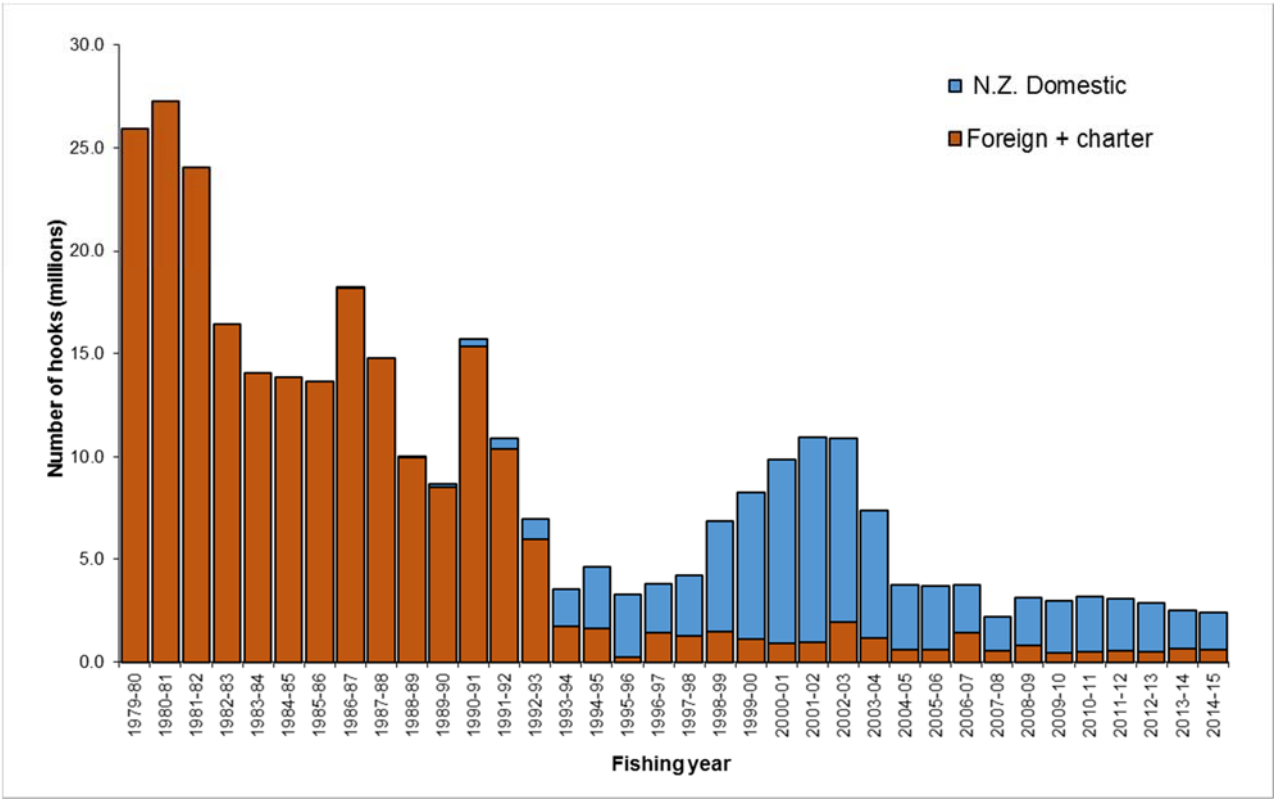
Species	Year	Fleet	% Alive	% Dead	Number
Dealfish	**2010–11**	Charter	33.1	66.9	151
		Total	**33.1**	**66.9**	**151**
	2011–12	Charter	25.6	74.4	211
		Total	**25.6**	**74.4**	**215**
	2012–13	Charter	25.1	74.9	175
		Total	**25.1**	**74.9**	**175**
	2013–14	Charter	24.5	75.5	441
		Domestic	35.0	65.0	20
		Total	**24.9**	**75.1**	**461**
	2014–15	Charter	22.8	77.2	522
		Total	**23.0**	**77.0**	**526**
	Total all strata		**25.2**	**74.8**	**1528**
Lancetfish	**2010–11**	Domestic	13.8	86.2	1328
		Total	**13.8**	**86.2**	**1328**
	2011–12	Domestic	3.2	96.8	1068
		Total	**3.4**	**96.6**	**1073**
	2012–13	Charter	24.4	75.6	41
		Domestic	47.3	52.7	560
		Total	**45.8**	**54.2**	**601**
	2013–14	Domestic	26.4	73.6	749
		Total	**26.6**	**73.4**	**759**
	2014–15	Charter	76.0	24.0	25
		Domestic	27.0	73.0	585
		Total	**29.0**	**71.0**	**610**
	Total all strata		**20.0**	**80.0**	**4371**
Escolar	**2010–11**	Charter	89.5	10.5	76
		Total	**79.5**	**20.5**	**88**
	2011–12	Charter	59.5	40.5	42
		Total	**54.3**	**45.7**	**46**
	2012–13	Charter	77.8	22.2	162
		Total	**76.8**	**23.2**	**168**
	2013–14	**Total**			**4**
	2014–15	**Total**			**5**
	Total all strata		**73.3**	**26.7**	**311**

Table 8 (*continued*). Teleosts (*continued*)

Species	Year	Fleet	% Alive	% Dead	Number
Oilfish	**2010–11**	**Total**			**10**
	2011–12	**Total**			**5**
	2012–13	Charter	71.4	28.6	35
		Total	**72.2**	**27.8**	**36**
	2013–14	**Total**			**5**
	2014–15	**Total**			**9**
	Total all strata		**73.8**	**26.2**	**65**
Rudderfish	**2010–11**	Charter	83.3	16.7	48
		Total	**82.0**	**18.0**	**50**
	2011–12	Charter	89.7	10.3	29
		Total	**89.7**	**10.3**	**29**
	2012–13	Charter	82.1	17.9	56
		Total	**81.0**	**19.0**	**58**
	2013–14	Charter	83.7	16.3	104
		Total	**82.7**	**17.3**	**110**
	2014–15	Charter	85.3	14.7	34
		Total	**81.6**	**18.4**	**38**
	Total all strata		**82.8**	**17.2**	**285**
Sunfish	**2010–11**	Domestic	97.4	2.6	234
		Total	**97.1**	**2.9**	**239**
	2011–12	Domestic	100.0	0.0	160
		Total	**100.0**	**0.0**	**165**
	2012–13	Charter	100.0	0.0	29
		Domestic	100.0	0.0	50
		Total	**100.0**	**0.0**	**79**
	2013–14	Domestic	100.0	0.0	114
		Total	**99.2**	**0.8**	**130**
	2014–15	Charter	100.0	0.0	21
		Domestic	100.0	0.0	48
		Total	**100.0**	**0.0**	**69**

Table 9: Percentage of main non-target species that were recovered alive and released alive or discarded dead during 2015 when observers began to record life status on release as well as recovery. '% Dead' refers to those discarded dead or near death and unlikely to survive, '% Alive' includes those released alive and uninjured and those with injuries considered survivable. Also shown is the percentage of those released alive that were released with injuries considered survivable. The criteria used by observers are shown in Appendix 1.

Species	Fleet	% Dead	% Alive	% of those alive, with non-fatal injuries	Number of discarded fish with known life fate in 2015
Blue shark	Charter	1.5	98.5	29.6	4644
	Domestic	9.0	91.0	11.9	2976
	Total	**4.4**	**95.6**	**23.0**	**7620**
Mako shark	Domestic	9.2	90.8	8.5	65
	Total	**8.2**	**91.8**	**7.5**	**73**
Porbeagle shark	Charter	1.1	98.9	33.3	188
	Domestic	12.9	87.1	8.2	70
	Total	**4.3**	**95.7**	**27.1**	**258**



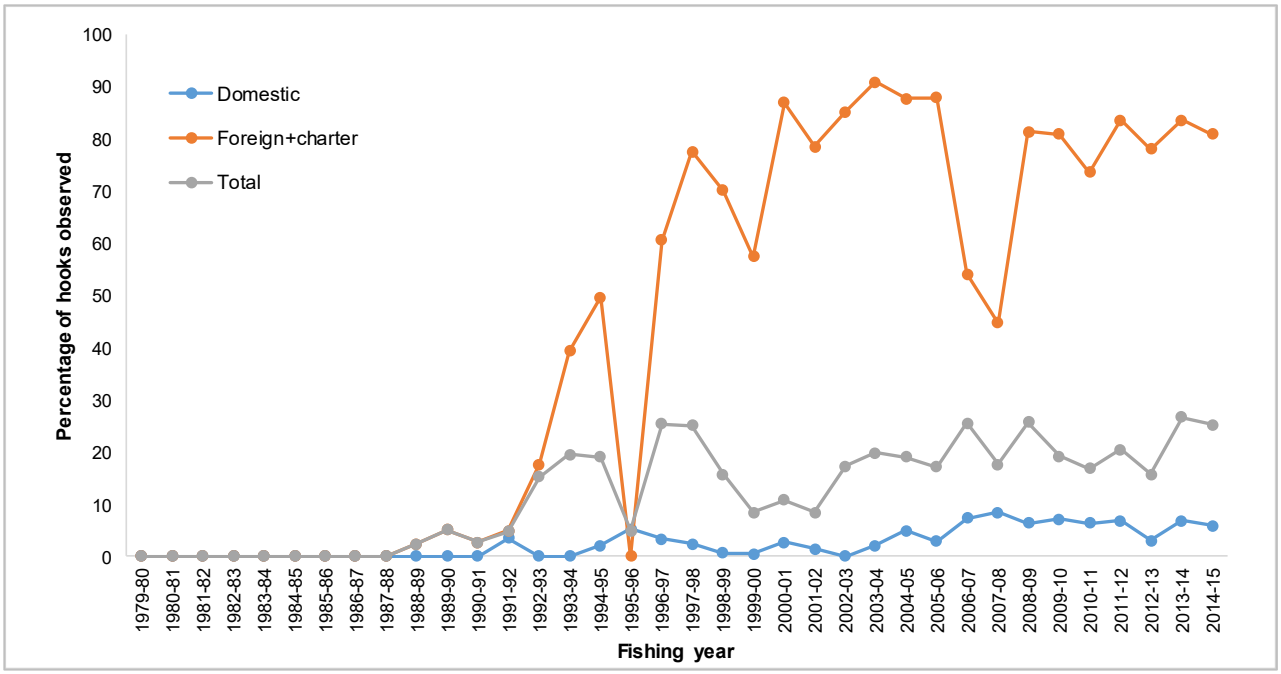


Figure 1: Number of hooks set by fishing year and fleet from 1979–80 to 2014–15 (above) and percentage of hooks observed (below). "Foreign + Charter" includes Japanese foreign licensed and Charter vessels, Korean foreign licensed vessels, Philippine Charter vessels, Australian Charter vessels, and one large New Zealand Domestic vessel which fished with the Charter fleet.

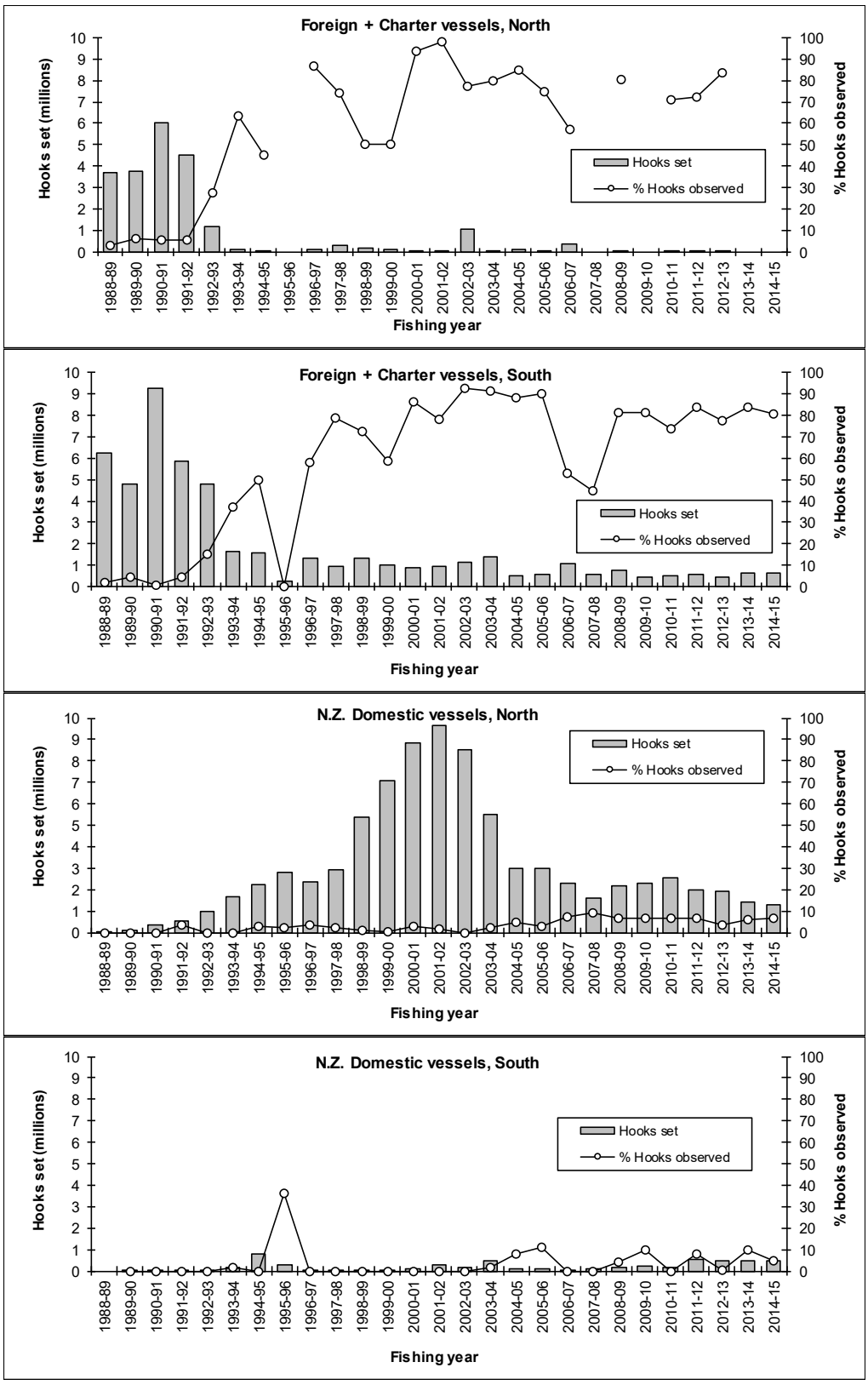


Figure 2: Numbers of hooks set, and percentage of hooks observed, by fleet, region and fishing year. "Foreign + Charter" includes Japanese foreign licensed and Charter vessels, Korean foreign licensed vessels, Philippine Charter vessels, Australian Charter vessels, and one large New Zealand Domestic vessel which fished with the Charter fleet.

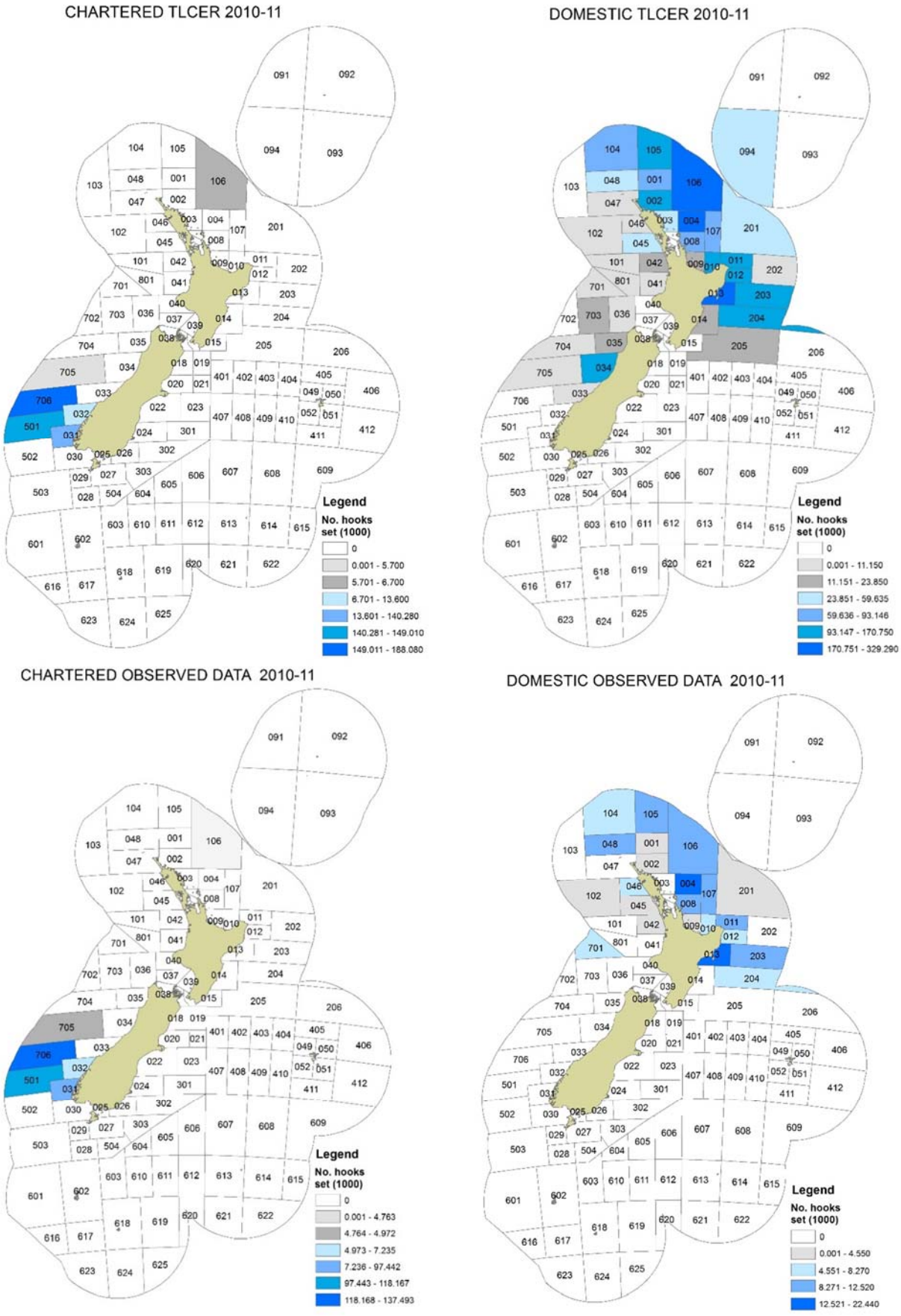


Figure 3: Numbers of hooks set (thousands) based on commercial returns (top) and observed (bottom) for longlines set by Chartered vessels (left) and Domestic vessels (right) shown as statistical area density plots. 2010–11. Colour legend shows number of hooks (differs among maps). Numerals are statistical area codes.

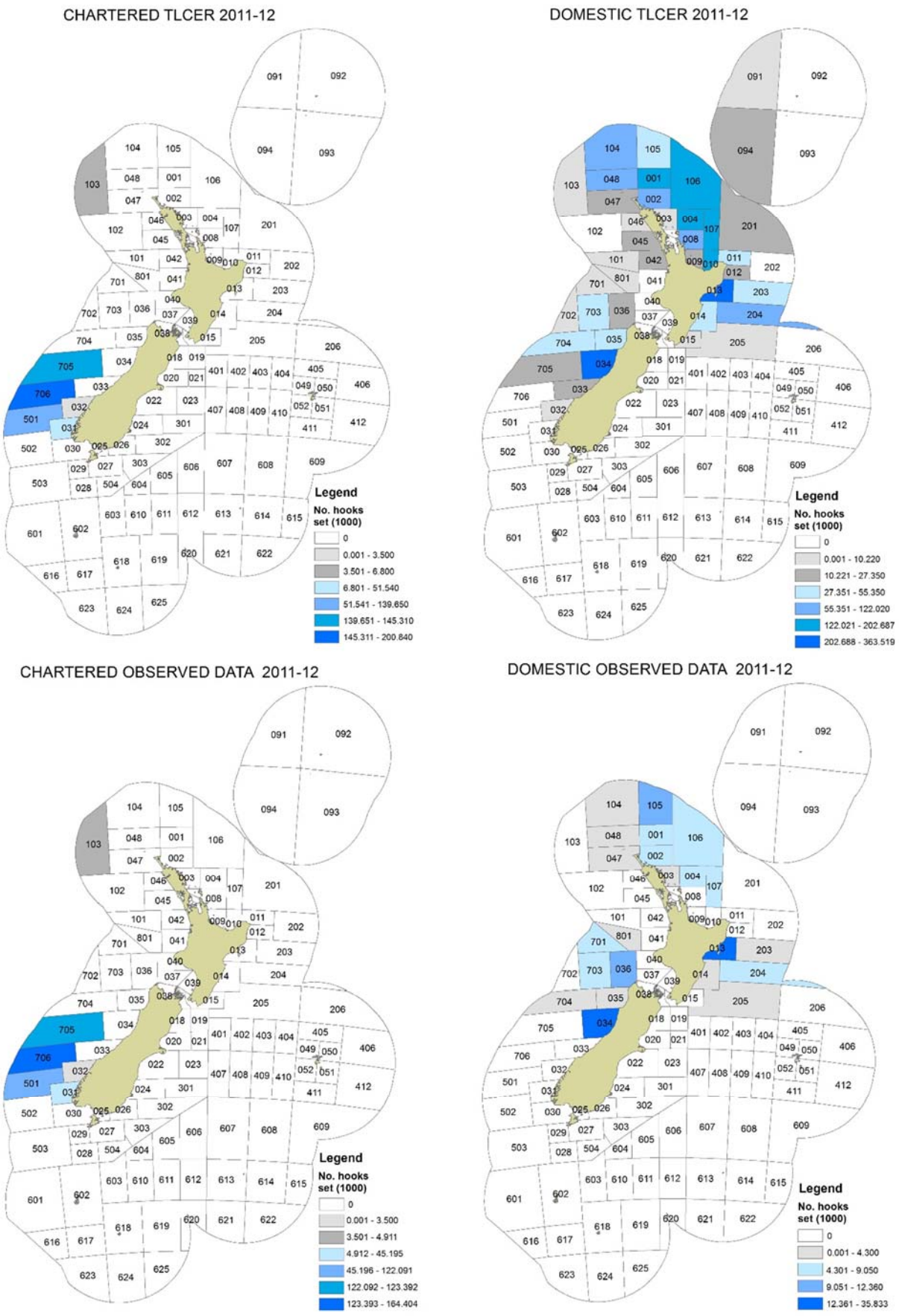


Figure 3: (continued). 2011–12.

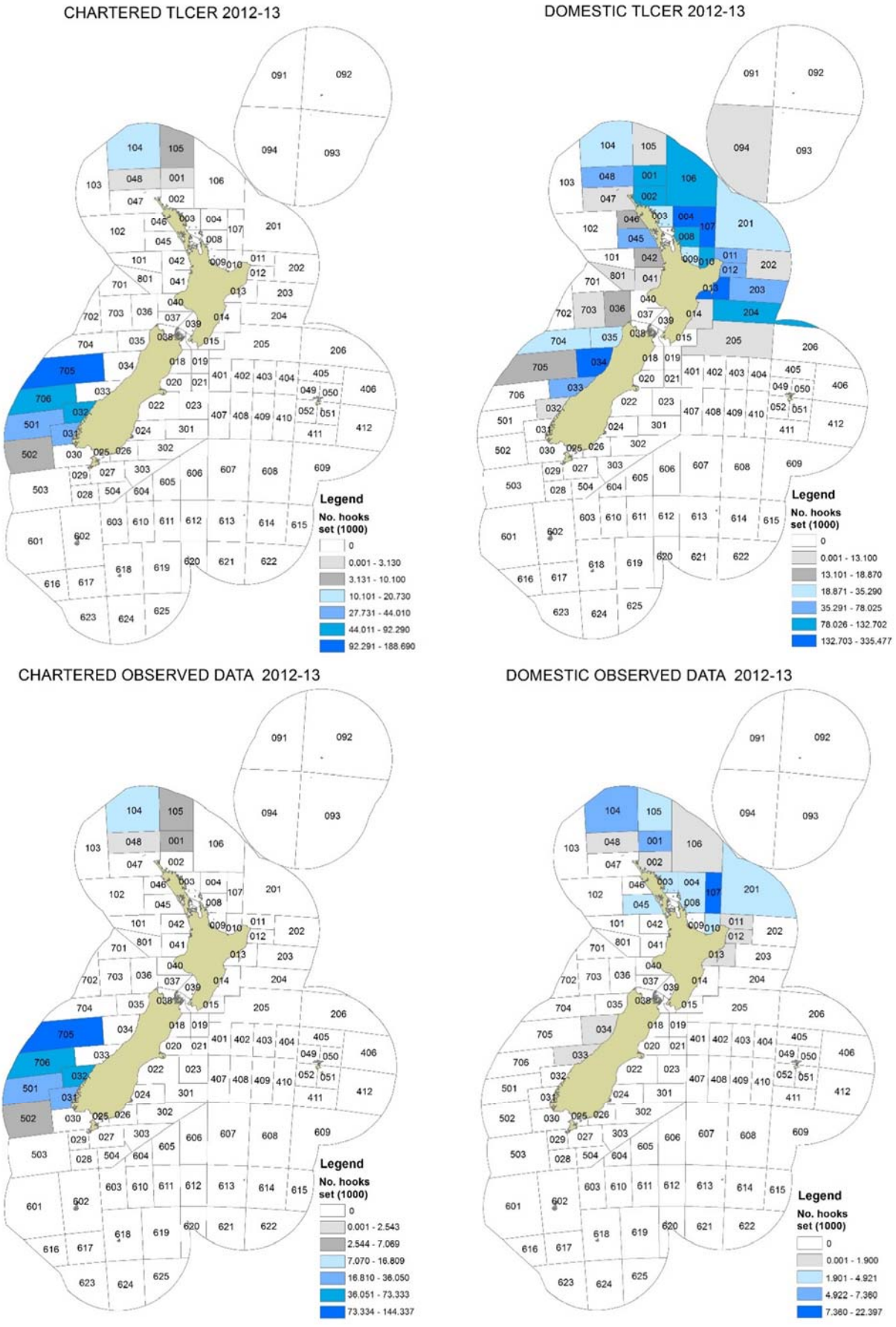


Figure 3: (continued). 2012–13

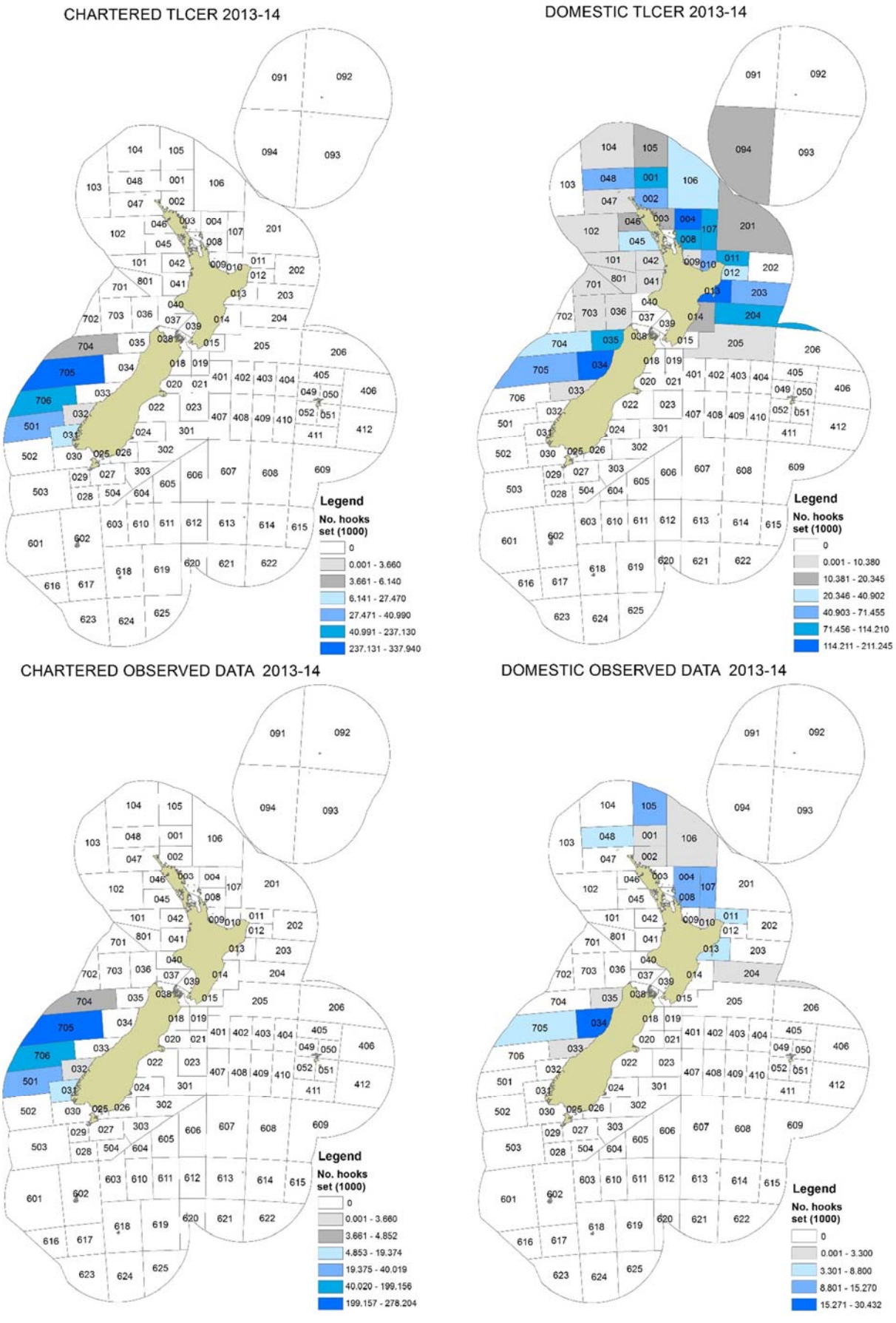


Figure 3: (continued). 2013–14

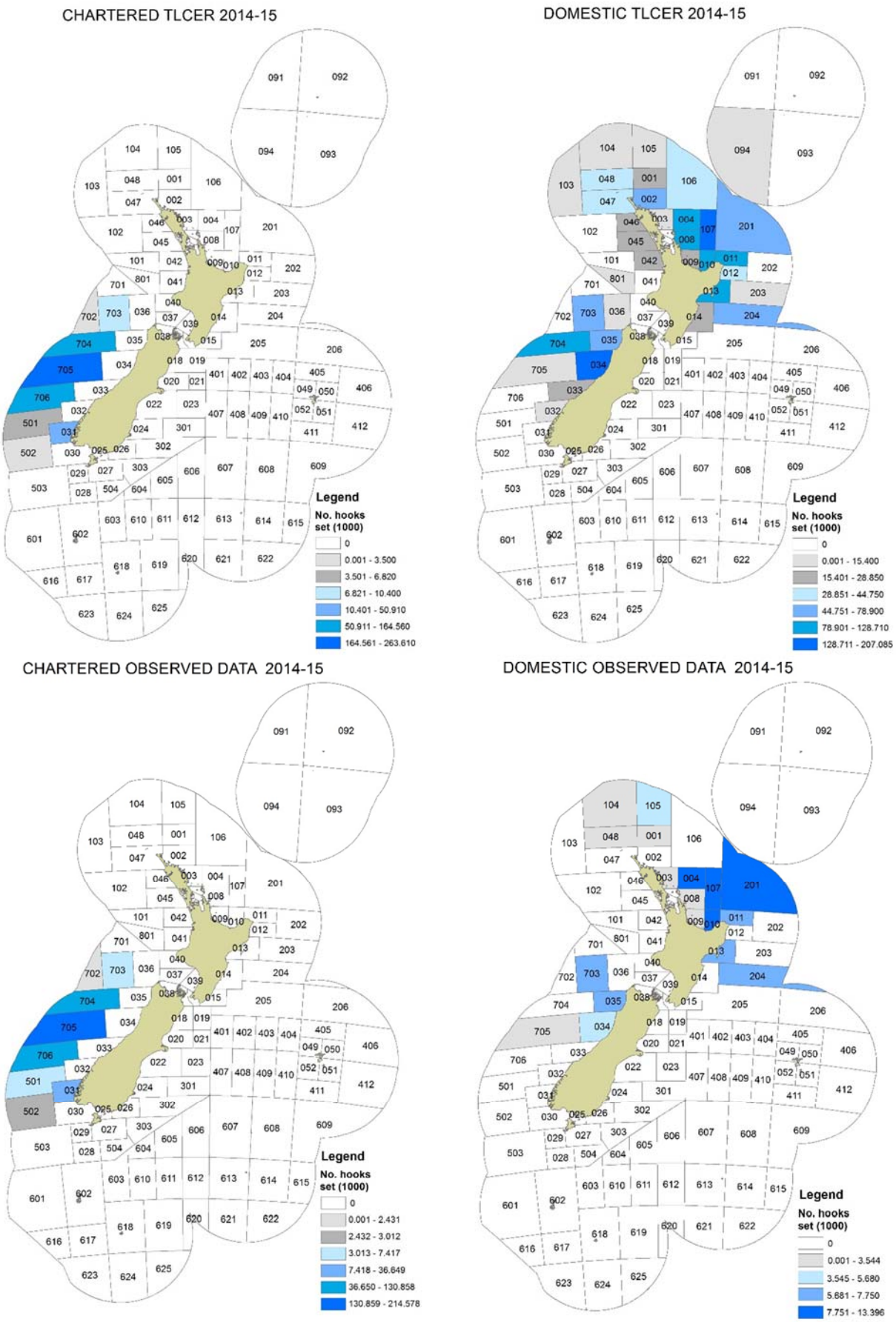


Figure 3: (continued). 2014–15.

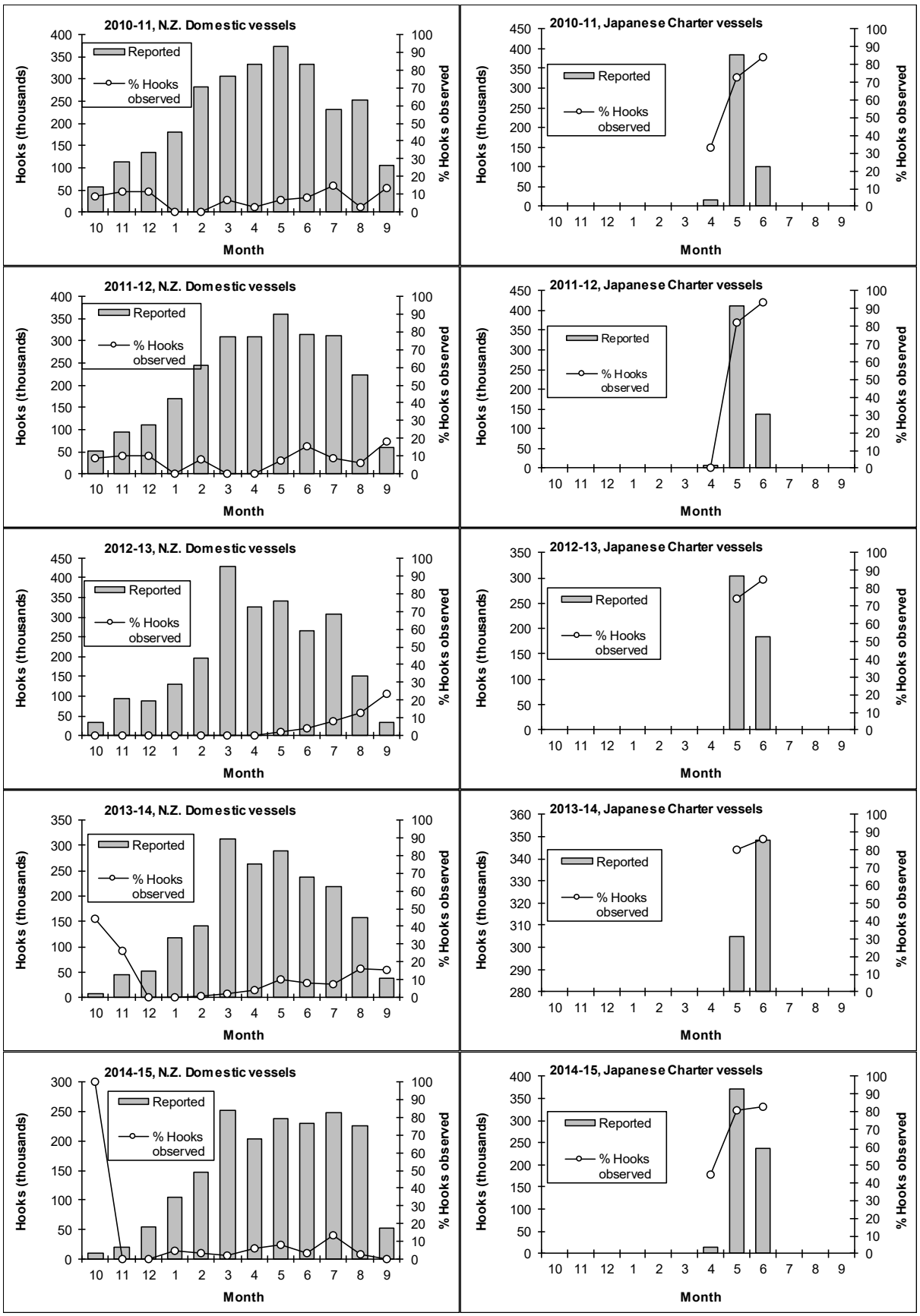


Figure 4: Monthly distribution of reported sets and the percentage observed in 2010–11 to 2014–15 by fleet and month. The percentage of hooks observed is shown on the right hand axes (white circles).

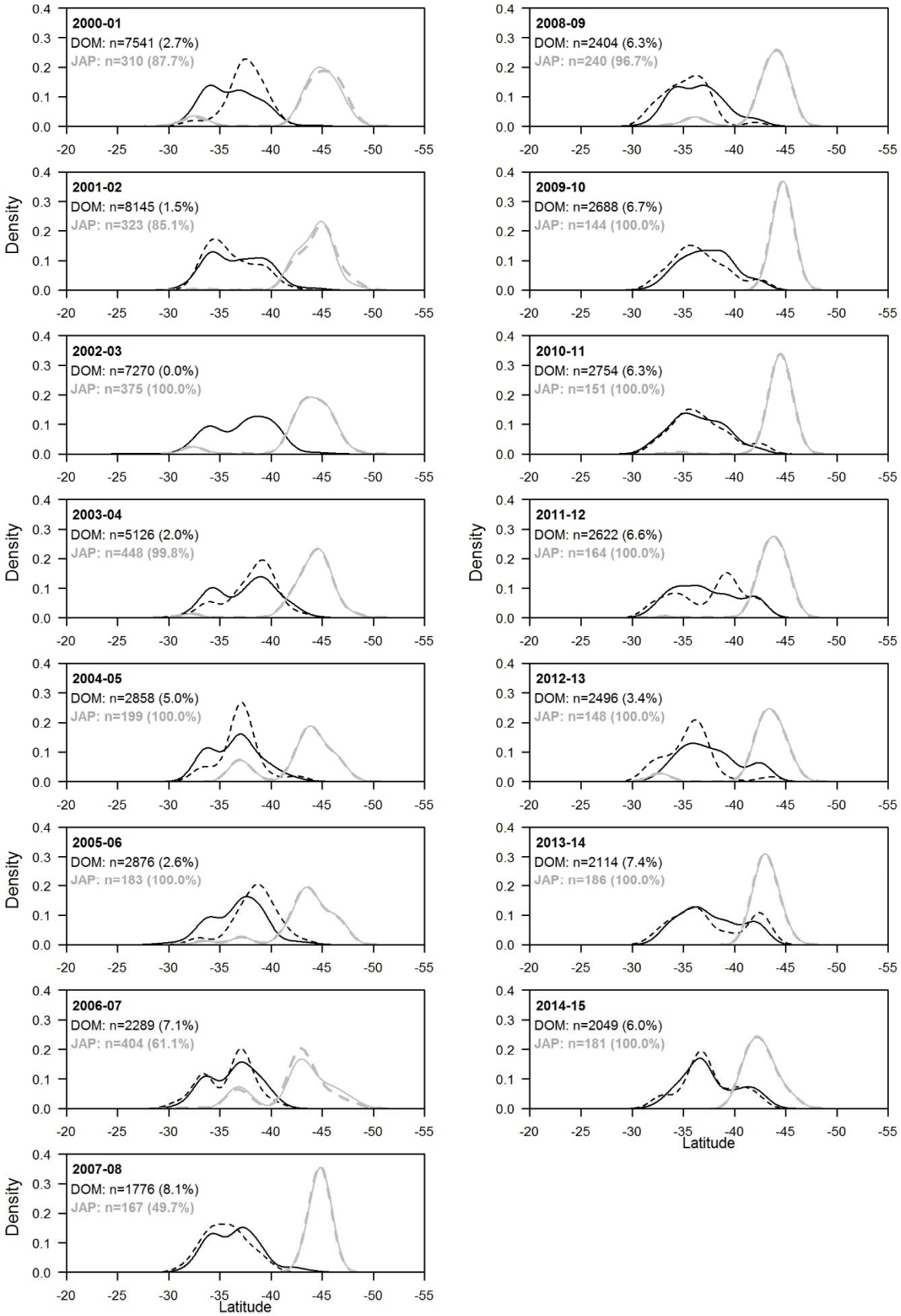


Figure 5: Distribution of start latitude positions for commercial and observed numbers of sets, for Domestic vessels (black lines) and Chartered Japanese vessels (grey lines), 2000–01 to 2014–15. Solid lines represent commercial data and dashed lines represent observed data. The total number of sets by each fleet and the percentage observed is given for each fishing year. Note: there was no observed Domestic effort in 2002–03. One large Domestic vessel was included in the Japanese effort during 2000–01 to 2003–04.

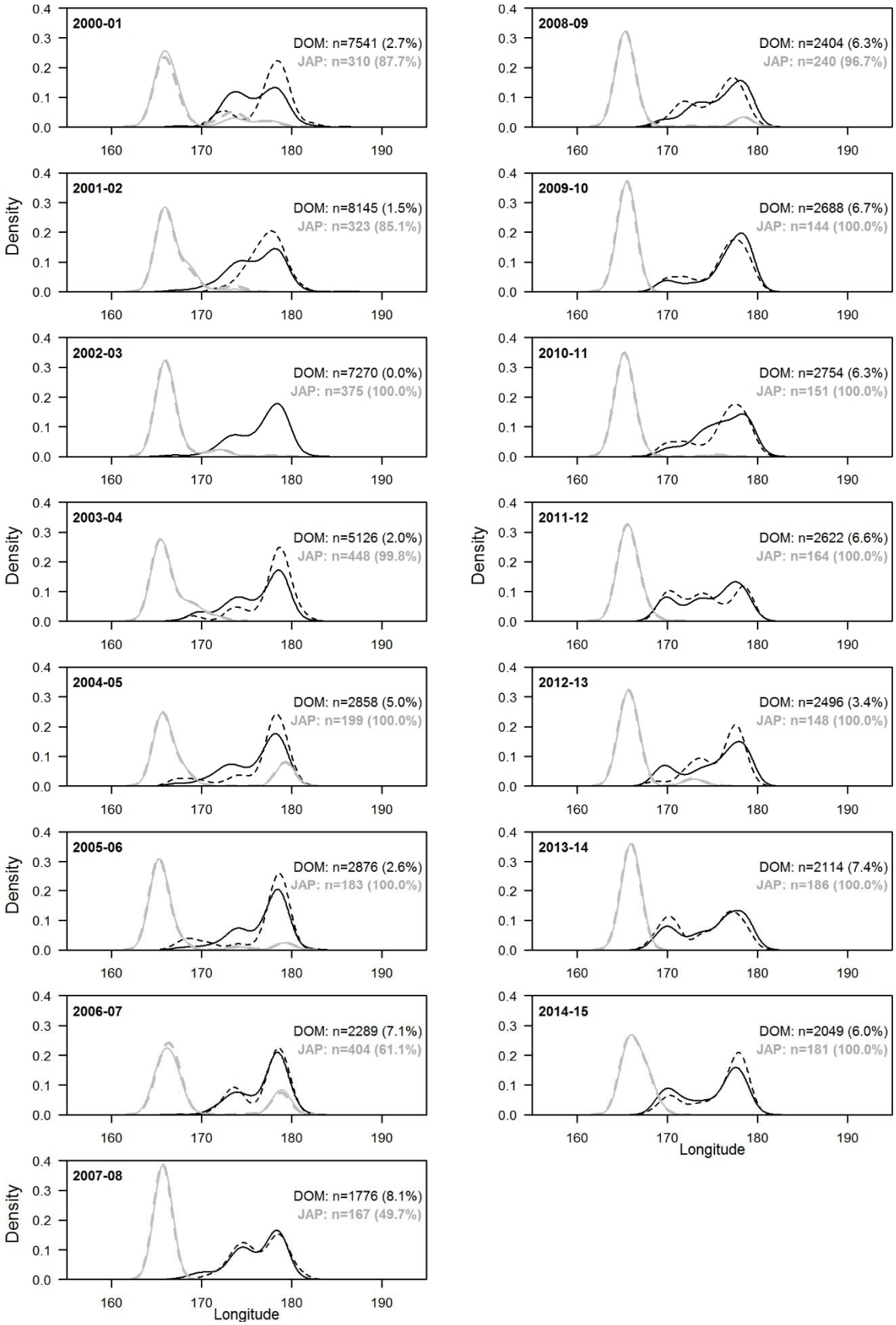


Figure 6: Distribution of start longitude positions for commercial and observed numbers of sets, for Domestic vessels (black lines) and Chartered Japanese vessels (grey lines), 2000–01 to 2014–15. Solid lines represent commercial data and dashed lines represent observed data. The total number of sets by each fleet and the percentage observed is given for each fishing year. Note: there was no observed Domestic effort in 2002–03. One large Domestic vessel was included in the Japanese effort during 2000–01 to 2003–04.

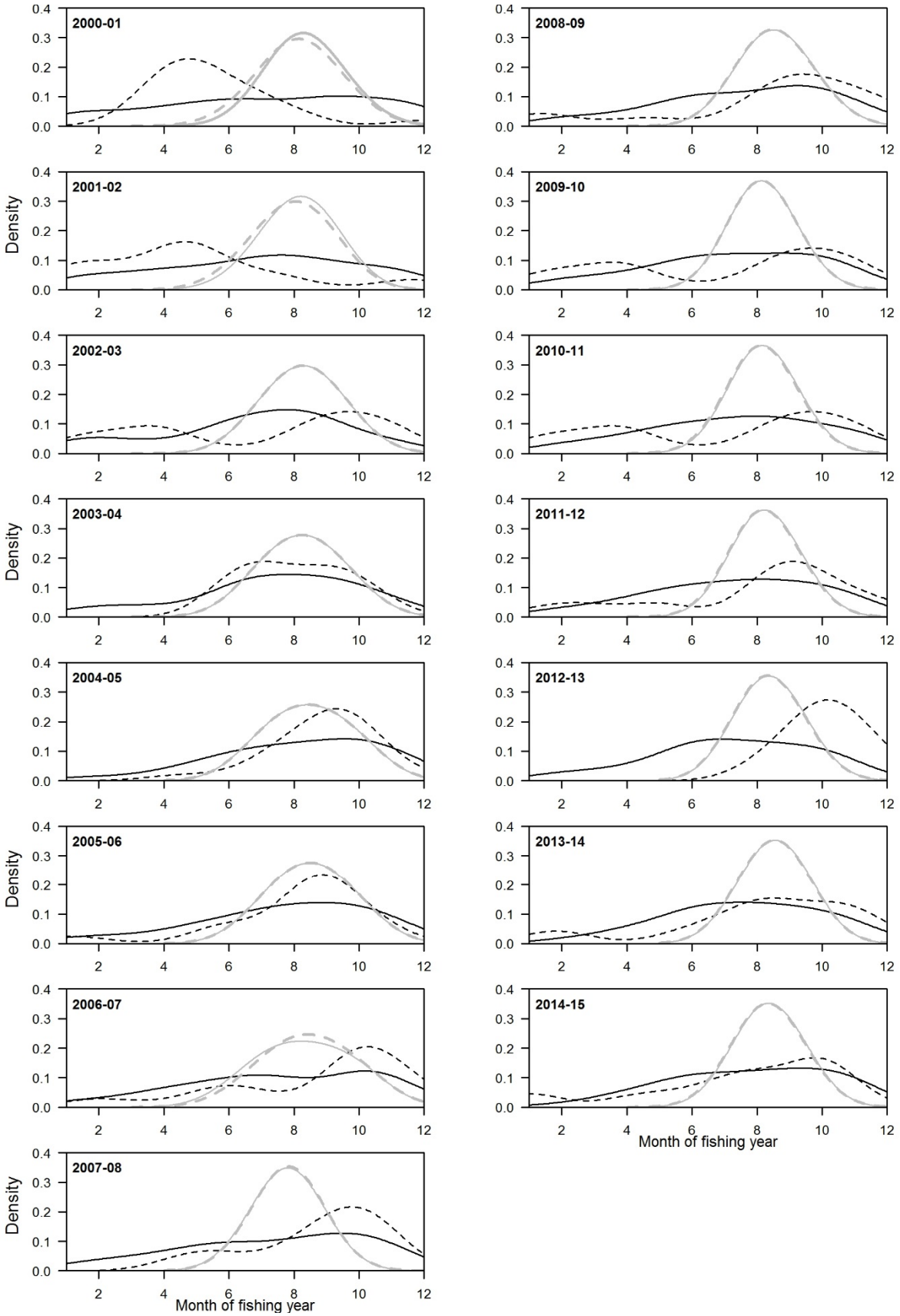


Figure 7: Distribution of month of fishing year (October to September) for commercial and observed numbers of sets, for Domestic vessels (black lines) and Chartered Japanese vessels (grey lines), 2000–01 to 2014–15. Solid lines represent commercial data and dashed lines represent observed data. Note: there was no observed Domestic effort in 2002–03. One large Domestic vessel was included in the Japanese effort during 2000–01 to 2003–04.

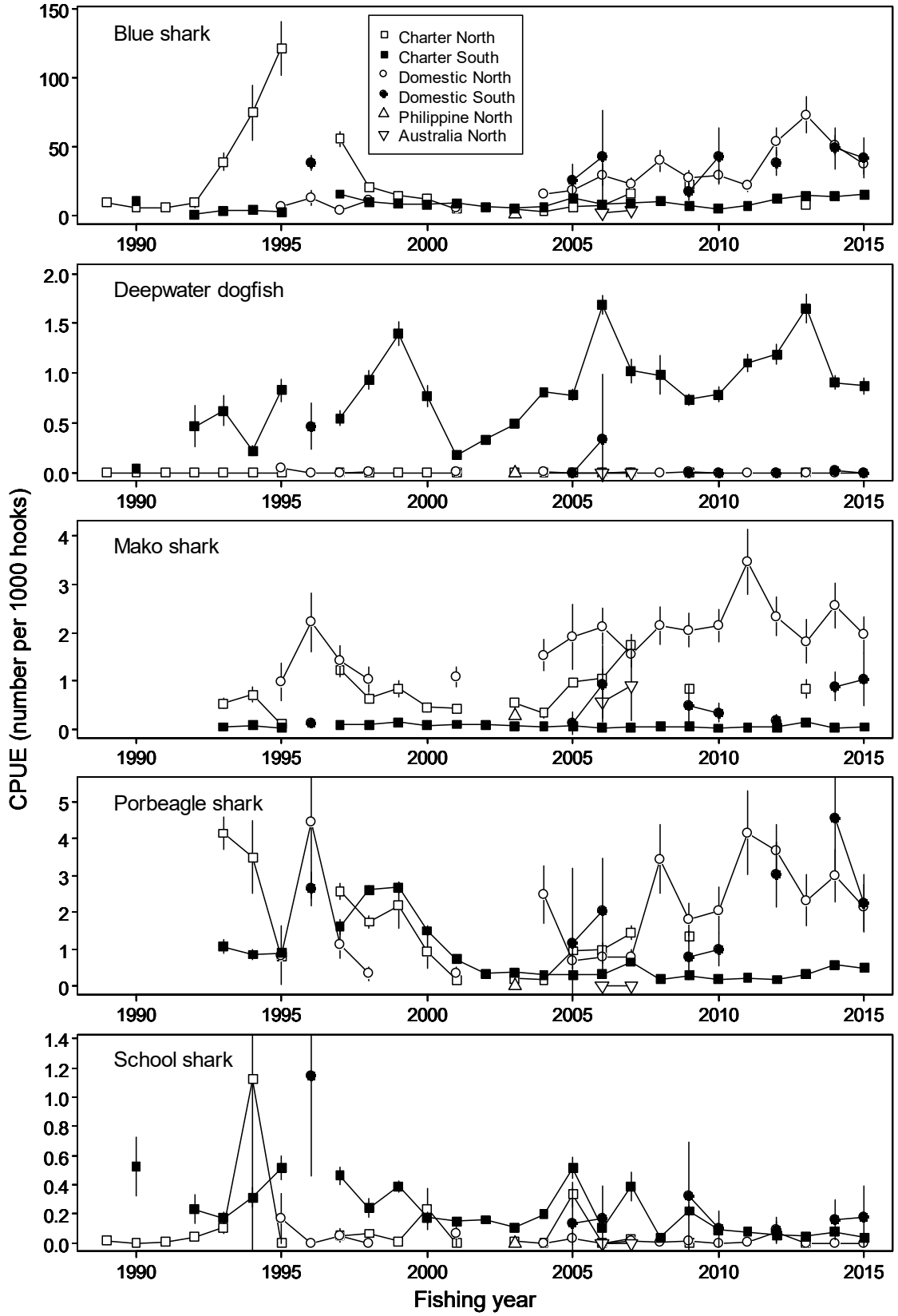


Figure 8: Annual variation in CPUE by fleet and region. Plotted values are the mean estimates with 95% confidence limits. Fishing year 1989 = October 1988 to September 1989. 1. Sharks.

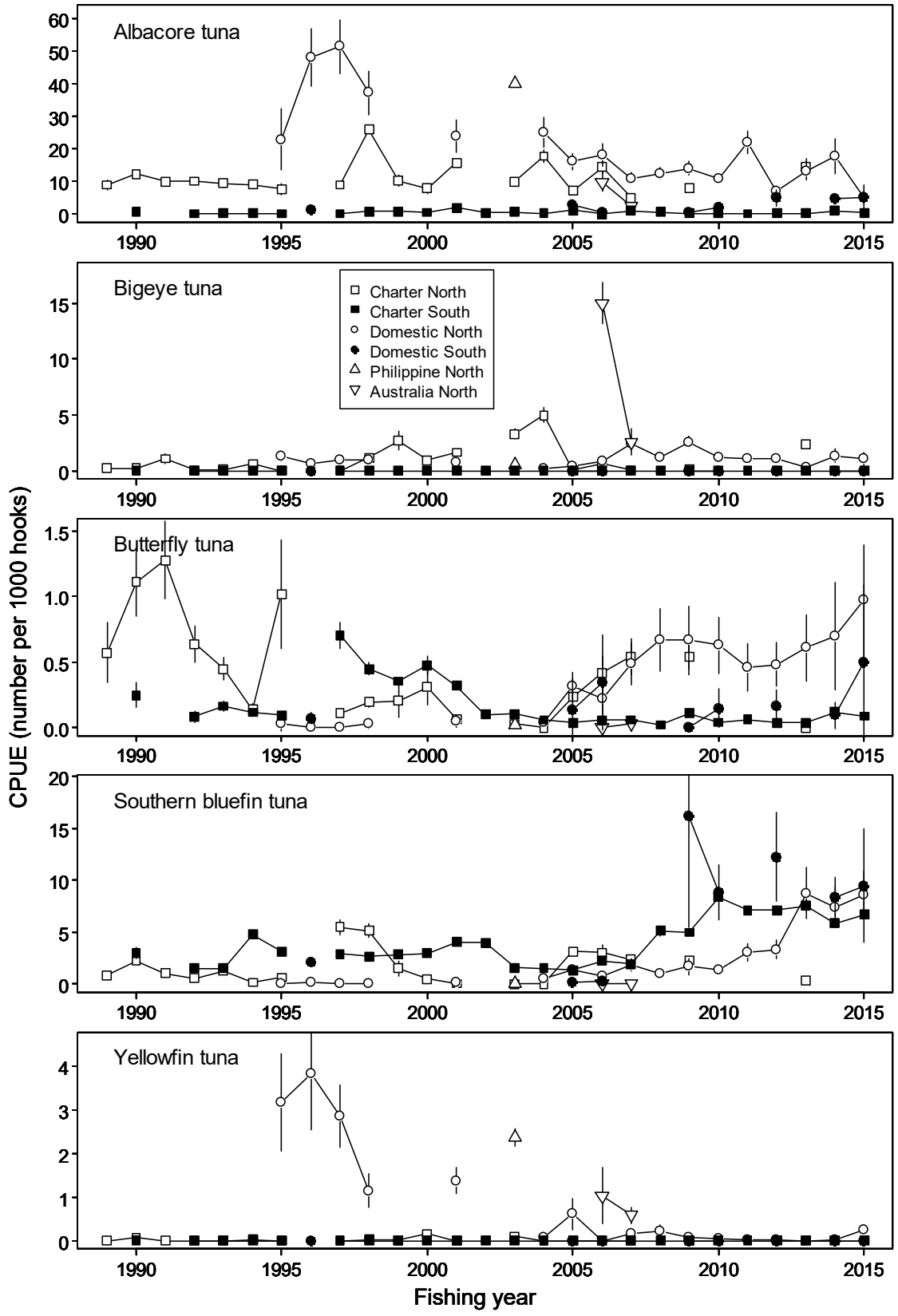


Figure 8: (continued). 2. Tunas.

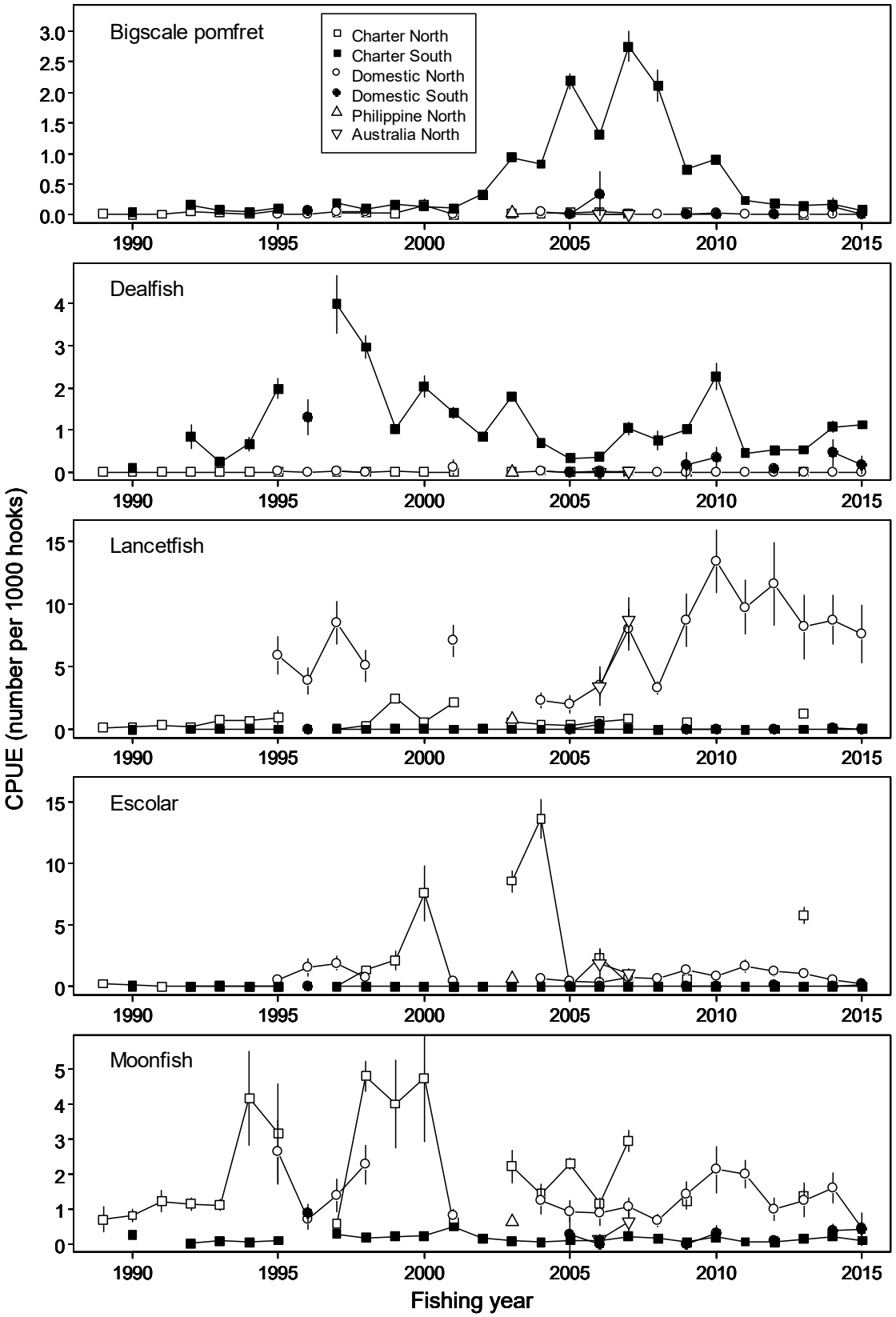


Figure 8: (continued). 3. Other species.

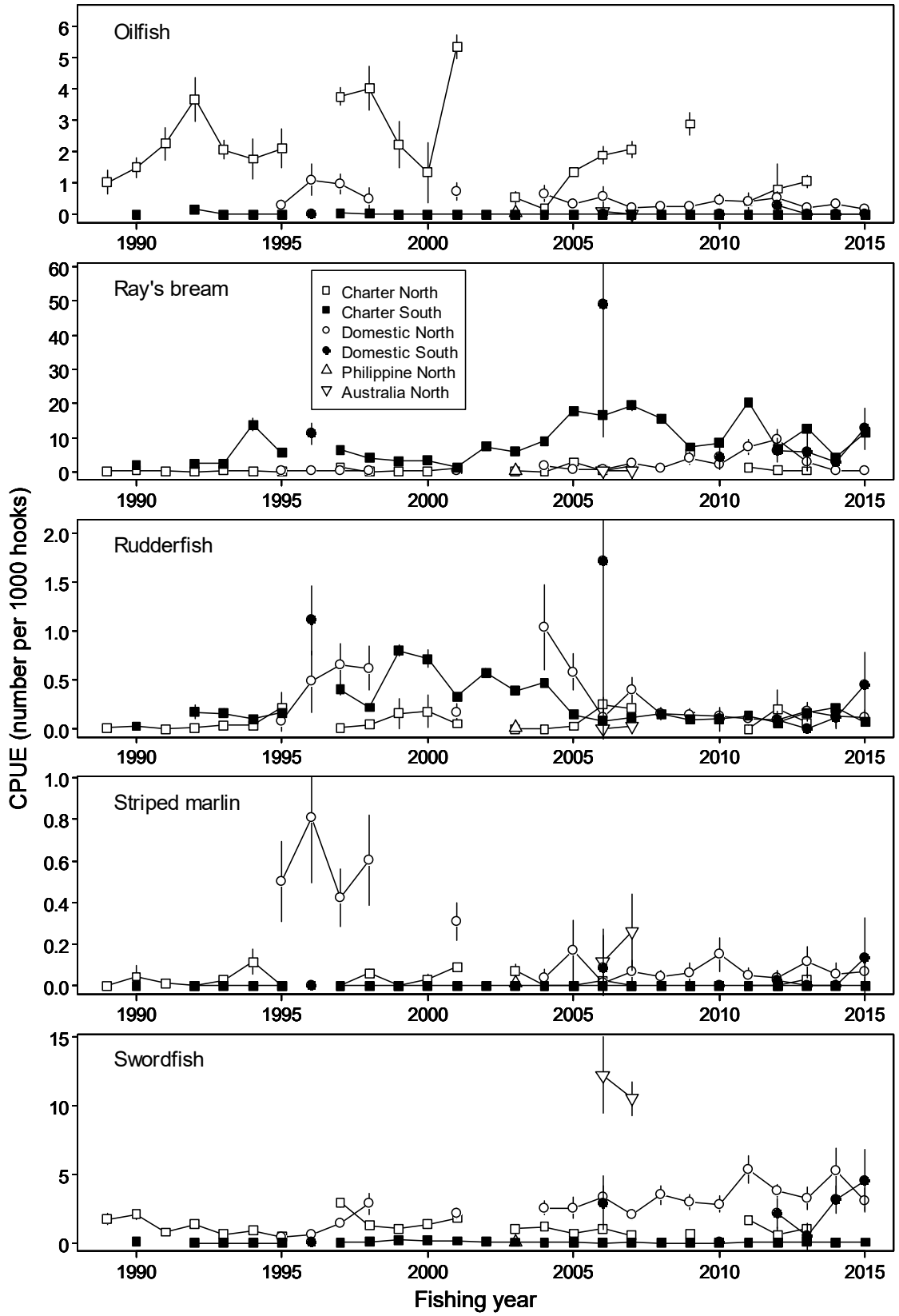


Figure 8: (continued). 3. Other species.

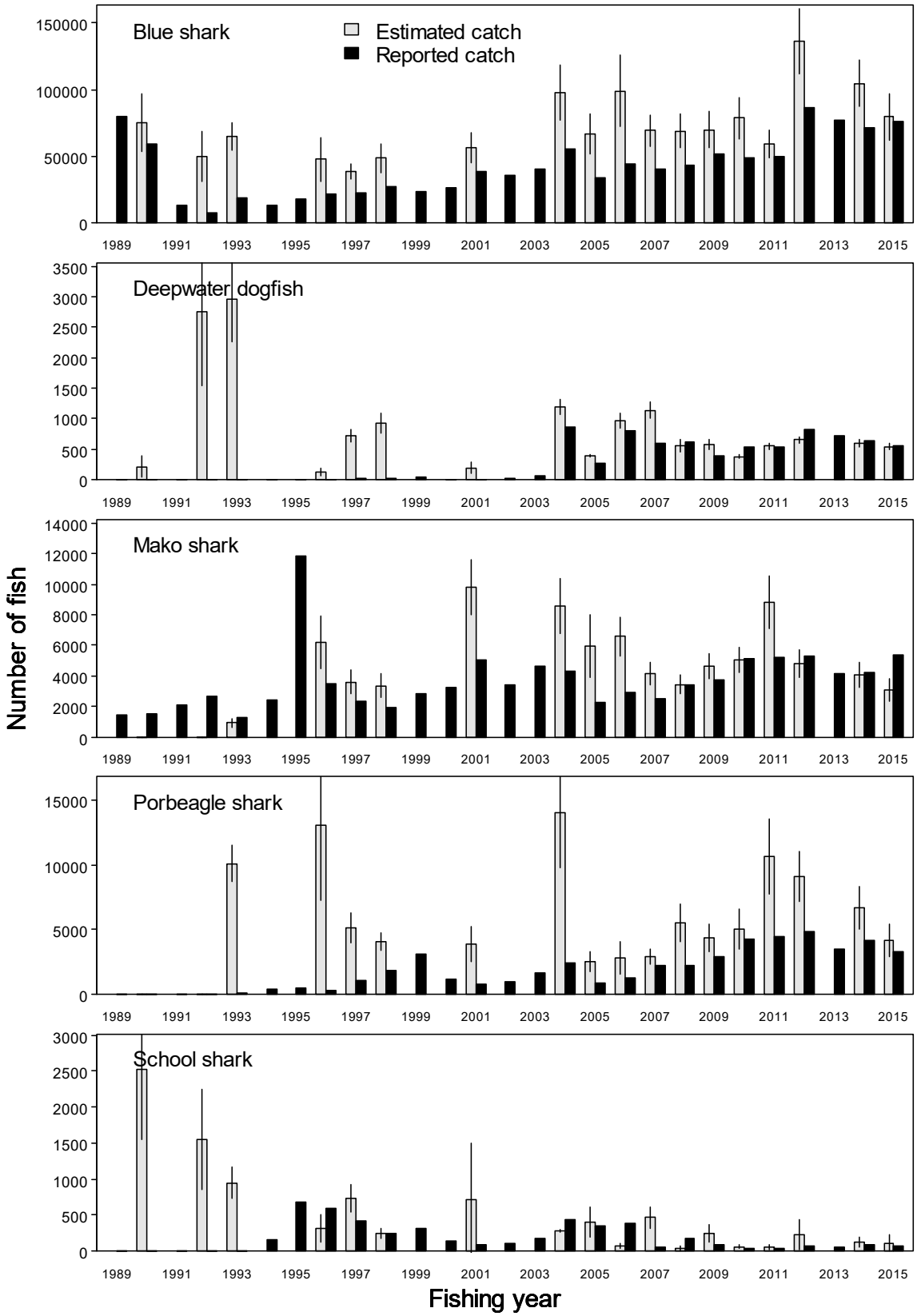


Figure 9: Observer-based estimates of scaled total numbers of fish caught, with 95 % confidence limits, and numbers reported caught on TLCER forms. Fishing year 1989 = October 1988 to September 1989. 1. Sharks.

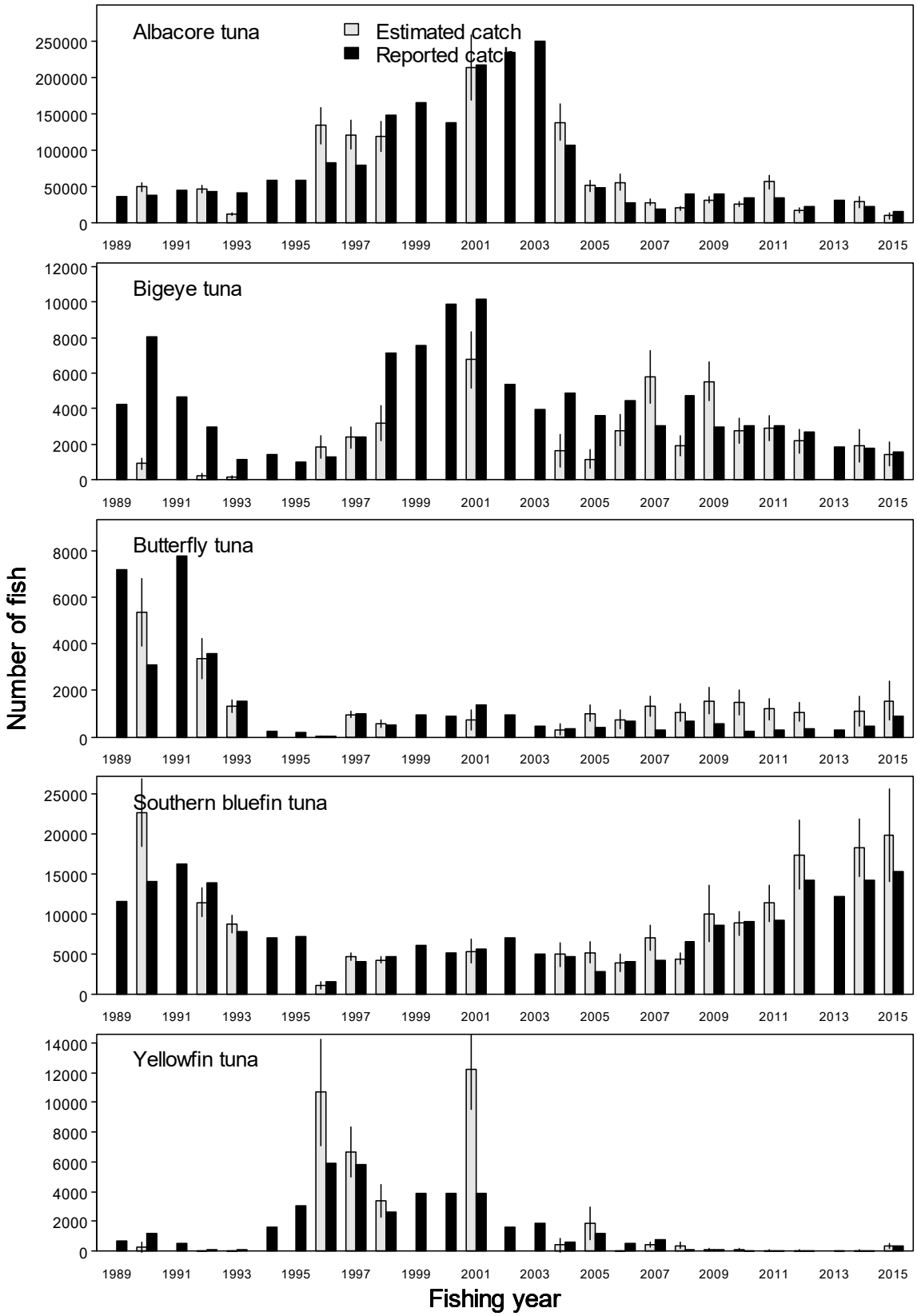


Figure 9: (continued). 2. Tunas.

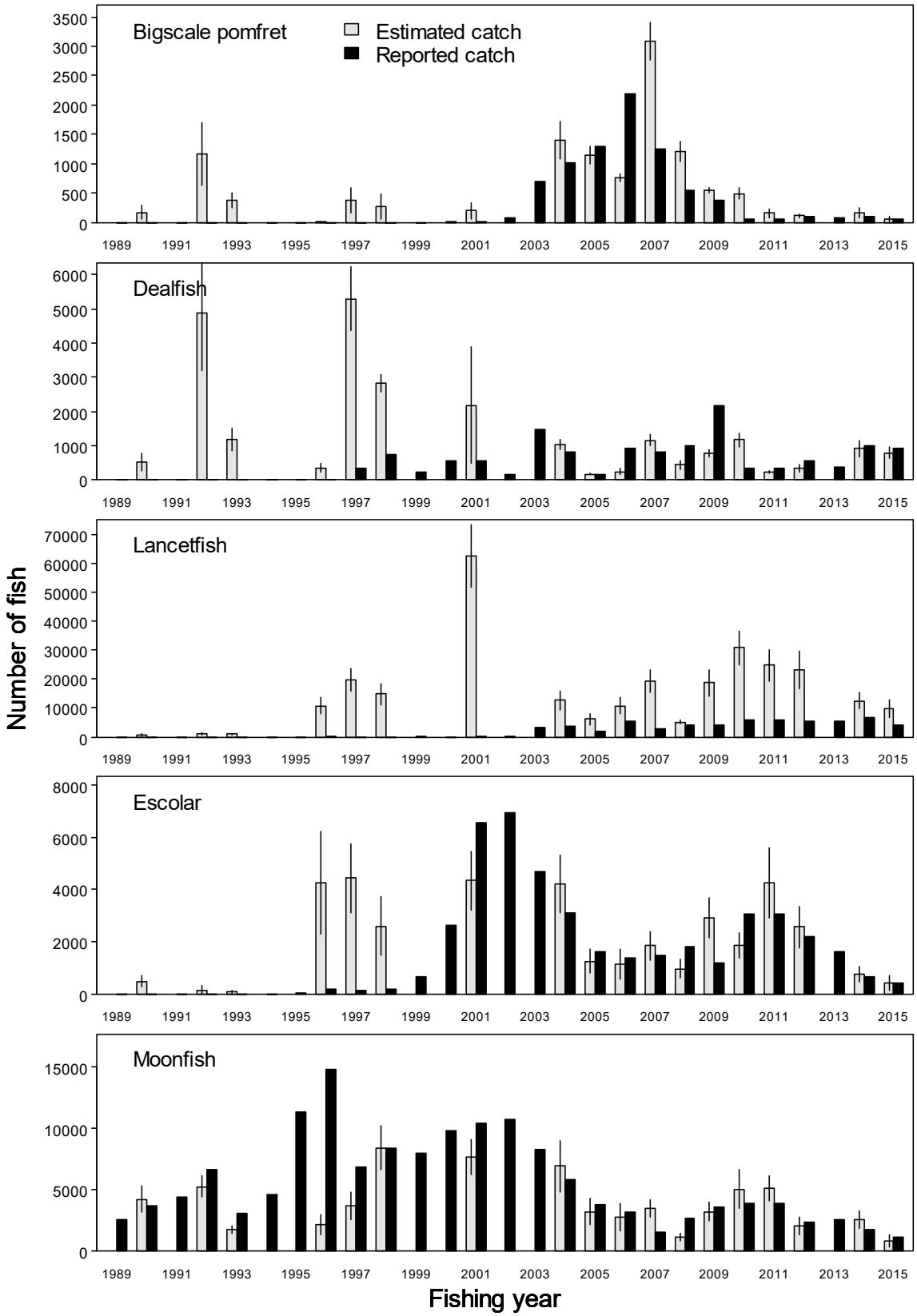


Figure 9: (continued). 3. Other species.

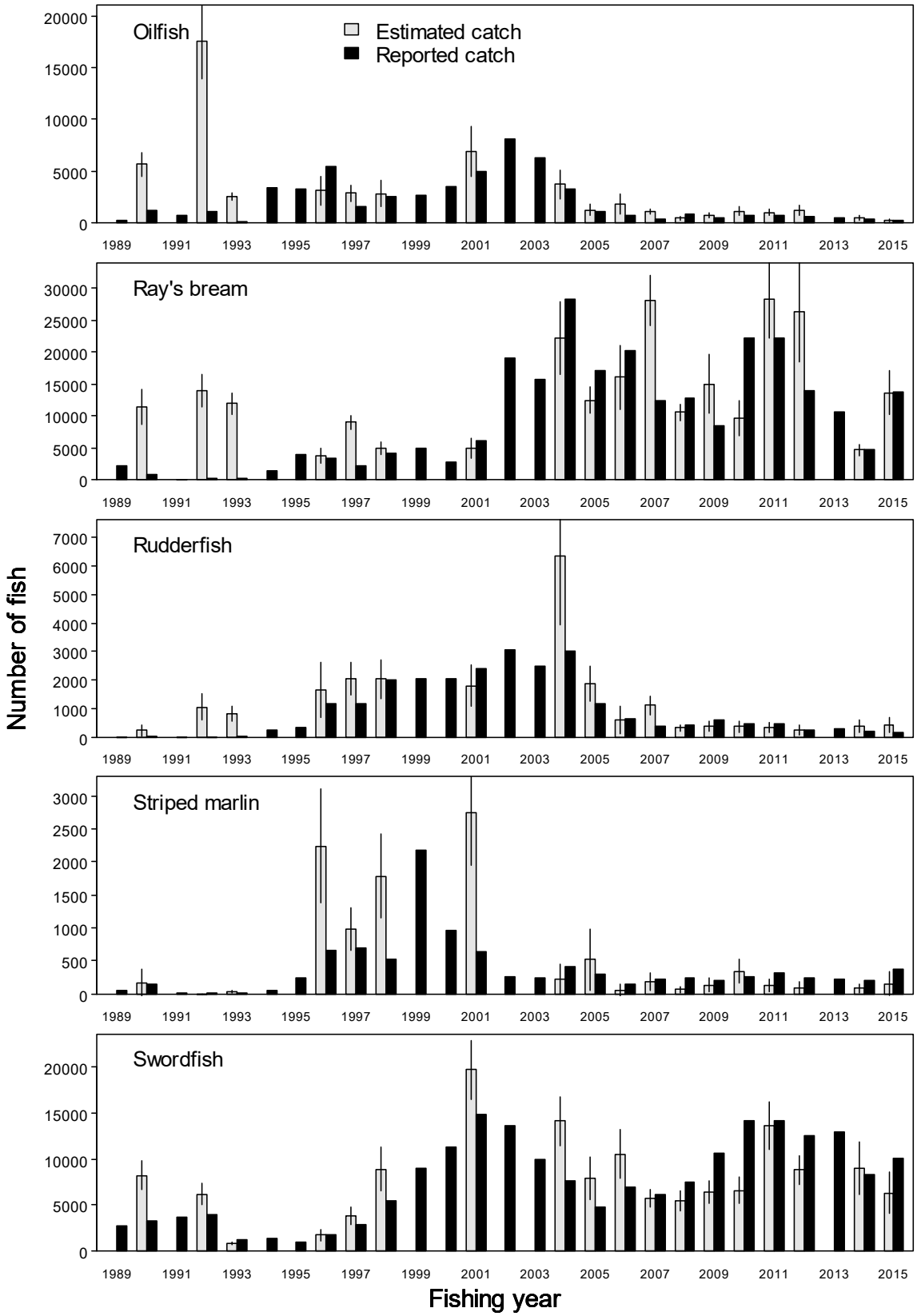


Figure 9: (continued). 3. Other species

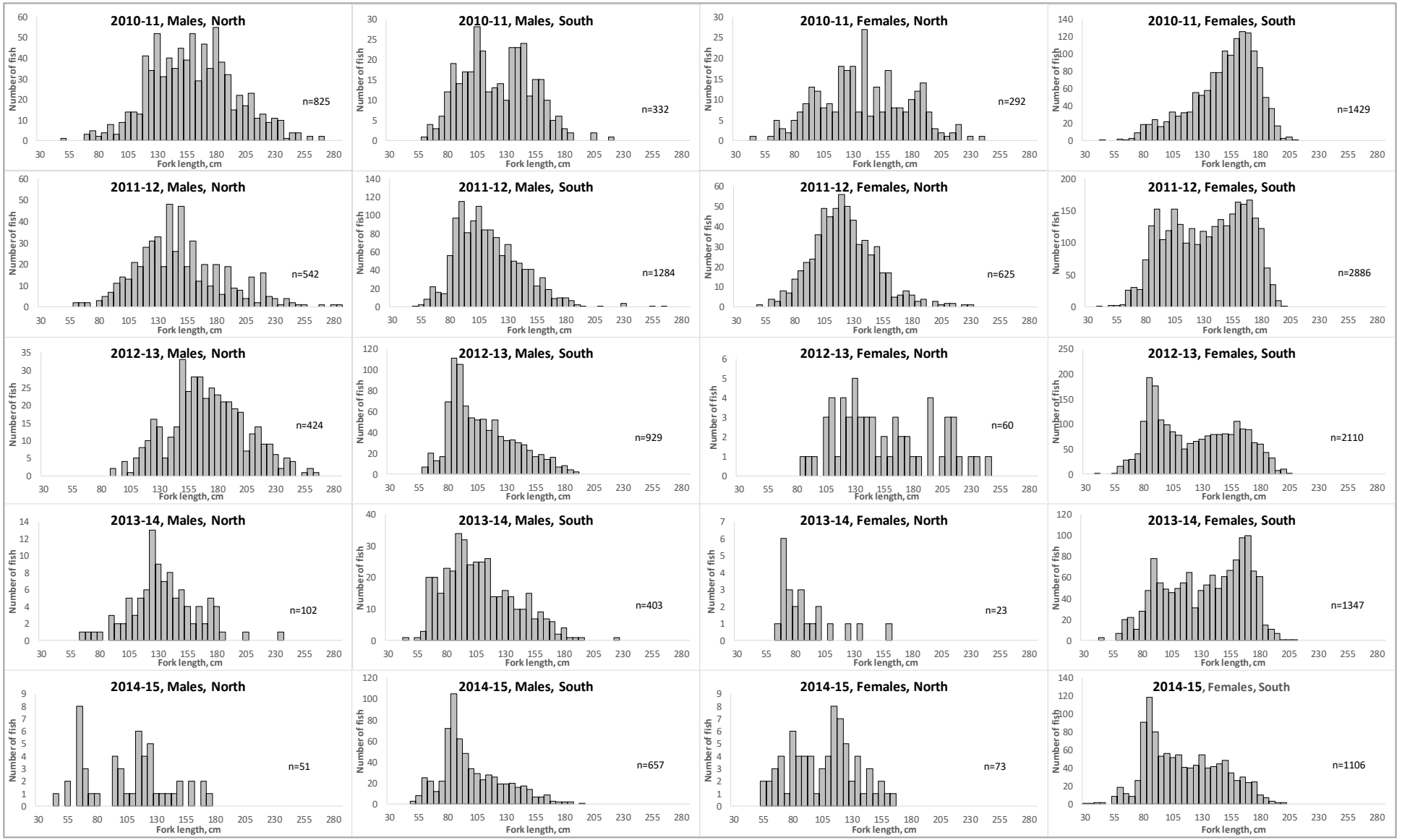


Figure 10: Length-frequency distributions of blue shark by fishing year, sex, and region.

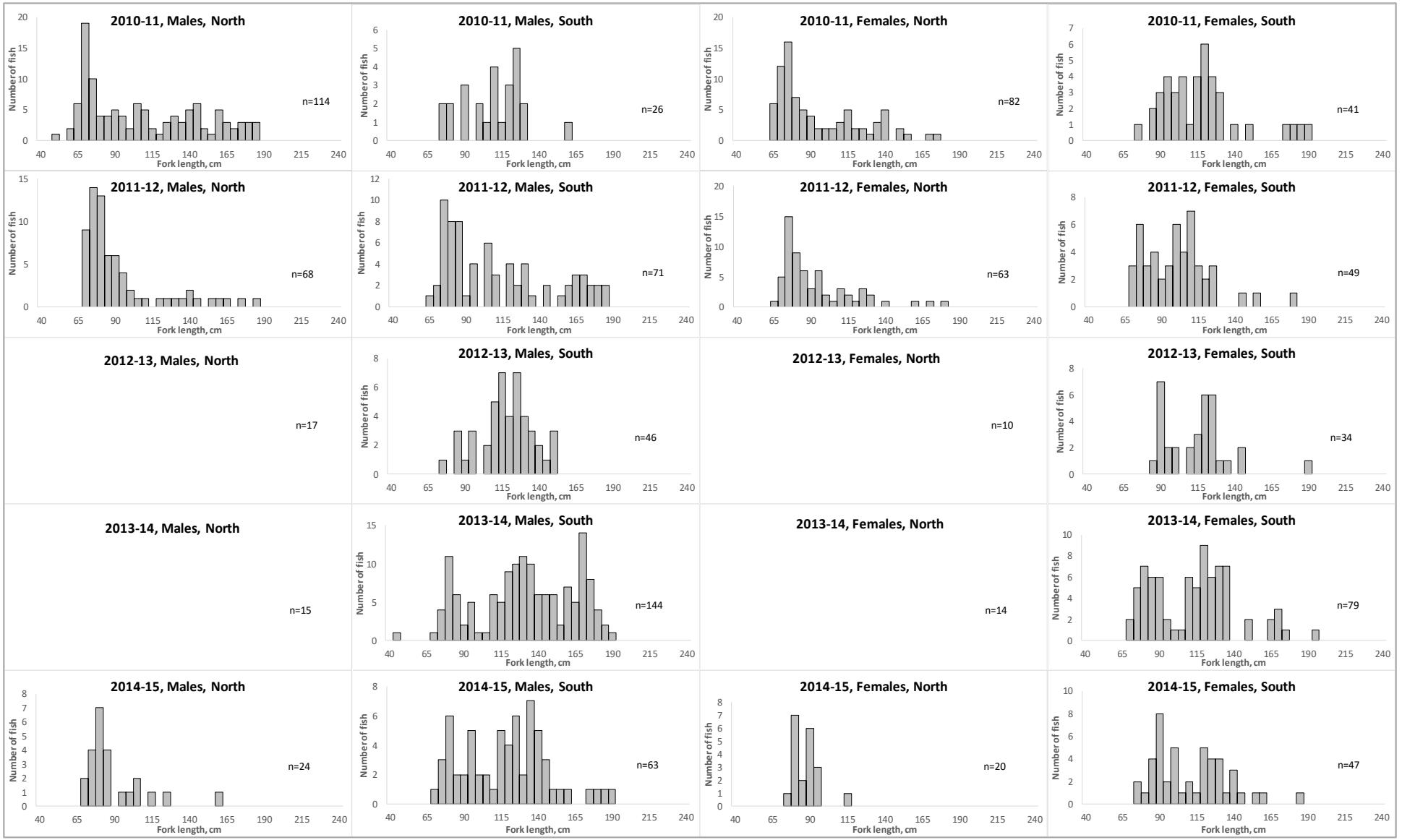


Figure 11: Length-frequency distributions of porbeagle shark by fishing year, sex, and region. Sample sizes of less than 20 fish not shown.

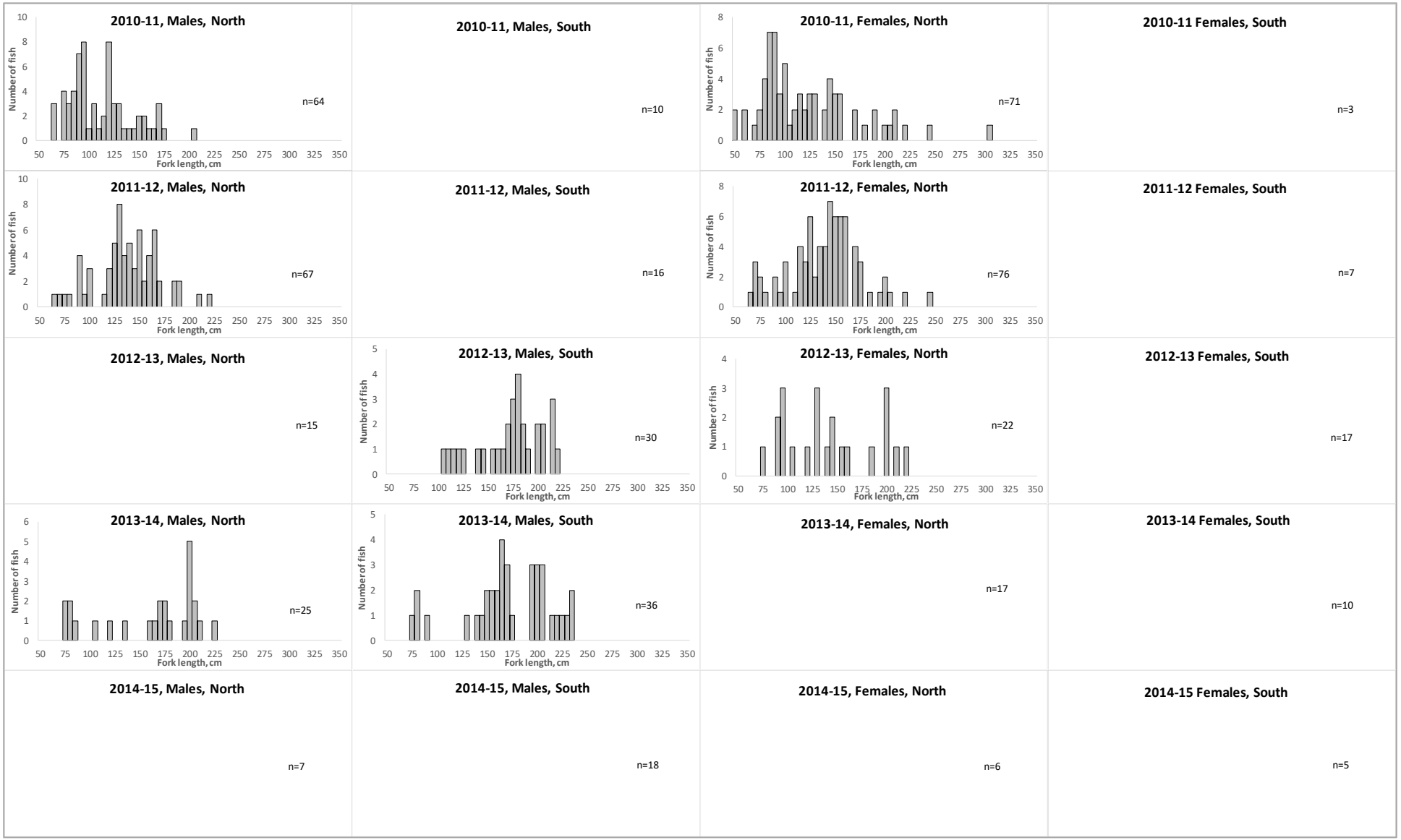


Figure 12: Length-frequency distributions of mako shark by fishing year, sex, and region. Sample sizes of less than 20 fish not shown.

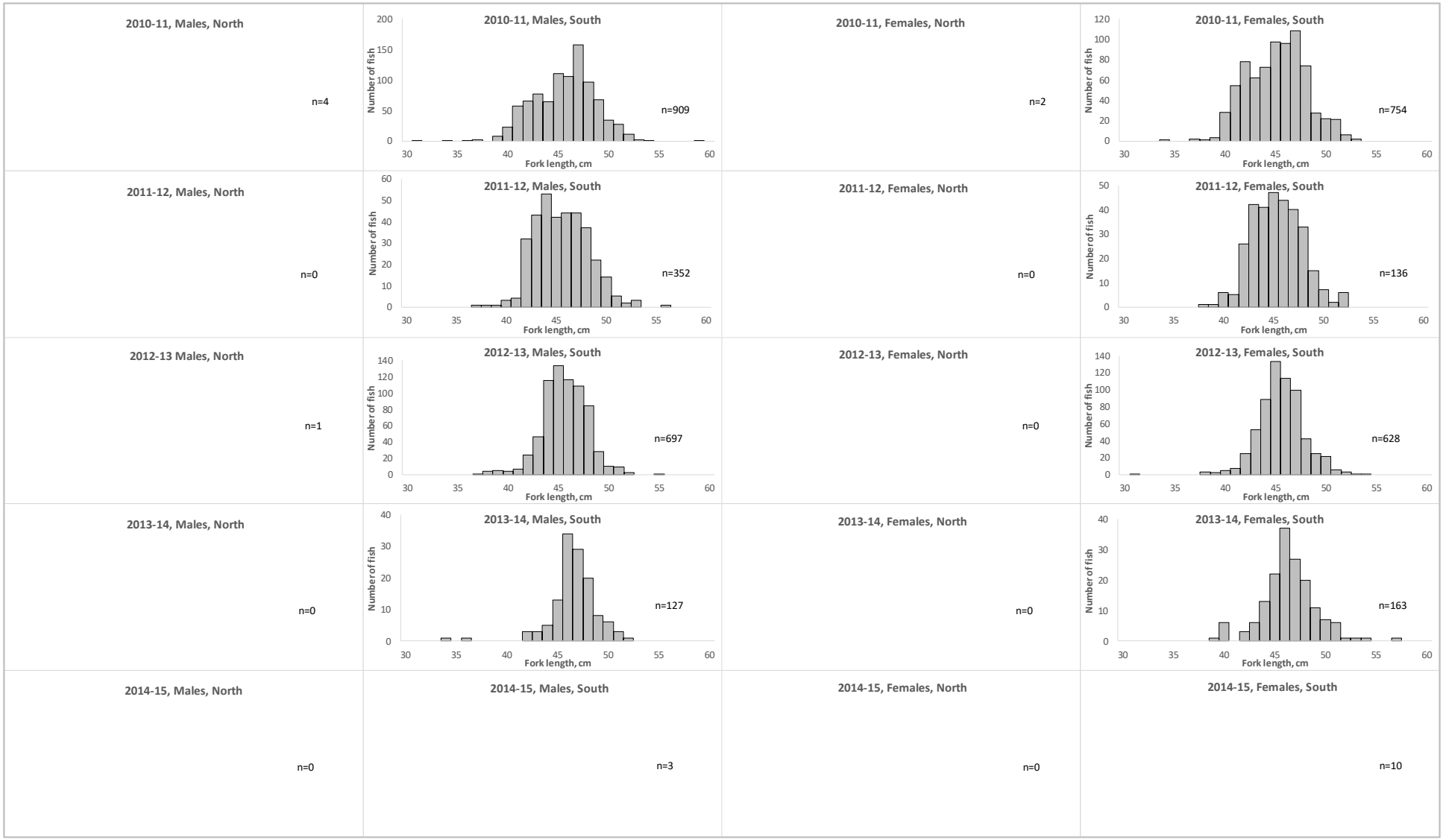


Figure 13: Length-frequency distributions of Ray's bream by fishing year, sex, and region. Sample sizes of less than 20 fish not shown.

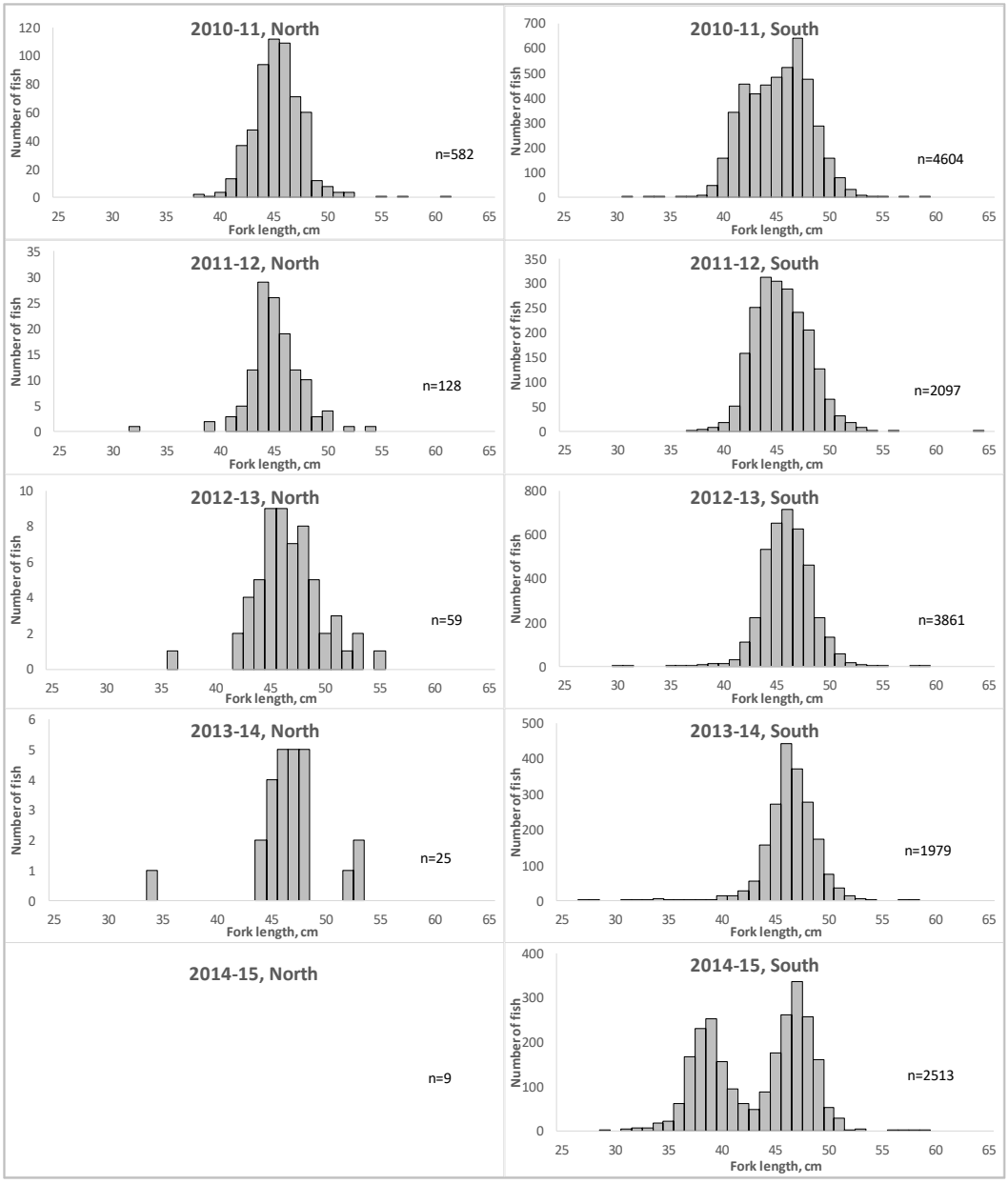


Figure 13: (continued). Length-frequency distributions of Ray's bream by fishing year, and region (both sexes and unsexed fish combined). Sample sizes of less than 20 fish not shown.

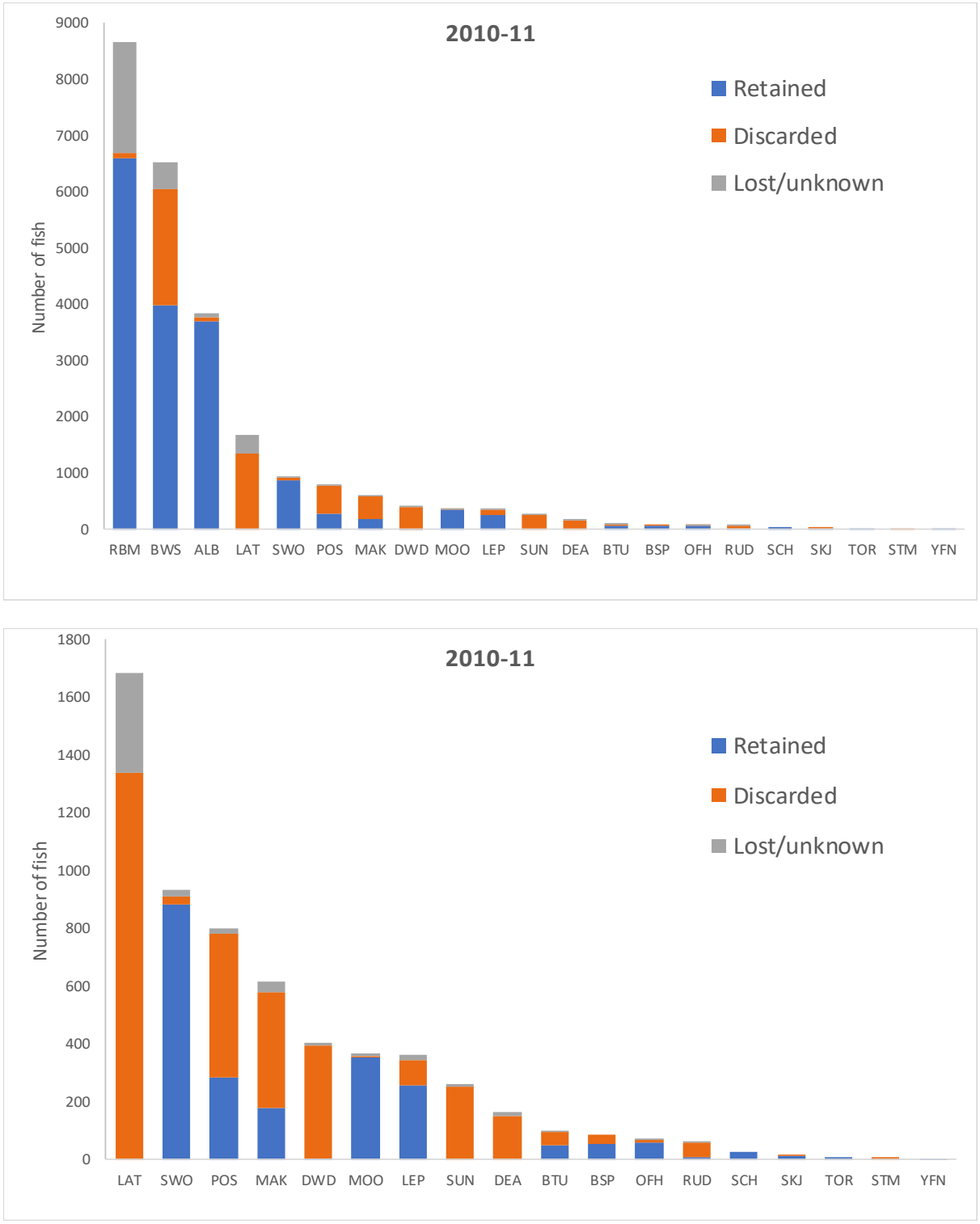
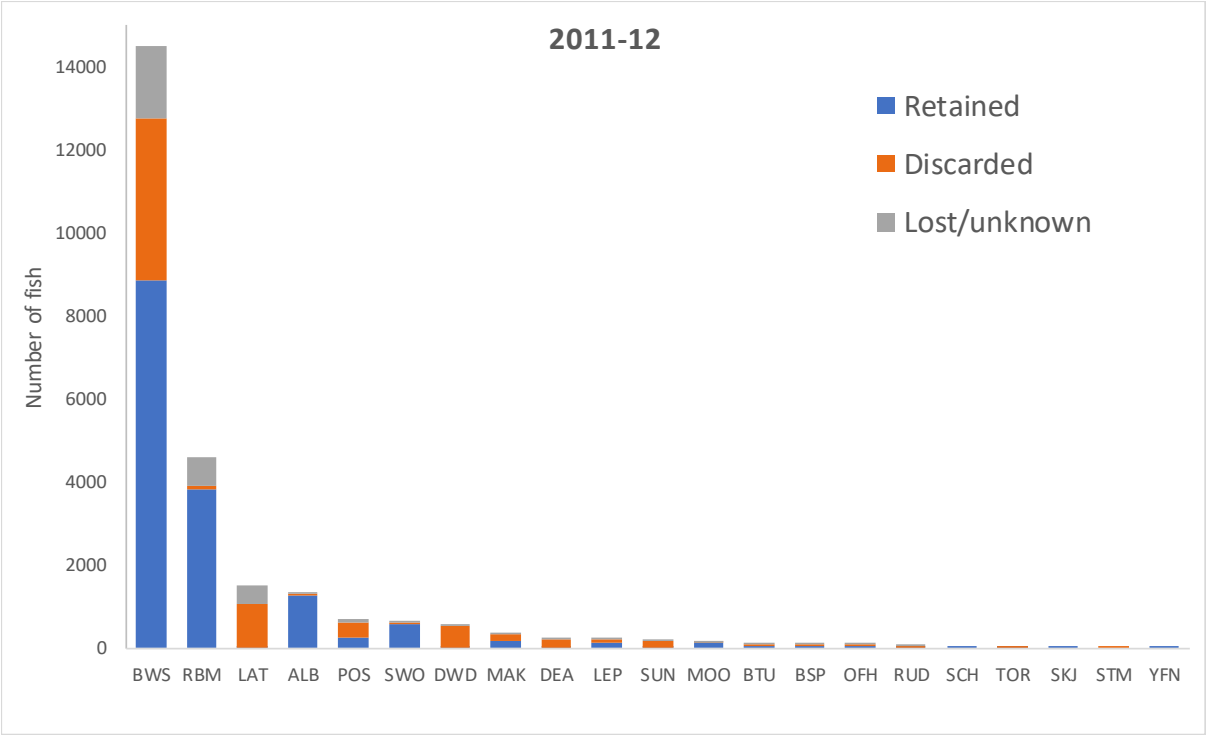


Figure 14: Number of fish retained (i.e. processed in some way), discarded, and lost or unknown. Upper graph shows main bycatch species; lower graph excludes the three most abundant species. 2010–11.



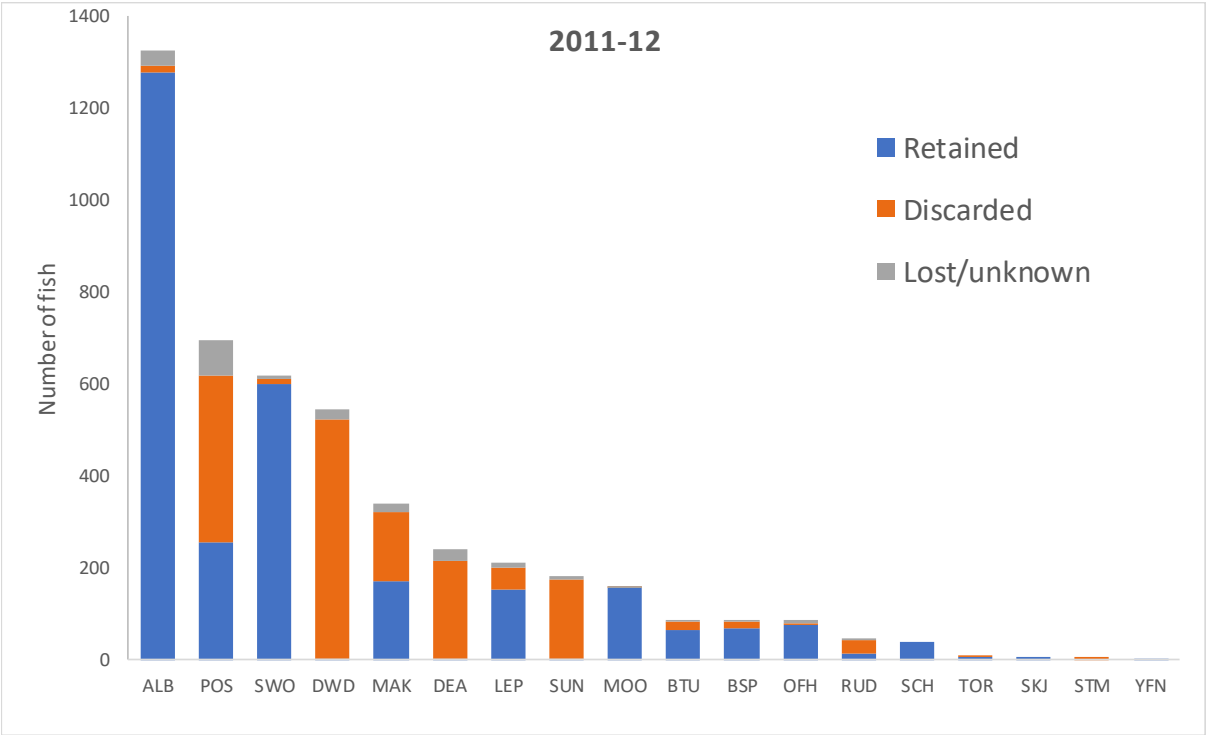
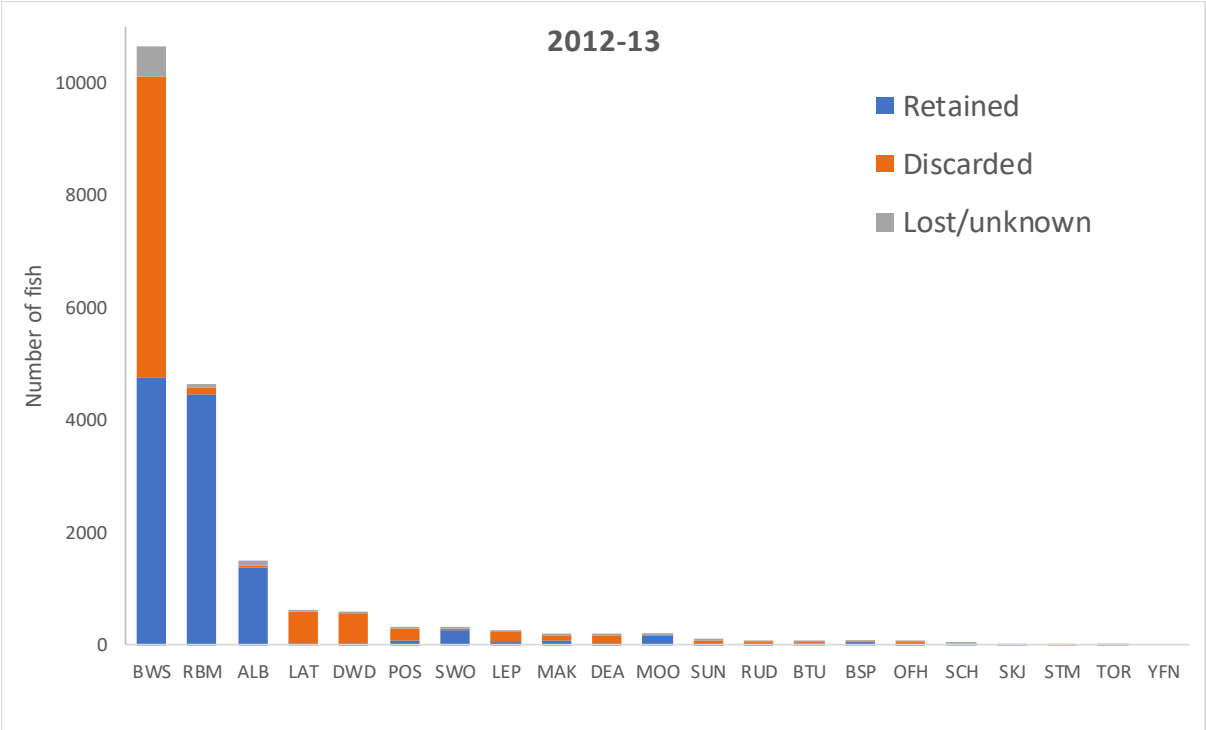


Figure 14: (continued). 2011–12.



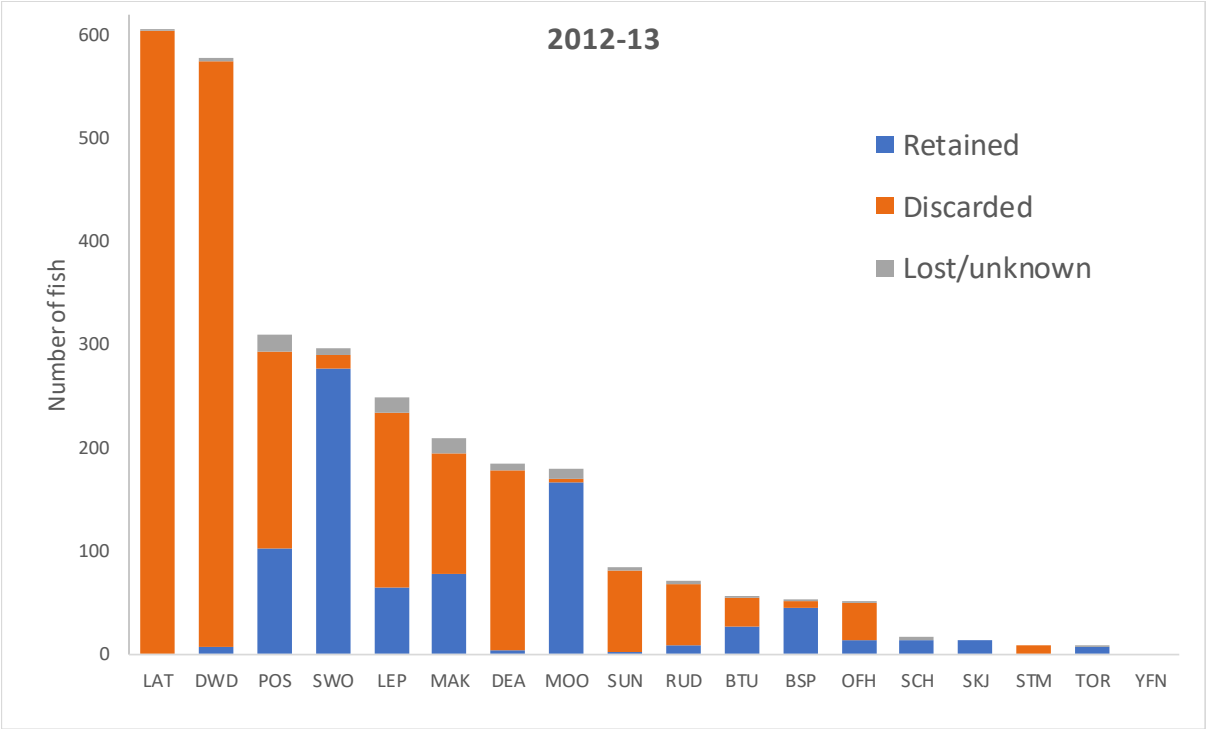
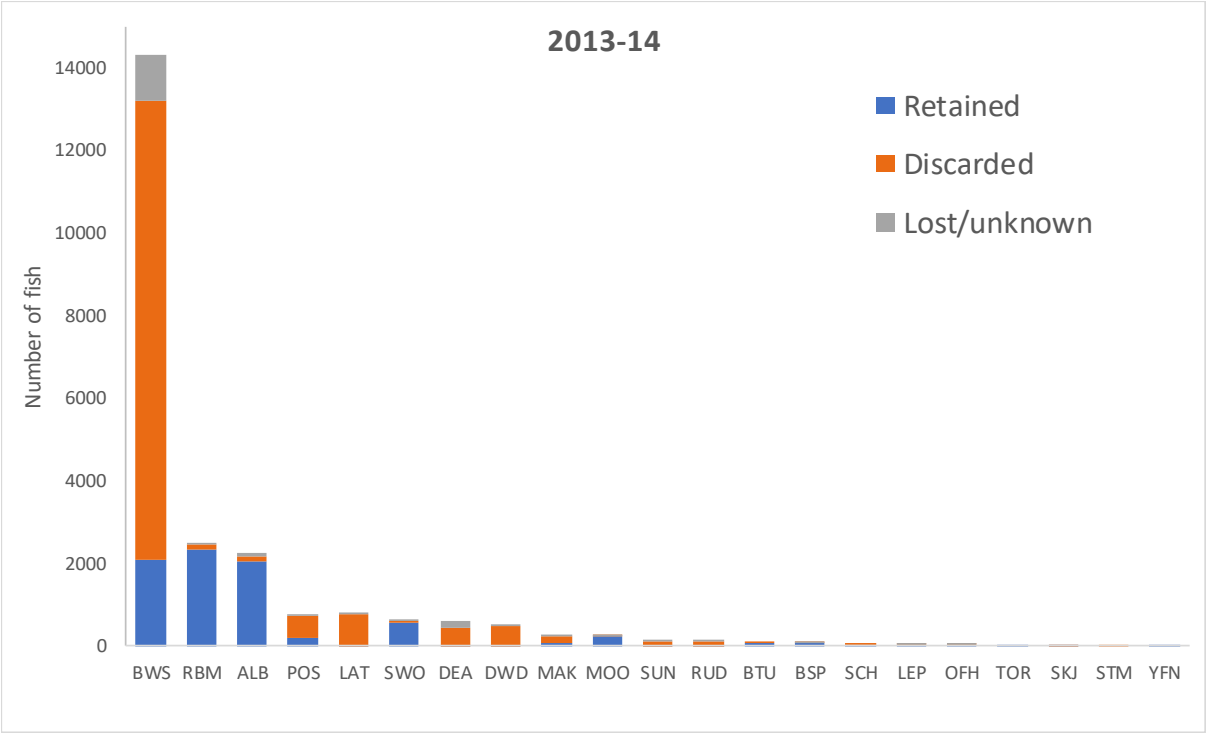


Figure 14: (continued). 2012–13.



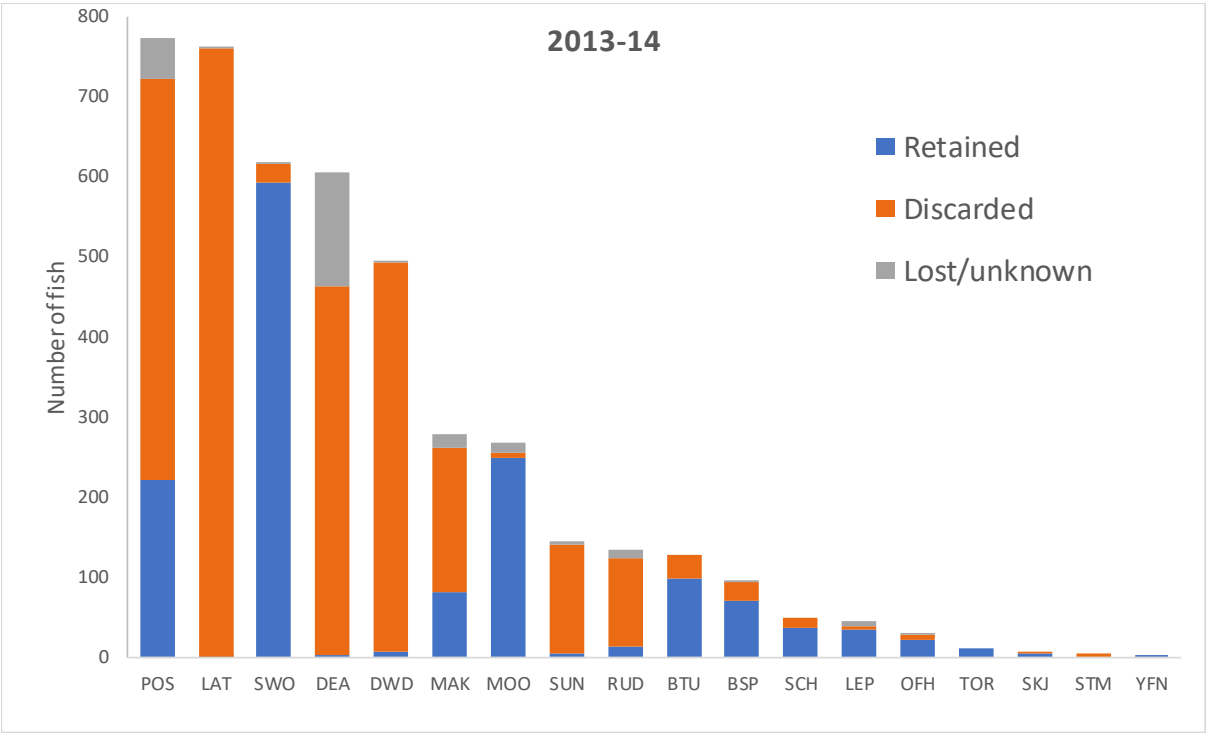
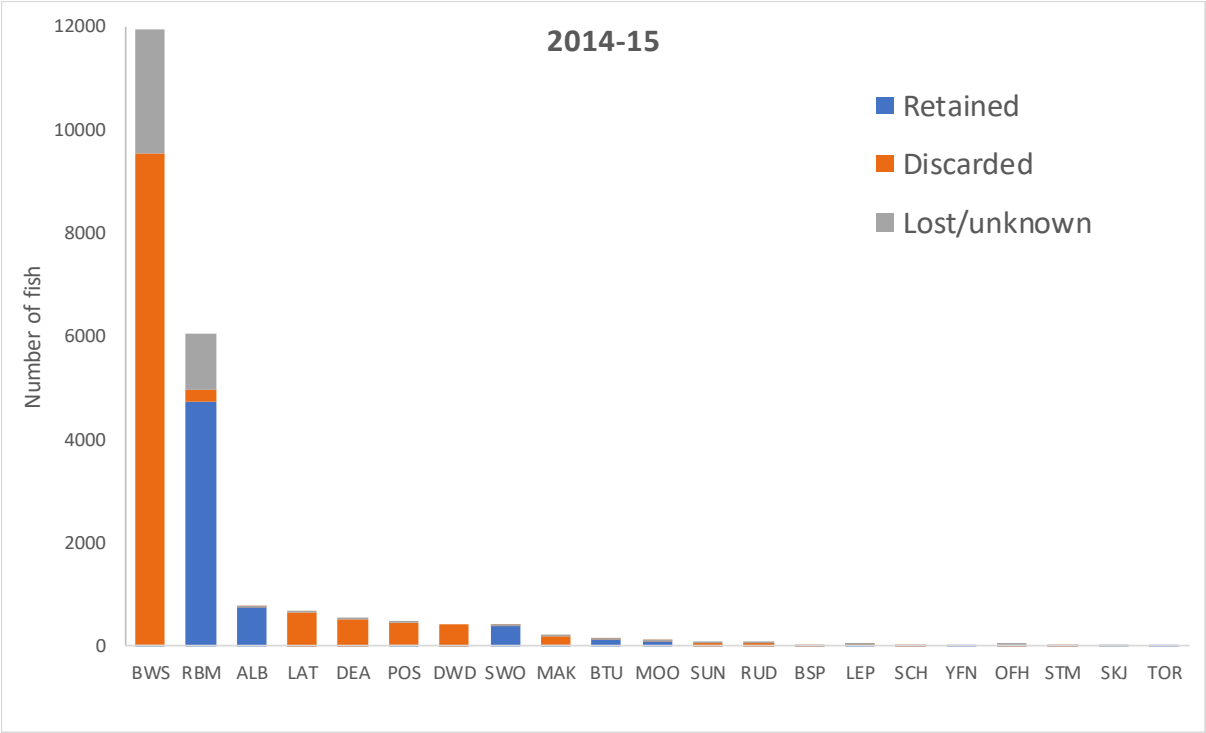


Figure 14: (continued). 2013–14.



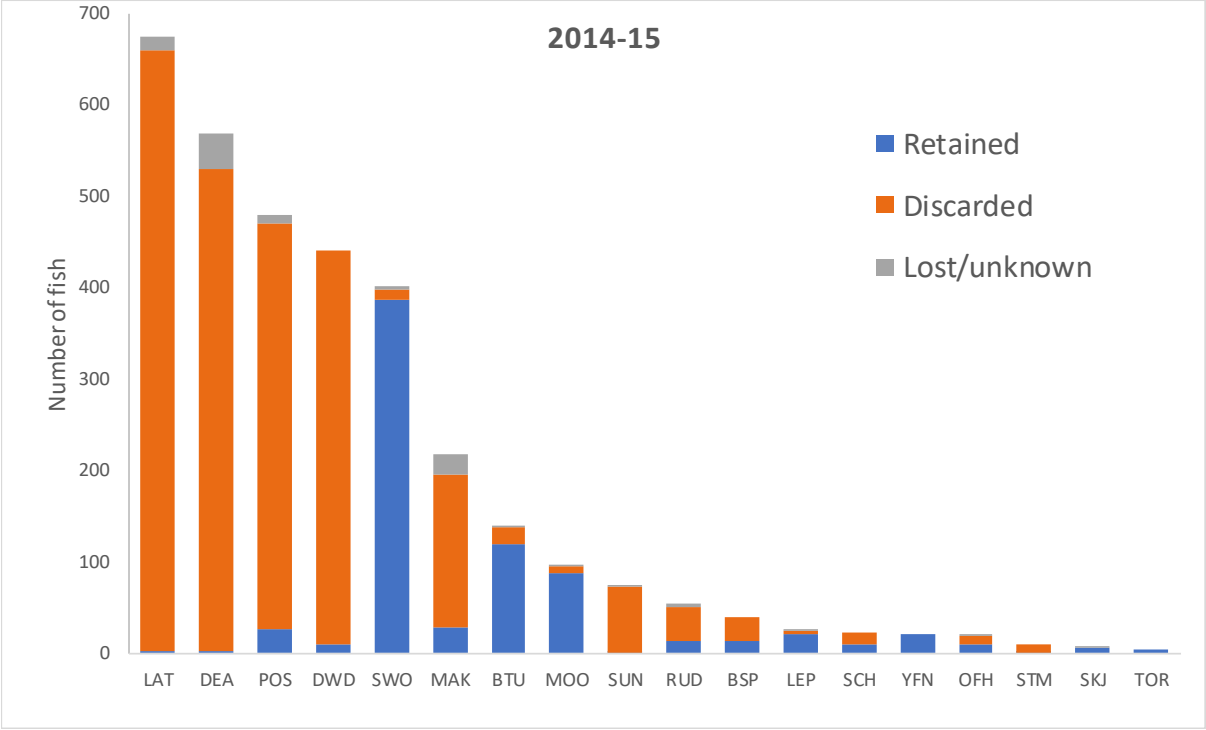


Figure 14: (continued). 2014–15.

Appendix 1: Life status codes and fate codes that observers began to use on surface longline vessels during 2015.

Code	Life Status	Explanation
A	Alive - no condition	Use this code if the hooked specimen is obviously alive, but it wasn't possible to make a further assessment of its condition.
D	Dead	Use this code when the species is obviously dead. *Shark is in rigour and lifeless, even if no apparent injuries are visible, and shows absolutely no response to being handled.*
U	Unobserved	Use this code if unable to assess the condition of the species. This might happen if it has been cut off without the observer seeing it, or several species arrive on the deck at the same time and there is no chance to assess the state of each one.
X	Alive-uninjured	Use this code when the species is lively when observed on deck or in the water. This could be indicated by thrashing on deck or swimming away vigorously. Note that for some species it will not be immediately obvious and it won't be until they are handled by the crew that their status can be determined. *Use if all of the following apply: quick movements and/or response to being hauled; frequent gill movement; shark is not bleeding or is bleeding slowly and not from the gills (blood may be seen around mouth and/or jaw); hook is visible (e.g. mouth hooked) and has not been swallowed or hooked in from the gills; jaw is intact and appears functional with injury limited to hook puncture and/or small extraction wound, with some bleeding possible from the wound; if gear is wrapped around the shark, it is not inhibiting or it is removed with minimal damage; appendages remain functional after removal of gear.*
Y	Alive-injured	Use this code when the species appears lively but has obvious injuries and is considered to be able to survive its injuries if released. *At least one of the following characteristics applies: shark is moving and/or reacts to being handled; gill movement; shark is gill hooked or hook is not visible and has obviously been swallowed; blood is flowing freely and continuously (i.e. gushing) from any wound on the shark and shows no sign of slowing down or stopping; jaw is damaged, but still useable; injuries (greater than hook puncture or minimal gear extraction wound) are present, but not immediately life threatening, e.g. fins may be frayed, damaged or torn, but are still useable; if wounds are present on the body—though muscle may be visible—they are not deep enough to expose internal organs*
Z	Alive-moribund	Use this code for species that are near death and unlikely to survive. *Shark is alive, but is presumed to have at least one of the following lethal injuries:* *bleeding from a torn or severed gill arch (unlikely to survive if gills are bleeding, even though it may look alive at the moment of release); multiple fins missing; serious damage to eyes or head; jaw broken, unusable or missing to the point where the shark will be unable to swim, hunt or feed; deep wounds with internal organs visible; amount of bleeding may be used to qualify whether a shark is moribund.*

Fate codes for specimens not processed

Code	Fate
ALI	Discarded alive
DID	Discarded dead
DIS	Discarded – Use this code when you are unable to assess fish condition, but fish species and discard was observed
DIX	Discarded – alive uninjured (*refer **X** life status above*)
DIY	Discarded – alive injured (*refer **Y** life status above*)
DIZ	Discarded – alive moribund (*refer **Z** life status above*)
ACC	Lost - Use this code for all species that are lost or escape off the hook while in the water, or, before, during or after landing.
UNO	Unobserved – Use this code if you were unable to see the fish discarded, you may have been told by crew.
EAT	Retained for consumption on board
BAT	Retained on board for bait

Fate codes for processed fish

Code	Principal landed state	
GGO	Gilled and gutted, tail on (tuna species)	
GGT	Gilled and gutted, tail off (tuna species)	
GRE	Green (or whole)	
DRE	Dressed	
HGU	Headed and gutted	
HGF	Headed, gutted and finned (swordfish)	
LIV	Livers	
SFA	Shark fins attached (blue shark)	
GUT	Gutted	
FIW FID	Fins, wet (blue, mako or porbeagle shark) Fins, dried (blued, mako or porbeagle shark)	*Retaining fins as a primary state is now illegal – if this practice is occurring it is to be captured using these codes*

Appendix 2: Numbers of fish reported by observers during 2010–11 to 2014–15, and the total observed catch since 1988–89. Species are ranked in descending order of abundance since 1988–89.

Species	Scientific Name	2010–11 to 2014–15	Total number
Blue shark	*Prionace glauca*	57 912	240 540
Rays bream	*Brama* spp.	26 427	124 632
Albacore tuna	*Thunnus alalunga*	9 707	111 023
Southern bluefin tuna	*Thunnus maccoyii*	19 149	62 440
Porbeagle shark	*Lamna nasus*	3 058	22 069
Lancetfish	*Alepisaurus ferox & A. brevirostris*	5 256	19 639
Dealfish	*Trachipterus trachypterus*	1 761	18 946
Deepwater dogfish	Squaliformes	2 459	11 571
Swordfish	*Xiphias gladius*	2 868	11 154
Moonfish	*Lampris guttatus*	1 070	10 204
Big scale pomfret	*Taractichthys longipinnis*	361	8 179
Mako shark	*Isurus oxyrinchus*	1 660	7 822
Oilfish	*Ruvettus pretiosus*	256	7 798
Escolar	*Lepidocybium flavobrunneum*	895	5 317
Rudderfish	*Centrolophus niger*	370	5 277
Bigeye tuna	*Thunnus obesus*	663	5 053
Butterfly tuna	*Gasterochisma melampus*	510	4 979
School shark	*Galeorhinus galeus*	157	3 777
Sunfish	*Mola* spp.	746	3 501
Yellowfin tuna	*Thunnus albacares*	29	3 371
Pelagic stingray	*Pteroplatytrygon violacea*	475	2 873
Hoki	*Macruronus novaezelandiae*	20	2 041
Thresher shark	*Alopias vulpinus*	100	1 500
Skipjack tuna	*Katsuwonus pelamis*	50	1 201
Dolphinfish	*Coryphaena hippurus*	192	800
Flathead pomfret	*Taractes asper*	106	622
Striped marlin	*Kajikia audax*	39	507
Black barracouta	*Nesiarchus nasutus*	84	470
Barracouta	*Thyrsites atun*	3	360
Pacific bluefin tuna	*Thunnus orientalis*	42	264
Shark, unidentified	*Selachii*	31	244
Hapuku and bass	*Polyprion oxygeneios & P. americanus*	34	232
Cubehead	*Cubiceps* spp.	14	218
Slender tuna	*Allothunnus fallai*	20	188
Bronze whaler shark	*Carcharhinus brachyurus*	16	152
Shortbill spearfish	*Tetrapturus angustirostris*	3	136
Kingfish	*Seriola lalandi*	19	123
Fanfish	*Pterycombus petersii*	29	96
Ray, unidentified	Myliobatiformes	3	93
Frostfish	*Lepidopus caudatus*	0	77
Bigeye thresher	*Alopias superciliosus*	18	73
Wahoo	*Acanthocybium solandri*	0	72
Hake	*Merluccius australis*	22	71

Appendix 2: (continued).

Species	Scientific Name	2010–11 to 2014–15	Total number
Opah	*Lampris immaculatus*	0	65
Snipe eel	*Nemichthyidae*	10	64
Wingfish	*Pteraclis velifera*	5	62
Gemfish	*Rexea solandri*	12	34
Broadnose seven gill shark	*Notorynchus cepedianus*	19	26
Hammerhead shark	*Sphyrna zygaena*	2	21
Blue marlin	*Makaira mazara*	0	20
Oceanic whitetip shark	*Carcharhinus longimanus*	1	19
Unicornfish	*Lophotus capellei*	0	19
Bluenose	*Hyperoglyphe antarctica*	6	15
Snake mackerel	*Gempylus serpens*	1	11
Skate	*Rajidae*	0	11
Pilotfish	*Naucrates ductor*	0	10
Black marlin	*Makaira indica*	2	9
Barracudina	*Magnisudis prionosa*	1	9
Marlin, unspecified	Istiophoridae	0	9
Remora	*Echeneidae*	2	8
Pelagic stargazer	*Pleuroscopus pseudodorsalis*	1	8
Galapagos shark	*Carcharhinus galapagensis*	0	8
Pomfret, unidentified	*Bramidae* spp.	4	7
Barracuda	*Sphyraena novaehollandiae*	0	7
Ragfish	*Icichthys australis*	0	7
Seahorse	*Hippocampus* spp.	0	7
Ribaldo	*Mora moro*	0	6
Sawtooth eel	*Serrivomer* spp.	0	6
Scissortail	*Psenes pellucidus*	0	5
Squid	Cephalopoda	0	5
Manta ray	*Mobula japanica*	1	4
Scalloped dealfish	*Zu elongatus*	0	4
Squaretail	*Tetragonus cuvieri*	0	4
Basking shark	*Cetorhinus maximus*	0	3
Black mackerel	*Scombrolabrax heterolepis*	0	3
Great white shark	*Carcharodon carcharias*	0	3
Pufferfish	*Sphoeroides pachygaster*	0	3
Smallscaled brown slickhead	*Alepocephalus australis*	0	3
Bluntnose skate	*Notoraja* spp.	2	2
Tuna, unspecified	Scombridae	2	2
Sea perch	*Helicolenus* spp.	1	2
Trevally	*Pseudocaranx dentex*	1	2
Bigeye scabbard fish	*Benthodesmus elongatus*	0	2
Blue cod	*Parapercis colias*	0	2
Carpet shark	*Cephaloscyllium isabellum*	0	2
Crab	Crustacea	0	2

Appendix 2: (continued).

Species	Scientific Name	2010–11 to 2014–15	Total number
Octopus	*Cephalopoda*	0	2
Pelagic butterfish	*Schedophilus maculatus*	0	2
Deepwater eel	Ophichthidae	1	1
Globefish	*Contusus richei*	1	1
Manta rays and devil rays	*Mobula* spp.	1	1
Salp	Salpidae	1	1
Short-tailed black ray	*Dasyatis brevicaudata*	1	1
Amberjack	*Seriola rivoliana*	0	1
Blue mackerel	*Scomber australasicus*	0	1
Brown stargazer	*Xenocephalus armatus*	0	1
Frigate tuna	*Auxis thazard*	0	1
Jack mackerel	*Trachurus* spp.	0	1
Kahawai	*Arripis trutta*	0	1
Large headed slickhead	*Rouleina* spp.	0	1
Louvar	*Luvaris imperialis*	0	1
Manefish	*Caristius* spp.	0	1
Ocean blue-eye	*Schedophilus velaini*	0	1
Pipefish	*Syngnathidae*	0	1
Prickly anglerfish	*Himantolophus appelii*	0	1
Red cod	*Pseudophycis bachus*	0	1
Sharpnose seven gill shark	*Heptranchias perlo*	0	1
Silky shark	*Carcharhinus falciformis*	0	1
Sixgill shark	*Hexanchus griseus*	0	1
Snapper	*Pagrus auratus*	0	1
Sprat	*Sprattus* spp.	0	1
Tasmanian ruffe	*Tubbia tasmanica*	0	1
Tiger shark	*Galeocerdo cuvier*	0	1
White warehou	*Seriolella caerulea*	0	1
Unidentified fish		780	5 179
Total		137 492	705 435

Appendix 3: Total reported catches of each species caught in 2010–11 to 2014–15.

	Number of fish				
	2010–11	2011–12	2012–13	2013–14	2014–15
Albacore tuna	34 075	22 975	30 290	22 329	14 524
Bigeye tuna	3 074	2 674	1 879	1 761	1 553
Bigscale pomfret	70	105	83	99	54
Butterfly tuna	270	329	273	437	894
Blue shark	50 024	86 245	76 965	71 650	75 806
Dealfish	344	571	355	988	932
Deepwater dogfish	536	815	721	646	553
Lancetfish	6 023	5 565	5 545	6 836	4 290
Escolar	3 044	2 178	1 630	668	445
Mako shark	5 231	5 251	4 143	4 204	5 409
Moonfish	3 895	2 359	2 543	1 773	1 129
Oilfish	739	646	509	314	245
Porbeagle shark	4 409	4 826	3 448	4 190	3 246
Ray's bream	22 205	13 988	10 670	4 744	13 785
Rudderfish	475	241	276	216	168
School shark	45	74	55	86	64
Striped marlin	314	239	219	201	374
Southern bluefin tuna	9 215	14 255	12 150	14 162	15 350
Swordfish	14 199	12 524	12 879	8 310	10 017
Yellowfin tuna	42	34	8	31	371