



**SCIENTIFIC COMMITTEE  
FOURTEENTH REGULAR SESSION**

**Busan, Republic of Korea  
8-16 August 2018**

---

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

---

**WCPFC-SC14-AR/CCM-16**

**NEW ZEALAND**

**NEW ZEALAND**

**Annual report**

**Part 1**

**Information on fisheries, statistics and research**

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 2018	<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 catch of all tuna species (9,427t in 2017), 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 (387t in 2017). 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 (2,141 t in 2017) 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 2017, 99.5 t of striped marlin were caught by the recreational fleet, with 47% tagged and released.

New Zealand had one Class-5 purse seiner fishing offshore in the Exclusive Economic Zones (EEZs) of Pacific Island States and in high seas areas of the equatorial western and central Pacific Ocean (WCPO) in 2017. This vessel also fishes domestically from time to time along with up to four smaller capacity domestic-based purse seiners. The New Zealand longline tuna fleet consists of domestically owned and operated vessels (mostly between 15 and 25 m in length) and until recently a limited number of foreign owned vessels that operate under charter. The number of longline vessels operating in New Zealand declined from 151 vessels in 2002 to 32 in 2017.

Blue shark is the most common non-tuna bycatch species in the longline fishery followed by Ray's Bream and moonfish. Reductions in longline effort since 2002 have resulted in reductions in catches of the major bycatch species to low levels in 2017,

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 CMM2012-07. New Zealand longline vessels have been provided with turtle de-hooking equipment. As the purse seine fishery in New Zealand fishery waters is based on free schools of skipjack, bycatch is minimal (about 1% by mass). No interactions with non-fish bycatch (e.g. seabirds, turtles, and marine mammals) have been observed in the purse seine fishery.

New Zealand has an Observer Programme and two active domestic port sampling programmes for highly migratory species. In 2017, 16% of the longline effort (hooks) was observed, and more than 23% of the New Zealand domestic 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 2017 is provided in Table 2 and Figure 1. Since 2002, skipjack catches taken by purse seine have comprised the greatest part of the catch 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 in each year 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 bigeye, southern bluefin and swordfish, the greatest part of the catch consists of albacore. 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, but to protect New Zealand's sport fishery, marlins may not be retained by commercial fishers when taken within New Zealand fisheries waters.

The striped marlin catch by recreational fishers in 2017 was estimated to be 99.5 tonnes, with 47% 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 2017 calendar year two Pacific bluefin tuna were reported caught in New Zealand fishery waters by Amateur-fishing charter vessels. Both of these fish were landed with total weight estimated at 480 kg.

In 2012 the recreational sector was estimated to have landed 21,898 (CV 0.21) albacore. Based on a mean weight of 4.2 kg this catch was estimated to be 92 t. The recreational National Panel Survey for the 2011–12 fishing year also 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. 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 continuously since the late 1990s in both commercial and recreational fisheries with a small upturn in 2015 and 2016; this overall trend is of great concern to New Zealand.

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

Approximately 140 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 2017. 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.

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 one in 2017. These vessels may also fish part of the year within New Zealand fisheries waters targeting free swimming (unassociated) schools of skipjack. The number of smaller capacity domestic-based purse seiners had declined to five vessels by 2009 and to four vessels in 2015.

A small fleet of foreign owned longline vessels on charter to New Zealand fishing companies had operated in New Zealand fisheries waters since the late 1980s. These longliners target southern bluefin tuna, although a mixed bag of species including other tunas and swordfish are caught. On one occasion two vessels were chartered to target albacore tuna. In 2006, three Australian flagged vessels entered the longline fishery under charter arrangements for two years, targeting bigeye tuna and swordfish. No chartered longliners have fished in New Zealand fisheries waters since 2015.

**Table 1: Estimated whole weight (t) of tuna and swordfish landed by New Zealand flagged vessels active in the WCPFC Convention Area, for years 2012 to 2017 (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 2017 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.**

		2012	2013	2014	2015	2016	2017
Albacore	NZFW	2990	3142	2257	2648	2186	2141
<i>Thunnus alalunga</i>	ET	0	0	0	0	0	0
	<b>Total</b>	2990	3142	2257	2648	2186	2141
Bigeye	NZFW	154	110	122	81	177	97
<i>Thunnus obesus</i>	ET*	95	92	190	24	30	60
	<b>Total</b>	250	202	312	105	207	157
Pacific bluefin <sup>&amp;</sup>	NZFW	13	24	12	16	18	14
<i>Thunnus orientalis</i>	ET	0	0	0	0	0	0
	<b>Total</b>	13	24	12	16	18	14
Skipjack	NZFW	9881	13312	11245	12351	5268	5120
<i>Katsuwonus pelamis</i>	ET	8016	10456	8137	6503	4913	4307
	<b>Total</b>	17897	23768	19382	18853	10181	9427
Swordfish	NZFW	687	778	583	715	757	507
<i>Xiphias gladius</i>	ET	0	0	0	0	0	0
	<b>Total</b>	687	778	583	715	757	507
Yellowfin	NZFW	2	1	2	16	57	10
<i>Thunnus albacares</i>	ET*	1042	925	942	272	74	387
	<b>Total</b>	1044	925	944	288	131	397

\* 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 2017 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%.**

2017	Longline	Troll	Handline	Pole & Line	Purse seine
Albacore	8	<1	<1	0	<1
Bigeye tuna	62	<1	0	0	38
Skipjack tuna	0	<1	<1	0	100
Swordfish	100	<1	0	0	0
Yellowfin tuna	2	<1	0	0	97

**Table 3: Catch of south Pacific albacore by New Zealand vessels south of 20°S in tonnes (raised), using surface longline, troll, or purse seine gear; and in thousands of fish (for longline and troll only, unraised), 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 2013–2017 (note that some vessels will be included in both totals).**

Year	ALB (tonnes)			ALB (000's fish)			Number of vessels	
	Target	Bycatch	Total	Target	Bycatch	Total	Target	Bycatch
2013	2848	294	3142	440	30	470	161	43
2014	2003	253	2256	316	22	337	152	32
2015	2477	171	2648	347	15	361	132	32
2016	1976	209	2185	333	24	358	134	31
2017	1960	181	2141	309	19	328	112	33

### 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. The southern bluefin tuna fishery occurs during the second quarter 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 has 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 and effort is consistent 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 2013 to 2017.**

Fishing Method	Calendar	Total no.	Vessels size range (GRT)			
	Year	vessels	0 – 50	51 - 200	201 - 500	500+
Surface Longline	2013	39	21	14	3	1
	2014	37	19	14	2	2
	2015	34	17	13	2	2
	2016	32	19	13	0	0
	2017	32	18	14	0	0
Purse Seining			<b>0 – 500</b>	<b>501-1000</b>	<b>1001 - 1500</b>	<b>1501+</b>
	2013	9	5	0	2	2
	2014	9	5	0	2	2
	2015	8	4	0	2	2
	2016	6	4	0	2	0
Pole & Line			<b>0-50</b>	<b>51-150</b>		
	2013	1	1	0		
	2014	0	0	0		
	2015	0	0	0		
	2016	0	0	0		
Troll			<b>0 – 50</b>	<b>51 - 200</b>		
	2013	161	140	21		
	2014	153	132	21		
	2015	131	108	23		
	2016	134	113	21		
Troll season			<b>0 – 50</b>	<b>51 - 200</b>		
	2012-13	153	134	19		
	2013-14	149	130	19		
	2014-15	127	105	22		
	2015-16	130	110	20		
2016-17	99	82	17			

**Table 5: Annual longline effort (000s of hooks) by target species. 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
2013	1506	854	9	354	2724
2014	1583	710	1	215	2509
2015	1565	406	0	450	2421
2016	1237	626	21	473	2357
2017	1225	514	4	362	2104

**Table 6: The total number of vessels that fished for albacore (troll and surface longline), and the total catch of albacore for the domestic troll, and domestic and charter surface longline fleets in New Zealand EEZ by calendar year. 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		Charter longline vessels	
	Catch (tonnes)	Vessel numbers	Catch (tonnes)	Vessel numbers	Catch (tonnes)	Vessel numbers
2001	2736.3	326	2588.2	128	25.4	4
2002	3012.4	317	2536.9	147	7.9	4
2003	3721.2	283	2496.4	126	474.1	6
2004	3211.8	251	1232.3	95	16.0	4
2005	2808.8	213	604.4	55	29.7	2
2006	2043.4	178	479.8	53	16.4	3
2007	1735.8	136	313.7	38	42.8	6
2008	3352.3	168	372.7	31	9.8	4
2009	1793.6	166	409.5	36	12.0	4
2010	1832.5	133	457.7	40	1.8	4
2011	2786.6	162	417.7	38	1.5	4
2012	2725.7	168	261.8	39	2.8	4
2013	2835.9	160	296.1	35	7.2	4
2014	1936.6	154	299.9	33	12.7	4
2015	2479.0	131	162.7	30	5.9	4
2016	1968.9	130	216.7	32	0.0	0
2017	1959.3	111	181.1	32	0.0	0

**Table 7: The total number of vessels that fished for swordfish (all surface longline vessels), and the total catch of swordfish for the domestic and charter surface longline fleets in New Zealand EEZ by calendar year.**

Year	NZ-flagged vessels south of 20°S		Chartered vessels		Other vessels fishing within New Zealand's waters south of 20°S		
	Catch (tonnes)	Vessel numbers	Catch (tonnes)	Vessel numbers	Flag	Catch (tonnes)	Vessel numbers
2001	1009.5	128	17.5	4	NA	NA	0
2002	909.0	147	11.0	4	NA	NA	0
2003	616.9	126	18.1	6	NA	NA	0
2004	528.1	95	9.9	4	NA	NA	0
2005	337.8	55	10.2	2	NA	NA	0
2006	558.7	53	22.3	3	NA	NA	0
2007	334.8	38	57.2	6	NA	NA	0
2008	343.0	31	3.0	4	NA	NA	0
2009	412.7	36	5.3	4	NA	NA	0
2010	535.1	41	0.9	3	NA	NA	0
2011	736.2	37	2.8	4	NA	NA	0
2012	679.1	39	7.7	3	NA	NA	0
2013	765.2	35	12.6	4	NA	NA	0
2014	576.7	33	6.4	4	NA	NA	0
2015	706.1	30	8.7	4	NA	NA	0
2016	755.4	32	0.0	0	NA	NA	0
2017	504.2	32	0.0	0	NA	NA	0

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

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). The large reduction in blue shark landed catch in 2014 was due to a lack of markets for shark products (Table 8). The large increase for Ray's Bream in 2013 and 2014 came from fisheries other than the surface longline fisheries for tuna. In recent years the overall bycatch levels for all other species have been relatively consistent between years.

**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 2013 – 2017 and for some species may include catches from non-tuna fisheries.**

Species	Scientific name	2013	2014	2015	2016	2017
Blue shark	<i>Prionace glauca</i>	661	106	148	172	126
Mako shark	<i>Isurus oxyrinchus</i>	79	49	47	72	39
Moonfish	<i>Lampris guttatus</i>	65	51	37	64	50
Porbeagle shark	<i>Lamna nasus</i>	85	74	83	42	26
Ray's bream	<i>Brama brama</i>	847	658	169	125	110

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 2014 to 2017. Also provided is the percentage of these species retained (2017 data only) and the percentage of fish that were alive when discarded, N/A (none discarded).**

Species	2014	2015	2016	2017	% retained (2017)	% discards alive (2017)
Blue shark	80 118	72 480	57 210	49 924	0.0	88.7
Lancetfish	21 002	12 962	17 442	13 274	0.0	33.5
Porbeagle shark	5 061	4 058	6 566	3 101	1.0	51.1
Rays bream	4 591	17 555	7 758	2 421	99.0	26.7
Moonfish	1 655	3 060	3 036	2 022	98.0	50.0
Pelagic stingray	684	979	1 414	1 798	0.0	100.0
Sunfish	1 981	770	4 849	1 648	0.0	99.8
Mako shark	4 506	2 667	4 417	1 391	4.0	65.6
Rudderfish	327	373	237	680	45.0	89.4
Butterfly tuna	699	1 309	768	406	86.0	20.7
Escolar	656	653	669	300	67.0	67.9
Striped marlin	151	120	550	290	0.0	66.7
Thresher shark	261	177	601	260	0.0	76.0
Oilfish	518	584	281	227	42.0	85.4
Dealfish	910	842	63	72	0.0	31.8

School shark	119	88	24	59	84.0	100.0
Skipjack tuna	90	150	185	57	86.0	100.0
Deepwater dogfish	600	545	0	32	0.0	83.3
Big scale pomfret	164	59	16	17	100.0	n/a

The major bycatch species can be divided into three groups: species that are typically discarded and are usually alive (e.g. deepwater dogfish and rudderfish), 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. While there is a general rule prohibiting the discarding of quota species, in the case of these highly migratory sharks, specific provision has been made within the QMS to allow for the discarding of these species either alive or dead.

In 2017 the following observations were made on shark captures in longline fisheries:

- ) No reported oceanic whitetip, silky, great white or whale sharks captures
- ) One manta ray caught and released alive

Seabirds are sometimes caught in longline fisheries, during both setting and hauling. The observed captures in 2010 - 2017 are given in Table 10. All confirmed fishing activity occurred south of 30° S. Estimates based on observer coverage are highly uncertain but the capture rates are shown in Table 10. 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 CMM2015-03.

**Table 10a: Fishing effort, number of observed hooks, and estimated seabird capture rates by year south of 30°S. For each year from 2010 -2017, 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); the capture rate (captures per thousand hooks).**

Year	Fishing effort				Observed seabird captures	
	Number of vessels	Number of hooks	Observed hooks	% hooks observed	Number	Rate
2010	44	2 988 029	658 283	22.0	143	0.217
2011	42	3 153 254	666 382	21.1	41	0.062
2012	43	3 062 522	702 900	22.9	58	0.083
2013	40	2 774 214	575 190	20.7	29	0.050
2014	37	2 431 597	758 670	31.2	34	0.045
2015	34	2 421 191	625 673	25.8	47	0.075
2016	32	2 356 638	332 446	14.1	130	0.391
2017	32	2 104 324	330 235	15.7	57	0.173

**Table 10b Observed seabird captures in longline fisheries in 2017. 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>	16
Buller's albatross	<i>Thalassarche bulleri</i>	13
Black petrel	<i>Procellaria parkinsoni</i>	11
Westland petrel	<i>Procellaria westlandica</i>	8
Wandering albatross	<i>Diomedea</i> spp.	2
Albatross unidentified	Diomedidae	1
Grey petrel	<i>Procellaria cinerea</i>	1
Black-browed albatross unidentified	<i>Thalassarche</i> spp.	1
Northern Royal albatross	<i>Diomedea sanfordi</i>	1
Mid-sized Petrels & Shearwaters	<i>Pterodroma, Procellaria &amp; Puffinus</i> spp.	1
Royal albatrosses	<i>Diomedea sanfordi &amp; D. epomophora</i>	1
Shy albatross	<i>Thalassarche cauta</i>	1
Total		57

Since 2001, only 28 sea turtles have been reported by observers within New Zealand fisheries waters. Of these, 23 were leatherback turtles, one was a loggerhead turtle, two were green turtles and one was an olive ridley turtle. In the most recent seven years only 15 sea turtles have been captured in New Zealand fishery waters (Table 11), all were released alive.

Overall, sea turtle interactions are very 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). All but one of the turtles caught since 2001 were released alive. The only observed turtle mortality (2001) that occurred in New Zealand fisheries waters in the past 16 years was identified as a green turtle (based on photographs taken by the observer). No turtles have been observed or reported from the purse seine or troll fisheries that operate within New Zealand fisheries waters.

**Table 11: Observed sea turtle interactions for surface longline vessels based on observer records. All turtles were alive on capture and released.**

Common name	Scientific name	2009	2010	2011	2012	2013	2014	2015	2016	2017
Green turtle	<i>Chelonia mydas</i>	0	0	0	0	0	0	0	0	0
Leatherback turtle	<i>Dermochelys coriacea</i>	2	0	3	0	0	0	2	3	2
Loggerhead turtle	<i>Caretta caretta</i>	0	0	0	0	0	0	0	0	0
Olive ridley turtle	<i>Lepidochelys olivacea</i>	0	0	1	0	0	0	0	0	0
Unidentified		0	0	0	0	2	0	0	2	0
Total		2	0	4	0	2	0	2	5	2

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 four trips covered

in 2016 and 2017 is provided in Table 12 and levels of coverage are provided in Table 13. As the fishery is based on free schools of skipjack, bycatch is minimal.

The following interactions were reported in purse seine fisheries in 2017:

- ) Seven spine-tailed devil rays were captured and released alive, six of them were unharmed, and one was injured.
- ) No seabirds, marine mammals or turtles were reported caught
- ) No oceanic whitetip sharks, silky sharks, whale sharks or great white sharks were reported caught

**Table 12: Catch composition from four observed purse seine trips operating within New Zealand fisheries waters in 2016 and 2017.**

Common name	Scientific name	Observed catch weight (kg)	% of catch
Skipjack tuna	<i>Katsuwonus pelamis</i>	2 388 086	97.47
Jack mackerel	<i>Trachurus spp.</i>	50 571	2.06
Sunfish	<i>Mola mola</i>	4 325	0.18
Frigate tuna	<i>Auxis thazard</i>	2 591	0.11
Striped marlin	<i>Kajikia audax</i>	1 115	0.05
Albacore tuna	<i>Thunnus alalunga</i>	913	0.04
Spine-tailed devil ray	<i>Mobula japanica</i>	840	0.03
Frostfish	<i>Lepidopus caudatus</i>	416	0.02
Southern bluefin tuna	<i>Thunnus maccoyii</i>	280	0.01
Jellyfish		200	0.01
Mako shark	<i>Isurus oxyrinchus</i>	175	0.01
Thresher shark	<i>Alopias vulpinus</i>	130	0.01
Flying fish	<i>Exocoetidae</i>	73	<0.1
Jack mackerel	<i>Trachurus novaezelandiae</i>	50	<0.1
Blue mackerel	<i>Scomber australasicus</i>	44	<0.1
Stingray	<i>Dasyatididae</i>	32	<0.1
Discfish	<i>Diretmus argenteus</i>	30	<0.1
Bigeye tuna	<i>Thunnus obesus</i>	28	<0.1
Smooth skate	<i>Dipturus innominatus</i>	20	<0.1
Blue shark	<i>Prionace glauca</i>	15	<0.1
Pelagic ray	<i>Pteroplatytrygon violacea</i>	12	<0.1
Porcupine fish	<i>Allomycterus jaculiferus</i>	9	<0.1
School shark	<i>Galeorhinus galeus</i>	8	<0.1
Dolphinfish	<i>Coryphaena hippurus</i>	7	<0.1

Electric ray	<i>Torpedo fairchildi</i>	7	<0.1
Octopus		7	<0.1
Squid	<i>Teuthoidea</i>	7	<0.1
Barracouta	<i>Thyrsites atun</i>	5	<0.1
John Dory	<i>Zeus faber</i>	5	<0.1
Ling	<i>Genypterus blacodes</i>	5	<0.1
Saury	<i>Scomberesox saurus</i>	5	<0.1
Dealfish	<i>Trachipterus trachipterus</i>	3	<0.1
Flatfish		3	<0.1
Opah	<i>Lampris immaculatus</i>	3	<0.1
Skate		3	<0.1
Snapper	<i>Pagrus auratus</i>	3	<0.1
Kingfish	<i>Seriola lalandi</i>	2	<0.1
Tarakihi	<i>Nemadactylus macropterus</i>	2	<0.1
Starfish		2	<0.1
Unidentified		1	<0.1

**Table 13: Domestic purse seine sets observed as a percentage of sets made for 2005 to 2017.**

Calendar year	No. sets observed	% sets observed	% SKJ catch
2005	37	4.7	4.5
2006	104	17.6	35.5
2007	77	14.8	25.2
2008	118	27.6	57.3
2009	83	10.4	33.1
2010	109	8.8	15.3
2011	125	11.9	23.8
2012	113	9.5	19.7
2013	112	9.2	19.8
2014	95	18.2	15.2
2015	102	20.9	17.5
2016	80	25.2	25.9
2017	69	23.7	21.2

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 for 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, 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 undertaken 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 May 2014, the New Zealand albacore troll fishery had its third annual audit and was successfully re-certified. The domestic skipjack fishery was also successful in attaining MSC certification in 2017. New Zealand continues to advocate for and support work towards refining the limit reference point and adopting a target reference point for south Pacific albacore.

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 ENSO index. The future prospects for New Zealand are strongly dependent on good management of tuna resources in the WCPO, 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, with smaller proportions exported to Australia and United States. Troll caught albacore are sent to a variety of markets and in 2017 most was exported to Spain. In 2017 skipjack tuna caught by NZ vessels was exported to Thailand, Mauritius Seychelles and Thailand in almost equal proportions. The large purse seine vessels operating in the tropical Pacific unload or tranship their catch in a number of ports including Majuro, Noro, Suva and Pago Pago.

## **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.

The observer programme is administered by Observer Services Unit within the Ministry for Primary Industries and training courses for new recruits are run generally once or twice a year. The frequency is dependent on attrition of observers and the number of sea-days forecast for the coming fishing year. Observer training is largely aligned to fall within the New Zealand Qualifications Authority framework. Observer training encompasses shore-based training and at-sea assessment.

Prior to each trip observers receive comprehensive briefings along with relevant reference material prior to undertaking any at-sea observation of longline vessels. Observers are provided with an observer manual that includes: details of species identification, what to record for each species caught, biological sampling instructions, and details of operational data to record.

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. Data have been recorded on the stomach content information from 119,837 highly migratory fish (60,449 tuna; 8,597 billfish; 35,826 sharks and 14,965 other fish species).

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 (December – May). Over the duration of the programme over 96,000 albacore have been sampled for length and 10% 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 and has extended this programme to include other HMS taken in the longline fishery. For large HMS, fish processors often collect individual processed weight data as part of their operations. This programme is collating these individual fish records from the major processors. It is anticipated that it may be possible to collect individual weights for up to 90% of the catch of some species. Where necessary, these data will be supplemented with information from observers, e.g. conversion factors from length to processed weight and sex-structured data for swordfish.

### 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 and recent New Zealand research on tuna and tuna-related species include:

#### **Albacore**

Stock monitoring of albacore

Analysis of albacore CPUE from the commercial troll fishery

#### **All HMS and Bycatch**

Characterisation of New Zealand tuna fisheries

Commercial catch sampling programme for HMS

Gamefish tag recapture programme

#### **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 - trials of line weighting, hook pods and tori lines

#### **Environmental**

Data collection of demographic, distributional and trophic information on selected seabirds species to allow estimation of effects of fishing on population viability

DNA database for commercial marine fish and invertebrates

The impacts of climate variability on commercial fish abundance

Climate variability and long-term trends of relevance to NZ fisheries

Ocean acidification: plankton biodiversity & productivity of calcifiers in NZ ocean region

Continuous plankton recorder project: annual transects from East Coast South Island to Ross Sea

Estimation of bycatch and discards in deepwater and middle depth trawl fisheries, longline fisheries, and scampi fisheries

Ecological risk assessment of seamounts

Ecological Risk Assessment for New Zealand fishery interaction with seabirds and mammals

Estimation of protected species captures in longline fisheries using electronic monitoring.  
Estimation of the nature and extent of incidental captures of marine mammals in NZ fisheries  
Estimation of the nature and extent of incidental captures of seabirds in NZ fisheries.  
Estimation of the nature and extent of sea turtles captures in NZ fisheries  
Identification of marine mammals captured in NZ fisheries  
Modelling of impacts of fishing-related mortality on NZ seabird populations  
Modelling the effects of fishing on population viability of selected seabirds  
Evaluation of ecotrophic and environmental factors affecting the distribution and abundance of highly migratory species in New Zealand waters  
Determination of spatial and temporal movements and trophic linkages of HMS

### **Great white shark**

Electronic tagging of great white sharks

### **Blue Shark**

Post release survival estimation from longline fisheries

Indicator analyses of blue sharks

Age, growth and reproduction of blue sharks

### **Mako shark**

Electronic tagging of mako sharks

Indicator analyses of mako sharks

Age, growth and reproduction of mako sharks

### **Hammerhead shark**

Electronic tagging of hammerhead sharks

Stock dynamics of hammerhead sharks

### **Porbeagle shark**

Electronic tagging of porbeagle sharks

Indicator analyses of porbeagle sharks

Age, growth and reproduction of porbeagle sharks

### **Skipjack**

Evaluation of the distribution and abundance of skipjack tuna in New Zealand waters

### **Southern bluefin**

Catch-at-age of southern bluefin tuna

### **Striped Marlin**

Stock monitoring of striped marlin

Analysis of CPUE for striped marlin from the recreational fishery

### Manta rays

Post release survival experiments from purse seine nets

### Customary research

Rapid assessment of iwi fish utilisation

If you would like further details regarding any of these studies please contact John Annala ([John.Annala@mpi.govt.nz](mailto:John.Annala@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);
- ) 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.

These are described below with further details provided in Appendix 1.

#### *Catch and effort data*

Catch, fishing effort, operational data and vessel information are collected on logsheets provided by each permit holder to the Ministry for Primary Industries. Tuna fisheries generally use either a Catch Effort Landing Return (CELR) or a Tuna Longline Catch Effort Return (TLCER). CELR forms are completed for each day of fishing for various gear types (e.g. handline, troll, purse seine and some longline) while TLCER forms are used only for surface longlining for tunas, and are filled out for each set. The forms are submitted monthly by the 15<sup>th</sup> of following month and the data are captured and stored on an electronic database.

Tuna landings data are compiled from the Licensed Fish Receiver Returns (LFRR) filed monthly by each Licensed Fish Receiver and Monthly Harvest Returns (MHR) filed by the fishing permit holder. Additional information on catch composition, length and weight, sex ratio, discard and loss rate of fish, are collected by staff from the Ministry for Primary Industries Observer Programme.

Tuna fisheries catch and effort data have been collected by the Ministry for Primary Industries and its predecessor since at least 1976. CELR and TLCER data are available beginning with the third quarter of 1989 (start of the 1989–90 fishing year).

#### *Monthly harvest return data*

Monthly Harvest Returns (MHR) provide a record of the total catch (monthly harvest) taken by each fisher (permit holder), by fishstock for each calendar month. If there is no catch taken in a month then a nil return is required. The forms are submitted monthly by the 15<sup>th</sup> of the following month. These data have been collected on these forms since October 2001. Prior to 2001 similar data (but for quota species only) are available from the Quota Monitoring Returns (QMR) system.

#### *Licensed fish receiver data*

All New Zealand Licensed Fish Receivers are required to submit monthly returns (LFRRs). These returns record the quantity of each species the LFR has received from each source (permit holder) for each month. The LFRR data set provides complete coverage of all species that are landed legally in New Zealand, with some minor exceptions. Licensed Fish Receivers must submit a return within 15 days after the last day of the calendar month. If no fish have been received in a month then a nil return is required. Both QMS and non-QMS species are reported in this system. Fish that are not landed to a Licensed Fish Receiver (such as fish that are discarded or sold to the public at the wharf) are not reported through this system. Discarded fish & wharf sale fish are recorded on the landing section of a Catch Effort Landing Return or on a Catch Landing Return.

These data have been collected on these forms since January 1986.

#### *Out of the New Zealand EEZ purse seine data*

The large purse seine vessels fishing on the high seas and the zones of other countries typically fill in the regional purse seine catch effort form, or the variant used in the country in which they are fishing. When fishing in other zones, logsheets are submitted to the coastal state, who then submits them to SPC. The Ministry for Primary Industries also receives a copy from the vessel and these data are currently maintained within a database managed by the National Institute of Water and Atmospheric Research (NIWA). Each year, New Zealand coordinates with SPC to ensure that they have copies of all logsheets filled during the year.

#### *Non-fish bycatch data*

Since 2008 fishers have been required to complete a non-fish protected species bycatch reporting form to record any interactions with non-fish bycatch. Fishers are required to record incidental catches of seabirds, marine mammals, marine reptiles, corals, sponges, bryozoans, and fish species that are protected under the Wildlife Act 1953.

The form is linked to the catch effort return so that fishers do not need to duplicate information already reported. Fishers are required to report to the species level if they are able to identify the incidental catch, but if not generic group codes are permitted. Corals, sponges and bryozoans are reported by estimated weight and all other species are reported by number of individuals. The count of individuals includes whether the animals were alive and uninjured, alive and injured, or dead. Definitions of what "injured" means are provided. The Ministry for Primary Industries has prepared a species identification guide that has been distributed to fishers to assist them in their reporting obligations.

Completion of the form is a requirement under the Fisheries (Reporting) Regulations 2001. Fishers are required to use these forms to report, they must do so by a due date and may be penalised for misreporting.

Purse seine operators have agreed to apply purse seine provisions of FAO guidelines with respect to sea turtle handling and mitigation and the provisions of CMM 2008-03 by way of a code of practice. There are also requirements in their High Seas permits that they must follow to avoid turtle bycatch and support survival of incidentally caught turtles.

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

As noted above, 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 coverage rate for the longline fishery is 10% of effort, which should reflect approximately 10% of the HMS catch. Since the Japanese charter vessels ceased operating in New Zealand waters after 2015, observer coverage of the domestic fleet has stabilized at about 15% of the reported effort.

**Table 14: Hooks observed from the New Zealand longline fishery as a percentage of hooks set.**

Calendar year	Domestic	Charter (Japanese)	Charter (Aust.)	Total
2004	2.4	90.8		21.6
2005	4.8	88.1		18.7
2006	3.2	88.7	83.0	18.0
2007	7.0	54.7	25.3	25.2
2008	9.2	44.7		18.2
2009	7.2	81.3		26.0
2010	6.9	80.9		18.7
2011	6.2	73.5		17.1
2012	5.9	84.1		20.0
2013	3.8	78.0		16.9
2014	6.9	83.5		27.0
2015	6.9	80.8		25.9
2016	14.1	NA		14.1
2017	15.7	NA		15.7

The shore-based port sampling programme includes the primary species taken in longline fisheries (e.g. bigeye and yellowfin tuna and southern and Pacific bluefin tunas). The sampling programme obtained individual processed weights for 76%, 84%, and 77% of the total landed catch in 2017 of swordfish, bigeye tuna and yellowfin tuna respectively (Table 15). The number of striped marlin caught by fleet are presented in Table 16. Over half are released alive according to observer records in commercial vessels and historical tag and release rates on sport fishing vessels.

New Zealand vessels mostly offload their catch of tunas in port but a small number of landings are transhipped in port (Table 17).

**Table 15: Number and percent of swordfish and large tunas sampled for individual processed weights for calendar years 2016 and 2017.**

Calendar Year	Numbers of fish sampled			Percentage of catch		
	Swordfish	Bigeye tuna	Yellowfin tuna	Swordfish	Bigeye tuna	Yellowfin tuna
2016	6521	3377	1174	75.6	93.5	83.1
2017	4243	1552	201	76.3	84.4	76.7

**Table 16: Commercial landings and discards (both are numbers of fish) of striped marlin in the New Zealand EEZ reported by fishing nation (CELRs and TLCERs), and number of fish landed and tagged by the recreational fleet, by fishing year.**

Fishing Year	Japan	Japan	Korea	Philippine	Domestic	<u>NZ Recreational</u>		Total
	Landed	Discarded	Landed	Discarded	Discarded	Landed	Tagged	
2000-01					527	422	851	1 800
2001-02					225	430	771	1 426
2002-03		3		7	205	495	671	1 371
2003-04		1			423	592	1 051	2 066
2004-05					258	834	1 348	2 440
2005-06					168	630	923	1 721
2006-07					154	688	964	1 806
2007-08		1			208	485	806	1 499
2008-09		1			241	731	1 058	2 030
2009-10					195	607	858	1 660
2010-11					269	607	725	1 601
2011-12					241	635	655	1 531
2012-13		1			227	730	745	1 703
2013-14					202	620	478	1 300
2014-15					371	696	953	2 020
2015-16					550	900	1 530	2 980
2016-17					261	516	454	1 260

**Table 17: Transhipment Information for New Zealand vessels for 2017.**

<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>Caught Inside / Outside Convention area</b>	<b>Product form</b>	<b>Fishing gear</b>
Skipjack tuna (SKJ)	852	In Port	Inside	Inside	Frozen Whole	Purse Seine
Yellowfin tuna (YFN)	60	In Port	Inside	Inside	Frozen Whole	Purse Seine
Bigeye tuna (BET)	21	In Port	Inside	Inside	Frozen Whole	Purse Seine

<b>Species</b>	<b>Offloaded - Number of Transhipments</b>	<b>Transhipped In Port, national Jurisdiction, etc</b>	<b>Transhipped Inside/Outside Convention area</b>	<b>Caught Inside/Outside Convention area</b>	<b>Fishing gear</b>
Skipjack tuna (SKJ)	1*	In Port	Inside	Inside	Purse Seine
Yellowfin tuna (YFN)	1*	In Port	Inside	Inside	Purse Seine
Bigeye tuna (BET)	1*	In Port	Inside	Inside	Purse Seine

\* split between two vessels

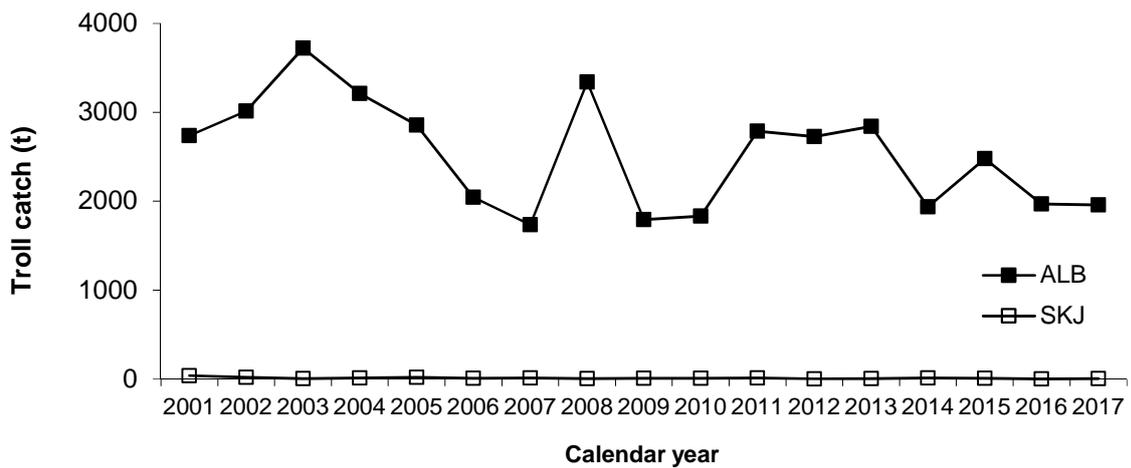
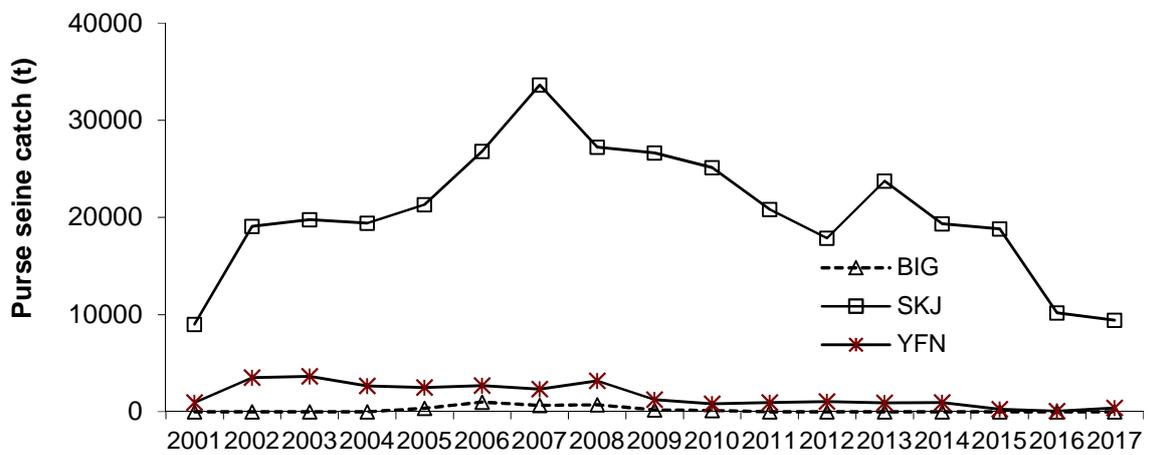
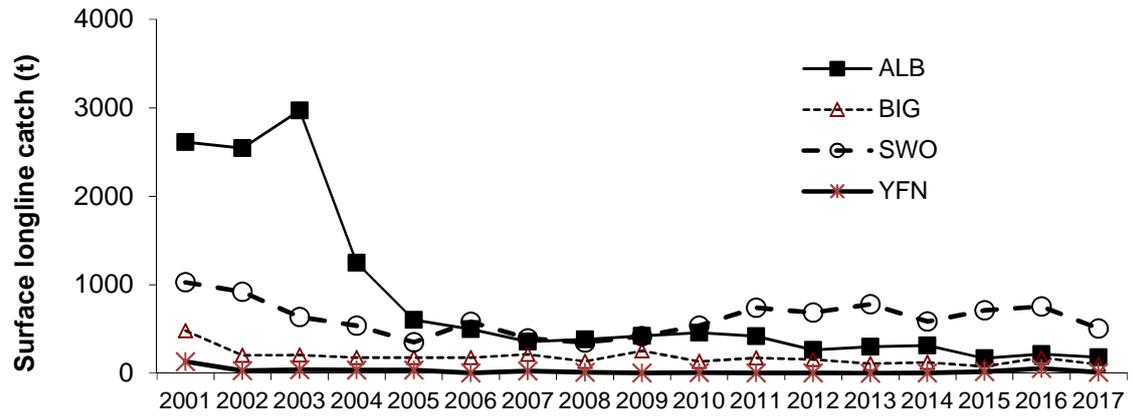
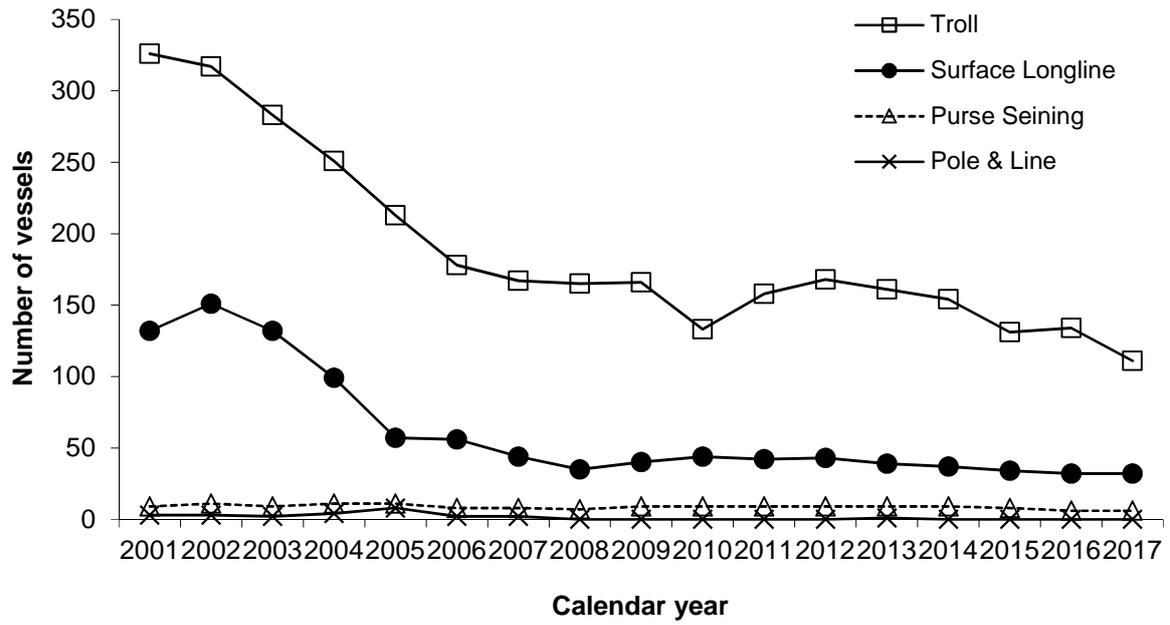
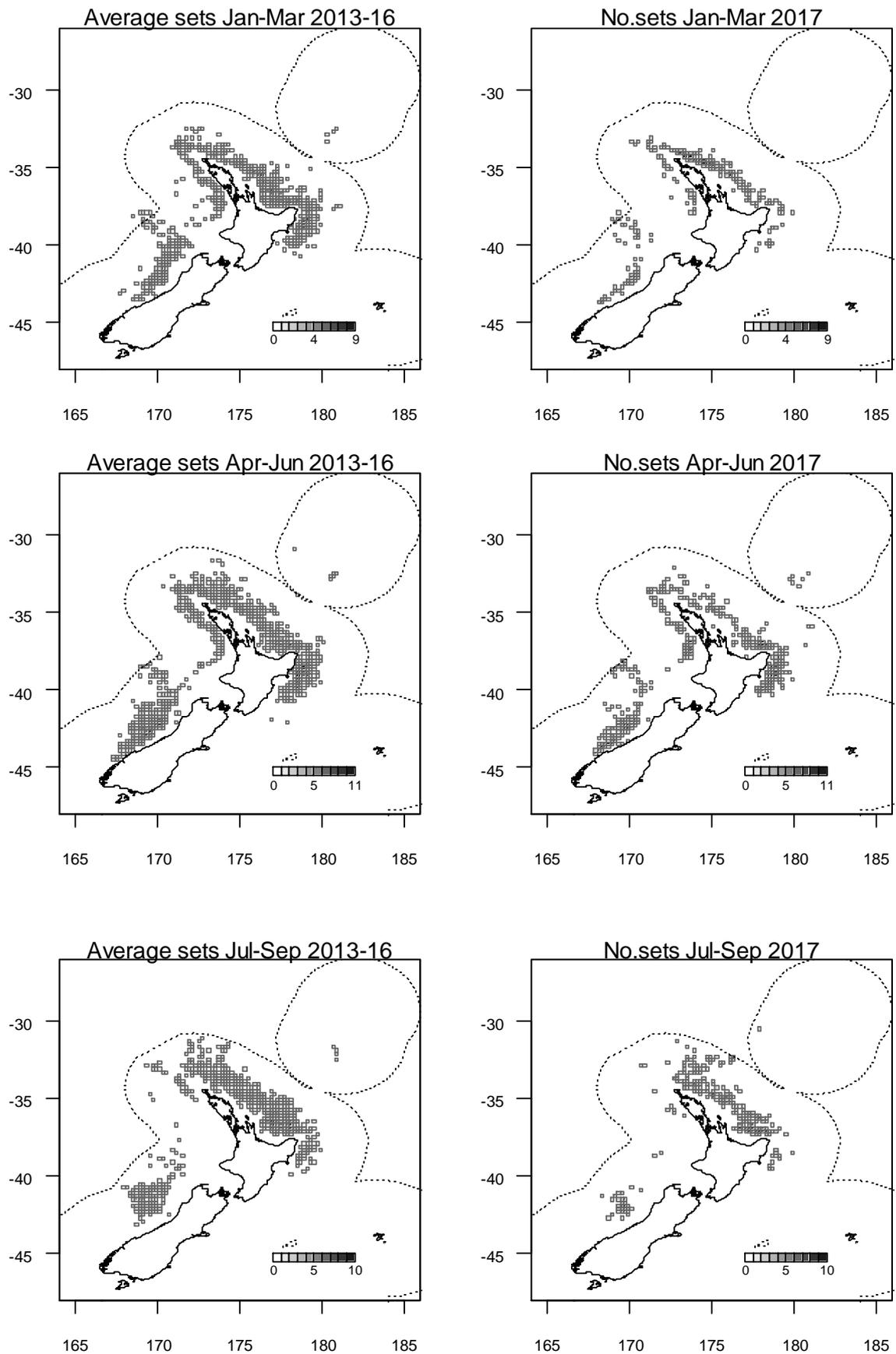


Figure 1: Historical catch (t) by gear and main species for the New Zealand longline, purse-seine and troll fleets operating in the WCPFC Convention area.



**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. 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 2013-2016 (average) and 2017 (actual).**

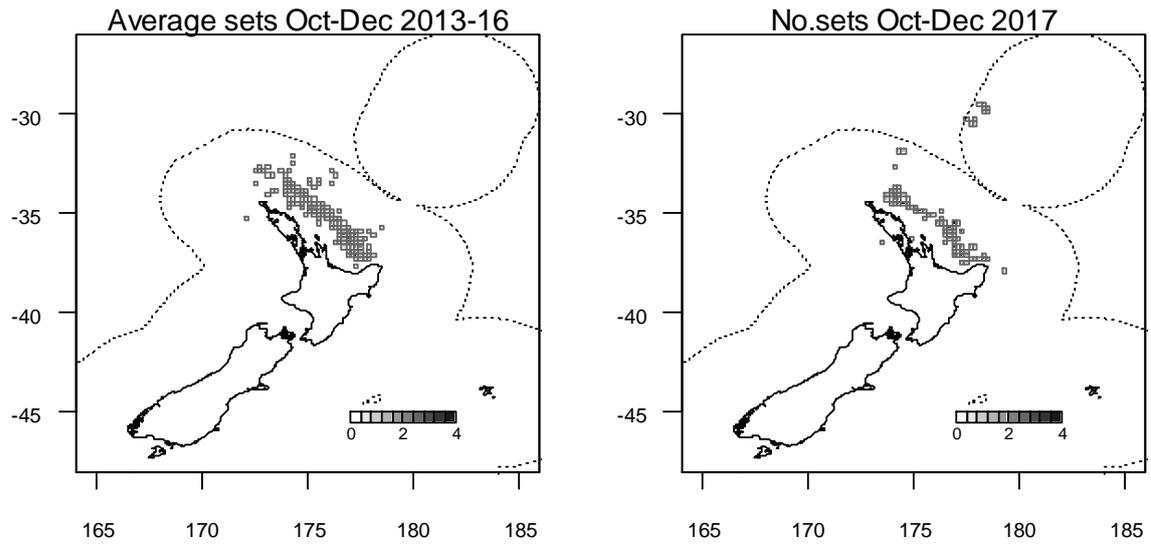


Figure 3 (continued): Distribution of effort (number of sets per 1/5 degree square) for the domestic longline fleet by quarter-year for 2013-2016 (average) and 2017 (actual).

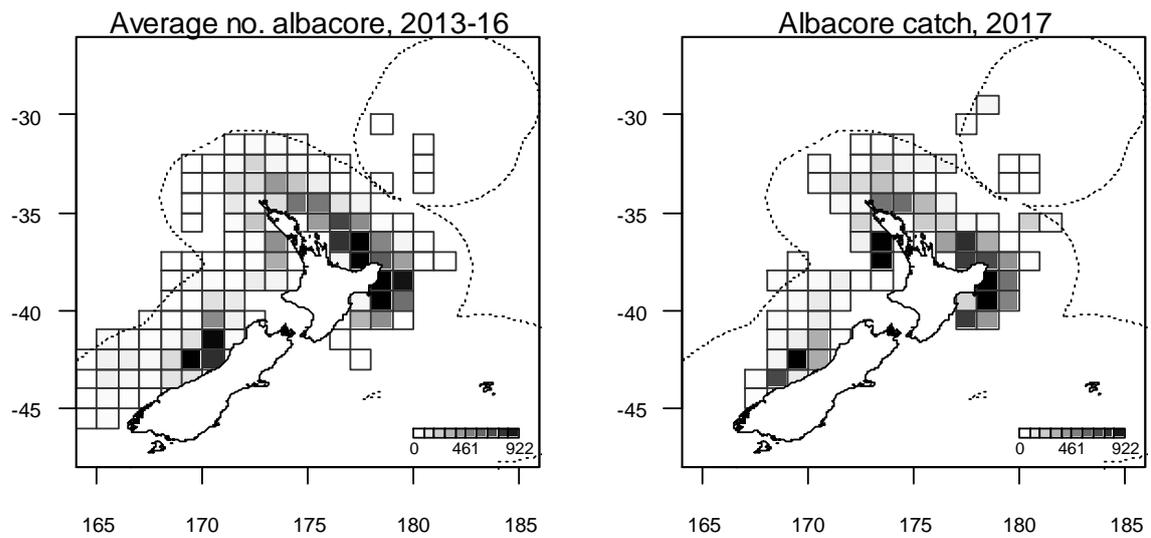
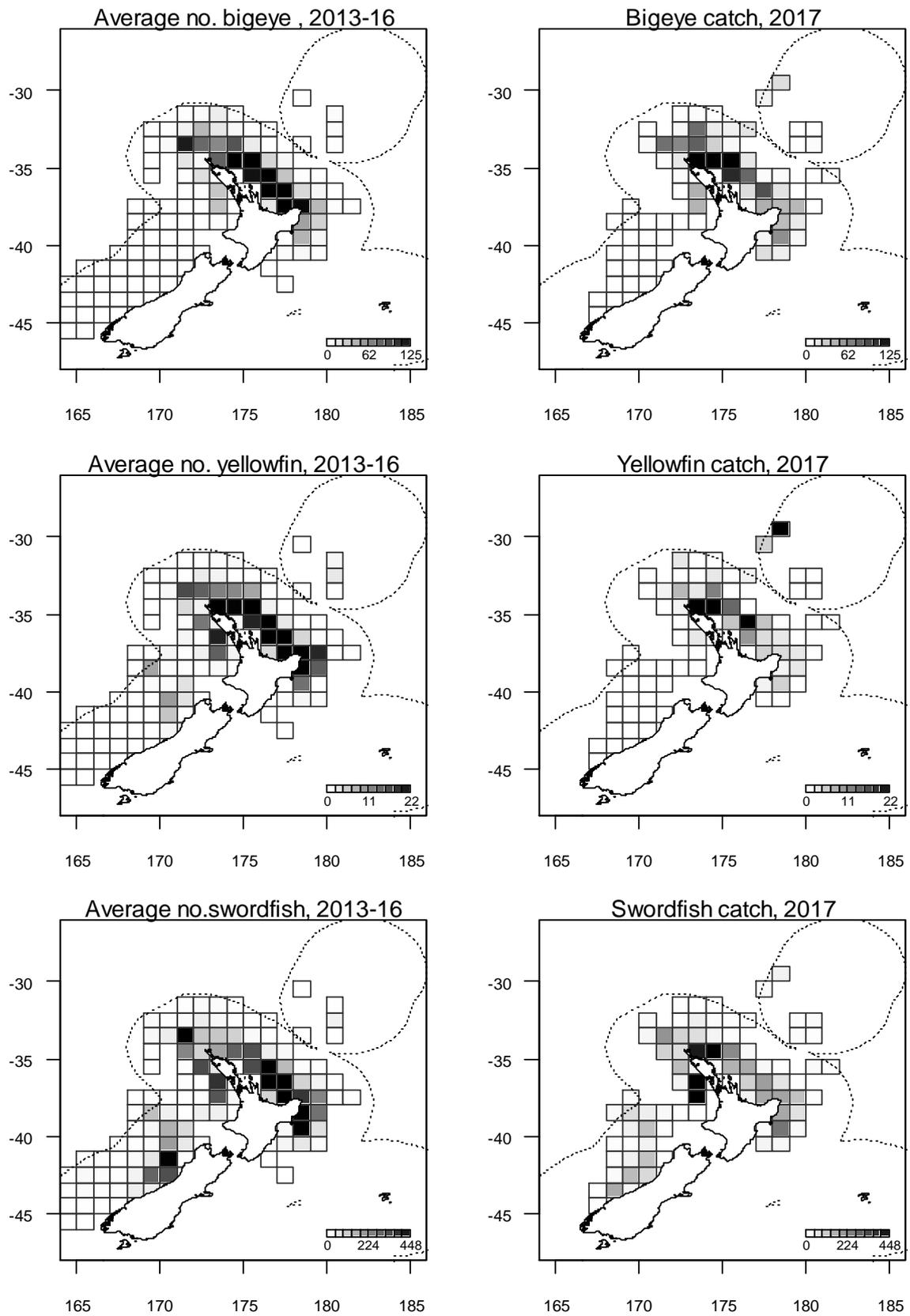
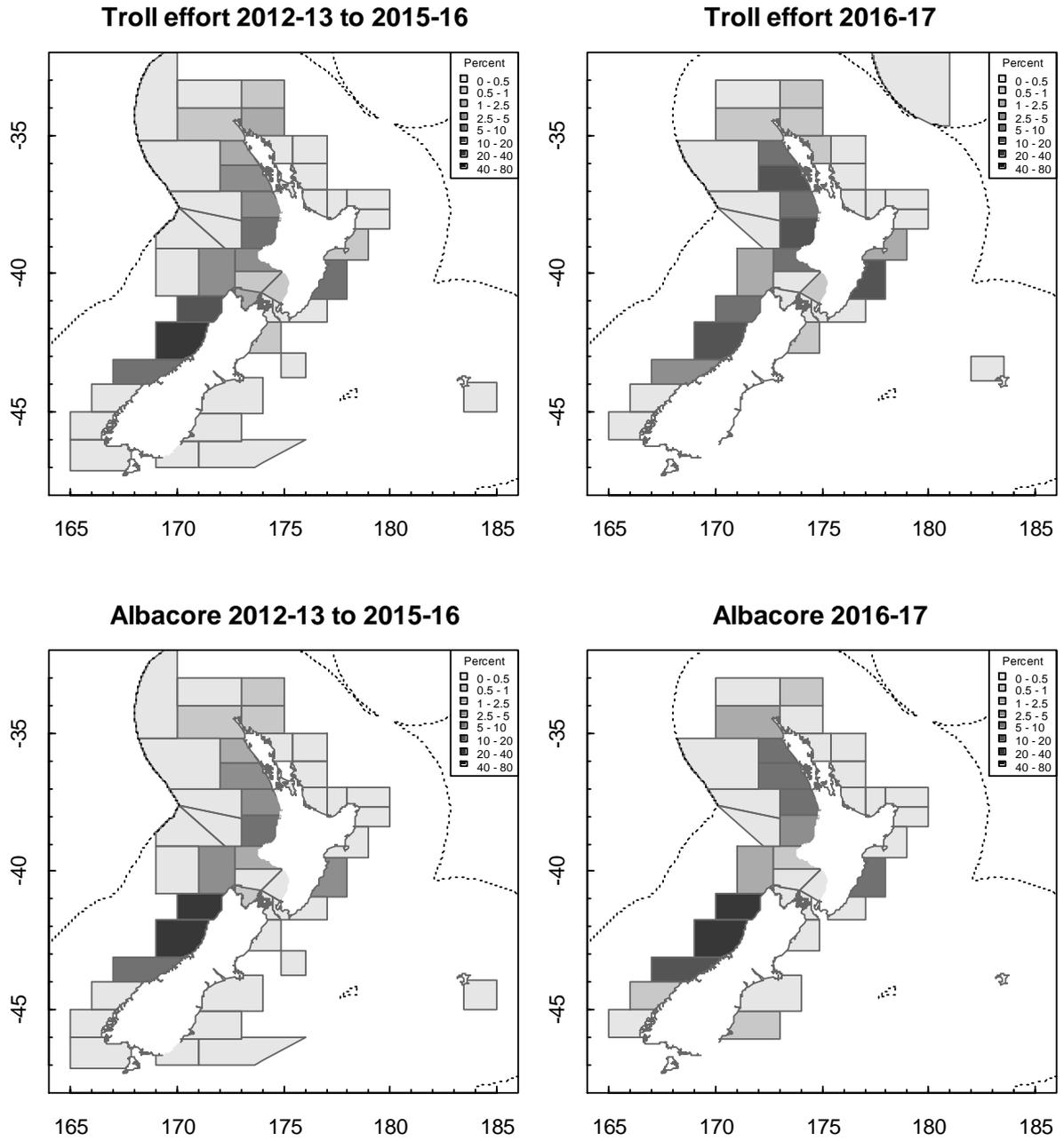


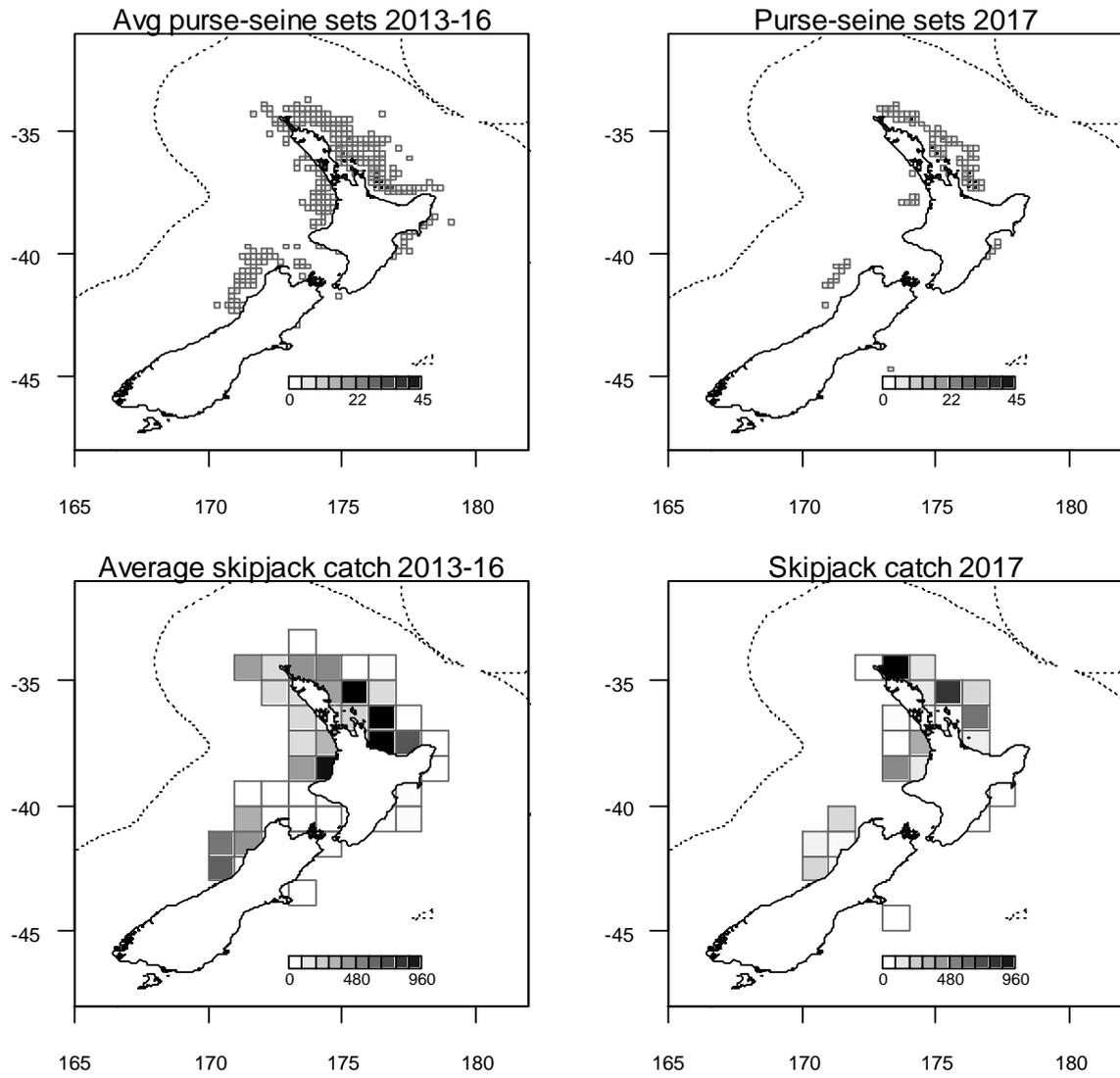
Figure 4: Distribution of longline catch (number of fish in 1 degree squares) for albacore, bigeye, and yellowfin tunas, and swordfish for 2013 to 2016 (average), and for 2017 (actual). All months and all vessels combined.



**Figure 4 (continued):** Distribution of longline catch (number of fish in 1 degree squares) for albacore, bigeye, and yellowfin tunas, and swordfish for 2013 to 2016 (average), and for 2017 (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 2012-13 to 2015-16 troll seasons (left) and for 2016-17 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 2013-16 calendar years (left) and actual for 2017 (right).**

**Appendix 1: Description of the types of catch, effort, and size data that are available for HMS species (source: Ministry for Primary Industries Catch Effort reference library version 2, August 2003).**

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>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>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 accurate as the conversion. The whole weights of</p>

			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) March 1989 onwards (charter vessels) March 1991 onwards (domestic vessels)	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.  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.
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.  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, and trolling vessels)	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, January 2006 onwards for Purse Seine & January 2007 for trolling vessels	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 information is available than is available from the commercial catch forms completed by fishers.