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PART 1: INFORMATION ON FISHERIES, RESEARCH, AND STATISTICS

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NEW ZEALAND

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Annual report
Part 1
Information on fisheries, statistics and research

Ministry of Fisheries
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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 2010	**YES**
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Abstract

Since 2002, skipjack (23,622 t in 2010), which is nearly all taken by purse seine, has comprised the greatest part of the New Zealand catch of all tuna species, both within and beyond New Zealand fisheries waters. Yellowfin (770 t in 2010) makes up most of the balance, and is mostly taken outside New Zealand waters. Yellowfin are rarely part of the purse seine catch within New Zealand fisheries waters because the domestic purse-seine fishery targets only on free schools of skipjack. The second most important component of New Zealand's domestic fisheries is albacore (2,290t) 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. Almost 143t of striped marlin are caught annually by the recreational fleet, with 80t tagged and released and 63t retained. Most highly migratory species caught in New Zealand waters are exported; the destination of exports varies depending on the species.

New Zealand has four Class-6 purse seiners fishing offshore in the EEZs of Pacific Island States and in high seas areas of the equatorial western and central Pacific Ocean (WCPO). These vessels have also fished domestically from time to time along with up to seven smaller capacity domestic-based purse seiners. The number of purse-seiners has declined from 11 vessels in 2005 to 7 vessels in 2010. The New Zealand longline tuna fleet consists of domestically owned and operated vessels (mostly between 15 to 25 m in length) and a limited number of foreign owned vessels that operate under charter. The number of longline vessels operating in New Zealand has declined from 151 vessels in 2002 to 44 in 2010.

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 their lowest levels in 2008, but there has been some subsequent increase.

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^{o}S must use two mitigation measures as specified in CMM 2007-04. New Zealand longline vessels have been provided with turtle dehooking and mitigation equipment. As the purse seine fishery in New Zealand fishery waters is based on free schools of skipjack, bycatch is minimal (e.g. 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 2010, 19% of the longline effort (hooks) was observed, and almost 9% of the New Zealand purse seine sets were observed, in addition seven troll trips 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 of Fisheries. 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 by species taken within and beyond New Zealand fisheries waters is summarised in Table 1 and catch by gear type for 2010 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 is exclusively targeted on 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. More than 96% of longline caught albacore in each year is bycatch. Some longline effort is targeted at albacore in each year, but has accounted for between 0.2% (in 2008) and 3.7% (in 2006) of catch by weight since 2006. 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.

Although longlining has mostly targeted bigeye, southern bluefin and more recently 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 landed for sale when taken within New Zealand fisheries waters.

New Zealand is on the margins of yellowfin distribution and therefore will be impacted by range contraction associated with stock decline. Yellowfin tuna catches in New Zealand have declined continuously since the late 1990s in both commercial and recreational fisheries, this trend is a great concern to New Zealand.

Over 178 t of striped marlin were caught in 2009 in the recreational fishery, with well over half the fish tagged and released. Most world records for striped marlin are for fish caught in New Zealand. A recreational fishery for Pacific bluefin tuna has also recently developed, and preliminary estimates of landings are in excess of 10t per year, along with an estimated 22-36t of fish being tagged and released. Tagging data indicates good survival rates for tagged fish. Several world records have been claimed in this fishery.

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

1.1.2 Number of vessels by gear type, size

Approximately 170 domestically owned and operated vessels (mostly 15 to 25 m) make up the main part of the domestic commercial New Zealand tuna fishing fleet. These vessels fish using troll or longline gear, with some switching between gear types seasonally or operating for part of the year in non-tuna fisheries (Table 4). 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.

There has been a significant reduction in the New Zealand tuna fleet since 2001 (Figure 2). Most of the reduction has occurred in vessels smaller than 50 GRT, although some reduction is also seen in larger vessels.

Four New Zealand flagged Class-6 purse seiners (vessels with over 4256t combined hold capacity) have fished in the EEZs of Pacific Island States and on the high seas of the equatorial western and central Pacific Ocean (WCPO) since 2000. Two of these vessels have traditionally also fished 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 5 vessels by 2009.

There has been no foreign licensed access for tuna longline fishing in New Zealand fisheries waters since 1995 and only vessels operated by New Zealand companies have fished using longlines in New Zealand fisheries waters since that time. The only foreign licences issued since 1995 for fishing in New Zealand fisheries waters have been to US purse vessel operating under the Multilateral Treaty between the Government of the United States of America and the Governments of certain Pacific Island Countries (commonly referred to as the US Tuna Treaty).

A small fleet of foreign owned longline vessels on charter to New Zealand fishing companies have operated in New Zealand fisheries waters since the late 1980s. These longliners targeted southern bluefin tuna, although a mixed bag of species including other tunas and swordfish are landed. On one occasion two vessels were chartered to target albacore tuna. In 2006, three Australian flagged vessels entered the longline fishery under charter arrangements, targeting bigeye tuna and swordfish.

Table 1: Estimated whole weight (t) of tuna and swordfish landed by New Zealand flagged vessels active in the WCPFC Convention Area, for years 2006 to 2010 (0 refers to catches < 500 kg). NZFW refers to catches within New Zealand fishery waters (200nm of the coastline), and ET refers to catches outside this area. The 2010 figures are preliminary. Note: the estimates presented in this Table may differ from those estimated by the SPC (WCPFC-2008-IP-11 rev2) due to differences in the estimation procedures used for the purse seine catch.

		Calendar year				
		2006	**2007**	**2008**	**2009**	**2010**
Albacore	NZFW	2541	2092	3720	2216	2290
Thunnus alalunga	ET	1	0	0	100	0
	Total	2542	2092	3720	2316	2290
Bigeye	NZFW	178	213	133	254	131
Thunnus obesus	ET*	997	651	713	204	131
	Total	1175	864	846	458	262
Pacific bluefin	NZFW	21	14	14	16	14
Thunnus orientalis	ET	0	0	0	0	0
	Total	21	14	14	16	14
Skipjack	NZFW	7247	11392	10033	4685	8629
Katsuwonus pelamis	ET	19588	22266	17204	21991	14994
	Total	26835	33659	27237	26676	23622
Swordfish	NZFW	571	392	346	418	535
Xiphias gladius	ET	10	0	0	0	0
	Total	581	392	346	418	535
Yellowfin	NZFW	14	25	12	3	6
Thunnus albacares	ET*	2679	2329	3200	1264	765
	Total	2693	2355	3213	1267	770

* The ET estimates for yellowfin tuna 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 2010 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%.

2010	Longline	Troll	Handline	Pole & Line	Purse seine
Albacore	20	80	<1	0	<1
Bigeye tuna	50	<1	0	0	50
Skipjack tuna	0	<1	<1	0	100
Swordfish	100	0	0	0	0
Yellowfin tuna	1	<1	0	0	99

Table 3: Catch of South Pacific Albacore in tonnes, and in thousands of fish, by New Zealand vessels south of 20°S, using surface longline, troll, or purse seine gear; 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 2006–2010 (note that some vessels will be included in both totals).

	ALB (tonnes)			ALB (000's fish)			Number of vessels	
Year	Target	Bycatch	Total	Target	Bycatch	Total	Target	Bycatch
2006	2 181	360	2 541	395	38	434	182	25
2007	1 838	254	2 092	353	29	382	135	32
2008	3 399	321	3 720	739	34	773	166	23
2009	1 857	359	2 216	364	39	403	162	25
2010	1 883	407	2 290	354	44	398	125	23

1.1.3 Fishing patterns

This section describes spatial/temporal trends in catch and effort in each New Zealand tuna fishery (including ET fisheries). Longline effort for the domestic longline fleet by quarter is presented in Figure 3 and total effort in terms of hooks fished by the traditional target species is provided in Table 5. The catch of swordfish, and number of vessels involved in that fishery are given for each fleet in Table 6.

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 tip 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 lead 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 variance and the distribution of catch and effort is almost identical (Figure 5).

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

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 2006 to 2010**.

	Calendar	Total no.	Vessels size range (GRT)			
Fishing Method	**Year**	**vessels**	**0 – 50**	**51 - 200**	**201 - 500**	**500+**
Surface Longline	2006	56	30	24	2	0
	2007	44	19	21	3	1
	2008	35	16	15	3	1
	2009	40	19	17	3	1
	2010	44	22	18	3	1
Purse Seining			**0 – 500**	**501-1000**	**1001 - 1500**	**1501+**
	2006	8	7	0	1	0
	2007	8	6	0	1	1
	2008	7	6	0	1	3
	2009	7	5	0	1	3
	2010	7	5	0	1	3
Pole & Line			**0-50**	**51-150**		
	2006	2	1	1		
	2007	0	2	0		
	2008	0	0	0		
	2009	0	0	0		
	2010	0	0	0		
Troll			**0 – 50**	**51 - 200**		
	2006	178	157	21		
	2007	167	117	19		
	2008	165	143	24		
	2009	166	143	23		
	2010	136	115	21		
Troll season			**0 – 50**	**51 - 200**		
	2005-06	182	157	25		
	2006-07	134	115	19		
	2007-08	154	135	19		
	2008-09	161	141	20		
	2009-10	122	103	19		

Table 5: **Annual longline effort (000s of hooks) by target species. The category other includes Pacific bluefin, yellowfin tuna, and swordfish (able to be targeted since 2005/06). 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 tunas simultaneously**.

Year	Southern bluefin	Bigeye	Albacore	Other	Total
2006	1495	1814	60	324	3693
2007	1939	1525	14	212	3690
2008	1105	989	1	162	2256
2009	1484	1658	8	60	3199
2010	1584	1224	20	169	2997

Table 6: The total number of vessels that fished for swordfish (by surface longline), and the total catch of swordfish for the domestic and charter fleets in New Zealand EEZ by calendar year.

	NZ-flagged vessels south of 20°S		Chartered vessels		Other vessels fishing within the CCM's waters south of 20°S		
Year	Catch (tonnes)	Vessel numbers	Catch (tonnes)	Vessel numbers	Flag	Catch (tonnes)	Vessel numbers
2000	935.2	103	39.3	4		NA	
2001	704.6	130	12.2	4		NA	
2002	610.5	149	7.4	4		NA	
2003	433.3	127	12.7	6		NA	
2004	371.7	95	7.0	4		NA	
2005	234.2	55	7.1	2		NA	
2006	413.4	52	16.5	3		NA	
2007	236.5	38	40.4	6		NA	
2008	252.7	31	2.2	4		NA	
2009	313.2	36	4.0	4		NA	
2010	396.2	40	0.7	4		NA	

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 information. Here we provide data on major bycatch species including "key shark species" from CMM2009-04 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 New Zealand Quota Management System (QMS). Blue shark is the most common bycatch species retained followed by Ray's Bream (Table 7). In recent years bycatch levels have been relatively stable.

Table 7: **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 and for some species may include catches from non-tuna fisheries**.

Species	Scientific name	2007	2008	2009	2010
Blue shark	*Prionace glauca*	782	697	810	712
Mako shark	*Isurus oxyrinchus*	76	72	82	66
Moonfish	*Lampris guttatus*	78	45	89	111
Porbeagle shark	*Lamna nasus*	53	43	65	62
Ray's bream	*Brama brama*	153	160	175	118

It is also possible to estimate bycatch from the longline fishery using observer records. While this is important for estimating catches of the less valuable 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 discards are provided in Table 8.

Table 8: Estimated catch (numbers of fish) of common bycatch species in the New Zealand longline fishery as estimated from observer data in 2007 to 2010. Also provided for 2010 only is the percentage of these species retained and the percentage of non-retained fish that were alive when caught, N/A (none discarded).

Species	**2007**	**2008**	**2009**	**2010**	% retained (2010)	% alive (2010)
Blue shark	53727	42454	53869	66113	52.9	90.9
Lancetfish	23234	12002	25416	43425	0.0	13.2
Rays bream	28992	10690	17503	20041	98.7	94.3
Moonfish	3919	1659	4911	5398	97.5	76.1
Porbeagle shark	2804	3966	4244	4679	50.4	55.7
Mako shark	3848	2740	4592	4490	25.2	77.7
Sunfish	3346	2543	5143	3148	0.0	99.4
Pelagic stingray	2216	2090	3185	1983	0.0	99.0
Escolar	2347	2560	2461	1539	88.9	73.2
Dealfish	1154	429	773	1160	0.0	49.6
Butterfly tuna	849	490	994	1158	76.3	19.1
Oilfish	1245	452	890	886	85.9	88.9
Big scale pomfret	3090	1204	548	505	42.5	90.5
Striped marlin	234	93	142	471	0.0	72.7
Deepwater dogfish	1137	559	571	377	0.0	93.0
Rudderfish	1399	239	304	326	38.3	76.7
Thresher shark	335	248	138	209	28.6	68.4
Skipjack tuna	260	106	231	91	100.0	20.0
School shark	454	27	232	62	100.0	64.5

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 discarded if alive (e.g. moonfish, blue shark, and porbeagle shark). The species listed in this last group are subject to the QMS. While there is a general rule prohibiting the discarding of quota species, in the case of Highly Migratory sharks subject to the QMS, specific provision has been made to allow for the discarding of these species subject to the condition that they are alive and likely to survive release. This provision provides for the release of juvenile shark as provided for in CMM2009-04.

Seabirds are sometimes caught in longline fisheries, both during setting and hauling. Scaled estimates based on observer coverage are highly uncertain. Observed and estimated captures are shown in Figure 7. 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^{o}S must use two mitigation measures, as specified in CMM 2007-04.

Since 2001 only 17 sea turtles have been reported by fishers and observers within New Zealand fisheries waters (Table 9). Of these, 13 were leatherback turtles, one was a loggerhead turtle, two were reported as green turtles, and one was unidentified.

Overall, sea turtle interactions are very rare in the New Zealand longline fishery. Sea turtles interactions have occurred throughout the year with a slight increase observed during the austral summer (November to March). All but one of the turtles were released alive. The only observed turtle mortality (2001) that occurred in New Zealand fisheries waters in the past 9 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 9: **Observed sea turtle interactions for surface longline vessels based on fisher and observer records. All turtles, except for one green turtle caught in 2001, were alive on capture and released.**

Species	Scientific name	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Green turtle	*Chelonia mydas*	1				1					
Leatherback turtle	*Dermochelys coriacea*	2	1		1	2	3	1	1	2	
Loggerhead turtle	*Caretta caretta*		1								
Unidentified		1									
Total		4	2	0	1	3	3	1	1	2	0

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 eight trips covered in 2009 and 2010 is provided in Table 10 and levels of coverage are provided in Table 11. As the fishery is based on free schools of skipjack, bycatch is minimal. No interactions with non-fish bycatch (e.g. seabirds, turtles, and marine mammals) were observed or reported.

Table 10: **Catch composition from eight observed purse seine trips operating within New Zealand fisheries waters in 2009 and 2010.**

		2009 & 2010	
Common name	Scientific name	Observed catch weight (kg)	% Catch
Skipjack tuna	*Katsuwonus pelamis*	2,318,068	99.18
Jack mackerel	*Trachurus novaezelandiae*	7,030	0.30
Blue mackerel	*Scomber australasicus*	2,862	0.12
Jack mackerel	*Trachurus* spp.	2,120	0.09
Sunfish	*Mola mola*	1,775	0.08
Manta rays and devil rays	*Mobula* spp.	1,355	0.06
Jellyfish	Scyphozoa	845	0.04
Striped marlin	*Tetrapturus audax*	790	0.03
Manta ray	*Mobula japanica*	752	0.03
Mako shark	*Isurus oxyrinchus*	310	0.01
Albacore tuna	*Thunnus alalunga*	303	0.01
Porcupine fish	*Tragulichthys jaculiferus*	291	0.01
Flying fish	Exocoetidae	205	0.01
Frostfish	*Lepidopus caudatus*	95	<0.01
Hammerhead shark	*Sphyrna zygaena*	80	<0.01
Salps	Thaliacea	54	<0.01
Barracouta	*Thyrsites atun*	42	<0.01
Frigate tuna	*Auxis thazard*	42	<0.01
Blue shark	*Prionace glauca*	40	<0.01
Jack mackerel	*Trachurus declivis*	40	<0.01
Electric ray	*Torpedo fairchildi*	31	<0.01
Arrow Squid	*Nototodarus sloanii & n gouldi*	25	<0.01
Slender tuna	*Allothunnus fallai*	20	<0.01
Pilot fish	*Naucrates ductor*	5	<0.01
Porbeagle shark	*Lamna nasus*	5	<0.01
Smooth skate	*Dipturus innominatus*	5	<0.01
Rays bream	*Brama brama*	2	<0.01
Rudderfish	*Centrolophus niger*	2	<0.01
Saury	Scomberesox saurus	2	<0.01
Dolphinfish	*Coryphaena hippurus*	1	<0.01
John dory	Zeus faber	1	<0.01
White warehou	*Seriolella caerulea*	1	<0.01

Table 11: **Domestic purse seine sets observed as a percentage of sets made for 2005 to 2010.**

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	83	8.6	11.8

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. 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 rapid expansion particularly in the late 1990s through to 2000 arose because tuna fisheries were among the few open access fisheries in New Zealand at that time. It is also likely to have been encouraged due to the potential for claiming an allowance of quota on the basis of fishing history when tuna species entered the Quota Management System (QMS). As expected, the number of longline vessels targeting tuna declined following Government decisions on catch history years for several important target species in the longline fishery.

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. Southern bluefin tuna was also bought into the QMS in 2004, with a catch limit that applies to catch by New Zealand flagged vessels regardless of where they fish.

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 uneconomic quota amounts for the species. Some responded 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, increasing fuel costs and a static market value for fish product.

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 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 (including albacore) are mostly exported "chilled" to Japan, with a smaller proportion exported to Australia and the United States. Troll caught albacore are sent to a variety of markets and in the most recent year most was exported to Spain. In 2010 almost 60% of our skipjack was exported to Iran with the majority of the remainder exported to Thailand and smaller amounts to Mexico and Tunisia. 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 Observer Programme was provided to the Commission in June, 2009, as part of the accreditation process for the Regional Observer Programme.

The Observer Programme is administered by Observer Services within the Ministry of Fisheries, 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. All observer training is being aligned to fall within the New Zealand Qualifications Authority framework and completion of shore-based training, along with some at-sea assessment, results in an internationally recognised qualification.

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.

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. We have recorded the stomach content information from 84,298 highly migratory fish (38,498 tuna; 5,049 billfish; 26,317 sharks and 14,434 other species). Physical specimens are 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 every individual caught so the observers focus on detailed sampling of the bycatch species and sub-sampling of the target species. To this end New Zealand is working with SPC 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.

With respect to HMS fisheries, most observer effort is currently directed at the longline and purse seine fisheries. In addition to strengthening the coverage in the longline fishery, observer effort is also being directed at the albacore troll fishery. The main goal of this coverage is to better understand the fishing process.

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 of Fisheries (costs recovered from industry) since 1998-99. Sampling typically occurs at three ports on the west coast of New Zealand during the Austral summer (December – May).

Over the duration of the programme over 44 000 albacore have been sampled for length and almost 10% of these also sampled for weight. Further to this, otoliths from smaller fish have been collected for use in other SPC research programmes. The length frequency data are provided to SPC annually and have been incorporated into the regional assessment for South Pacific albacore.

In 2005, the Ministry of Fisheries funded the development of a port sampling programme for swordfish and has extended this programme to include other highly migratory species (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 is directed at highly migratory species in New Zealand. The Ministry of Fisheries runs a research planning process each year which involves the updating of the Medium Term Research Plan (MTRPs) for groups of species. The Ministry of Fisheries has, in consultation with stakeholders, developed MTRPs for tunas, billfish, pelagic sharks, other fish species taken in tuna fisheries, and the Gamefish tagging programme. The research plans describe the current knowledge about the species, lists all historic research (by New Zealand researchers), and sets out a plan for future 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[1] on tuna and tuna-related species include:

Albacore
Stock monitoring of albacore
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
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
Trends in annual acoustic backscatter (mesopelagic fish, plankton) in the Chatham Rise and subantarctic areas
Trophic study of 25 fish species important to deepwater NZ fisheries
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

[1] This includes some research undertaken independently of the Ministry of 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
Great white shark
Electronic tagging of great white sharks
Porbeagle shark
Electronic tagging of porbeagle sharks
Skipjack
Characterisation of New Zealand skipjack tuna fisheries
Southern bluefin
Catch-at-age of southern bluefin tuna
Electronic tagging of southern bluefin tuna
Striped Marlin
Stock monitoring of striped marlin

If you would like further details regarding any of these studies please contact Stephen Brouwer (Stephen.brouwer@fish.govt.nz).

1.2.3 Statistical data collection systems in use

In order to fish commercially 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 of Fisheries. 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 will each be described below with further details provided in Appendix 1.

Catch and effort data

Catch, fishing effort, fishing operation data, and vessel information are collected on logsheets provided by each permit holder to the Ministry of Fisheries. 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 15th 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 on loss rate of fish, are collected by staff from the Ministry of Fisheries Observer Programme.

Tuna fisheries catch and effort data have been collected by the Ministry of Fisheries 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 15th of 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 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 zone 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 of Fisheries 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
In 2008 a new protected species bycatch reporting form was instituted that requires fishers who catch a protected species to record the interaction on the non-fish/protected species bycatch form. 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 of Fisheries has prepared a species identification guide that has been distributed to fishers to assist them in their reporting obligations. All the New Zealand fishers fishing for highly migratory fish species have also had copies of the SPC marine species identification manual sent to them.

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.

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 1% of the catch by weight based on sampling about 30 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. Historically, coverage of "hooks fished" is better than this target, although the coverage of the domestic component of the longline fleet is lower than the charter coverage (Table 12Table). Japanese longline vessels operating under charter arrangements have always carried observers, but because of the long haul time of these vessels it is not possible for these observers to observe all hooks set. As the composition of the domestic fleet becomes more stable reaching the 10% observer target for this component of the fleet will be more achievable.

Table 12: 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

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 88%, 71% and 70% of the total landed catch in 2010 of swordfish, bigeye tuna and yellowfin tuna respectively (Table 13). The catches of striped marlin are presented in Table 14.

Table 13: Number and percent of swordfish and large tunas sampled for calendar years 2009 and 2010. * = preliminary data.

	Numbers of fish sampled			Percentage of catch		
Calendar year	**Swordfish**	**Bigeye tuna**	**Yellowfin tuna**	**Swordfish**	**Bigeye tuna**	**Yellowfin tuna**
2009	5186	4096	55	83.5	66.4	76.4
2010*	7656	2032	81	88.4	70.8	70.4

Table 14: Commercial landings and discards (number of fish) of striped marlin in the New Zealand EEZ reported by fishing nation (CELRs and TLCERs), and recreational landings and number of fish tagged, by fishing year.

Fishing	Japan	Japan	Korea	Philippine	Domestic	NZ Recreational		Total
Year	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					197	607	808	1612

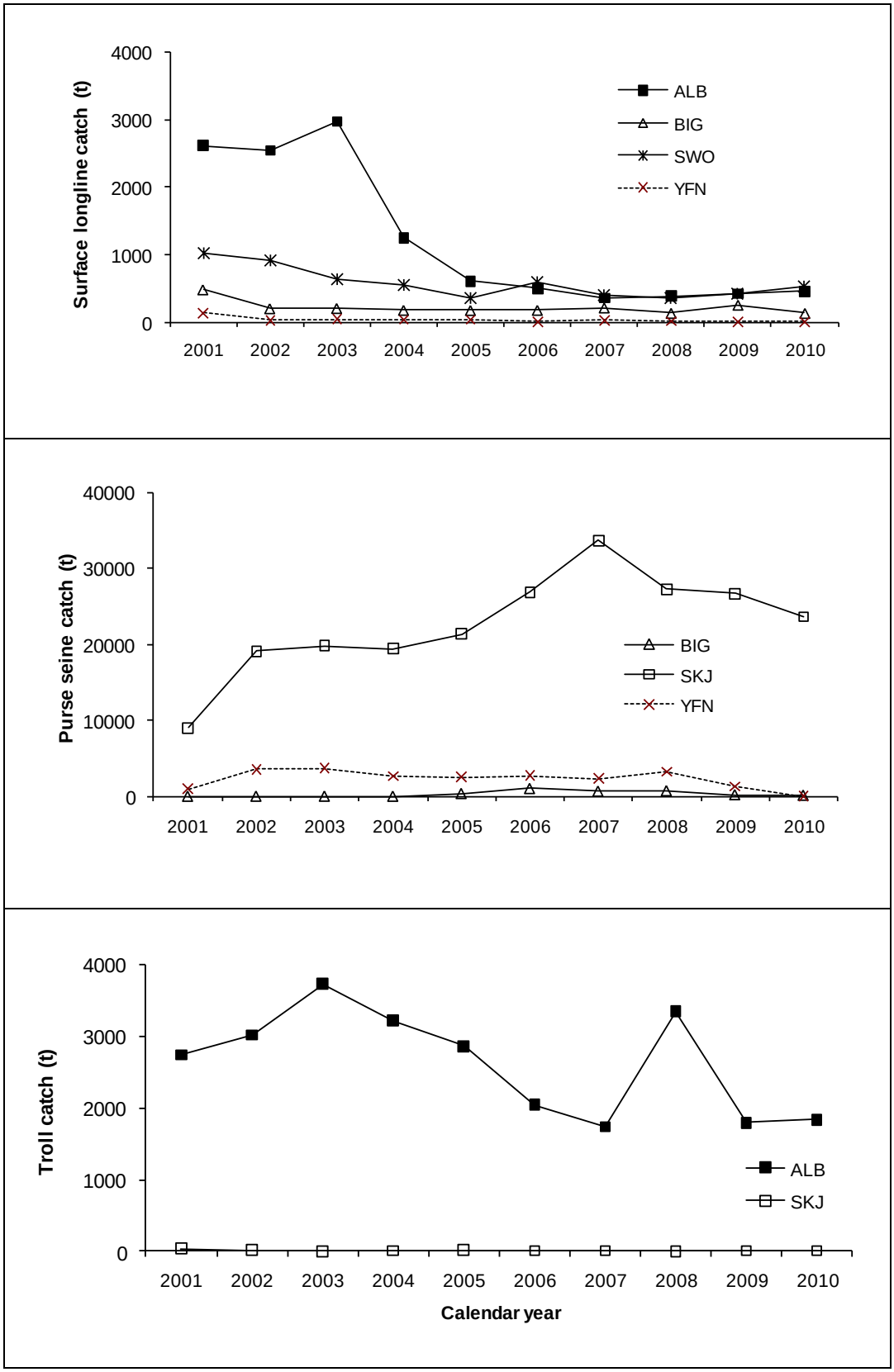

Figure 1: Historical catch (t) by gear and main species for the New Zealand longline, purse-seine and troll fleets operating in the WCPFC Convention area.

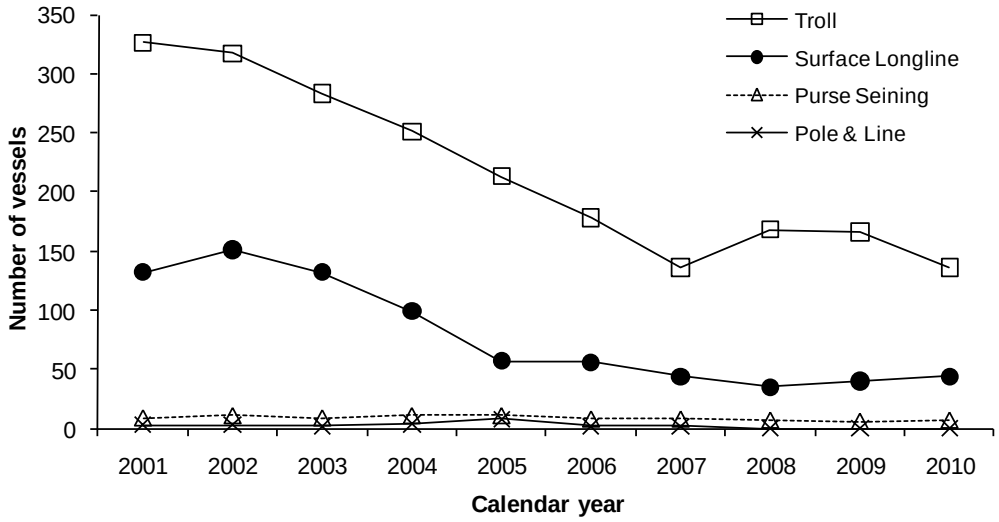

Figure 2: Historical annual vessel numbers for the New Zealand longline, purse seine, troll and pole and line fleets by gear for the WCPFC Convention area. Vessels switch gear seasonally and may be included in more than one category.

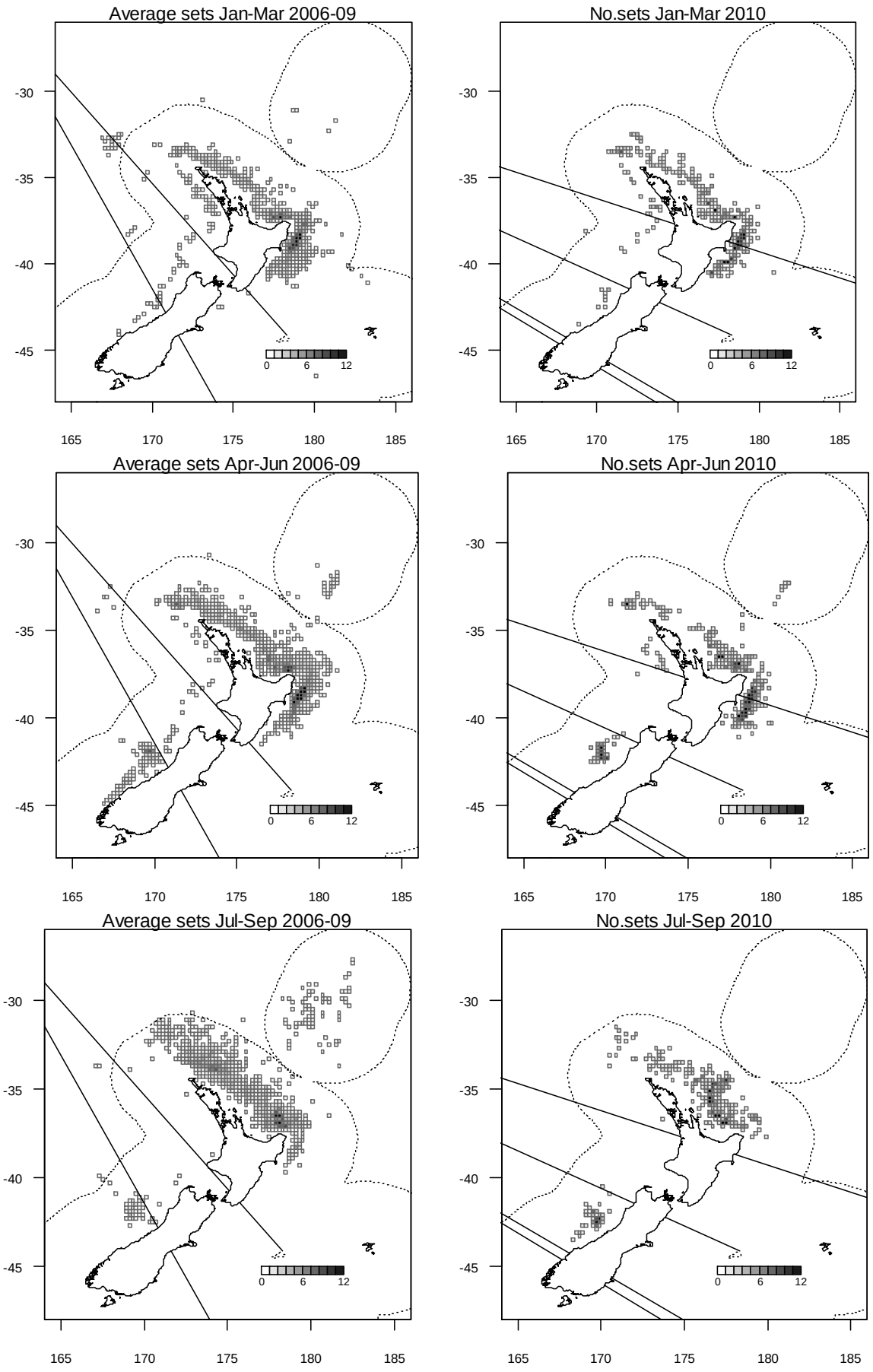

Figure 3: Distribution of effort (number of sets per 1/5 degree square) for the domestic longline fleet by quarter-year for 2006-2009 (average) and 2010 (actual). Max grey scale is 95th percentile for April – June in 2010.

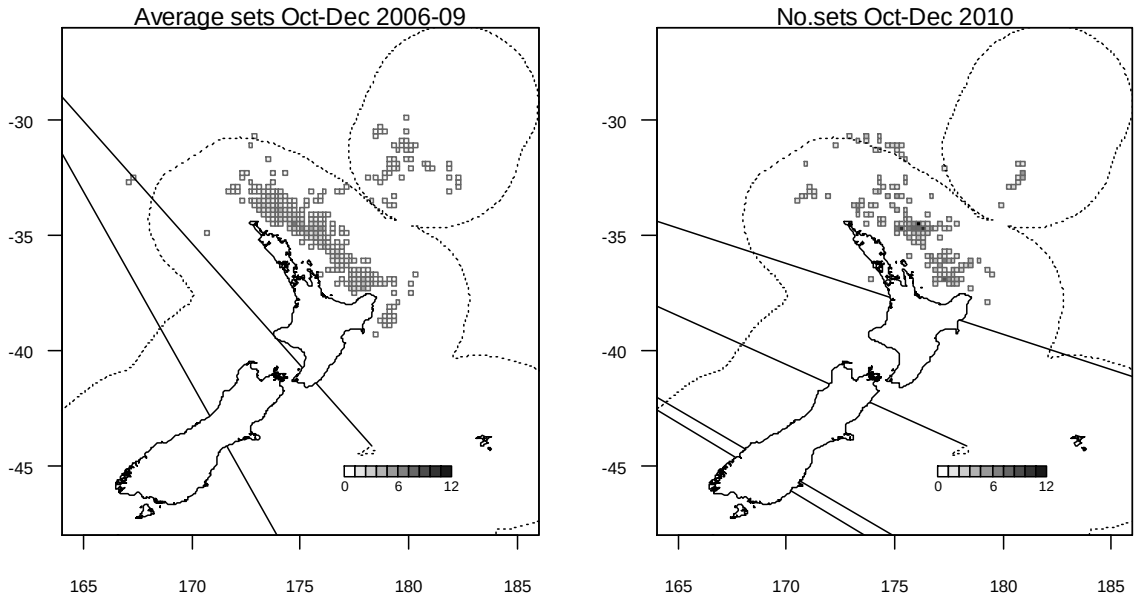

Figure 3 (continued): Distribution of effort (number of sets per 1/5 degree square) for the domestic longline fleet by quarter-year for 2006-2009 (average) and 2010 (actual). Max grey scale is 95th percentile for April – June in 2010.

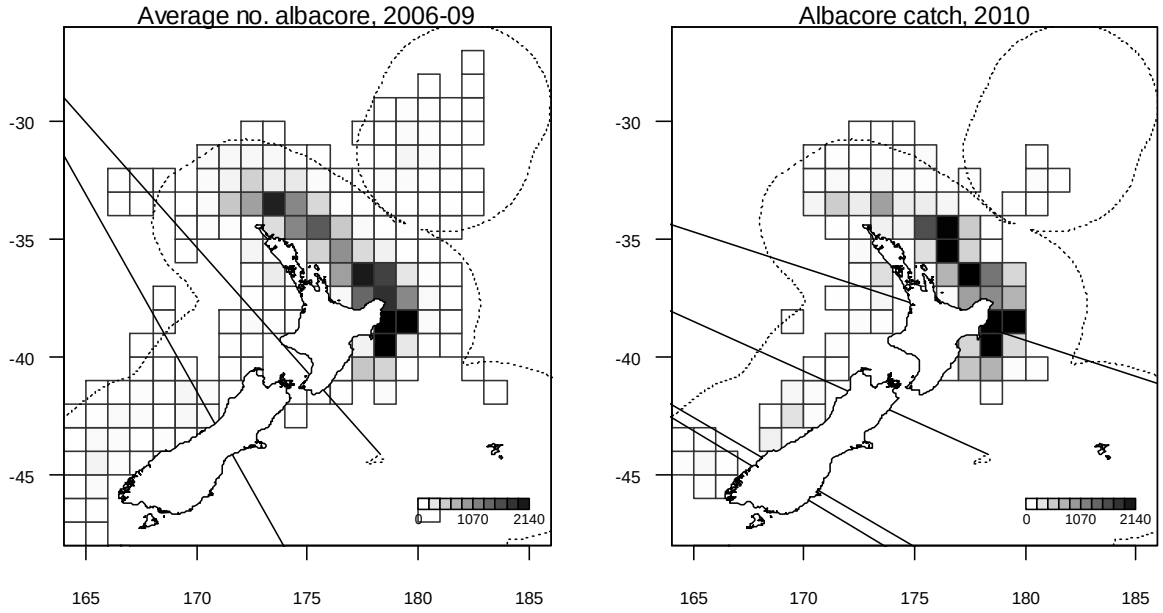

Figure 4: Distribution of longline catch (number of fish in 1 degree squares) for albacore, bigeye, and yellowfin tunas, and swordfish for 2006 to 2009 (average), and for 2010 (actual). All months and all vessels combined. Max grey scale is 95th percentile for 2010.

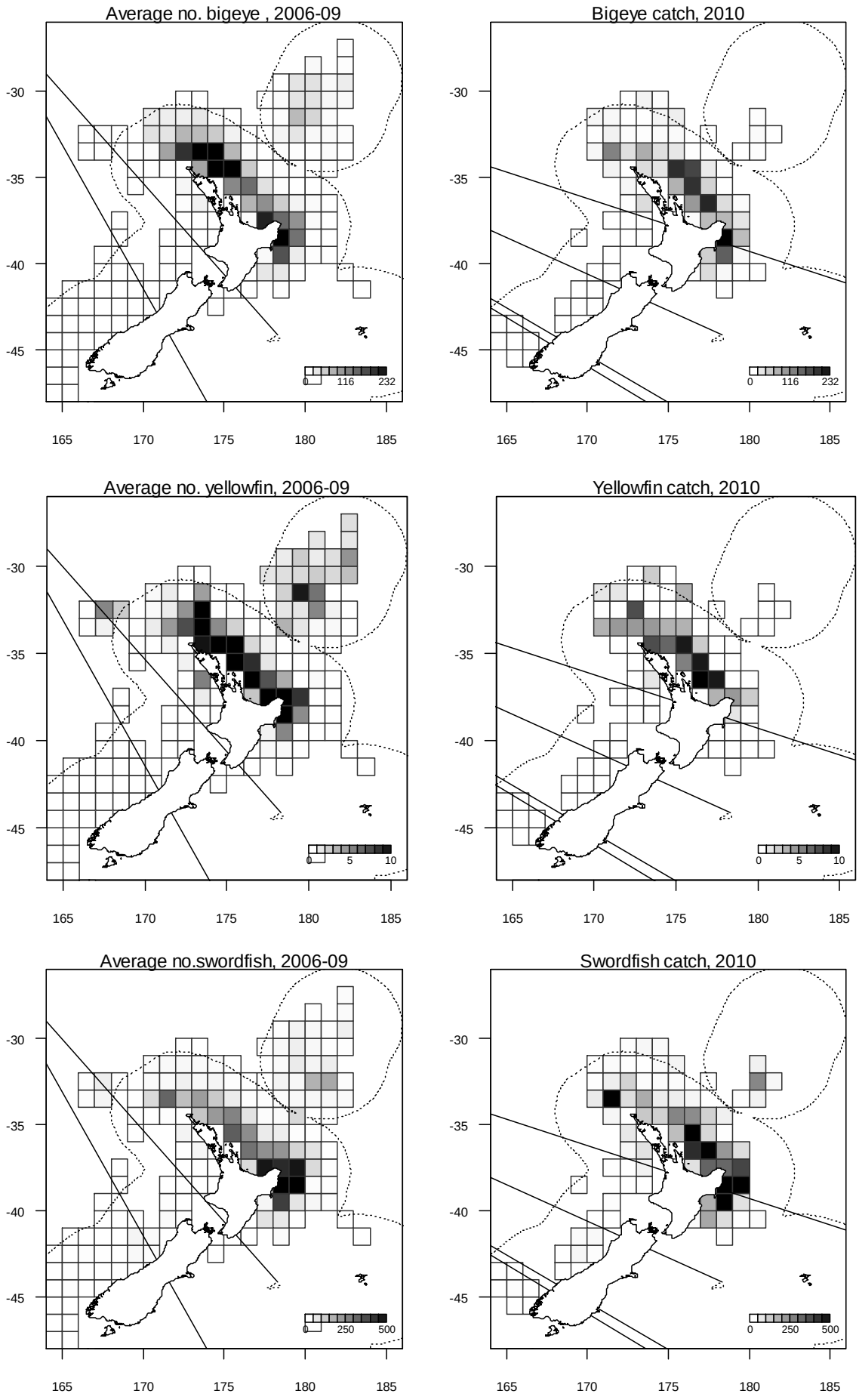

Figure 4 (continued): Distribution of longline catch (number of fish in 1 degree squares) for albacore, bigeye, and yellowfin tunas, and swordfish for 2006 to 2009 (average), and for 2010 (actual). All months and all vessels combined. Max grey scale is 95th percentile for 2010.

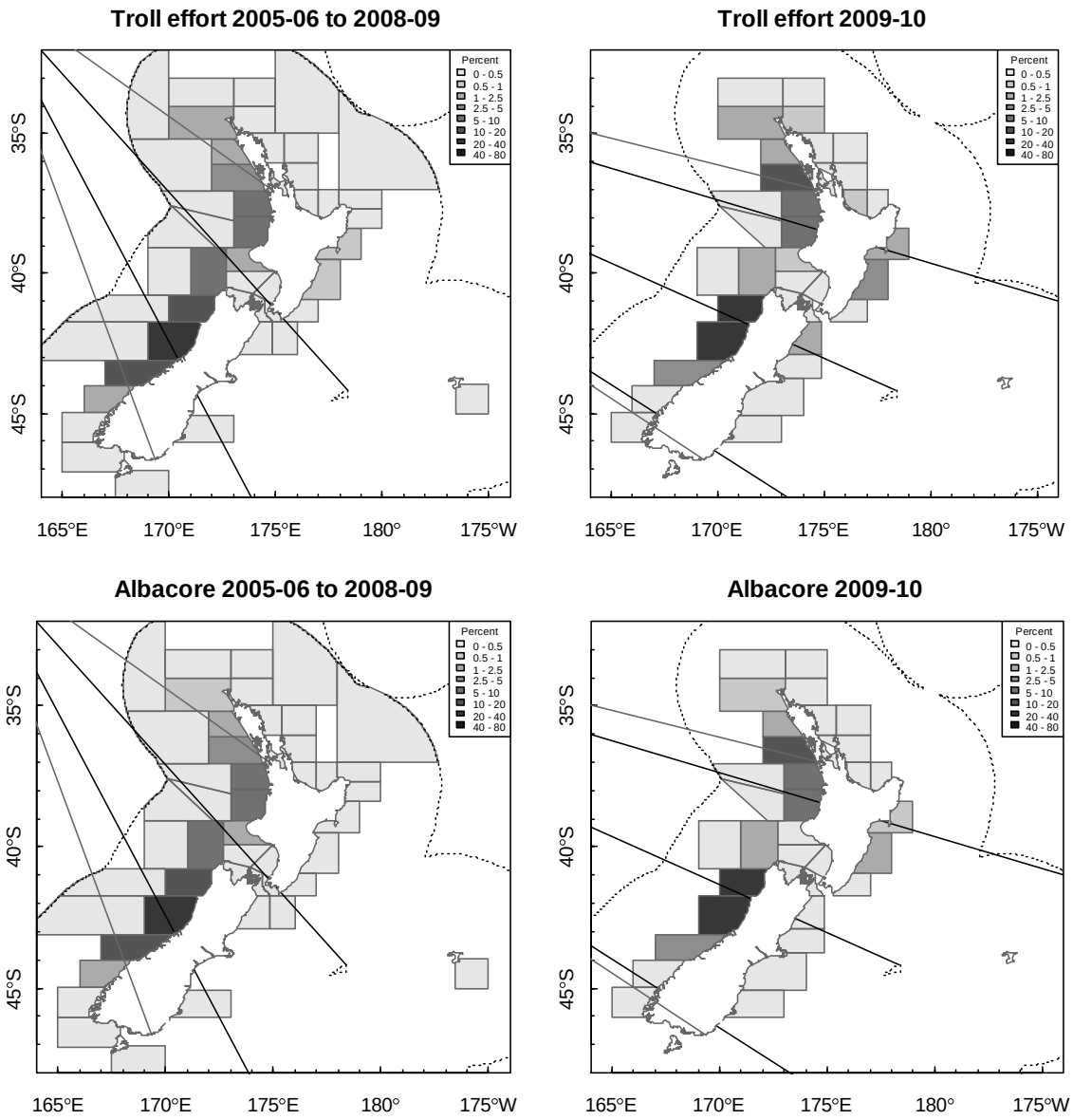

Figure 5: Distribution of troll effort (percent of vessel-days) and troll catch of albacore (percent of total catch) for 2005-06 to 2008-09 troll seasons (left) and l for 2009-10 season (right); Note: Positional data for troll are reported at a NZ statistical area resolution.

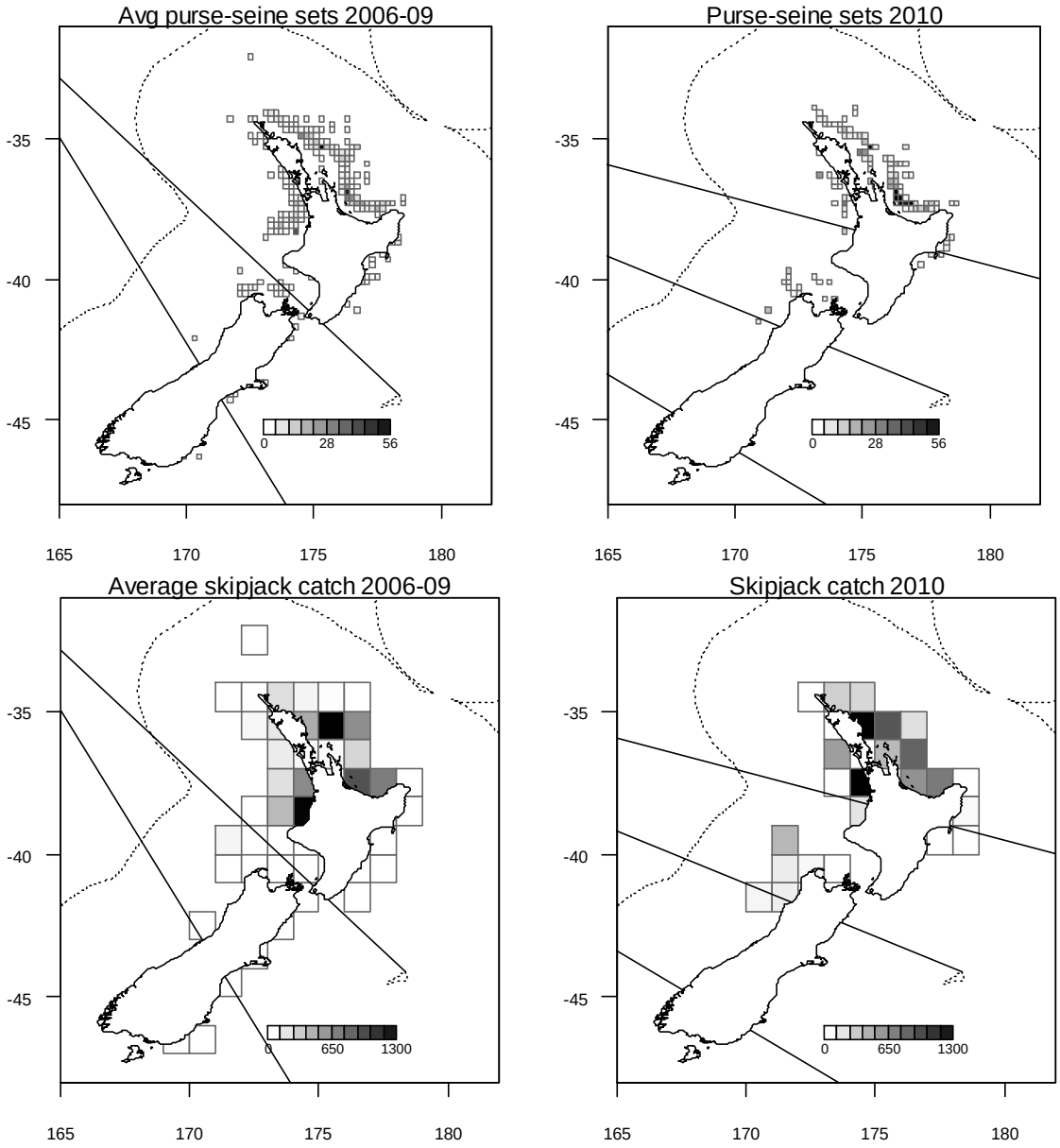

Figure 6: Distribution of purse-seine effort (number of sets per 1 degree square) and purse-seine catch of skipjack (tonnes per 1 degree square), average for 2006-07 calendar years (left) and actual for 2010 (right).

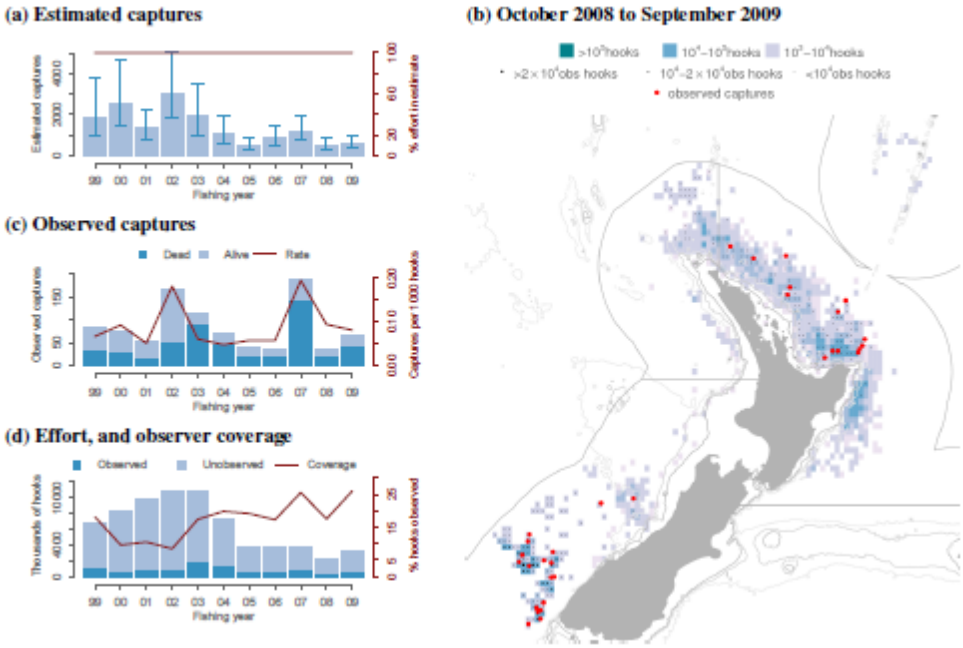

Figure 7: All bird captures in surface longline fisheries. (a) Estimated captures, with 95% confidence intervals, (b) Mapped effort and captures from 2008–09, (c) Observed captures, (d) Effort and observed effort. Abraham, E.R.; Thompson, F.N. (2011). Summary of the capture of seabirds, marine mammals, and turtles in New Zealand commercial fisheries, 1998–99 to 2008–09. Final Research Report prepared for Ministry of Fisheries project PRO2007/01. 170 pages. (Unpublished report held by the Ministry of Fisheries, Wellington.)

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

Data type	Description	Years available	Comments
CELR (Catch Effort Landing Return)	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. 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: • stock assessment- to provide a measure of catch per unit effort • policy evaluation –to determine the location and method of fishing • enforcement –to monitor activities of fishers • monitoring environmental performance –to monitor effort 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.	January 1988 onwards	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. There are a number of limitations and problems in this data set that need to be considered: • 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. • The catches reported are only estimates and are not weighed. Tuna catches are reported in numbers rather than weight. 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
CLR (Catch Landing Return)	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.	January 1991 onwards (TLCER forms)	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. 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 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.