



**SCIENTIFIC COMMITTEE  
EIGHTEENTH REGULAR SESSION**

**ELECTRONIC MEETING**  
10-18 August 2022

---

**ANNUAL REPORT TO THE COMMISSION  
PART 1: INFORMATION ON FISHERIES, RESEARCH AND STATISTICS**

---

**WCPFC-SC18-AR/CCM-16**

**NEW ZEALAND**

**NEW ZEALAND**

**Annual report**

**Part 1**

**Information on fisheries research and statistics**

Ministry for Primary Industries

Po Box 2526, Wellington, New Zealand 6140

|  |            |
|--|------------|
| Scientific data was provided to the Commission in accordance with the decision relating to the provision of scientific data to the Commission by 30 April 2022 | <b>YES</b> |
| If no, please indicate the reason(s) and intended actions:   |            |

## **Abstract**

Since 2002, skipjack, which is nearly all taken by purse seine, has comprised the greatest part of the New Zealand vessels' catch of all tuna species (6,076 t in 2021), both within and beyond New Zealand fisheries waters. Yellowfin make up most of the balance of the purse seine catch and are caught largely outside of New Zealand fishery waters (63 t in 2021). Yellowfin are rarely part of the purse seine catch within New Zealand fisheries waters where the domestic purse-seine fishery targets only free schools of skipjack. The second most important component of New Zealand's domestic fisheries by volume is albacore (3,485 t in 2021) which are taken mostly by troll gear, but are also landed as target and bycatch in the longline fishery. The domestic longline fleet targets both bigeye and southern bluefin tuna and more recently swordfish, but the greatest part of the catch consists of albacore. Most highly migratory species caught commercially in New Zealand waters are exported; the destination of exports varies depending on the species. In 2021, 154 t of striped marlin were caught by the recreational fleet, with 63% of these tagged and released.

New Zealand had one Class-5 purse seiner fishing offshore in high seas areas of the equatorial western and central Pacific Ocean (WCPO) in 2021. This vessel also fishes domestically from time to time along with up to four smaller capacity domestic-based purse seiners. Before 2016 a limited number of foreign owned longline vessels operated under charter in the NZ EEZ. Since 2016 the New Zealand longline tuna fleet has consisted only of domestically owned and operated vessels (mostly between 15 and 25 m in length). The total number of longline vessels operating in New Zealand declined from 151 vessels in 2002 to 37 in 2014 and 29 in 2021.

In 2021 blue shark was the most common non-tuna fish bycatch species observed caught in the longline fishery followed by lancetfish and pelagic stingray.

Longline vessels fishing for tuna or swordfish in New Zealand fishery waters are required to use tori lines and may only set their lines at night unless using approved line weighting. New Zealand longline vessels fishing on the high seas south of 30°S must use two mitigation measures as specified in WCPFC CMM2018-03. New Zealand longline vessels have been provided with turtle de-hooking equipment. The purse seine fishery in New Zealand fishery waters is based on free schools of skipjack, and bycatch is minimal (about 1% by mass). Several non-fish bycatch interactions were observed in the purse seine fishery in 2021 (e.g. seabirds, marine mammals, elasmobranchs), but all were released alive.

New Zealand has an Observer Programme and two active domestic port sampling programmes for highly migratory species. In 2021, 11.7% of the longline effort (hooks), and 40.5% of the New Zealand purse seine sets were observed.

A considerable amount of research is directed at tunas, tuna-like and bycatch species in New Zealand. Fishers and fish receivers are required to furnish returns (monthly reports) to the Ministry for Primary Industries. New Zealand has four data collection systems in place to collect catch and effort data. New Zealand also has a system for collecting information on non-fish bycatch from fishers.

## **1.1 Annual Fisheries Information**

### **1.1.1 Annual catch by species and gear in the WCPFC Convention Area**

The catch of the main Highly Migratory Species taken within and beyond New Zealand fisheries waters is summarised in Table 1 and catch by gear type for 2021 is provided in Table 2 and Figure 1. Since 2002, skipjack catches taken by purse seine have comprised the greatest part of the catch by New Zealand vessels of all tuna species, both inside and outside New Zealand fisheries waters. Outside New

Zealand fisheries waters, yellowfin makes up most of the balance, but are rarely part of the purse seine catch inside New Zealand fisheries waters. The purse-seine fishery inside New Zealand fisheries waters exclusively targets free schools of skipjack.

Albacore are the second largest component of the tuna catch, and are taken mostly by troll gear, but also by longline. Although economically important to longline fishers in New Zealand, more than 96% of longline caught albacore is bycatch. In contrast, effectively all (more than 99.99% annually) of troll caught albacore is targeted (Table 3). Troll gear also takes a small amount of skipjack with occasional catches of other tuna species.

Overall commercial landings of the longline and troll caught species have generally declined since 2002, consistent with the decline in the number of vessels operating in these fisheries.

Although longlining has mostly targeted southern bluefin, bigeye, and swordfish, the greatest part of the catch consists of albacore taken mostly as bycatch. Pacific bluefin and yellowfin tunas are also taken in small numbers in longline sets, with skipjack only rarely taken. Blue, black, and striped marlin are caught in small numbers in the domestic longline fishery. In order to protect New Zealand's sport fishery, since 1988 marlins may not be retained by commercial fishers when taken within New Zealand fisheries waters.

The striped marlin catch by recreational fishers in 2021 was estimated to be 154 t, with 63% of the fish tagged and released. Most International Game Fish Association world records for striped marlin are for fish caught in New Zealand. A recreational fishery for Pacific bluefin tuna has developed, but is limited by a short winter period when fish are available. In the 2021 calendar year no Pacific bluefin tuna were landed from New Zealand fishery waters by recreational fishers.

A National Panel Survey of recreational fishers was conducted in the 2011–12 fishing year. The recreational sector was estimated to have landed 21,898 (CV 0.21) albacore in that year. Based on a mean weight of 4.2 kg this catch was estimated to be 92 t. The survey was repeated in the 2017–18 fishing year and recreational fishers were estimated to have caught 12,463 albacore with a mean weight of 4.55 kg for a catch of 57 t (CV 0.22).

The National Panel Survey for the 2011–12 fishing year estimated 92 t of skipjack tuna was landed based on an estimated 41,182 (CV 0.23) fish with a mean weight of 2.24 kg. In the 2017–18 fishing year, an estimated 54 t of skipjack tuna was landed (CV 0.17) based on an estimated 29,892 fish with a mean weight of 1.80 kg. Other pelagic species were not caught in sufficient quantities to be recorded in the survey. National recreational harvest surveys will provide estimates for tuna catch about every 5 years.

New Zealand is on the margins of yellowfin distribution and therefore will be impacted by any range contraction associated with stock decline or changed environmental conditions. Yellowfin tuna catches in New Zealand have declined significantly since the late 1990s in both commercial and recreational fisheries with a small upturn in 2015 and 2016; this overall trend is of concern to participants in both these fisheries.

### **1.1.2 Number of vessels by gear type, size**

Approximately 155 domestically owned and operated vessels (mostly 15 to 25 m) made up the main part of the domestic commercial New Zealand tuna fishing fleet in 2021. These vessels use troll or longline gear, with some vessels using both gear types at different times of the year. Some of these vessels do a limited amount of pole and line and handline fishing, but there is no dedicated pole and line or handline fishery in New Zealand. All surface longline vessels reported in Table 4 targeted a species complex including tuna and swordfish.

A small fleet of foreign owned longline vessels on charter to New Zealand fishing companies operated in New Zealand fisheries waters from the late 1980s through 2015. These longliners primarily targeted southern bluefin tuna, although a mixed bag of species including other tunas and swordfish were caught. No chartered longliners have fished in New Zealand fisheries waters since 2016.

Four New Zealand flagged Class-5 and Class-6 purse seiners fished in the EEZs of Pacific Island States and on the high seas of the equatorial western and central Pacific Ocean (WCPO) through 2015, declining to two in 2016 and 2017, and to one since 2019 (Table 4). These vessels also fished part of the year within New Zealand fisheries waters targeting free swimming (unassociated) schools of skipjack.

**Table 1: Estimated whole weight (t) of tuna and swordfish landed by New Zealand flagged vessels active in the WCPFC Convention Area, for years 2017 to 2021 (0 refers to catches < 500 kg). NZFW refers to catches within New Zealand fishery waters (up to 200nm off the coastline), and Extra Territorial (ET) refers to catches outside this area. The 2021 figures are preliminary. Note: the estimates presented in this Table may differ from those estimated by the SPC due to differences in the estimation procedures used for the purse seine catch.**

|                                       |              | 2017 | 2018 | 2019 | 2020 | 2021 |
|---------------------------------------|--------------|------|------|------|------|------|
| Albacore                              | NZFW         | 2141 | 2493 | 2752 | 3043 | 3485 |
| <i>Thunnus alalunga</i>               | ET           | 0    | 3    | 0    | 0    | 0    |
|                                       | <b>Total</b> | 2142 | 2496 | 2752 | 3043 | 3485 |
| Bigeye                                | NZFW         | 97   | 136  | 50   | 67   | 86   |
| <i>Thunnus obesus</i>                 | ET*          | 60   | 17   | 100  | 101  | 0    |
|                                       | <b>Total</b> | 157  | 153  | 150  | 169  | 86   |
| Pacific bluefin                       | NZFW         | 14   | 20   | 23   | 46   | 42   |
| <i>Thunnus orientalis</i>             | ET           | 0    | 0    | 0    | 0    | 0    |
|                                       | <b>Total</b> | 14   | 20   | 23   | 46   | 42   |
| Skipjack<br><i>Katsuwonus pelamis</i> | NZFW         | 5120 | 3817 | 5519 | 5392 | 4914 |
|                                       | ET           | 3673 | 2050 | 3792 | 3859 | 1162 |
|                                       | <b>Total</b> | 8793 | 5868 | 9311 | 9251 | 6076 |
| Swordfish                             | NZFW         | 507  | 469  | 264  | 219  | 302  |
| <i>Xiphias gladius</i>                | ET           | 0    | 0    | 0    | 0    | 0    |
|                                       | <b>Total</b> | 507  | 469  | 264  | 219  | 302  |
| Yellowfin                             | NZFW         | 10   | 20   | 5    | 11   | 22   |
| <i>Thunnus albacares</i>              | ET*          | 369  | 964  | 167  | 171  | 41   |
|                                       | <b>Total</b> | 379  | 984  | 172  | 182  | 63   |

\* The ET estimates for yellowfin tuna may also include some bigeye tuna as these are not always separated on purse seine logbooks completed by fishers.

**Table 2: Percentage catch by gear type for 2021 for major species taken in New Zealand tuna fisheries in the Western and Central Pacific Fisheries Commission convention area. Note: due to rounding some of these figures may add up to >100%.**

| 2021           | Longline | Troll | Handline | Pole & Line | Purse seine |
|----------------|----------|-------|----------|-------------|-------------|
| Albacore       | 3        | 97    | 0        | <1          | 0           |
| Bigeye tuna    | 100      | <1    | 0        | 0           | 0           |
| Skipjack tuna  | 0        | <1    | 0        | 0           | 100         |
| Swordfish      | 100      | 0     | 0        | 0           | 0           |
| Yellowfin tuna | 98       | 2     | <1       | 0           | <1          |

**Table 3: Catch of south Pacific albacore by New Zealand vessels south of 20°S in t (scaled), using surface longline, troll, or purse seine gear; and in thousands of fish (for longline and troll only, unscaled), as target and as bycatch. Number of vessels that reported a target catch and number of vessels that reported a bycatch of albacore for years 2017–2021 (note that some vessels will be included in both totals).**

| Year | ALB (t) |         |       | ALB (000's fish) |         |       | Number of vessels |         |
|------|---------|---------|-------|------------------|---------|-------|-------------------|---------|
|      | Target  | Bycatch | Total | Target           | Bycatch | Total | Target            | Bycatch |
| 2017 | 1953    | 188     | 2141  | 297              | 19      | 316   | 108               | 33      |
| 2018 | 2254    | 239     | 2493  | 392              | 20      | 412   | 138               | 36      |
| 2019 | 2633    | 119     | 2752  | 441              | 11      | 451   | 135               | 29      |
| 2020 | 2845    | 198     | 3043  | 605              | 19      | 624   | 142               | 27      |
| 2021 | 3384    | 101     | 3485  | 659              | 8       | 667   | 148               | 31      |

### 1.1.3 Fishing patterns

Longline effort (sets) for the domestic fleet by quarter is presented in Figure 3. Total effort (hooks set) for each target species is provided in Table 5. The catch of albacore and the number of vessels involved in the troll and longline fisheries are given for each fleet in Table 6. The catch of swordfish (taken entirely by surface longline) and the number of vessels involved in that fishery are given in Table 7.

The key target species in the longline fishery are southern bluefin and bigeye tuna and swordfish. The southern bluefin tuna fishery generally occurs during the second and third quarters of the year and mostly off the east coast of the North Island and the west coast of the South Island. For the remainder of the year the fishery targets bigeye tuna and other minor target species and occurs off the east coast and northeast of the North Island. As a result of a change in management from a competitive to an individually allocated regime for southern bluefin tuna, fishers are able to delay catching their quota until later in the season when prices are better. This led to some changes in the seasonal distribution of the fishery before and after 2004. Annual catch distributions for the longline fisheries are provided in Figure 4.

The albacore troll fishery is based mainly on the west coast of the North and South Islands and operates between December and May each year. There is considerable variation from year to year in the availability of these fish to New Zealand waters, with poorer years associated with El Nino events. Within a season, however, catch rates experienced across the fleet show little variation and the distribution of catch is consistent with that of effort between years (Figure 5).

The purse seine fishery within New Zealand fisheries waters occurs on both the east and west coasts of the North Island between January and May (Figure 6). The amount of catch/effort in a given year depends on the availability of skipjack and the presence of the larger New Zealand flagged purse seine vessels that sometimes move down from the tropics to fish within New Zealand fisheries waters during the summer.

**Table 4: Number of New Zealand-registered vessels fishing for tuna in the WCPFC Convention Area by vessel size class (GRT) and gear type active in the WCPFC Convention Area, for years 2017 to 2021. Fishing methods surface longline, purse seining, pole & line, and troll are presented by calendar year; troll season refers to July-June.**

| Fishing Method   | Calendar | Total no. | Vessels size range (GRT) |                 |                    |
|------------------|----------|-----------|--------------------------|-----------------|--------------------|
|                  | Year     | vessels   | 0 – 50                   | 51 - 200        |                    |
| Surface Longline | 2017     | 32        | 18                       | 14              |                    |
|                  | 2018     | 34        | 17                       | 17              |                    |
|                  | 2019     | 28        | 14                       | 14              |                    |
|                  | 2020     | 28        | 13                       | 15              |                    |
|                  | 2021     | 28        | 13                       | 16              |                    |
| Purse Seining    |          |           | <b>0 – 500</b>           | <b>501-1000</b> | <b>1001 - 1500</b> |
|                  | 2017     | 6         | 4                        | 0               | 2                  |
|                  | 2018     | 5         | 4                        | 0               | 1                  |
|                  | 2019     | 5         | 4                        | 0               | 1                  |
|                  | 2020     | 4         | 3                        | 0               | 1                  |
|                  | 2021     | 4         | 3                        | 0               | 1                  |
| Pole & Line      |          |           | <b>0-50</b>              | <b>51-150</b>   |                    |
|                  | 2017     | 0         | 0                        | 0               |                    |
|                  | 2018     | 0         | 0                        | 0               |                    |
|                  | 2019     | 0         | 0                        | 0               |                    |
|                  | 2020     | 1         | 0                        | 1               |                    |
|                  | 2021     | 1         | 0                        | 1               |                    |
| Troll            |          |           | <b>0 – 50</b>            | <b>51 - 200</b> |                    |
|                  | 2017     | 111       | 88                       | 23              |                    |
|                  | 2018     | 143       | 110                      | 33              |                    |
|                  | 2019     | 143       | 110                      | 33              |                    |
|                  | 2020     | 145       | 111                      | 34              |                    |
|                  | 2021     | 159       | 121                      | 38              |                    |
| Troll season     |          |           | <b>0 – 50</b>            | <b>51 - 200</b> |                    |
|                  | 2016-17  | 98        | 82                       | 16              |                    |
|                  | 2017-18  | 133       | 104                      | 29              |                    |
|                  | 2018-19  | 134       | 106                      | 28              |                    |
|                  | 2019-20  | 137       | 104                      | 33              |                    |
|                  | 2020-21  | 151       | 114                      | 37              |                    |



**Table 5: Annual longline effort (000s of hooks) by target species for years 2017 - 2021. The category other includes Pacific bluefin, yellowfin tuna, and swordfish. It should be noted that fishers record only one target species on their logsheets but are often targeting multiple species such as bigeye and albacore tuna simultaneously.**

| Southern |         |        |          |       |       |
|----------|---------|--------|----------|-------|-------|
| Year     | Bluefin | Bigeye | Albacore | Other | Total |
| 2017     | 1227    | 512    | 4        | 362   | 2105  |
| 2018     | 1256    | 577    | 1        | 418   | 2252  |
| 2019     | 1448    | 325    | 3        | 202   | 1977  |
| 2020     | 1318    | 428    | 8        | 188   | 1942  |
| 2021     | 943     | 304    | 6        | 283   | 1535  |

**Table 6: The total number of domestic vessels that fished for albacore (troll and surface longline), and the total catch of albacore for the domestic troll and surface longline fleets in New Zealand EEZ by calendar year from 2017 - 2021. Small amounts (less than 4 t annually) were taken by other methods including pole and line, handline, and purse seine.**

| Year | NZ troll vessels |                | New Zealand longline vessels |                |
|------|------------------|----------------|------------------------------|----------------|
|      | Catch (tonnes)   | Vessel numbers | Catch (tonnes)               | Vessel numbers |
|      | 2017             | 1952.7         | 111                          | 188.2          |
| 2018 | 2255.1           | 143            | 237.7                        | 34             |
| 2019 | 2634.7           | 140            | 116.5                        | 28             |
| 2020 | 2825.2           | 145            | 202.0                        | 28             |
| 2021 | 3382.5           | 159            | 102.2                        | 29             |

**Table 7: The number of domestic vessels that fished for swordfish (all surface longline vessels), and the catch of swordfish for the domestic longline fleet in New Zealand EEZ south of 20°S by calendar year from 2017-2021.**

| Year | Catch (tonnes) | Vessel numbers |
|------|----------------|----------------|
| 2017 | 504.2          | 32             |
| 2018 | 468.8          | 34             |
| 2019 | 263.6          | 28             |
| 2020 | 219.1          | 28             |
| 2021 | 301.8          | 27             |

#### **1.1.4 Estimated total catches of non-target, associated and dependent species**

##### **Non-target fish bycatch**

For bycatch species of commercial interest, good estimates of landings are obtained from fisher records, while for less valuable species, observer data provides the best source of information. Here we provide data on major bycatch species including “key shark species” from CMM2010-07 and species of special interest for the longline and purse seine fisheries within, and adjacent to, New Zealand fisheries waters.

The major bycatch species in the longline fishery have been brought into the New Zealand Quota Management System (QMS). In recent years the overall bycatch levels have been relatively consistent between years except for Ray’s bream, a species which is predominantly caught by trawling in non-tuna fisheries (Table 8).

**Table 8: Landed catch (t) of non-target species currently managed within the QMS that are taken in tuna fisheries within New Zealand fisheries waters. Data are provided by calendar year for 2017 – 2021 and for some species may include catches from non-tuna fisheries.**

| Species         | Scientific name          | 2017 | 2018 | 2019 | 2020 | 2021 |
|-----------------|--------------------------|------|------|------|------|------|
| Blue shark      | <i>Prionace glauca</i>   | 119  | 117  | 103  | 104  | 93   |
| Mako shark      | <i>Isurus oxyrinchus</i> | 39   | 35   | 25   | 27   | 28   |
| Moonfish        | <i>Lampris guttatus</i>  | 51   | 67   | 41   | 52   | 31   |
| Porbeagle shark | <i>Lamna nasus</i>       | 26   | 56   | 38   | 23   | 33   |
| Ray's bream     | <i>Brama brama</i>       | 109  | 273  | 146  | 212  | 411  |

It is also possible to estimate bycatch from the longline fishery using observer records. While this is important for estimating catches of the species that are less likely to be retained or recorded, it is difficult to obtain reliable estimates from species rarely caught in longline fisheries. Observed longline trips are stratified by year, fleet, region and target species, and a CPUE (ratio of means) for each species is established from numbers of fish and numbers of hooks observed. Estimates of catches (in numbers of fish) are obtained by scaling CPUE to total hooks set by the commercial fishery per stratum and summing across strata. Those estimates of catch, the percentage of those catches retained, and an indication of the life status of discarded fish are provided in Table 9.

**Table 9: Total estimated catch (numbers of fish) of common bycatch species in the New Zealand longline fishery as estimated from observer data from 2017 to 2021. Also provided is the percentage of these species retained (2021 data only) and the percentage of fish that were alive when discarded, N/A (none discarded).**

| Species           | 2017   | 2018   | 2019   | 2020   | 2021   | % retained (2021) | discards % alive (2021) |
|-------------------|--------|--------|--------|--------|--------|-------------------|-------------------------|
| Blue shark        | 49 924 | 63 618 | 89 377 | 37 093 | 39 524 | <0.1              | 86.9                    |
| Lancetfish        | 13 274 | 13 163 | 18 747 | 11 457 | 4 211  | 0                 | 12.5                    |
| Pelagic stingray  | 1 798  | 2 949  | 526    | 1 721  | 3 182  | 0                 | 96.1                    |
| Rays bream        | 2 421  | 1 579  | 1 949  | 3 211  | 2 514  | 96.2              | 81.8                    |
| Porbeagle shark   | 3 101  | 2 594  | 2 883  | 1 320  | 2 248  | 0                 | 28.3                    |
| Sunfish           | 1 648  | 3 648  | 1 982  | 1 618  | 1 537  | 0                 | 99.4                    |
| Moonfish          | 2 022  | 2 698  | 1 975  | 1 834  | 1 033  | 97.6              | 100.0                   |
| Mako shark        | 1 391  | 2 721  | 1 138  | 859    | 933    | 0                 | 53.1                    |
| Oilfish           | 227    | 602    | 417    | 1 149  | 504    | 21.3              | 69.4                    |
| Striped marlin    | 290    | 247    | 157    | 279    | 426    | 0                 | 77.8                    |
| Escolar           | 300    | 594    | 488    | 808    | 388    | 52.2              | 68.2                    |
| Butterfly tuna    | 406    | 419    | 348    | 120    | 388    | 39.5              | 22.7                    |
| Rudderfish        | 680    | 253    | 186    | 164    | 221    | 17.6              | 50.0                    |
| Thresher shark    | 260    | 253    | 193    | 269    | 161    | 0                 | 73.3                    |
| Skipjack tuna     | 57     | 184    | 8      | 134    | 110    | 100.0             | N/A                     |
| School shark      | 59     | 187    | 116    | 29     | 64     | 20.0              | 25.0                    |
| Deepwater dogfish | 32     | 6      | 90     | 29     | 42     | 0                 | 66.7                    |
| Dealfish          | 72     | 25     | 23     | 69     | 18     | 0                 | 66.7                    |
| Big scale pomfret | 17     | 34     | 0      | 52     | 17     | 0                 | unknown                 |

The major fish bycatch species can be divided into three groups: species that are typically discarded and are usually alive (e.g. sunfish and pelagic stingray), species that are typically discarded and are usually dead (e.g. dealfish and lancetfish), and species that are typically retained, but may be returned

to the sea (i.e. mako shark and porbeagle shark). The species listed in this last group are subject to the QMS and dead releases of these sharks count against a fisher’s quota. Blue, mako, and porbeagle sharks have usually been discarded since finning was banned in New Zealand, with the proportion alive highest for blue sharks and lowest for porbeagle sharks.

In 2021 the following observations were made on shark and ray captures in longline fisheries:

- One giant manta (*Manta birostris*) was caught
- No reported silky, oceanic whitetip, great white, or whale sharks captures

### **Seabird bycatch**

Seabirds are sometimes caught in longline fisheries, during setting and hauling, as well as occasionally on the soak. The observed captures in 2017 - 2021 are given in Table 10. All confirmed fishing activity occurred south of 30° S. Estimates of total captures based on observer coverage are highly uncertain, so the capture rates are also shown. Observed seabird captures by species for 2021 are shown in Table 11. Longline vessels fishing for tuna or swordfish in New Zealand fishery waters are required to use tori lines and may only set their lines at night unless using approved line weighting. New Zealand longline vessels fishing on the high seas south of 30°S must use two of the three mitigation measures (tori lines, weighted branch lies, or night setting) or approved hook shielding devices as a stand-alone measure, as specified in CMM2018-03. Observed mitigation measures used by the fleet in 2021 are shown in Table 12.

Observed seabirds captures in the surface longline fishery increased substantially in 2016 compared with previous years. The increase was primarily driven by a few high mortality incidents. No high mortality events were observed in 2017 and captures for that year decreased. In 2018, observed captures increased again, with a similar capture rate to that seen in 2016. The increase in 2018 was primarily driven by high mortality incidents on three observed trips. In 2019 the observed capture numbers decreased to 2017 levels but the capture rate remained similar to 2018 levels. In 2020 there were fewer captures and a lower capture rate than seen in the previous four years. Capture numbers and rates increased again in 2021 due to high mortality incidents on one particular observed trip.

**Table 10: Fishing effort, number of observed hooks, and estimated seabird capture rates by year south of 30°S. For each year from 2017 -21, the table gives the total number of hooks; the number of observed hooks; observer coverage (the percentage of hooks that were observed); the number of observed captures (both dead and alive); and the capture rate (captures per thousand hooks).**

| Year | Number of vessels | Number of hooks | Fishing effort |                  | Observed seabird captures |       |
|------|-------------------|-----------------|----------------|------------------|---------------------------|-------|
|      |                   |                 | Observed hooks | % hooks observed | Number                    | Rate  |
| 2017 | 32                | 2 104 324       | 330 235        | 15.7             | 57                        | 0.173 |
| 2018 | 33                | 2 233 199       | 291 638        | 13.1             | 98                        | 0.336 |
| 2019 | 28                | 1 977 487       | 165 149        | 8.4              | 56                        | 0.339 |
| 2020 | 28                | 1 949 002       | 193 551        | 9.9              | 24                        | 0.124 |
| 2021 | 28                | 1 535 392       | 179 169        | 11.7             | 53                        | 0.296 |

**Table 11: Observed seabird captures in longline fisheries in 2021. All confirmed fishing activity and observed captures occurred south of 30° S.**

| Common name                              | Scientific name                          | Number observed |
|--|--|-----------------|
| White-capped albatross                   | <i>Thalassarche steadi</i>               | 21              |
| Black petrel                             | <i>Procellaria parkinsoni</i>            | 8               |
| Buller's albatross and Pacific albatross | <i>Thalassarche bulleri</i>              | 5               |
| White-chinned petrel                     | <i>Procellaria aequinoctialis steadi</i> | 5               |
| Westland petrel                          | <i>Procellaria westlandica</i>           | 5               |
| Smaller albatrosses                      | <i>Thalassarche</i> spp.                 | 2               |
| Wandering albatross                      | <i>Diomedea</i> spp.                     | 1               |
| Buller's albatross                       | <i>Thalassarche bulleri</i>              | 1               |
| Giant petrel unidentified                | <i>Macronectes</i> spp.                  | 1               |
| Storm Petrel                             | Hydrobatidae (Family)                    | 1               |
| Flesh-footed shearwater                  | <i>Puffinus carneipes hullianus</i>      | 1               |
| Bullers shearwater                       | <i>Puffinus bulleri</i>                  | 1               |
| Australasian gannet                      | <i>Morus serrator</i>                    | 1               |

**Table 12: Proportion of observed mitigation types used by the fleet in 2021; all observed effort was south of 30° S. TL = tori line, NS = night setting, WB = weighted branch lines, SS = side setting, BC = bird curtain, BDB = blue dyed bait, DSLS = deep setting line shooter, MOD = management of offal discharge.**

| Combination of Mitigation Measures | Proportion of observed effort using mitigation type |
|------------------------------------|---|
|                                    | South of 30° S                                      |
| No mitigation measures             | 0%  |
| TL + NS                            | 34.3%   |
| TL + WB                            | 22%   |
| NS + WB                            | 0%  |
| TL + WB + NS                       | 34.5%   |
| SS/BC/WB/DSL                       | 0%  |
| SS/BC/WB/(MOD or BDB)              | 0%  |
| TL <sup>1</sup>                    | 9%  |
| NS                                 | 0%  |
| <b>Totals (must equal 100%)</b>    | <b>100%</b>   |

<sup>1</sup> Fishing events during two observed fishing trips were determined to occur before nautical dusk based on the recorded date, time and position associated with the start of the fishing events.

## Sea turtle bycatch

Since 2001, 52 sea turtles have been reported by observers within New Zealand fisheries waters. Of these, 38 were leatherback turtles, three were loggerhead turtles, five were green turtles, one was an olive ridley turtle, and 5 were unidentified. In the most recent five years 22 sea turtles have been captured in New Zealand fishery waters (Table 13), and all were released alive except for one green turtle in 2020, and two leatherback turtles in 2021, which were landed dead (based on photographs taken by observers). These sea turtle mortalities in 2020 and 2021 were the first since 2001, when one green turtle mortality was observed.

Overall, sea turtle interactions are rare in the New Zealand longline fishery. Sea turtle interactions may occur throughout the year with a slight increase observed during the austral summer (November to March). Preliminary data from observer reports to date in 2021 however indicates an increase in sea turtle interactions with surface longline vessels, and this trend is also reflected in reporting from commercial fishers. New Zealand fisheries officials are undertaking investigations to understand this recent increase in sea turtle interactions. No turtles have been observed or reported from the purse seine or troll fisheries that operate within New Zealand fisheries waters.

**Table 13: Observed sea turtle interactions for surface longline vessels based on observer records each year from 2017 to 2021. All turtles were alive on capture and released except for one green turtle landed dead in 2020 and two leatherback turtles in 2021.**

| Common name         | Scientific name              | 2017 | 2018 | 2019 | 2020 | 2021 |
|---------------------|------------------------------|------|------|------|------|------|
| Green turtle        | <i>Chelonia mydas</i>        | 0    | 1    | 0    | 1    | 1    |
| Leatherback turtle  | <i>Dermochelys coriacea</i>  | 2    | 2    | 0    | 2    | 11   |
| Loggerhead turtle   | <i>Caretta caretta</i>       | 0    | 1    | 0    | 1    | 0    |
| Olive ridley turtle | <i>Lepidochelys olivacea</i> | 0    | 0    | 0    | 0    | 0    |
| Unidentified        |                              | 0    | 0    | 0    | 0    | 0    |
| Total               |                              | 2    | 4    | 0    | 4    | 12   |

## Purse seine fisheries

Observers have been deployed on purse seine vessels since 2005 to determine levels of bycatch in the fishery that operates within New Zealand fishery waters. The catch composition for 4 trips covered in 2021 is provided in Table 14 and levels of coverage are provided in Table 15. There were no observed purse seine trips in 2020. As the fishery is based on free schools of skipjack, bycatch is minimal.

The following interactions were reported by purse seine fishery observers in 2021:

- 34 spine-tailed devil rays were captured and released alive
- Three seabirds were reported caught (one common diving petrel, one flesh-footed shearwater and one unidentified prion) and were released alive
- Four common dolphins were reported caught and were released alive
- No turtles were reported caught
- No oceanic whitetip sharks, silky sharks, whale sharks or great white sharks were reported caught

**Table 14: Catch composition from 2 observed purse seine trips operating within New Zealand fisheries waters in 2021.**

| Common name         | Scientific name                 | Observed catch weight (kg) | % of catch |
|---------------------|---------------------------------|----------------------------|------------|
| Skipjack tuna       | <i>Katsuwonus pelamis</i>       | 1 541 319                  | 95.3       |
| Blue Mackerel       | <i>Scomber australasicus</i>    | 60 009                     | 3.7        |
| Jellyfish           |                                 | 7 820                      | 0.5        |
| Sunfish             | <i>Mola mola</i>                | 4 078                      | 0.3        |
| Jack Mackerel       | <i>Trachurus novaehelandiae</i> | 3 300                      | 0.2        |
| Striped Marlin      | <i>Kajikia audax</i>            | 620                        | <0.1       |
| Porcupine Fish      | <i>Allomycterus jaculiferus</i> | 111                        | <0.1       |
| Bronze Whaler Shark | <i>Carcharhinus brachyurus</i>  | 110                        | <0.1       |
| Hammerhead Shark    | <i>Sphyrna zygaena</i>          | 85                         | <0.1       |
| Salp                |                                 | 82                         | <0.1       |
| Blue Shark          | <i>Prionace glauca</i>          | 40                         | <0.1       |
| Jack Mackerel       | <i>Trachurus spp.</i>           | 32                         | <0.1       |
| Albacore Tuna       | <i>Thunnus alalunga</i>         | 30                         | <0.1       |
| Yellowfin Tuna      | <i>Thunnus albacares</i>        | 15                         | <0.1       |
| Electric Ray        | <i>Torpedo fairchildi</i>       | 14                         | <0.1       |
| Unicornfish         | <i>Lophotus capellei</i>        | 10                         | <0.1       |
| Longtailed Stingray | <i>Dasyatis thetidis</i>        | 8                          | <0.1       |
| Flying Fish         | Exocoetidae                     | 7                          | <0.1       |
| Seaweed             |                                 | 5                          | <0.1       |
| Globefish           | <i>Contusus richiei</i>         | 3                          | <0.1       |
| John Dory           | <i>Zeus faber</i>               | 2                          | <0.1       |
| Brown Stargazer     | <i>Xenocephalus armatus</i>     | 1                          | <0.1       |
| Rough Skate         | <i>Dipturus nasutus</i>         | 1                          | <0.1       |
| Bobtail squid       | <i>Sepioloidea spp.</i>         | 1                          | <0.1       |

**Table 15: Domestic purse seine sets observed as a percentage of sets made for 2017 to 2021.**

| Calendar year | No. sets observed | % sets observed | % SKJ catch |
|---------------|-------------------|-----------------|-------------|
| 2017          | 69                | 23.7            | 21.2        |
| 2018          | 67                | 36.2            | 44.1        |
| 2019          | 36                | 13.7            | 10.4        |
| 2020          | 0                 | 0               | 0           |
| 2021          | 70                | 40.5            | 38.9        |

Records from observers from the Regional Observer Programme aboard the New Zealand purse seine vessels operating in the tropical Pacific are held by SPC and are available to the Commission. New Zealand purse seine vessels operating outside the New Zealand EEZ have 100% observer coverage. We have not summarised bycatch for these vessels.

### **1.1.5 Other information**

Following the development of domestic longlining in the early 1990s, the number of vessels in the domestic tuna fleet operating in New Zealand fisheries waters peaked in 2001 and has subsequently declined. The potential for claiming an allowance of quota on the basis of fishing history when tuna species entered the Quota Management System (QMS) is likely to have attracted participants to the fishery. As expected, the number of longline vessels targeting tuna declined once the years to be used for determining catch history were known, reducing any incentive to fish to establish catch history.

On 1 October 2004, bigeye, yellowfin and Pacific bluefin tuna were introduced to the QMS system with catch limits set within New Zealand fisheries waters. Several key bycatch species, namely mako, blue, shark porbeagle shark, moonfish, Ray's bream and swordfish were also introduced to the QMS at this time and a Total Allowable Catch (TAC) was set for each species. Southern bluefin tuna was brought into the QMS in 2004, with a catch limit that applies to catch by New Zealand flagged vessels regardless of where they fish. In 2012 New Zealand reduced the TAC for porbeagle and mako sharks.

The allocation of southern bluefin tuna quota was a further driver for rationalisation in the tuna longline fleet. A national allocation applies to New Zealand southern bluefin tuna catch and, as a result of allocation of individual shares in this fishery, many fishers received small quota allocations that rendered their operations economically unviable. Some responded to this shortfall by purchasing further quota, but many chose to exit the fishery.

Recent economic conditions have also resulted in further decreases in participation in domestic longlining and trolling. These conditions include a variable New Zealand dollar and a static market value for fish product. Some companies have sought to enhance the value of their fishery through applying for MSC (Marine Stewardship Council) certification. The MSC certified on the 16<sup>th</sup> of May 2011 that the New Zealand troll fishery for albacore conforms to the requirements of the MSC Principles and Criteria for Sustainable Fishing. In 2017 the New Zealand albacore troll fishery was successfully re-certified. The domestic skipjack fishery was also successful in attaining MSC certification in 2017. These two certifications are active until 2022. New Zealand continues to advocate for and support work towards developing harvest strategies for the four main tuna species at WCPFC.

New Zealand fisheries are at the limits of the range of many highly migratory species. Catches vary from year to year depending on seasonal variations in highly migratory species (HMS) migrations. The availability of juvenile albacore to the troll fishery in New Zealand waters varies from year to year with larger scale climatic events indicated by the El Niño Southern Oscillation (ENSO) index. The future prospects for New Zealand are strongly dependent on good management of tuna resources by the WCPFC, in particular on biomass of key stocks remaining at a sufficiently high level that no major changes in distribution occur.

Most tuna caught in New Zealand waters are exported and the destination of exports varies depending on the species. Large tunas caught by longline are mostly exported "chilled" to Japan and the United States, with smaller proportions exported to Australia. Troll caught albacore are sent to a variety of markets and in 2021 most was exported frozen whole to Thailand and Vietnam, Europe and Costa Rica. In 2021, skipjack tuna caught by NZ vessels was largely exported to Ecuador and Thailand.

## **1.2 Research and Statistics**

### **1.2.1 Summary of observer and port sampling programmes**

New Zealand has an observer programme and two active port sampling programmes. Information on the New Zealand observer programme was provided to the Commission in June 2009, as part of the accreditation process for the Regional Observer Programme. The New Zealand observer programme was audited by the WCPFC in early 2012.

With respect to HMS fisheries, most observer effort is currently directed at the longline and purse seine fisheries. In the past, observer effort was also directed at the albacore troll fishery. The main aim of the latter coverage was to better understand the fishing process, and to collect catch, effort and biological samples from albacore

On longline vessels the observers collect detailed data on all fish and non-fish catch. Length or weight is collected for all specimens and most have additional data collected, e.g. sex, maturity stage and stomach contents. Physical specimens are also often collected, e.g. hard parts for ageing. Observers make detailed records of the fishery operation, e.g. hooks per basket, use of floats, light-sticks, hook types, bait types, and snood setup. Observers also record information on the behaviour of seabirds and other non-fish species in relation to the fishing operation, e.g. whether seabirds were present during setting or hauling.

On purse seine vessels it is not possible to sample the entire catch so the observers focus on detailed sampling of the bycatch species and sub-sampling of the target species. To this end New Zealand has worked with SPC in the past to conduct trials using observers where different sampling strategies are utilised to assess the effects of sampling bias on species and length composition of the catch.

The albacore port sampling programme was established during the 1996-97 albacore fishing season. The first two years of sampling were funded through SPC, but the programme has been funded by the Ministry for Primary Industries (costs recovered from industry) since 1998-99. Sampling typically occurs at ports on the west coast of New Zealand during the austral summer. During the duration of the programme over 110,000 albacore have been sampled for length and 12% of these were also sampled for weight. The length frequency data are provided to the Commission annually and have been incorporated into the regional assessment for south Pacific albacore.

In 2005, the Ministry for Primary Industries funded the development of a port sampling programme for swordfish. This programme was subsequently extended to include large tunas (bigeye, yellowfin, and Pacific bluefin) for which fish processors often collect individual processed weight data as part of their operations. It has been possible to collect individual weights for up to 90% of the catch of some species.

### **1.2.2 Research activities**

Considerable research effort has been directed at highly migratory species in New Zealand. The Ministry for Primary Industries runs a research planning process each year which involves the updating of the Medium Term Research Plan (MTRP) for groups of species. The Ministry for Primary Industries has, in consultation with stakeholders, developed a MTRP for tunas, billfish, pelagic sharks, other fish species taken in tuna fisheries, and the gamefish tagging programme. The research plan describes the current knowledge about the species, lists all historic research (by New Zealand researchers), and sets out a five-year plan for research activities. Summaries of research were initially provided to WCPFC-SC1 (as paper GN IP-2) and have been routinely reported since then in the Annual New Zealand Country Report.

Current New Zealand research on tuna and tuna-related species include:

#### **All Highly Migratory Species**

- Characterisation of New Zealand tuna fisheries
- Commercial catch sampling programme for HMS
- Gamefish tag recapture programme

#### **Albacore**

- Stock monitoring of albacore
- Analysis of albacore CPUE from the commercial troll fishery



## **Bycatch**

- Characterisation of bycatch in pelagic fisheries
- Estimation of non-target fish catches in the tuna longline fishery
- Productivity of non-target species
- Longline seabird mitigation – hook shielding devices, underwater bait setter and passive electronic monitoring of mitigation usage

## **Environmental**

- Estimation of bycatch and discards in longline fisheries
- Data collection of demographic and distributional information for selected seabirds species to allow estimation of effects of fishing on population viability
- Spatial Explicit Fisheries Risk Assessment for New Zealand and Southern Hemisphere interactions with seabirds
- Spatial Explicit Fisheries Risk Assessment for New Zealand interactions with Marine Mammals
- Estimation of captures in longline fisheries for seabirds, marine mammals and turtles

## **Blue shark**

- Indicator analyses of blue sharks

## **Mako shark**

- Indicator analyses of mako sharks
- Age, growth and reproduction of mako sharks

## **Porbeagle shark**

- Indicator analyses of porbeagle sharks
- Age, growth and reproduction of porbeagle sharks

## **Striped marlin**

- Stock monitoring of striped marlin
- Analysis of CPUE for striped marlin from the recreational fishery

If you would like further details regarding any of these studies please contact Leyla Knittweis (Leyla.Knittweis@mpi.govt.nz).

### **1.2.3 Statistical data collection systems in use**

In order to fish commercially in New Zealand, an individual or entity is required to hold a fishing permit. Fishing permit holders may only sell their catch to licensed receivers of fish (wharf sales of 10kg or less are permitted but must be documented). Both fishing permit holders (fishers) and fish receivers are required to furnish returns to the Ministry for Primary Industries. New Zealand has four data collection systems in place to collect catch and effort data:

- the catch and effort system for all domestic and most high seas fishing (including non-fish bycatch data); in 2017-2019 this system was incrementally replaced by Electronic Reporting (ER) of effort, catch and positions by fishers across all fleets.
- monthly harvest returns from fishers
- licensed fish receiver returns for fish processors, and
- a system to collect data from purse seine vessels that are using FFA/SPC logsheets for fishing on the high seas and within the zones of other countries.

Except for the catch and effort system these four data collection systems have not changed substantially in recent years and descriptions and details provided in the 2018 Annual Report are still current. The catch and effort system was replaced with Electronic Reporting in 2017-2019. The ER system serves

the same purpose as the previous paper-based system, but with improvements to the amount of data collected and the timeliness of data collection.

#### 1.2.4 Data coverage of catch, effort and size data for all species

All fishers are required to fill in logsheets providing 100% coverage of catch and effort. In addition, for fishing within New Zealand fisheries waters we have two independent records of total catches, the monthly reporting by fishers (MHRs) and licensed fish receivers (LFRRs).

Shore-based catch monitoring of the albacore troll fishery samples about 4% of the catch by weight based on sampling about 50 landings in selected fishing seasons. Given the small number of cohorts taken in this fishery, this level of sampling provides good precision on the catch-at-length estimates (e.g. mean weighted coefficient of variation of <0.20 for catch-at-length).

Currently much of the size data from longline, purse seine, and troll fisheries for other HMS comes through the observer and port sampling programmes.

The target observer coverage rate for the longline fishery is 10% of effort, which should reflect approximately 10% of the HMS catch. When Japanese charter vessels ceased operating in New Zealand waters after 2015, observer coverage of the domestic fleet decreased to about 15% of the reported effort for three years, declining to less than the 10% target value in 2019 and 2020. In 2021 observer coverage increased to 11.7% (Table 16).

**Table 16: Hooks observed from the New Zealand domestic longline fishery as a percentage of hooks set for 2017– 2021.**

| Calendar year | % hooks observed |
|---------------|------------------|
| 2016          | 14.1             |
| 2017          | 15.7             |
| 2018          | 13.1             |
| 2019          | 8.4              |
| 2020          | 9.9              |
| 2021          | 11.7             |

The shore-based port sampling programme includes the primary species taken in longline fisheries (e.g. bigeye, yellowfin and Pacific bluefin tunas). The sampling programme obtained individual processed weights for more than 67% of swordfish caught in 2021, and for more than 78% of the catch of bigeye tuna and yellowfin tuna (Table 17). The number of striped marlin caught by fleet are presented in Table 18. In New Zealand, retention of striped marlin catches on commercial vessels has been prohibited since the introduction of a Billfish Moratorium in 1987. Any bycatch individuals must be released; based on information available from observer records as well tag and release rates on sport fishing vessels over half of the released individuals are alive.

New Zealand vessels mostly offload their catch of tunas in port, but a small number of landings are transhipped in port; there were no recorded offloads or transhipments by New Zealand vessels in 2021 (Table 19).

**Table 17: Number and percent of swordfish and large tunas sampled for individual processed weights for calendar years 2017 to 2021.**

| Calendar<br>Year | Numbers of fish sampled |             |                | Percentage of catch |             |                |
|------------------|-------------------------|-------------|----------------|---------------------|-------------|----------------|
|                  | Swordfish               | Bigeye tuna | Yellowfin tuna | Swordfish           | Bigeye tuna | Yellowfin tuna |
| 2017             | 4243                    | 1552        | 201            | 76.3                | 84.4        | 76.7           |
| 2018             | 4278                    | 1994        | 389            | 68.5                | 90.4        | 82.6           |
| 2019             | 2213                    | 669         | 93             | 74.8                | 90.7        | 83.0           |
| 2020             | 1771                    | 887         | 305            | 54.9                | 80.9        | 85.6           |
| 2021             | 3102                    | 1221        | 446            | 67.0                | 78.3        | 80.1           |

**Table 18: Commercial discards (numbers of fish) of striped marlin in the New Zealand EEZ reported by the NZ commercial fleet and number of fish landed and tagged by the recreational fleet, by fishing year for 2015-16 to 2020-21.**

| Fishing<br>Year | Commercial | NZ Recreational |        | Total |
|-----------------|------------|-----------------|--------|-------|
|                 | Discarded  | Landed          | Tagged |       |
| 2015-16         | 550        | 900             | 1658   | 3108  |
| 2016-17         | 261        | 516             | 528    | 1305  |
| 2017-18         | 168        | 618             | 686    | 1472  |
| 2018-19         | 74         | 507             | 739    | 1320  |
| 2019-20         | 129        | 333             | 437    | 899   |
| 2020-21         | 195        | 627             | 1049   | 1871  |

**Table 19: Transshipment Information for New Zealand vessels for 2021.**

| <b>Species</b>       | <b>Offloaded - Total Quantity (metric tonnes)</b> | <b>Transhipped In Port, national Jurisdiction, etc</b> | <b>Transhipped Inside / Outside Convention area</b> | <b>Product form</b> | <b>Fishing gear</b> |
|----------------------|---|--|---|---------------------|---------------------|
| Skipjack tuna (SKJ)  | -   | n/a  | n/a   | n/a                 | n/a                 |
| Yellowfin tuna (YFN) | -   | n/a  | n/a   | n/a                 | n/a                 |
| Bigeye tuna (BET)    | -   | n/a  | n/a   | n/a                 | n/a                 |

| <b>Species</b>       | <b>Offloaded - Number of Transshipments</b> | <b>Transhipped In Port, national Jurisdiction, etc</b> | <b>Transhipped Inside/Outside Convention area</b> | <b>Fishing gear</b> |
|----------------------|---|--|---|---------------------|
| Skipjack tuna (SKJ)  | -   | n/a  | n/a   | n/a                 |
| Yellowfin tuna (YFN) | -   | n/a  | n/a   | n/a                 |
| Bigeye tuna (BET)    | -   | n/a  | n/a   | n/a                 |

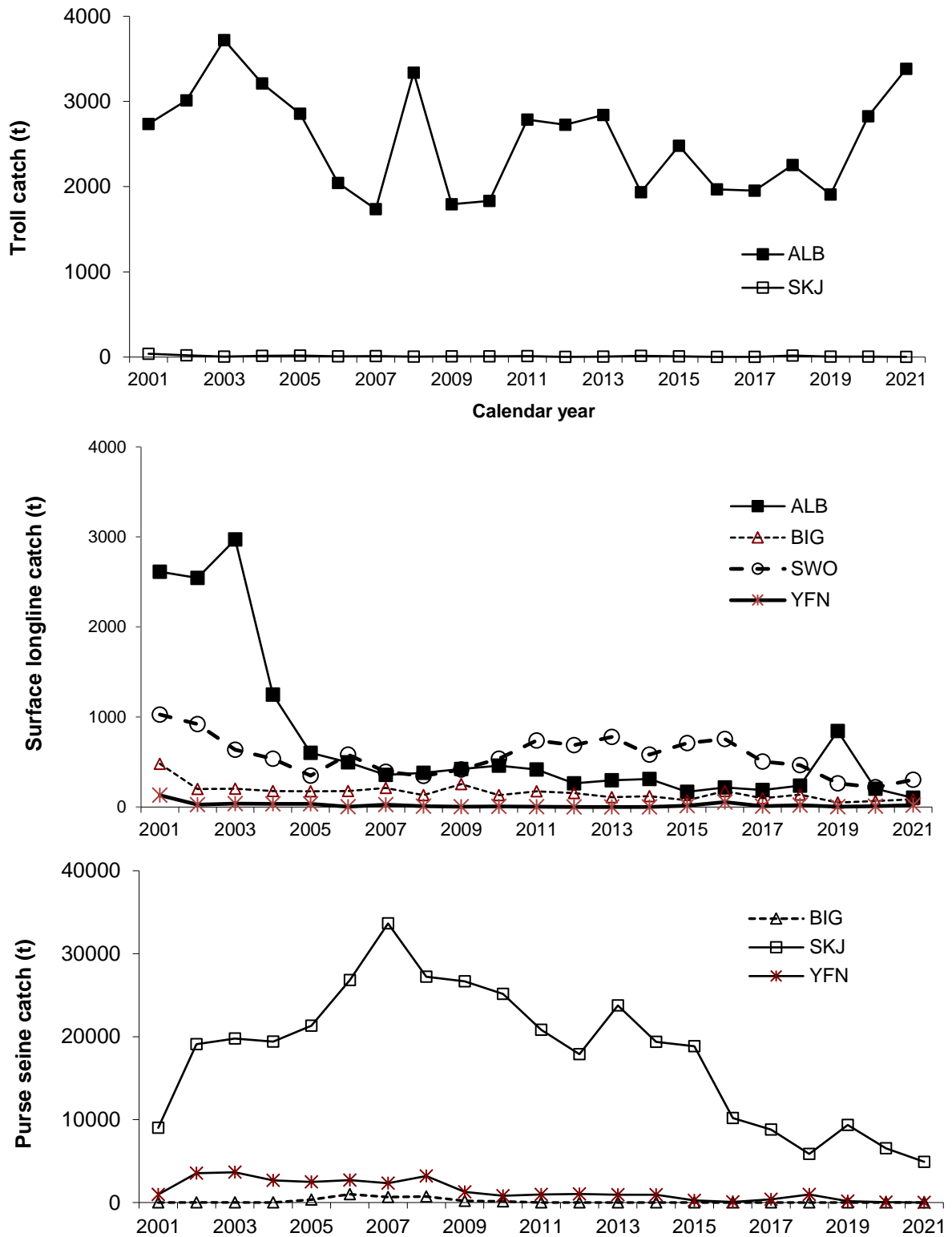
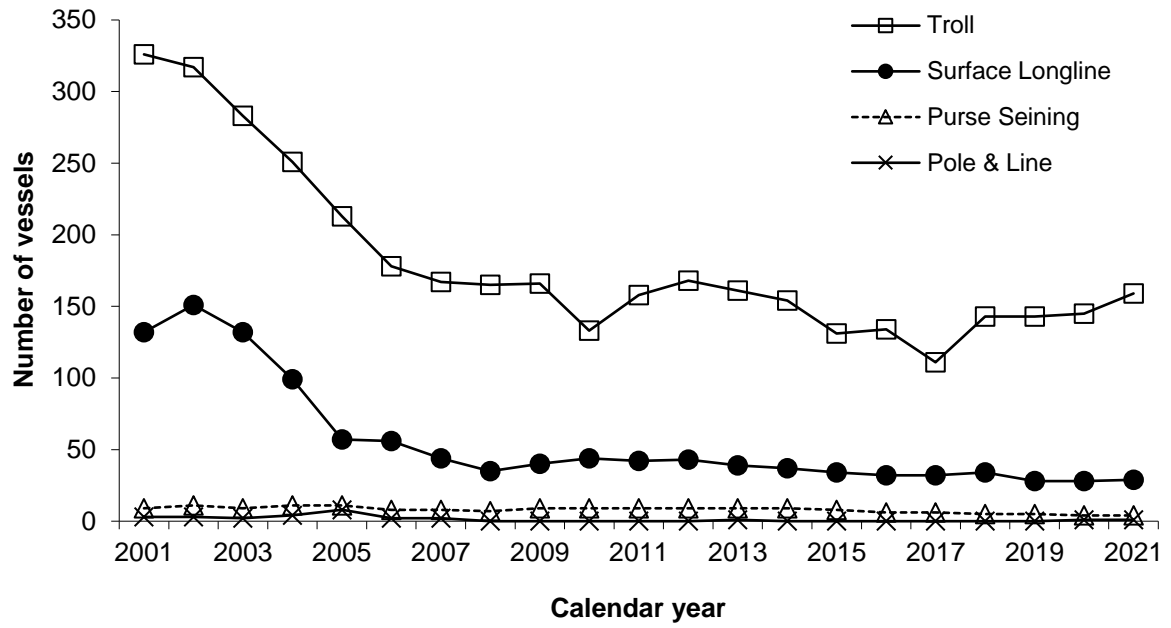
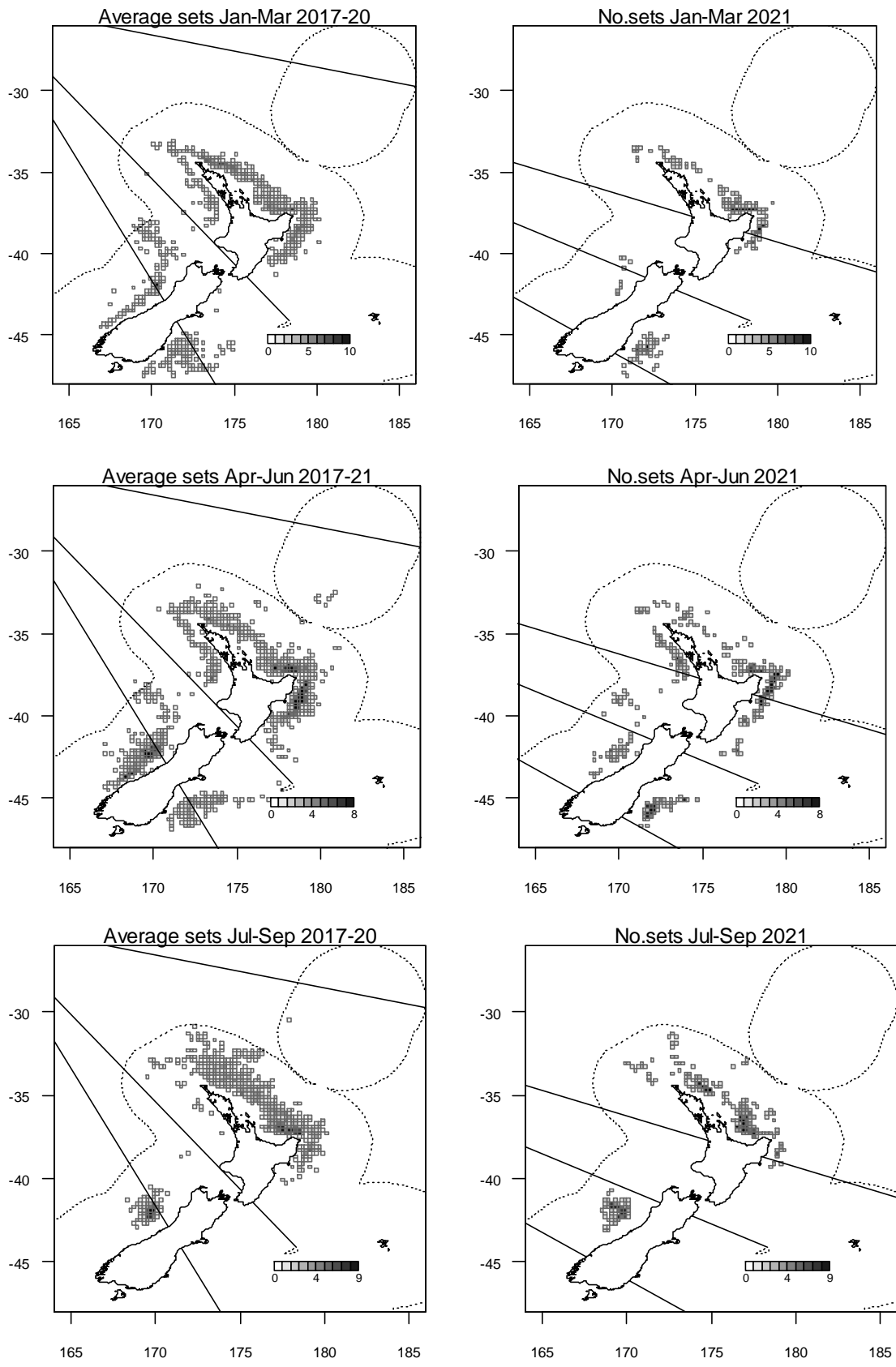


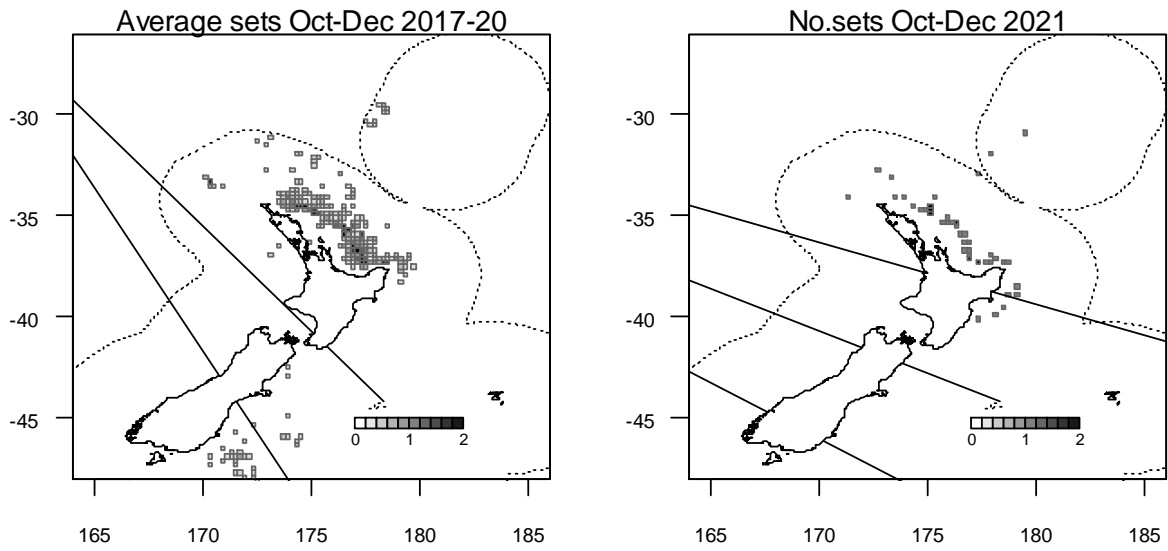
Figure 1: Historical catch (t) by gear and main species for the New Zealand longline, purse-seine and troll fleets operating in the WCPFC Convention area from 2001 to 2021.



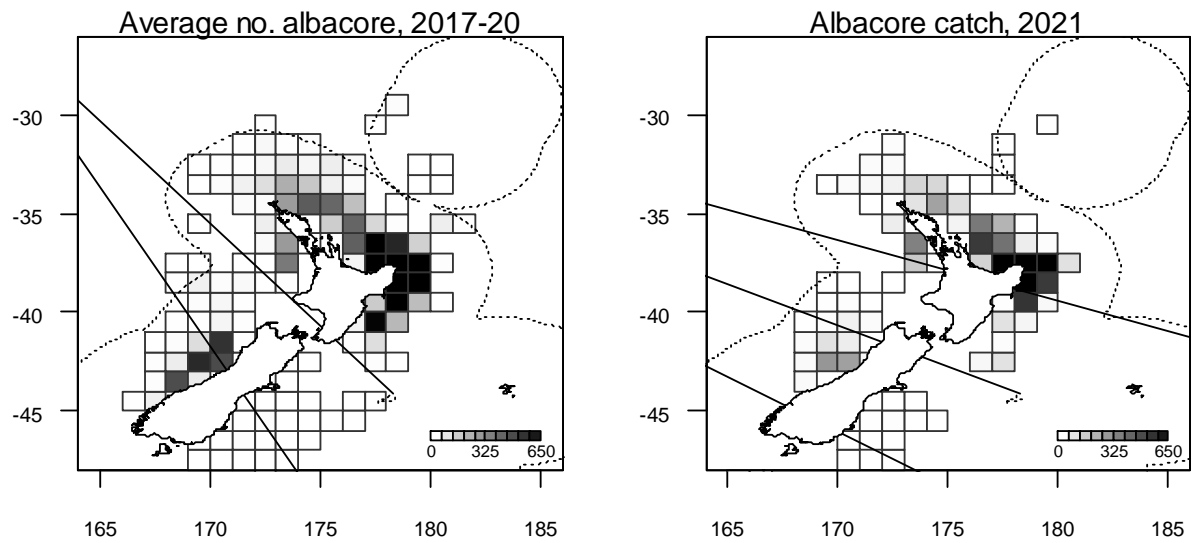
**Figure 2: Historical annual vessel numbers for the New Zealand longline, purse seine, troll and pole and line fleets by gear fishing in the WCPFC Convention area from 2001 to 2021. Vessels switch gear seasonally and may be included in more than one category.**



**Figure 3: Distribution of effort (number of sets per 1/5 degree square) for the domestic longline fleet by quarter-year for 2017-2020 (average) and 2021 (actual).**



**Figure 3 (continued):** Distribution of effort (number of sets per 1/5 degree square) for the domestic longline fleet by quarter-year for 2017-2020 (average) and 2021 (actual).



**Figure 4:** Distribution of longline catch (number of fish in 1 degree squares) for albacore, bigeye, and yellowfin tunas, and swordfish for 2017 to 2020 (average), and for 2021 (actual). All months and all vessels combined.



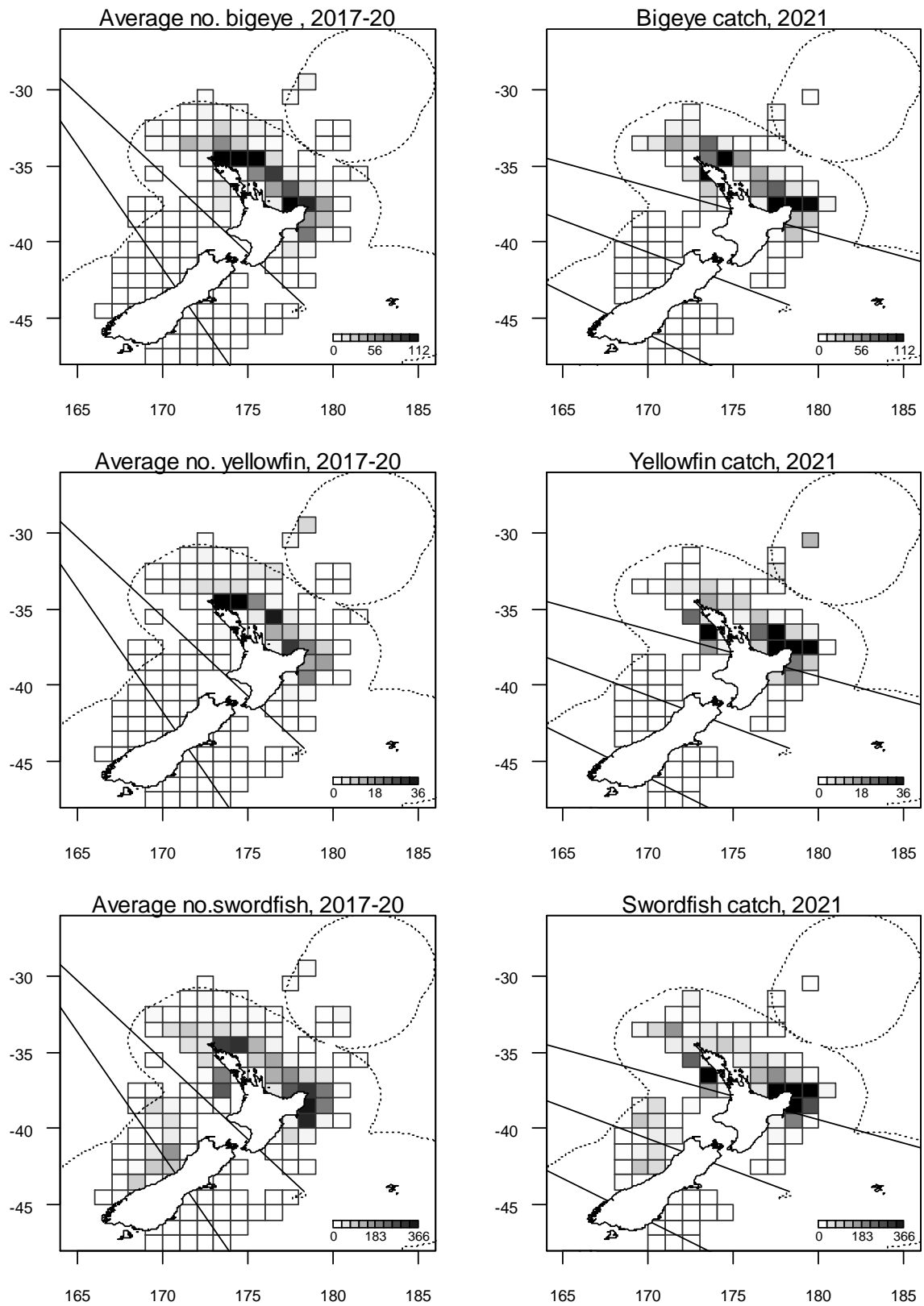
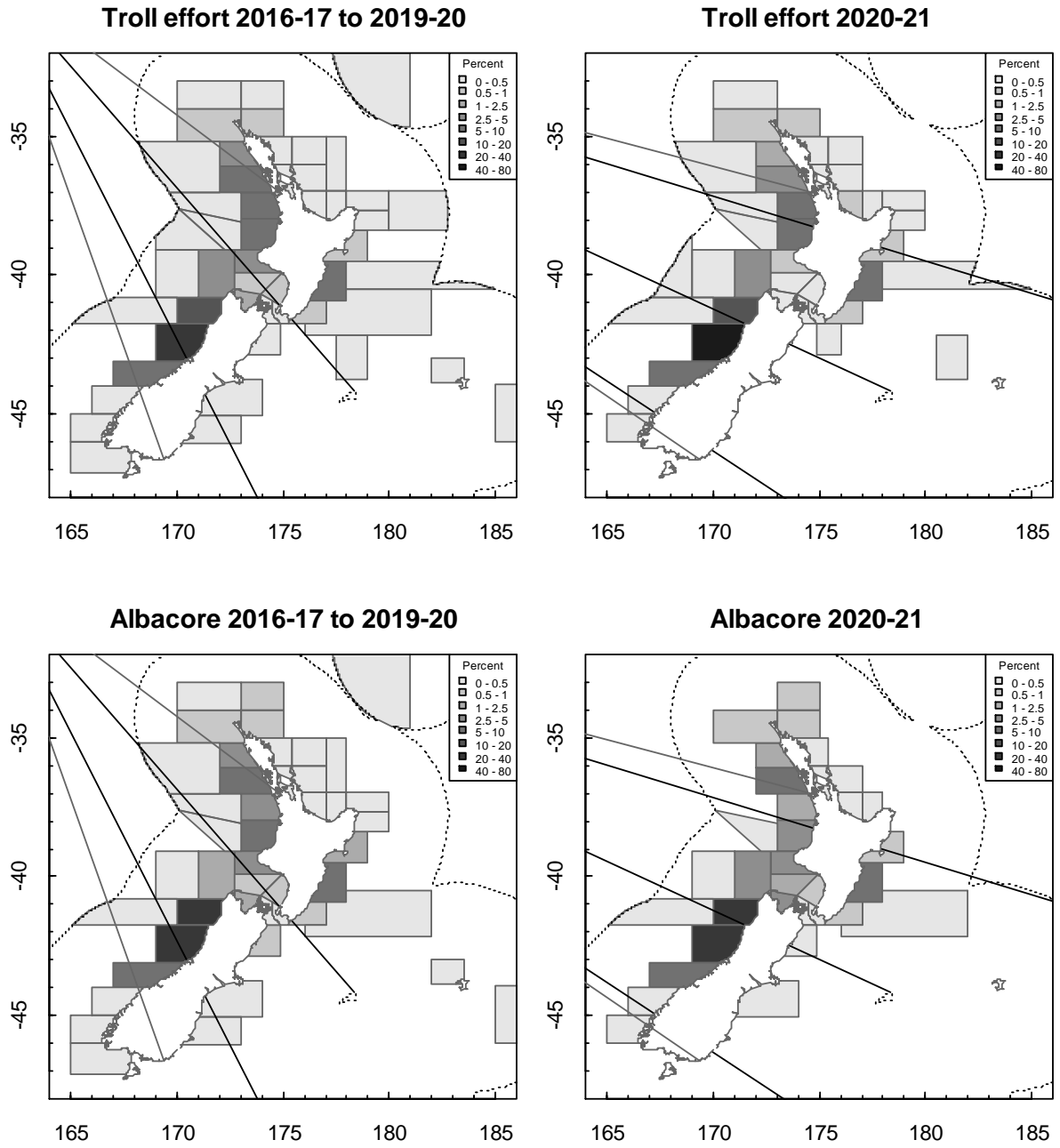
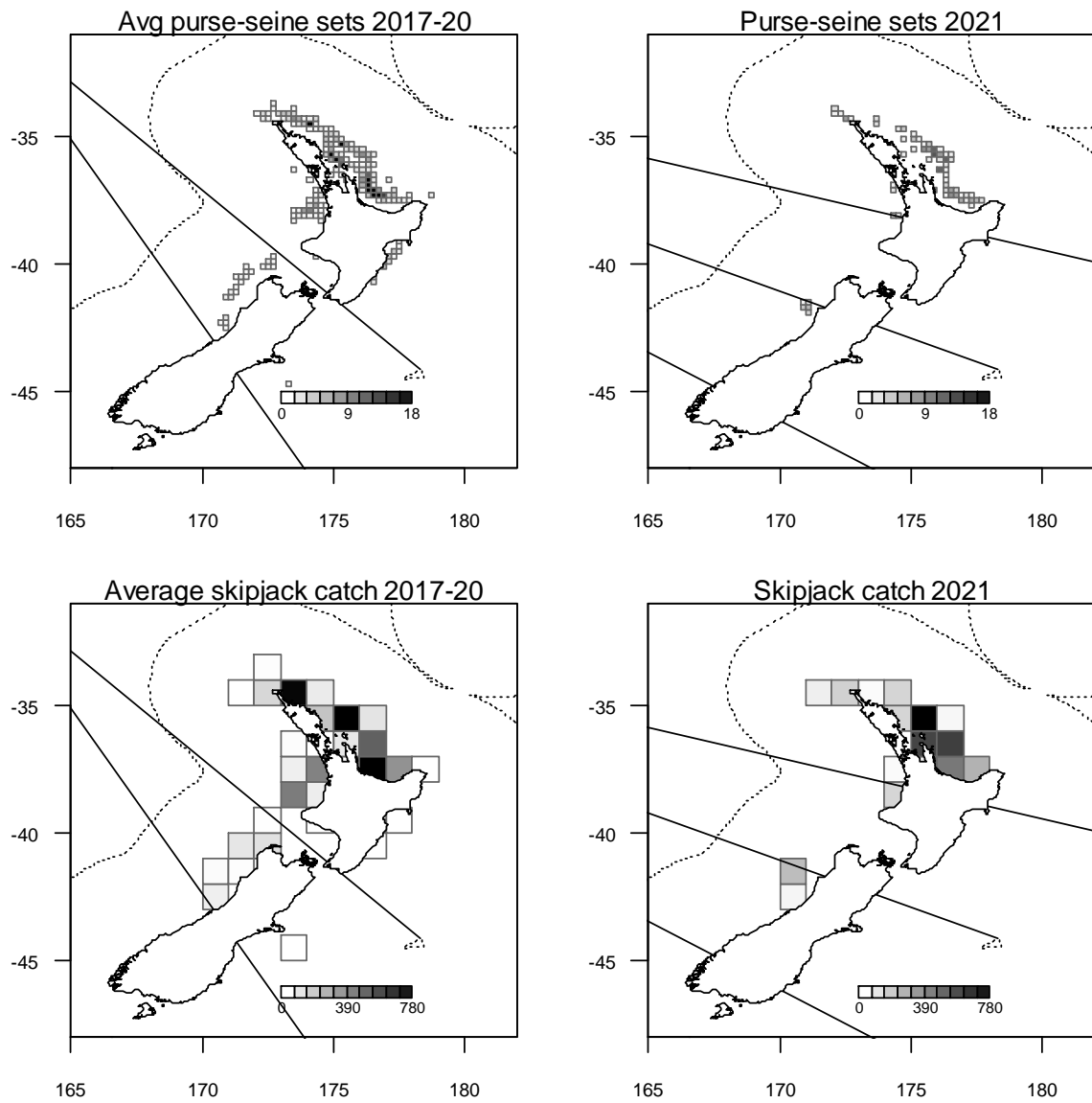


Figure 4 (continued): Distribution of longline catch (number of fish in 1 degree squares) for albacore, bigeye, and yellowfin tunas, and swordfish for 2017 to 2020 (average), and for 2021 (actual). All months and all vessels combined.



**Figure 5: Distribution of troll effort (percent of vessel-days) and troll catch of albacore (percent of total catch) for 2016-17 to 2019-20 troll seasons (left) and for 2020-21 season (right); Note: Positional data for troll are reported at a NZ statistical area resolution.**



**Figure 6: Distribution of purse-seine effort (number of sets per 1 degree square) and purse-seine catch of skipjack (tonnes per 1 degree square), average for 2017-20 calendar years (left) and actual for 2021 (right).**

**Appendix 1: Description of the types of catch, effort, and size data that are available for HMS species**

| Data type                                 | Description   | Years available   | Comments  |
|---|---|---|---|
| <p>CELR (Catch Effort Landing Return)</p> | <p>The CELR is a general-purpose form used for recording the taking of fish by any of a variety of methods where there is no more specific form type available. The top part of the form contains details of the fishing activity.</p> <p>A number of method-specific “templates” are used with the CELR form. The templates are overlaid on the standard CELR form and give instructions on filling in the form specific to particular types of method. the fishing details sections of the forms are mainly provided for the purposes of:</p> <ul style="list-style-type: none"> <li>• stock assessment- to provide a measure of catch per unit effort</li> <li>• policy evaluation –to determine the location and method of fishing</li> <li>• enforcement –to monitor activities of fishers</li> <li>• monitoring environmental performance –to monitor effort</li> </ul> <p>The catch effort returns relate details about the fishing activity (including the location of fishing) directly to an estimate of the amount of fish caught. The bottom part of the form contains landing information and records the catch that is landed, lost, discarded at sea, or retained on board after a landing. Landing information is required from all commercial fishing for all species, and hence, this is theoretically the most comprehensive source of information for commercial harvest levels in New Zealand.</p> | <p>January 1988 onwards.</p> <p>Incrementally phased out during the period 2017 to the end of 2019 and replaced by Electronic Reporting (ER).</p>               | <p>In addition to this form there is a version specifically for reporting fishing by New Zealand vessels on the high seas known as the HS-CELR (High Seas CELR). The HS-CELR is nearly identical to the standard version of the form and was introduced 1 March 2001.</p> <p>There are a number of limitations and problems in this data set that need to be considered:</p> <ul style="list-style-type: none"> <li>• Because there is only space on the form for the catches of five species per unit of effort, species caught in small quantities may not be reported.</li> <li>• The catches reported are only estimates and are not weighed. Tuna catches are reported in numbers rather than weight.</li> </ul> <p>Fish reported in the landing section of a CELR form usually cannot be related to any specific fishing event during a trip. If the vessel fished in several statistical areas within one trip then it is usually not possible to deduce how much of the landed catch was taken in each statistical area</p> |
| <p>CLR (Catch Landing Return)</p>         | <p>Catch Landing Returns are completed by vessels that use a form other than a CELR to report their fishing effort. They record the catch that is landed, lost, discarded at sea, or retained on board after a landing. Landing information is required from all commercial fishing for all species, and hence, this is theoretically the most comprehensive source of information for commercial harvest levels in New Zealand.</p>  | <p>January 1991 onwards (TLCER forms).</p> <p>Incrementally phased out during the period 2017 to the end of 2019 and replaced by Electronic Reporting (ER).</p> | <p>Fish reported in the landings form usually cannot be related any specific fishing event during a trip . If the vessel fished in several statistical areas within one trip then it is usually not possible to deduce how much of the landed catch was taken in each statistical area.</p> <p>The whole weights reported in the landings are calculated from the processed catch weights multiplied by a conversion factor. The calculated whole weights are therefore only as</p>   |

|   |  |   |   |
|---|--|---|---|
|   |  |   | accurate as the conversion. The whole weights of fish that are not landed to a Licensed Fish Receiver (e.g. fish discarded or trans-shipped) have historically not been fully recorded.   |
| TLCER (Tuna Longline Catch Effort Return) | The TLCER is required for all fishing that targets tunas using surface longlining. Data reported on the TLCER is for one set and has the date at start of set and end of haul and the time at start and end of setting and hauling. Locations (of start and end of setting) are reported in latitude and longitude. Catches of all species are recorded in number and in total processed weight.   | January 1980 to June 1995 (foreign licensed vessels)<br>March 1989 onwards (charter vessels)<br>March 1991 onwards (domestic vessels).<br>Incrementally phased out during the period 2017 to the end of 2019 and replaced by Electronic Reporting (ER). | In addition to this form there is a version specifically for reporting fishing by New Zealand vessels on the high seas known as the HS-TLCER (High Seas TLCER). The HS-TLCER is nearly identical to the standard version of the form and was introduced 1 March 2001.<br><br>The TLCER form was redesigned to include additional information on the position and timing of setting and hauling as well as disposition of catches from April 2003. |
| ER Landing reports                        | Landing reports record the catch that is landed, transhipped or retained on board after a landing. Landing information is required from all commercial fishing for all species and hence, combined with Disposal reports from the same trip are theoretically the most comprehensive source of information for commercial harvest levels in New Zealand.   | Incrementally introduced during the period 2017 to the end of 2019.   | The whole weights reported in the Landing report are calculated from the processed catch weights multiplied by a conversion factor. The calculated whole weights are therefore only as accurate as the conversion.  |
| ER Disposal reports                       | Disposal reports record the catch that is lost, discarded at sea or otherwise not reported on a Landing report. Disposal information is required from all commercial fishing for all species and hence, combined with Landing reports from the same trip are theoretically the most comprehensive source of information for commercial harvest levels in New Zealand. These reports record the weight and, when the catch was taken by surface longlining, the number of fish discarded.<br><br>Disposal reports are usually linked to a specific fishing event. | Incrementally introduced during the period 2017 to the end of 2019.   | The whole weights reported in the Disposal report are the estimate of the weight using the most practicable method available  |
| ER Tuna-Lining reports                    | The Tuna-Lining report is required for all fishing using surface longlining. Data reported on the Tuna-Lining report is for one set and has the date, time and position at the start and end of setting and at the start and end end of hauling. Locations are reported in latitude and longitude. Catches of all species retained are recorded in number and in total processed weight. Catch that is discarded is recorded on a  | Incrementally introduced during the period 2017 to the end of 2019.   | This report also records bycatch mitigation measures used the fishing event.  |

|  |   |   |   |
|--|---|---|---|
|  | separate Disposal report for the fishing event.   |   |   |
| ER Seining reports                         | The Seining report is required for all fishing using seining methods. Data reported on the Seining report is for each set and includes the date, time and position of the start and end of the fishing event. These reports record the weight of catch taken during the event   | Incrementally introduced during the period 2017 to the end of 2019.   | This report also records bycatch mitigation measures used the fishing event.  |
| ER Other Lining reports                    | The Other Lining report is required for all fishing using handlining, pale and line, and trolling fishing methods. Data reported on the Other Lining report includes the date, time and position of the start and end of the fishing event. When trolling if all lines are removed from the water before being deployed later in the day this will be treated separate events These reports record the weight of catch , and for trolling the number of fish, taken during the event. | Incrementally introduced during the period 2017 to the end of 2019.   |   |
| MHR (Monthly Harvest Return)               | The main purpose of the MHR is for fisheries administration. A secondary purpose is to provide an information source concerning total harvest levels of quota and non-quota species for fisheries assessment.   | October 2001 onwards  | MHR reports are recorded by permit holder, fishstock and month. Fine scale information such as vessel (unless the permit holder used only one vessel), statistical area or the date of fishing are not available in this dataset. The catch within and beyond the EEZ is reported.<br><br>Prior to October 2001, equivalent information was collected for species subject to New Zealand's Quota Monitoring System on Quota Monitoring Returns (QMRs). This information was collected from December 1986 onwards until the QMR was replaced by the MHR in October 2001. |
| LFRR (Licensed Fish Receiver Returns)      | The primary purpose of LFRR is for administration of the quota management system. LFRR data provides complete coverage of all species processed by licensed fish receivers. Fish not landed to a Licensed Fish Receiver (e.g. fish that are discarded) are not reported through this system.  | January 1986 onwards  | This dataset does not contain information about the origin of the fish apart from the quota holder. If a permit holder fishes in more than one fishstock in a month or uses more than one vessel, it may not be possible to relate the LFRR data to the landing records. This dataset is therefore useful mainly to estimate total catches for a species in a year. This dataset does not contain information about fish that was not landed to a Licensed Fish Receiver, such as fish that was discarded, eaten, sold at wharf etc.                                    |
| Observer Data (from longline, purse seine, | To monitor the activities of fishing vessels operating in the New Zealand EEZ and to obtain reliable, accurate and independent catch, effort and biological information.  | June 1988 onwards for longline,<br><br>January 2006 onwards for Purse | This system does not cover all commercial catch. It covers a sample of the tuna fishing (about 975 observer days budgeted in 2008/09), but for the trips that are covered, more detailed  |

|                       |  |   |  |
|-----------------------|--|---|--|
| and trolling vessels) |  | Seine & January 2007 for trolling vessels | information is available than is available from the commercial catch forms completed by fishers. |
|-----------------------|--|---|--|