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NEW ZEALAND

New Zealand Annual Report to the Commission:

Part 1 – Information on Fisheries, Research, and Statistics

July 2007

Abstract

The number of longline vessels operating in New Zealand has declined from 151 vessels in 2002 to 56 in 2006. The New Zealand tuna fleet consists of around 200 domestically owned and operated vessels (mostly between 15 to 25 m in length). New Zealand has four New Zealand flagged Class-6 purse seiners fishing offshore. These have fished in the EEZs of Pacific Island States and in high seas areas of the equatorial western and central Pacific Ocean (WCPO) since 2000. These vessels also fish domestically along with six smaller capacity domestic-based purse seiners. The number of purse-seiners has been stable at around 10 vessels.

Since 2002, skipjack (16 790t), of which nearly all was taken by purse seine, has comprised the greatest part of the catch of all tuna species, both within and beyond New Zealand fisheries waters. Beyond New Zealand fisheries waters, yellowfin (1 282t) makes up most of the balance. Yellowfin are rarely part of the purse seine catch within New Zealand fisheries waters due to the domestic purse-seine fishery focussing almost exclusively on free schools of skipjack. The second most important component of New Zealand's domestic fisheries are albacore (2 540t)) which are taken mostly by troll gear, but also by longline. The domestic longline fleet mostly targets bigeye, and southern bluefin tunas and more recently swordfish but the greatest part of the catch consists of albacore. Over 200t of striped marlin are caught annually by the recreational fleet, with well over half the fish tagged and released. Blue shark is the most common bycatch species in the longline fishery followed by Ray's Bream. The recent large reductions in longline effort have resulted in reductions in landings of the major bycatch species. New Zealand longline vessels fishing south of 30^{o}S are required to use tori lines to reduce catches of seabirds during the setting process. In addition, longline vessels fishing for tuna or swordfish in New Zealand fishery waters may only set their lines at night and must use tori lines while setting. As the purse seine fishery is based on free schools of skipjack, bycatch is minimal (e.g. 2.5 t out of 410 t). No interactions with non-fish bycatch (e.g. seabirds, turtles, and marine mammals) were observed. Most tuna caught in New Zealand waters are exported and the destination of exports varies depending on the species.

New Zealand has a Scientific Observer Programme (SOP) and two active port sampling programmes. In the 2005/06 fishing season 17.4% of the longline effort was observed, in 2006 3.4% of the New Zealand purse seine effort was observed. A considerable amount of research is directed at tunas and tuna-related species in New Zealand. 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. 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, gear in the WCPFC Convention Area

The catch by species taken within and beyond New Zealand fisheries waters is summarized in Table 1 and catch by gear type for 2005 and 2006 is provided in Table 2. Since 2002, skipjack, nearly all taken by purse seine, has 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 on free schools of skipjack.

Inside New Zealand fisheries waters, albacore is the second most important component of the tuna catch and is taken mostly by troll gear, but also by longline. Troll gear also takes small amounts of skipjack with occasional catches of other tuna species. Longline is mostly targeted at bigeye, and southern bluefin tunas and more recently swordfish but the greatest part of the catch consists of albacore. Pacific bluefin and yellowfin tunas are taken in small numbers in longline sets, and skipjack are rarely taken. Blue, black, and striped marlin are caught in small numbers in the domestic longline fishery, but they may not be landed for sale when taken within New Zealand fishery waters to protect New Zealand's world famous sport fishery.

Over 200t of striped marlin are caught annually by the recreational fleet, with well over half the fish tagged and released. Most world records for striped marlin are for fish caught in New Zealand. A sport fishery for Pacific bluefin tuna has also recently developed, and preliminary estimates of catches are in excess of 10t per year. Several world records have been claimed.

Landings of the mainly longline and troll caught species have declined in each year since 2002 consistent with the decline in number of vessels operating in these fisheries.

1.1.2 Number of vessels by gear type, size

In numbers, the New Zealand tuna fleet is dominated by around 200 domestically owned and operated vessels (mostly 15 to 25 m) that fish for tunas using troll and longline gear, some of them switching between gear types with the season or indeed operating part of the year in non-tuna fisheries (Table 3). There is a limited amount of pole and line and handline fishing undertaken by some of these same vessels, rather than by dedicated vessels.

There has been a significant reduction in the New Zealand tuna fleet since 2001 and 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 have fished in the EEZs of Pacific Island States and in high seas areas of the equatorial western and central Pacific Ocean (WCPO) since 2000. Often these vessels also fish part of the year within New Zealand fisheries waters targeting free swimming (unassociated) schools of skipjack together with six smaller capacity domestic-based purse seiners. The number of purse-seiners has been stable over the period at around 10 vessels in each year.

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 can fish in New Zealand fisheries waters. 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 have almost exclusively targeted southern bluefin tuna although on one occasion two were chartered to target albacore tuna. In 2006 some Australian flagged vessels entered the longline fishery under charter arrangements, targeting bigeye tuna and swordfish. United States purse seine

vessels fish occasionally in New Zealand waters 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).

Table 1: Estimated whole weight (t) of tuna and swordfish landed by New Zealand flagged vessels in the western and central Pacific Ocean convention area, by species, 2001–2006 (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. Note: the 2006 figures are preliminary.

		Calendar year					
		2001[#]	**2002**	**2003**	**2004**	**2005**	**2006**
Albacore	NZFW	5 352	5 546	6 677	4 459	3 459	2 540
Thunnus alalunga	ET	0	12	16	2	1	1
	Total	5 352	5 558	6 693	4 461	5 465	4 546
Bigeye	NZFW	481	201	204	185	176	178
Thunnus obesus	ET*	0	7	9	0	353	428
	Total	481	208	213	185	529	606
Pacific bluefin	NZFW	50	55	41	67	21	21
Thunnus orientalis	ET	0	0	0	0	0	0
	Total	50	55	41	67	21	21
Skipjack	NZFW	3 818	3 321	4 035	9 383	10 656	7 247
Katsuwonus pelamis	ET	5 241	15 812	15 761	10 003	10 746	9 543
	Total	9 059	19 133	19 796	19 386	21 402	16 790
Swordfish	NZFW	1 027	919	635	532	329	571
Xiphias gladius	ET	0	0	1	6	18	10
	Total	1 027	920	635	538	348	581
Yellowfin	NZFW	138	25	38	20	36	14
Thunnus albacares	ET*	955	3 531	3 646	2 658	2 486	1 282
	Total	1 093	3 556	3 684	2 678	2 522	1 296

[#] NZFW estimates in 2001 may include small amounts of ET catch (<5t)
* 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 2005 and 2006 for major species taken in New Zealand tuna fisheries in the western and central Pacific Ocean convention area. * See note in Table 1 for details. Note: due to rounding some of these figures may add up to >100%.

2005	**Longline**	**Troll**	**Handline**	**Pole & Line**	**Purse seine**
Albacore	17	83	0	<1	1
Bigeye tuna*	33	<1	0	0	67
Skipjack tuna	0	<1	<1	<1	100
Swordfish	100	<1	0	0	0
Yellowfin tuna*	1	<1	<1	<1	98

2006	**Longline**	**Troll**	**Handline**	**Pole & Line**	**Purse seine**
Albacore	20	80	0	<1	0
Bigeye tuna*	29	<1	0	0	71
Skipjack tuna	<1	<1	<1	0	100
Swordfish	100	0	0	0	0
Yellowfin tuna*	<1	<1	0	0	100

Table 3: Number of New Zealand flagged vessels fishing for tuna in the WCPFC Convention Area by vessel size class (GRT) and gear type. Note that many vessels use both troll and longline and will be included in both totals.

			Vessels size range (GRT)			
Fishing Method	**Calendar Year**	**Total no. vessels**	**0 – 50**	**51 - 200**	**201 - 500**	**500+**
Surface Longline	2001	132	95	32	5	0
	2002	151	100	46	5	0
	2003	132	77	48	5	2
	2004	99	55	39	5	0
	2005	57	30	25	2	0
	2006	56	30	24	2	0
Purse Seining			**0 – 500**	**501-1000**	**1001 - 1500**	**1501+**
	2001	9	7	0	1	1
	2002	11	8	0	2	2
	2003	9	6	0	2	2
	2004	11	7	0	2	2
	2005	11	7	0	2	2
	2006	11	7	0	2	2
Pole & Line			**0-50**	**51-150**		
	2001	3	3	0		
	2002	3	3	0		
	2003	2	2	0		
	2004	4	4	0		
	2005	8	7	1		
	2006	2	1	1		
Troll			**0 – 50**	**51 - 200**		
	2001	326	289	37		
	2002	317	278	39		
	2003	283	240	43		
	2004	251	213	38		
	2005	213	180	33		
	2006	178	157	21		
Troll season			**0 – 50**	**51 - 200**		
	2000-01	312	278	34		
	2001-02	299	270	29		
	2002-03	275	236	39		
	2003-04	245	209	36		
	2004-05	211	177	34		
	2005-06	182	157	25		

1.1.3 Fishing patterns

This section describes spatial / temporal trends in catch and effort in each New Zealand tuna fishery. Longline effort for the domestic longline fleet by quarter is presented in Figure 1 and total effort in terms of hooks fished by target species is provided in Table 4.

The key target species in the longline fishery are southern bluefin and bigeye tuna. The southern bluefin tuna fishery occurs during the second quarter in the year and mostly off the east coast of the North Island, with some effort also off the west coast of the South Island. The remainder of the year is focussed on 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. Annual catch distributions are provided in Figure 2.

Table 4: Annual longline effort (000s of hooks) by target species. The category other includes Pacific bluefin, yellowfin tuna, and swordfish (in 2005 - 2006).

Year	Southern bluefin	Bigeye	Albacore	Other	Total
2001	1 907	7 191	560	280	9 939
2002	2 821	6 867	907	202	10 796
2003	3 455	4 469	1 964	163	10 050
2004	3 199	2 908	449	168	6 725
2005	1 659	1 777	137	286	3 860
2006	1 495	1 816	60	322	3 693

The albacore troll fishery is based almost exclusively on the west coast of the North and South Islands and operates between December and May each year. The distribution of catch and effort is almost identical (Figure 3).

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 4). The amount of catch / effort in a given year depends on the presence of the larger purse seine vessels that sometimes move down to fish within New Zealand fisheries waters during the summer months. These larger vessels tend to fish further offshore and in deeper waters than the smaller domestic vessels.

In 2006 three New Zealand purse seine vessels, from a single company, operated in the Tropical Pacific. For reasons of commercial confidentiality, details of the spatial distribution of catch and effort for these vessels are not provided in this report.

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

For bycatch species of commercial interest, reasonably good estimates of landings can be obtained from fishers records, whilst for less valuable species, observer data provides the best information. Here we provide data on major bycatch species and species of special concern 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 bought into New Zealand Quota Management System (QMS). Blue shark is the most common bycatch species followed by Ray's Bream (Table 5). The large reductions in longline effort have resulted in reductions in landings of the major bycatch species.

Table 5: Landed catch (mt) of non-target species currently managed within the QMS that are taken in tuna fisheries within New Zealand fisheries waters. Data are provided by 1 Oct – 30 Sept fishing year and for some species include catches from non-tuna fisheries.

Species	Scientific name	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Blue shark	*Prionace glauca*	1 415	1 105	914	649	734	656
Mako shark	*Isurus oxyrinchus*	319	245	216	100	107	82
Moonfish	*Lampris guttatus*	351	342	239	156	111	79
Porbeagle shark	*Lamna nasus*	150	119	142	65	60	55
Ray's bream	*Brama brama*	926	536	357	157	259	215

It is also possible to estimate bycatch from the longline fishery using observer records. Whilst 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 reasonable estimates with the historically low levels of coverage in the longline fishery. Estimates of catches (in numbers of fish), the percentage of those catches to be landed, and an indication of the life status of discards are provided in Table 6.

Table 6: Estimated catch (numbers of fish) of common bycatch species in the New Zealand longline fishery as estimated from observer data. Also provided is the percentage of these species retained and the percentage of non-retained fish that were alive when caught. Data are provided by 1 October 2005 – 30 September 2006 fishing year.

Species	Scientific Name	Estimated number landed	% retained	Non-retained % alive
Rays bream	*Brama brama*	16079	99.6	6.9
Blue shark	*Prionace glauca*	98912	71.4	98.1
Deepwater dogfish	Squaliformes	971	0.2	76.4
Bigscale pomfret	*Taractichthys longipinnis*	769	49.7	82.5
Swordfish	*Xiphias gladius*	10499	93.8	36.8
Lancetfish	*Alepisaurus ferox*	10778	0.3	52.7
Porbeagle shark	*Lamna nasus*	2817	72.9	96.1
Mako shark	*Isurus oxyrinchus*	6560	61.5	92.5
Dealfish	*Trachipterus trachypterus*	237	0.6	43.9
Moonfish	*Lampris guttatus*	2783	96.3	0.0
Escolar	*Lepidocybium flavobrunneum*	1141	29.0	93.7
Oilfish	*Ruvettus pretiosus*	1854	31.5	96.1
Rudderfish	*Centrolophus niger*	578	29.1	77.6

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 are alive when discarded (e.g. moonfish, blue shark, and porbeagle shark). For species in this last group, fish were more likely to be retained if they were already dead when brought to the side of the boat.

Seabirds are sometimes taken in longline fisheries and the birds are landed both dead and alive, with an important proportion (24%) landed alive. This indicates that birds are caught both at the set and during the haul which has implications for mitigation techniques. Scaled estimates based on observer coverage are uncertain, but are provided in Table 7. As part of an agreement reached by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), New Zealand longline vessels fishing south of 30˚S are required to use tori lines to reduce catches of seabirds during the setting process. In addition, longline vessels fishing for tuna or swordfish in New Zealand fishery waters may only set their lines at night and must use tori lines while setting.

Table 7: Observed and estimated seabird interactions for surface longline vessels based on fisher and observer records. Data are provided by 1 Oct – 30 Sept fishing year. (Source: Baird and Smith[1])

Source	2000/01	2001/02	2002/03	2003/04	2004/05
Observed	53	167	115	71	44
Estimated	1 464	6 513	2 808	249	234

Since 2001 only 14 sea turtles have been reported by fishers and observers within New Zealand fisheries waters (Table 8). Of the 14, 10 were leatherback turtles, one was a loggerhead turtle, two were reported as green turtles, and one was not reported to species.

The turtles were mostly caught during the austral summer with catches from November to June. All but one turtle was released alive. Based on photographs taken by the observer the one dead turtle (from 2001) was identified as a green turtle. Overall turtles are a very rare catch in the New Zealand longline fishery and only one mortality has been observed in the past five years. No turtles have been observed or reported from the purse seine and troll fisheries that operate within New Zealand fisheries waters.

[1] Baird, S.J and M.H. Smith. 2007. Incidental capture of seabird species in commercial fisheries in New Zealand waters, 2003-04 & 2005-06. New Zealand aquatic environment and biodiversity report. No. 9. 108 pp.

Table 8: 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
Green turtle	*Chelonia mydas*	1				1	
Leatherback turtle	*Dermochelys coriacea*	3	1		1	2	3
Loggerhead turtle	*Caretta caretta*		1				
Unidentified		1					

Observers have been deployed on purse seine vessels in 2005 and 2006 to determine levels of bycatch in the fishery that operates within New Zealand fishery waters. The catch composition for the four trips covered is provided in Table 9 and levels of coverage are provided in Table 10. As the fishery is based on free schools of skipjack, bycatch is minimal (e.g. 2.5 t out of 410 t). No interactions with non-fish bycatch (e.g. seabirds, turtles, and marine mammals) were observed.

Table 9: Catch composition from four purse seine trips operating within New Zealand fisheries waters in 2005 and 2006.

Species	Scientific Name	Catch weight (kg)	% Catch
Skipjack tuna	*Katsuwonus pelamis*	999 858	99.75
Manta Ray	*Mobula japonica*	1 450	0.14
Yellowfin tuna	*Thunnus albacares*	342	0.03
Sunfish	*Mola mola*	165	0.02
Slender tuna	*Allothunnus fallai*	150	0.01
Frigate tuna	*Auxis thazard*	150	0.01
Striped marlin	*Tetrapturus audax*	75	0.01
Porcupine fish	*Tragulichthys jaculiferus*	72	0.01
Flying fish	Exocoetidae (family)	55	0.01
Unid. stingray		15	0
Squid		14	0
Jellyfish		4	0
Albacore	*Thunnus alalunga*	2	0

Table 10: Purse seine sets observed as a percentage of sets made

Calendar year	No. sets observed	% sets observed	% SKJ catch
2005	37	4.7	4.5
2006	23	3.4	6.7

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 this year, but will look to do so for future reports.

1.1.5 Other information

Following the development of domestic longlining in the early 1990s, 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 (only fishing history prior to 30 September 2000 was used in the determination of quota allocations for these species).

On 1 October 2004, bigeye, yellowfin, Pacific bluefin tuna were introduced to the QMS system with catch limits set for catches within New Zealand fisheries waters. Several key bycatch species, namely mako, blue, and porbeagle shark, moonfish, Ray's bream, and swordfish were also introduced at this time. Southern bluefin tuna was also bought into the QMS in 2004, but the limit applies to catch by New Zealand flagged vessels regardless of where they fish.

A further driver for rationalisation in the tuna longline fleet has been the allocation of southern bluefin tuna quota. 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 high New Zealand dollar, rapidly increasing fuel costs and a static market value. It is likely that these conditions will ease in the short-term.

Presently New Zealand has 6 small domestic purse seine vessels that currently fish exclusively within New Zealand fisheries waters, and one of New Zealand's four large super seiners has also fished primarily within New Zealand fisheries waters over the past year. The large super seiner operates primarily off the west coast of the North Island, an area previously only lightly fished by the domestic fleet. The other three large super seine vessels spend most of their time in the tropical Pacific. The level of skipjack catch within New Zealand fishery waters depends on whether some or all of these vessels fish in New Zealand over the Austral summer (January - May). Factors such as the relative catch rates between the tropical region and the New Zealand zone play a role in determining whether the vessels come south, and in recent years the cost of fuel has also been important.

New Zealand fisheries are at the limits of the range of many highly migratory species and catches can also vary from year to year depending on seasonal variations in migrations. The future prospects for New Zealand are strongly dependent on good sound 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 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 2005 over two-thirds of our skipjack was exported to Thailand with the majority of the remainder exported to Iran, and Turkey. The large purse seine vessels operating in the tropical Pacific tranship their catch in a number of ports including Majuro, Pohnpei, and Pago Pago.

1.2 Research and Statistics

1.2.1 Summary of observer and port sampling programmes

New Zealand has a Scientific Observer Programme (SOP) and two active port sampling programmes. These are described below.

The SOP is administered by 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. Training is focussed mainly on deep-water trawl fishery operations, although there is reference to other fisheries and fishing methods in the general course content. 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 will result in an internationally recognised qualification.

Observers receive comprehensive briefings, along with relevant reference material prior to undertaking any at sea observation of longline vessels prior to each trip. 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 fishery 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. Presently we have data on the stomach contents of over 40,000 highly migratory fish. Physical specimens are often collected, e.g. hard parts for ageing. The 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. The 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.

In terms of tuna fisheries, most effort is currently directed at the longline fishery and, to a lesser extent, the purse seine fishery. In addition to strengthening the coverage in the longline fishery, future effort will be directed at the albacore troll fishery. The main goal of this coverage will be to better understand the fishing process to allow further development of standardized CPUE indices for this fishery.

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, though only two ports were sampled in 2004-05 due to the reduced distribution of fishing effort in that year. Sampling occurs 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 have just 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 new 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 from information from observers, e.g. conversions factors from length to processed weight and sex-structured data for swordfish.

1.2.2 Research activities

Whilst pelagic fisheries are not as large and important as some of the other fisheries in New Zealand, considerable research activities are directed at tunas and tuna-related species. 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. Currently 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 MTRP describes 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 recent research were provided to WCPFC-SC1 (as paper GN IP-2) so the details of this paper are not repeated here.

Current and recent research[2] on tuna and tuna-related species includes:

- **Albacore tuna**
  - Monitoring the length structure of New Zealand commercial landings of albacore tuna (1997 – present)
  - Collection of otoliths for SPC research projects
  - Standardized CPUE for the longline and troll fisheries for albacore tuna

- **Pelagic sharks**
  - Age and growth of **blue shark** (*Prionace glauca*) from the New Zealand Exclusive Economic Zone
  - Age, growth, maturity, longevity and natural mortality of the **shortfin mako shark** (*Isurus oxyrinchus*) in New Zealand waters
  - Age, growth, maturity, longevity and natural mortality of the **porbeagle shark** (*Lamna nasus*) in New Zealand waters

- **Striped Marlin**:
  - Characterisation of striped marlin fisheries in New Zealand
  - Satellite tagging of striped marlin – funded by the New Zealand Marine Research Foundation
  - Size trends and population characteristics of striped marlin, *Tetrapturus audax* caught in the New Zealand recreational fishery
  - Standardized CPUE for the recreational striped marlin fishery
  - Implementation of a logbook programme for the recreational striped marlin fishery

- **Swordfish**
  - Swordfish stock structure using parasite markers
  - Growth rate, age-at-maturity, longevity and natural mortality rate of swordfish (*Xiphias gladius*)
  - Regional stock assessment for swordfish (in collaboration with CSIRO, Australia)
  - Standardized CPUE analyses for the swordfish longline fishery
  - Satellite tagging of swordfish
  - Development of a shore-based catch monitoring programme for swordfish

- **Other**
  - Growth rate, age-at-maturity, longevity and natural mortality rate of **Ray's bream** (*Brama* sp.)
  - Growth rate, age-at-maturity, longevity and natural mortality rate of **moonfish** (*Lampris guttatus*)
  - New Zealand **billfish** and **gamefish** tagging, 2003–04
  - The distribution of **Pacific bluefin tuna** (*Thunnus orientalis*) in the southwest Pacific Ocean, with emphasis on New Zealand waters
  - Development of shore-based sampling for **highly migratory species**

- **Seabirds**
  - Modelling of demographic impacts of mortality resulting from fisheries on New Zealand seabird populations
  - Experimental deployment of electronic monitoring to monitor protected species incidental captures in longline fisheries.
  - Data collection of demographic, distributional and trophic information on selected seabirds species to allow estimation of effects of fishing on population viability
  - Modelling of the effects of fishing on the population viability of selected seabirds

[2] This includes some research undertaken independently of MFish

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. 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: 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. New Zealand also has a system for collecting information on non-fish bycatch from fishers. These will each be described below with further details provided in Appendix 1.

Catch, fishing effort, fishing operation data, and vessel information are collected on logsheets provided by each permit holder to the Ministry of Fisheries on Catch Effort Landing Returns (CELR) and Tuna Longline Catch Effort Returns (TLCER). CELR forms are completed for each day of fishing for all gear types (e.g. handline, troll, purse seine and some longline) while TLCER forms are filled out only for surface longlining for tunas, these data are recorded for each longline set. The forms are submitted monthly by the 15th of following month.

Tuna landings data are compiled from either 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, is collected by staff from the Ministry of Fisheries Scientific Observer Programme.

Tuna fisheries catch and effort data have been collected by the Ministry of Fisheries (Ministry of Agriculture and Fisheries at that time) since at least 1976, but changes to data collection and processing mean that domestic fisheries catch and effort data are not currently available before 1989. CELR and TLCER data are available beginning with the third quarter of 1989 (start of the 1989–90 fishing year).

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, catch effort forms 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.

Fishers are required to report accidental deaths or injuries to marine mammal or marine wildlife that occur in the act of fishing under a variety of pieces of legislation (e.g. New Zealand Wildlife Act (1953) and the Marine Mammal Protection Act (1978)). Currently the Ministry of Fisheries and the Department of Conservation is improving the systems for the collection of these data and once the necessary regulatory amendments have been made a new system will come into place.

The NPC form will include incidental catch of the following species by commercial fishers: seabirds, marine mammals, marine reptiles, corals, sponges, bryozoans, and protected fish species (protected under the Wildlife Act 1953). Existing commercial catch and effort returns will include a declaration about whether or not non-fish / protected species incidental catch occurred for each tow/set. If these species are caught during a tow/set, fishers will also need to complete a NPC form.

The form includes more detailed information about the species caught. The form will be linked to the catch effort return so that fishers do not need to duplicate information already reported. Fishers will be required to report to the species level if they are able to identify the incidental catch, but if not generic group codes will be permitted. Corals, sponges and bryozoans will be reported by estimated weight and all other species will be reported by number of individuals. The count of individuals will include whether the animals were alive and uninjured, alive and injured, or dead. Definitions of what "injured" means will be provided. The Ministry of Fisheries is also preparing a species ID guide to distribute to fishers to assist them to meet their reporting obligations. All the New Zealand fishers fishing for highly migratory fish species have had copies of the SPC marine species identification manual sent to them.

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

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 data. In addition, for fishing within New Zealand fisheries waters we have two independent records of total catches, the monthly reporting by fishers (MHRs) and 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 each fishing season. 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 for other HMS comes through the Scientific Observer Programme. We have coverage of our longline and purse-seine fleets and are planning for coverage aboard some albacore troll vessels during the 2006/07 fishing season. Our target coverage rate for the longline fishery is around 10% of effort, which should reflect approximately 10% of the HMS catch. Historically, our coverage of “hooks fished” is better than this 10% level, but the coverage of the domestic component of the longline fleet is much lower than this (Table 11). All 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 we envisage reaching the 10% observer target for this component of the fleet.

Table 11: Hooks observed as a percentage of hooks set

Fishing year	Domestic	Charter (Japanese)	Charter (Aust.)	Total
2000-01	2.7	86.8		10.8
2001-02	1.5	78.8		8.4
2002-03	0.0	85.7		17.4
2003-04	2.2	90.8		19.9
2004-05	4.9	88.1		19.1
2005-06	2.8	88.7	81.7	17.4

The shore-based port sampling programme, which has recently been implemented for swordfish and currently being expanded to other HMS species taken in longline fisheries (e.g. bigeye and yellowfin tuna and southern and Pacific bluefin tunas), obtained individual processed weights for 68% of the total landed catch of swordfish in 2005-06 (Table 12).

Table 12: Number and percent of swordfish landed in 2005-06, by month, for which processed weights were collected.

Calendar Year	Month	No swordfish landed	No swordfish sampled	Percent sampled
2005	Jul	500	308	62
2005	Aug	360	281	78
2005	Sep	219	160	73
2005	Oct	53	42	79
2005	Nov	66	56	85
2005	Dec	68	51	75
2006	Jan	225	224	100
2006	Feb	661	458	69
2006	Mar	1090	747	69
2006	Apr	1434	1248	87
2006	May	2174	1260	58
2006	Jun	1341	723	54
		8191	**5558**	**68**

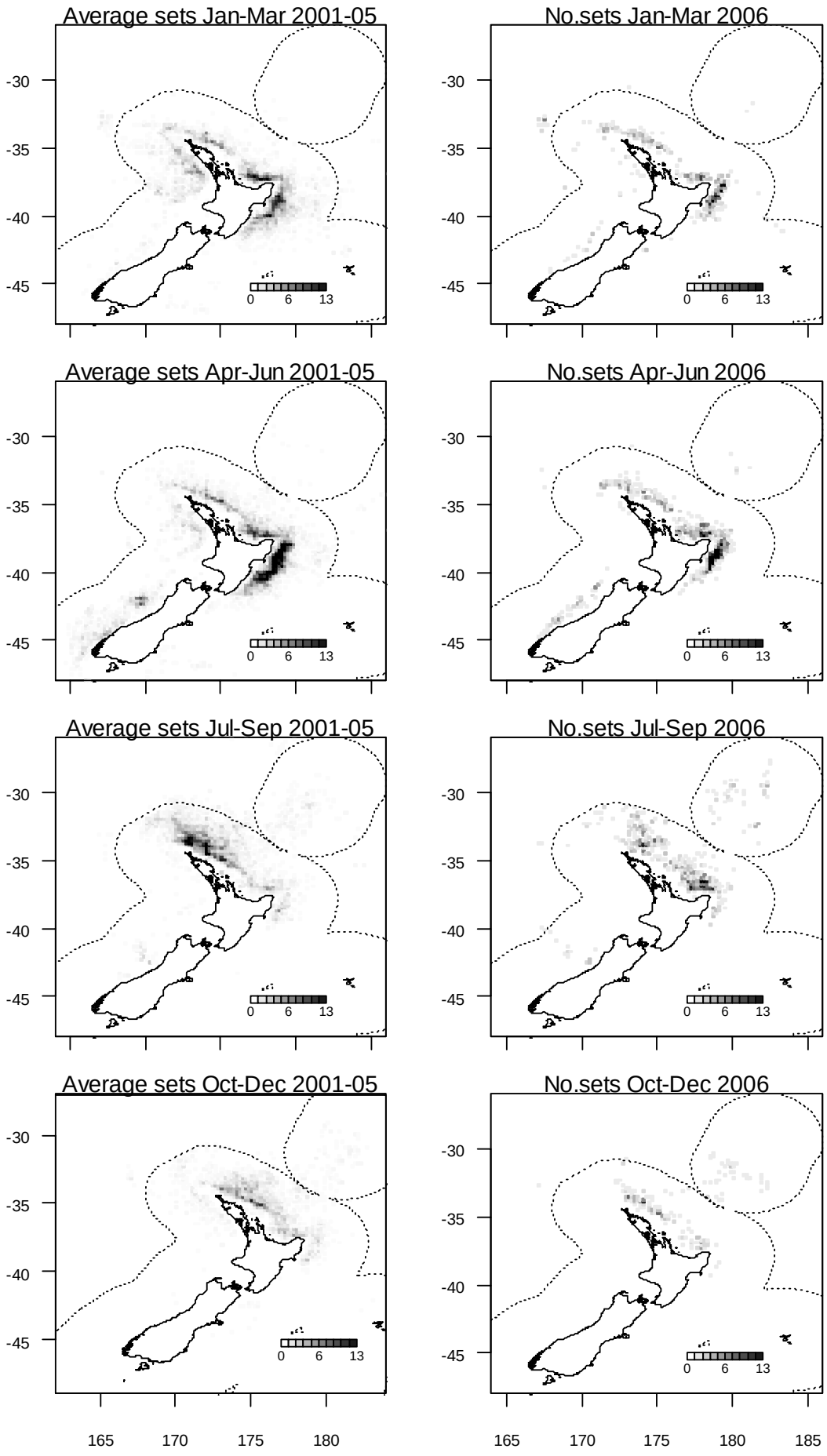

Figure 1: Number of sets per 1/5 degree square for the domestic longline fleet by quarter for 2001-2005 (average) and 2006. Max grey scale is 90th percentile for Apr-Jun.

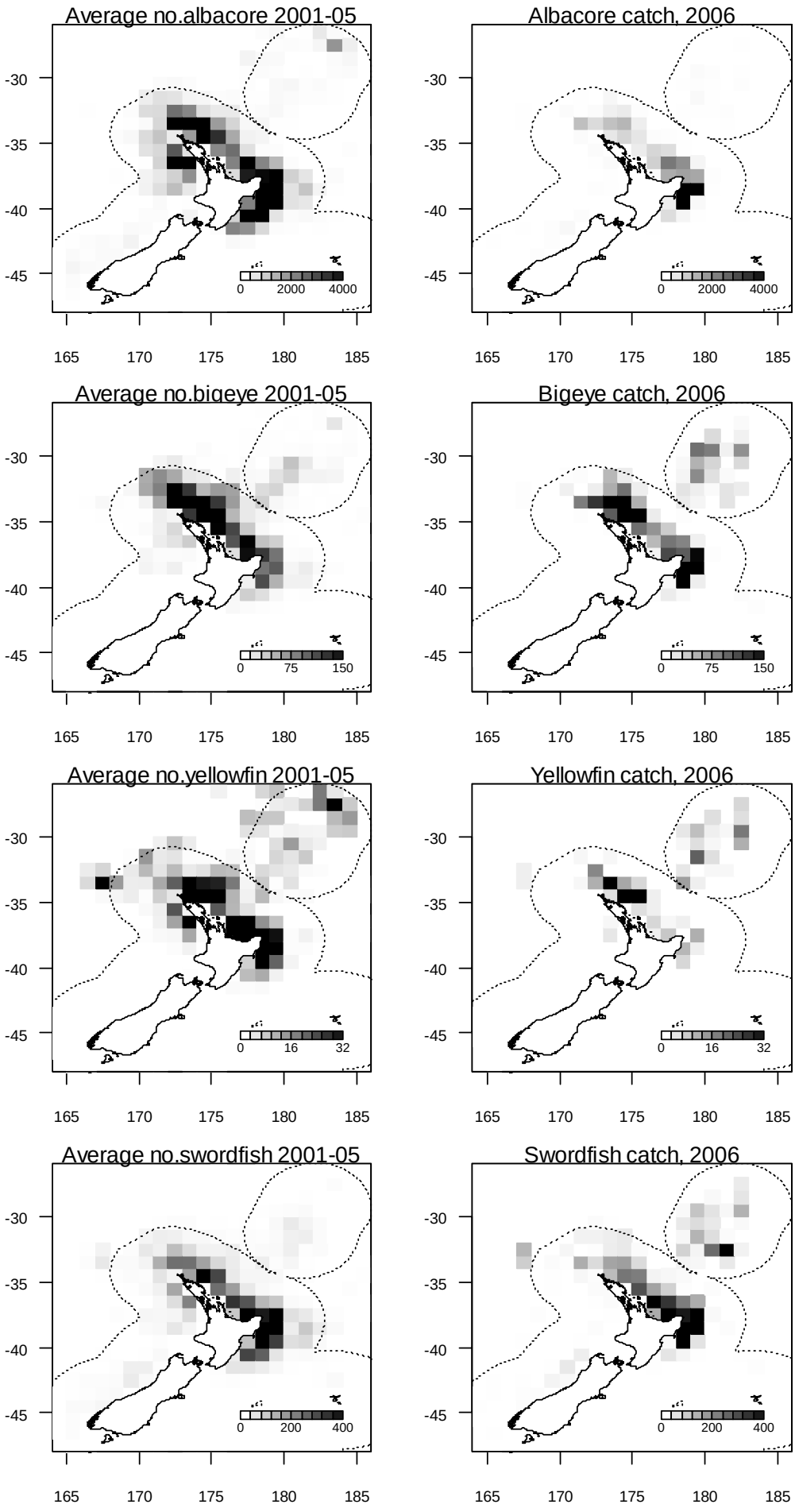

Figure 2: Annual longline catch (number of fish in 1 degree squares) for albacore, bigeye, and yellowfin tunas, and swordfish for 2001 to 2005 (average), and for 2006. All months and all vessels combined.

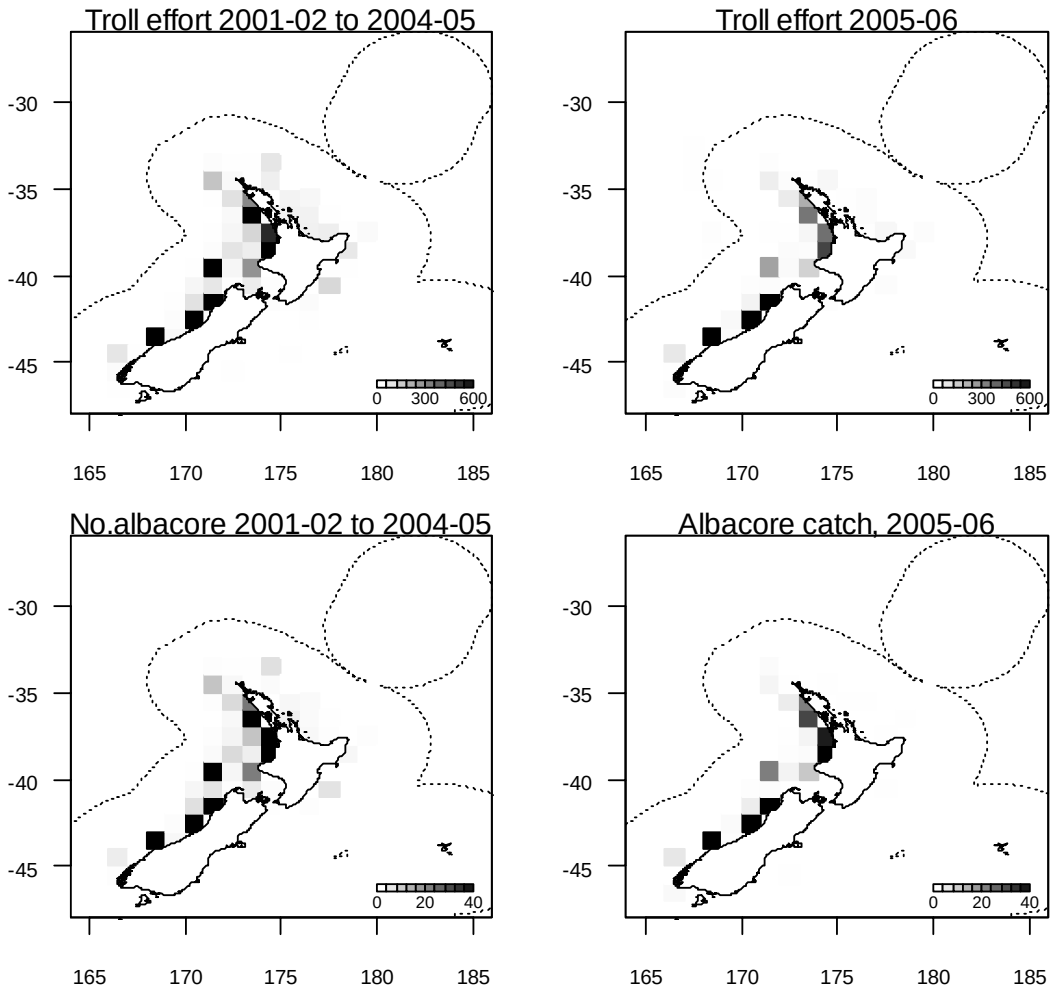

Figure 3: Annual troll effort (vessel-days per 1 degree square) for 2001-02 to 2004-05 troll seasons (average) and for 2005-06 season (top); and annual troll catch of albacore (thousands of fish per 1 degree square) for 2001-02 to 2004-05 troll seasons (average) and for 2005-06 season (bottom).

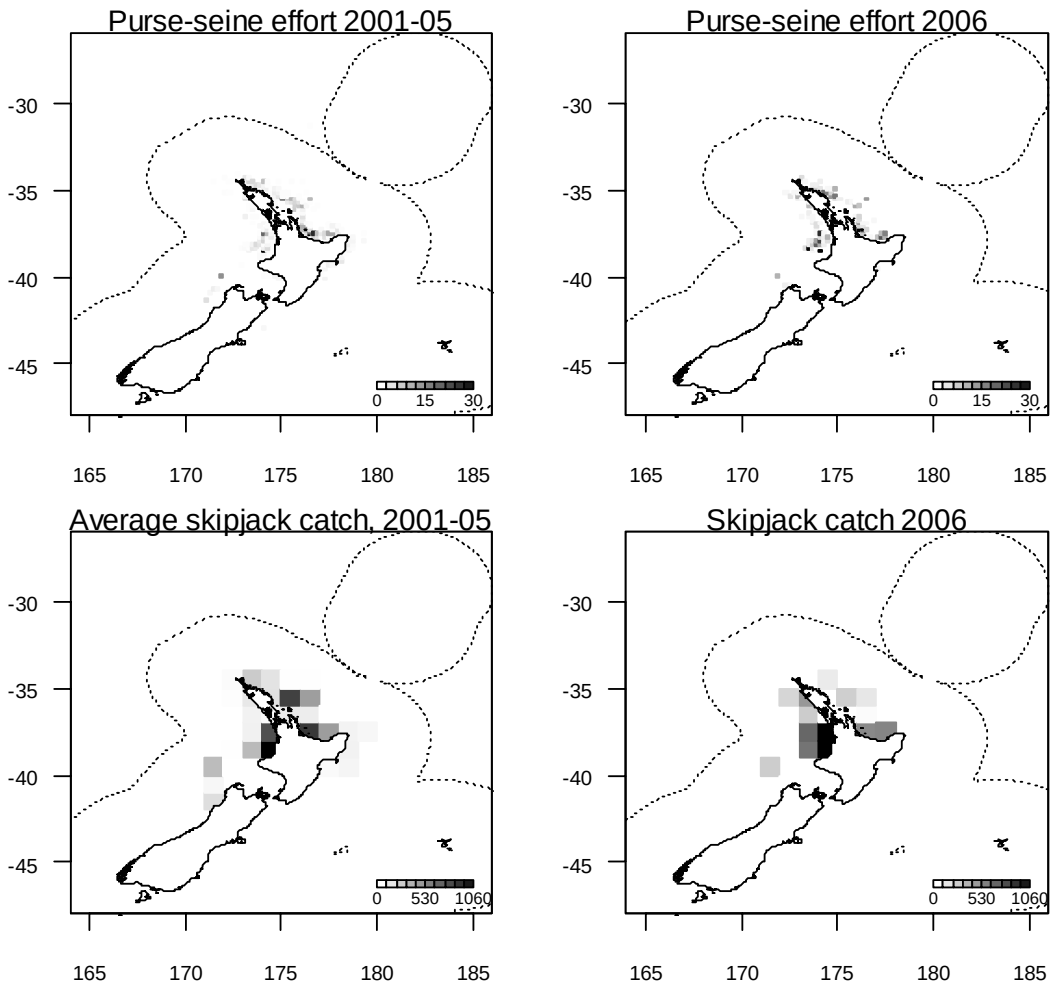

Figure 4: Annual purse-seine effort (number of sets per 1 degree square) for 2001-05 calendar years (average) and for 2006 (top); and annual purse-seine catch of skipjack (tonnes per 1 degree square) in 2001-05 (average) and in 2006 (bottom). Note: some positional data are presented at a NZ statistical area resolution and as some squares represent the centre of these areas they are somewhat over-represented.

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. The bottom part of the form contains landing information (CLR). The top part of the form contains fishing details. 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.	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.
CLR (Catch Landing Return)	Landing returns record the catch that is landed, lost, discarded at sea, or retained on board after a landing. Landing returns are 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. There are two types of catch landing forms used in tuna fishing. The "Catch Landing Return" (CLR) is used by vessels using TLCER catch effort forms while the "Catch Effort Landing Return (CELR) has a section for reporting landings	January 1988 onwards (CELR forms) January 1991 onwards (TLCER forms)	Fish reported in the landings form usually cannot be related to the fish reported on the individual CELR or TLCER forms. 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	January 1980 to June 1995 (foreign licensed vessels) March 1989 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-TLCER (High Seas TLCER). The HS-TLCER is nearly identical to the standard version of the form and was introduced 1 March 2001.

	weight.	(charter vessels) March 1991 onwards (domestic vessels)	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.
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 (longline vessels only)	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	This system does not cover all commercial catch. It covers a sample of the tuna longline fishing (about 1300 observer days budgeted in 2005/06), but for the trips that are covered, more detailed information is available than is available from the commercial catch forms completed by fishers.