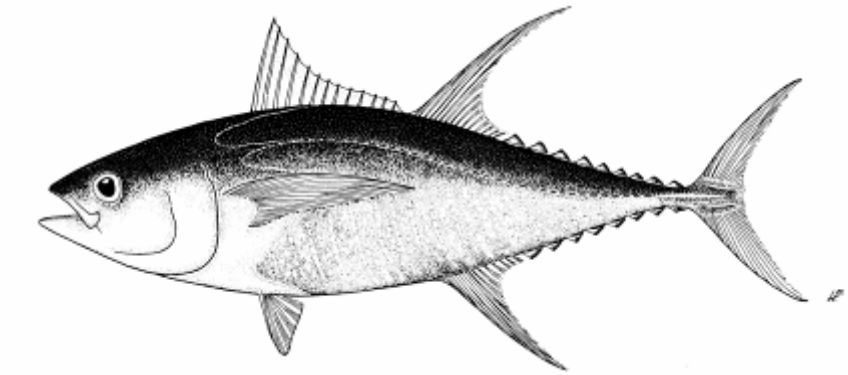
WCPFC–SC1 **FR WP–1**

Western and Central Pacific Fisheries Commission

1st Meeting of the Scientific Committee of the Western and Central Pacific Fisheries Commission
WCPFC–SC1
Noumea, New Caledonia
8–19 August 2005

New Zealand Domestic Tuna Fisheries in 2003 and 2004



T. Kendrick, S. Harley and T. Murray

Ministry of Fisheries, New Zealand..

August 2005

New Zealand Tuna Fisheries in 2004

Terese Kendrick[1], Talbot Murray, Shelton Harley, and Arthur Hore[2]

[1] Trophia Ltd., P.O. Box 60, Kaikoura, NZ
[2] Ministry of Fisheries, P.O. Box 1020, Wellington, NZ

1 Introduction

New Zealand tuna fisheries are based on the principal market species: albacore *(Thunnus alalunga*), bigeye *(T. obesus*), Pacific bluefin *(T. orientalis*), southern bluefin (*T. maccoyii*), skipjack *(Katsuwonus pelamis*) and yellowfin tunas *(T. albacares*). A range of gear types including purse seine, troll, longline, and occasionally pole-&-line and handline are used to catch these species.

Tuna longline species, swordfish and key bycatch species entered into the Quota Management System (QMS) from October 2004 (bigeye, southern bluefin, Pacific bluefin and yellowfin tunas and swordfish: blue, mako and porbeagle sharks, moonfish and Ray's bream). Albacore and skipjack tuna are not currently scheduled for entry into the QMS. Before October 2004, only southern bluefin tuna *(T. maccoyii*), was subject to catch restrictions, with a 420 t national catch limit set by the Commission for the Conservation of Southern Bluefin Tuna.

Tuna-like species slender tuna *(Allothunnus fallai*) and butterfly tuna *(Gasterochisma melampus*) are also caught in small quantities but have little or no commercial value. Striped marlin (*Tetrapturus audax*) is the main target species of a well-established recreational sport fishery in northern New Zealand. While billfish are also regularly a non-target catch on tuna longlines, no marlin species can be kept (whether alive or dead) when caught. Swordfish (*Xiphias gladius*) catches are an important component of the domestic tuna longline fishery.

New Zealand tuna fisheries began in the early 1960s with small but regular troll landings each year, usually of skipjack and albacore. These fisheries developed during the 1970s into the summer albacore troll and skipjack purse seine fisheries. During the 1980s, the domestic handline and troll fishery for southern bluefin tuna developed in winter months but has largely been replaced by longlining since the early 1990s. Starting in 1991, domestic longlining progressively expanded to displace foreign licensed longlining previously done by foreign licensed vessels from Japan and Korea. Handline and troll catches of southern bluefin tuna largely ceased under a competitive fishing regime owing to the quota being taken by longline before fish became available to these gear types.

Today New Zealand tuna fisheries target commercially valuable tuna species when they are present in the EEZ, and tuna fishing, once regarded as minor seasonal fisheries controlled by climatic factors and weather, is now an important year-round activity. In addition to tuna fishing in the EEZ, New Zealand fishers (1989 to 1997) fishing over 1000 miles east of New Zealand, helped to establish the high seas troll fishery for albacore that is now primarily the domain of troll vessels from the USA. A more recent development has been the entry of New Zealand (formerly USA and Canadian) Class-6 purse seiners operating under the FSM Agreement in the equatorial western Pacific for skipjack, yellowfin, and bigeye tunas.

A few domestic vessels have also fished outside the New Zealand EEZ using troll, or longline in most years, mostly in waters adjacent to the EEZ.

1.1 Fleet structure

Four New Zealand flagged Class-6 purse seiners have fished under license in the EEZs of Pacific Island States under the FSM Arrangement and in high seas areas of the equatorial western and central Pacific Ocean using purse seine since 2000. These vessels also now fish part of the year within New Zealand fisheries waters targeting skipjack together with five to seven smaller capacity domestic-based purse

seiners. The number of purse-seiners has been stable over the period at around 10 vessels in each year (Table 1).

The remainder of the tuna fleet consists of around 300 domestically owned and operated vessels (mostly 15 to 25 m LOA) 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. The limited amount of pole & line and handline fishing done is also an occasional activity of these same vessels, rather than done by dedicated vessels.

There has been no foreign licensed access for tuna longline fishing in the EEZ since 1995 and only vessels operated by New Zealand companies can fish in New Zealand fisheries waters. A small fleet of foreign owned and operated longline vessels on charter to New Zealand fishing companies have operated in the EEZ since the late 1980s. These longliners have almost exclusively targeted southern bluefin tuna although on occasion a few have been chartered to target other tuna species in some years. Unites States purse seine vessels fish occasionally in New Zealand waters under treaty arrangements.

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 once these species entered the QMS. Since their position has been clarified (only fishing history prior to 30 September 2000 was used for the allocation), the number of longline vessels targeting tuna has declined, as it was expected to. Table 1 presents a summary of vessel numbers by size class (GRT) for the main tuna gear types since 2002 and shows that most of the reduction occurred in vessels smaller than 50 GRT, although some reduction was also seen in larger vessels. Elimination of smaller longline vessels is likely to be due to the more limited range of weather conditions and more restricted areas of operation in which they would be able to operate effectively relative to larger vessels.

Table 1. Number of vessels in New Zealand flagged vessels fishing for tuna by vessel size class (GRT) and gear type. Note that Many vessels use both troll and longline and will be included in both totals.

Fishing Method	Calendar Year	Total	0 - 50 GRT	51 - 200 GRT	201 - 500 GRT	500+ GRT
Surface Longline	2002	156	105	46	5	0
Surface Longline	2003	132	77	48	5	2
Surface Longline	2004	99	55	39	5	0

Fishing Method	Calendar Year	Total	0 - 50 GRT	51 - 100 GRT	101 - 150 GRT	150+ GRT
Troll	2002	325	284	35	4	2
Troll	2003	283	240	38	3	2
Troll	2004	250	213	33	4	0

Fishing Method	Calendar Year	Total	101 - 200 GRT	201 - 300 GRT	301 - 400 GRT	400+ GRT
Purse Seining	2002	11	1	3	2	5
Purse Seining	2003	9	0	3	2	4
Purse Seining	2004	11	1	3	2	5

Fishing Method	Calendar Year	Total	0 - 50 GRT	50+ GRT
Pole & Line	2002	3	3	0
Pole & Line	2003	2	2	0
Pole & Line	2004	4	4	0

Over half of all vessels fishing for tunas since 2002 (53–59%) have used trolling exclusively with 11–19% of vessels using longline exclusively, while 15–21% use both methods. Relatively few vessels use other gears to catch tunas in New Zealand waters. It should be recalled that although only a few vessels purse seine for tuna in New Zealand waters, purse seining accounts for most of the landings in New Zealand (over 65% of all tunas in tonnage).

The monthly distribution of vessels fishing in 2004 shows the seasonality of tuna fisheries using longline, troll and purse seine (Figure 1). While there is some variation in the distribution of effort from year to year, 2004 is fairly typical and shows most purse seining takes place from January to May (for skipjack), trolling from November to May (for albacore) and longlining takes place throughout the year for a range of tuna species but primarily from March to August.

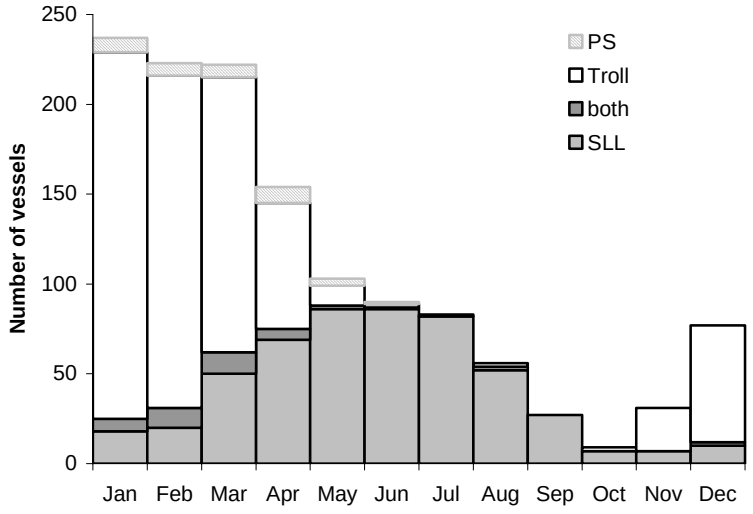


Figure 1: Number of vessels by month and gear type fishing in New Zealand fisheries waters in 2004.

2 Annual catches by New Zealand flagged vessels in the WCPFC Convention Area, 2000–2004

Since October 2001, fishing permit holders have been required to fill out Monthly Harvest Returns that allow the actual landed (in New Zealand) whole-weight of fish taken outside the New Zealand EEZ to be differentiated from landings of fish taken within the NZ EEZ. The landed weight of fish sold offshore (not through New Zealand licensed fish receivers) was estimated through FFA logsheet data and from logsheets provided to the Ministry of Fisheries by the companies operating vessels in these areas.

The catch by species taken within and beyond the New Zealand EEZ is summarized 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 the EEZ. Outside the EEZ, yellowfin makes up most of the balance, but are not part of the purse seine catch in New Zealand waters. Inside the EEZ, purse seine catches are comprised almost exclusively of skipjack.

Inside the New Zealand EEZ, 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, but the greatest part of the catch consists of albacore and swordfish. Pacific bluefin, and yellowfin tunas are taken in small numbers in longline sets, and skipjack is a very occasional catch.

Table 2: Estimated whole weight (t) of tuna and swordfish caught by New Zealand flagged vessels in the western and central Pacific Ocean, by species, 2002–2004 (0 refers to catches < 500 kg).

		2002	**2003**	**2004**
Albacore	EEZ	5 544	6 693	4 451
	ET	22	0	1
	Total	**5 566**	**6 693**	**4 452**
Bigeye*	EEZ	200	205	185
	ET	428	608	0
	Total	**628**	**813**	**571**
Skipjack	EEZ	3 321	4 035	9 424
	ET	15 812	15 445	10 865
	Total	**19 133**	**19 480**	**20 288**
Pacific bluefin	EEZ	56	41	67
	ET	0	0	0
	Total	**56**	**41**	**67**
Southern bluefin	EEZ	463	390	401
	ET	2	0	0
	Total	**465**	**390**	**401**
Yellowfin*	EEZ	25	40	57
	ET	3 107	2 945	2 500
	Total	**3 132**	**2 985**	**2 557**
Swordfish	EEZ	917	635	532
	ET	8	1	6
	Total	**924**	**637**	**538**

* ET purse-seine catches of bigeye and yellowfin tuna are combined for 2004

2.1 Catch and effort in New Zealand fisheries waters by gear type in 2004

Tuna and billfish catches within New Zealand fisheries waters in 2004 are summarized in Table 3 by gear type for all tuna fishing methods. In addition a small amount of incidental catch, primarily of swordfish, also occurs in various trawl fisheries. Longline effort in New Zealand is largely targeted at bigeye and southern bluefin tunas, and accounts for almost all of the catch of those species (over 90% by weight in 2004). Most albacore was taken by trolling: (70% by weight in 2004), with the balance mainly taken by longline. Skipjack was taken almost entirely (over 99% by weight) by purse seine in 2004. Small amounts of skipjack are also taken by longline and trolling. Due to the prohibition on landing marlin taken in New Zealand waters, no marlins landings were reported. A minor amount of short-billed spearfish (< 150 kg) was landed. Nearly all of the swordfish catch in 2004 was taken by longline.

Table 3. Estimated landings of tuna and billfish (whole weight, tonnes) in New Zealand fisheries waters in 2004 by tuna fishing method.

	Longline	Handline	Troll	Purse seine	Pole-&-line	Total
Albacore	1360.0	0.0	3091.0	0.0	0.5	4451.4
Bigeye	177.3	0.0	7.8	0.0	0.0	185.2
Pacific bluefin	43.6	22.2	1.6	0.0	0.0	67.3
Southern bluefin	399.5	0.5	1.0	0.0	0.0	401.0
Skipjack	< 0.1	0.0	< 0.1	9423.6	< 0.1	9423.6
Yellowfin	< 0.1	0.0	< 0.1	56.6	0	56.6

Longline fishing is carried out throughout the year, with effort peaking during autumn and early winter. Trolling and purse seining are both seasonal (summer) fisheries, with trolling taking place over a longer period (November to May) than purse seining, which is restricted in most years to the 3 to 4 months of summer. The seasonal distribution of catches by species reflects the seasonal patterns of effort for the main fishing methods. Skipjack catches are greatest during January to April, as are catches of albacore, however albacore is caught starting in December (Figure 2). Trolling for juveniles finishes after May, but larger albacore are caught throughout the year by longline.

Swordfish and the bluefin tunas are caught throughout the year but peak during early winter as a function of the amount of effort targeting southern bluefin at that time. Bigeye and yellowfin are caught in small numbers throughout the year, but appear to be least available during May and June, though this is also a function of increased effort targeted at southern bluefin (Figure 2).

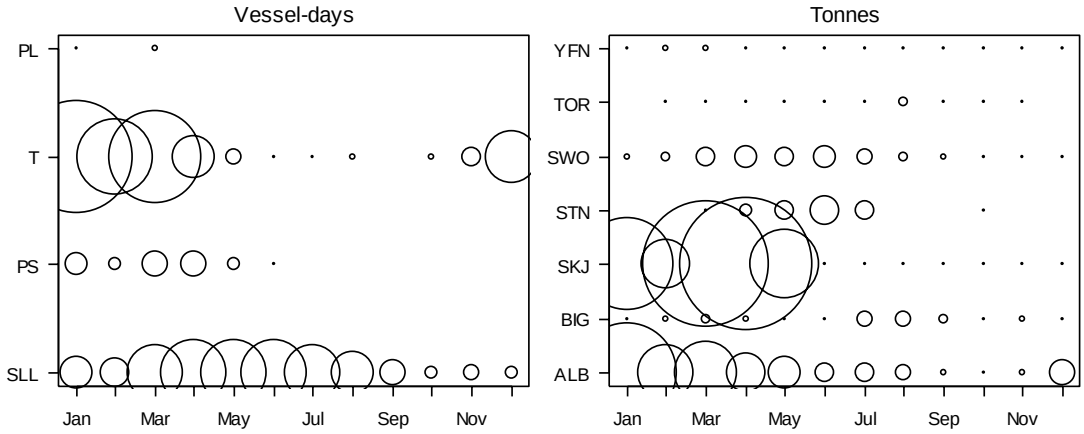


Figure 2: Seasonal distribution of effort (vessel-days fished) by method, and catch (t) by species, in the New Zealand EEZ in 2004.

2.2 Catch in waters beyond the New Zealand EEZ by gear type in 2004

In 2004 minor catches were made of a number of tuna and swordfish by longline and troll fisheries in high seas areas adjacent to the New Zealand EEZ. In contrast, New Zealand owned and operated Class-6 purse seiners caught substantial quantities of skipjack (10 865 t) and yellowfin and bigeye tuna combined (2 498 t) in high seas areas and in the EEZs of FFA member States under license arrangements.

2.3 The Longline fishery

The longline fleet consists mainly of domestic owner-operated vessels of between 15 and 25 m overall length, and a few (seven in 2004) larger vessels of around 55 m long that tend to fish in company, and are referred to as the charter fleet although it includes one domestically owned and operated vessel.

Effort in the longline fishery is in two non-overlapping target fisheries, a more northerly, warmer water fishery for bigeye, that extends throughout the year, and descends into higher latitudes during the summer months (Figure 3), and a cooler water fishery for southern bluefin tuna that occurs only in Autumn/Winter (Figure 4). The southern bluefin fishery occurs concurrently in two discreet areas, one in latitudes below 40^{o}S, off the west coast of the South Island (SW), and the other, three to four degrees further north, off the east coast of the North Island (NE).

Other species are often reported as target species, but those records are sporadic, may in some cases be spurious, but in any event, overlap the spatial-temporal windows of the two main target fisheries, with no demonstrable differences in fishing practice between them.

In this report the fisheries are defined by latitudinal band and month, regardless of the species reported as targeted. The latitudinal bands represent the coarsest common resolution of latitude used across fishing methods, and correspond approximately to domestic statistical areas used for reporting position for methods other than longline and purse seine (ie. troll). Longitudinal information is condensed to either west or east of New Zealand, and relative statistics plotted to show distributions by month and latitude within a year.

In 2004, the larger longliners of the charter fleet, fished almost exclusively in the (SW) southern bluefin tuna fishery, where catch rates of SBT are considerably higher, and weather conditions considerably heavier than in the NE fishery. The smaller owner-operated vessels that also fished this window achieved higher hook rates than the charter vessels, but similar day rates of southern bluefin. In previous years, the southern bluefin tuna longline fishery operating at these higher latitudes has also extended into waters off the east coast of New Zealand.

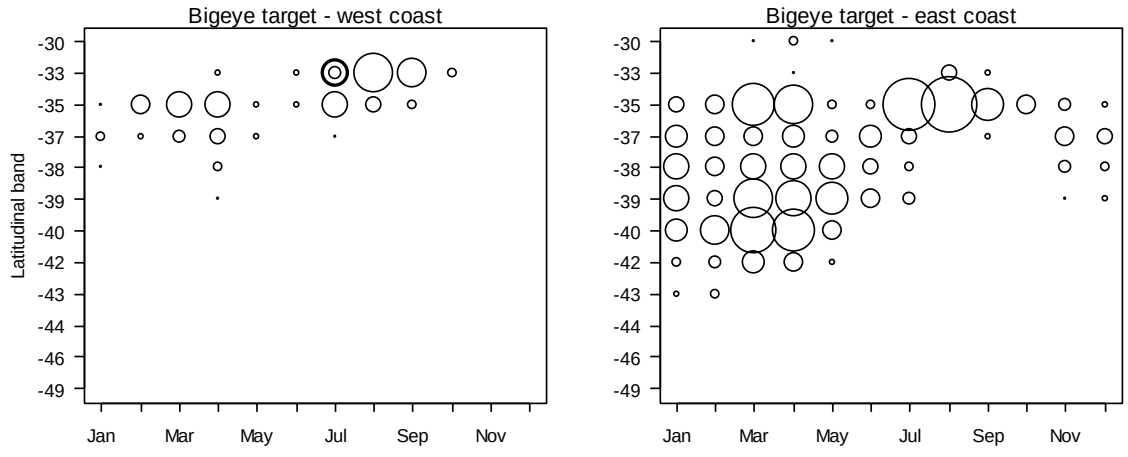


Figure 3: Distribution of longline effort targeting bigeye tuna, with latitude, in the NZ EEZ during the 2004 calendar year, shown separately for waters off the west and east coasts of New Zealand. The area of the circle is proportionate to the number of hooks set in a latitudinal band and month. Bold circles indicate effort by the charter fleet.

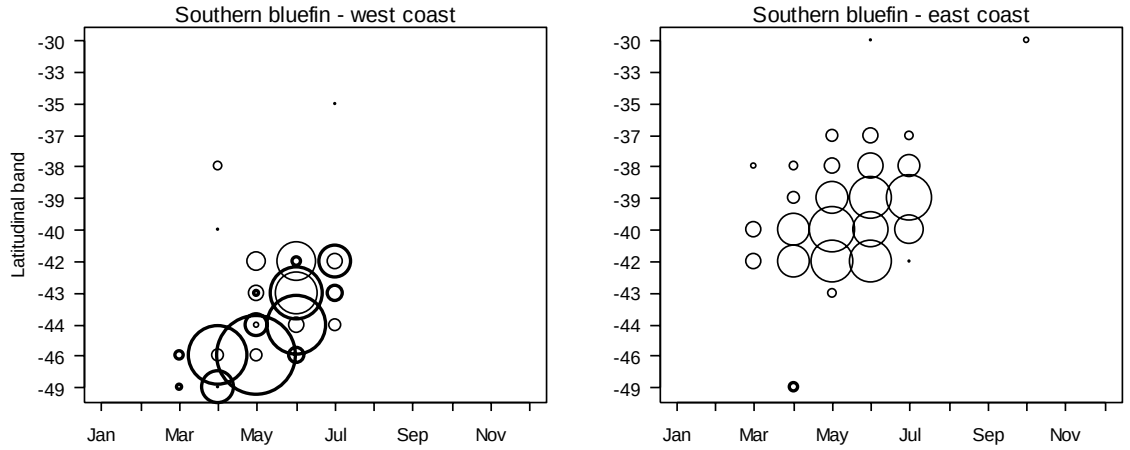


Figure 4: Distribution of longline effort targeting southern bluefin tuna, with latitude, in the NZ EEZ during the 2004 calendar year, shown separately for waters off the west and east coasts of New Zealand. The area of the circle is proportionate to the number of hooks set in a latitudinal band and month. Bold circles indicate effort by the charter fleet.

Albacore and swordfish comprise most of the tuna catch on longlines (by weight), and are caught in both the bigeye and the (NE) southern bluefin fisheries. The highest catch rates of albacore are reported along the southern limit of these fisheries, while swordfish catch rates are homogenous throughout. Both albacore and swordfish are also caught, though at much lower rates, in the (SE) southern bluefin fishery.

Bigeye and southern bluefin tuna, taken in targeted fishing, comprise the third or fourth largest (tuna) catch. There is little overlap of the occurrence of these two species.

Yellowfin tuna are caught, although less commonly, throughout the spatial and temporal extent of the bigeye fishery, but with the higher catch rates in more northern latitudes. Pacific bluefin are taken in small numbers throughout the bigeye and (NE) southern bluefin fisheries, but less commonly in the (SW) southern bluefin fishery.

2.4 The troll fishery

The troll season, starting in November or December, is approximated in this report by the New Zealand fishing year, which extends from 1 October to 30 September. The troll fleet in the 2003–04 season included 253 vessels, 58 of which also fished using longline gear during the year.

Practically all (99.9%) of the troll effort is targeted at albacore. Albacore is the main tuna species taken, along with small amounts of skipjack (less than 100 tonnes per year), with occasional catches of other tuna species and swordfish (Table 4).

The pattern of albacore catches in 2003–04 resembled that of effort, with the emphasis shifting steadily southward from December through to April. Catch rates on the east coast of the North Island are as high as in the West Coast fishery (North and South Island) though the actual amount of effort and of catch is much lower (Figure 5).

Table 4: Total landed whole weight of troll catch (tonnes) by species, for the fishing years 1999-00 to 2003-04. Totals scaled to LFRRs or MHRs.

Fishing	Landed wholeweight (t)							Total
year	Albacore	Bigeye	Skipjack	P. bluefin	S. bluefin	Yellowfin	Swordfish	catch (t)
99/00	3336	2	37	0	2	3	0	3380
00/01	3431	1	71	0	0	10	1	3514
01/02	3255	0	47	0	0	1	1	3304
02/03	4305	1	14	0	0	1	1	4322
03/04	4113	4	31	7	2	7	0	4163

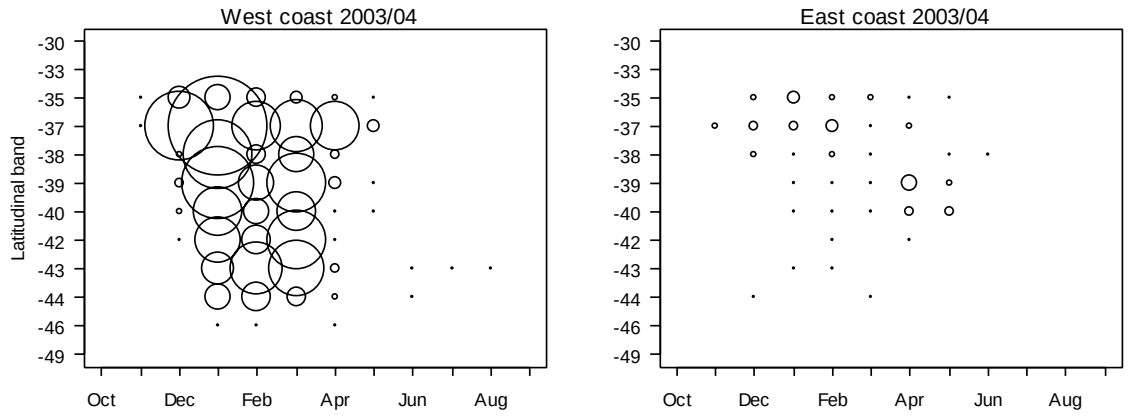


Figure 5: Distribution of troll effort (vessel-days), for the fishing year 2003–04, by latitude, and season, down the West coast [left] and the East coast [right] of New Zealand. Target species is predominantly albacore. The vertical axis labels approximate the lower boundary of latitudinal bands corresponding to statistical reporting areas. The area of the circle is proportionate to the number of vessel-days fished in a latitudinal band and month.

2.5 The Purse Seine fishery

The purse seine fleet in 2004 consisted of 11 domestically owned and operated vessels and this year included four Class-6 purse seiners. The participation of these additional large vessels for parts of the season has almost doubled the annual effort, and more than doubled the annual catch compared with the previous three years. All purse seine effort is targeted at free schools of skipjack although occasional catches of albacore and yellowfin have been reported.

Purse seining has historically been an east coast North Island activity, but effort since 2002 has shifted to the west coast of the North Island, with almost equal effort expended off both coasts in 2004. In 2004, purse seining started in December and finished in May, extending the season considerably compared with the previous year.

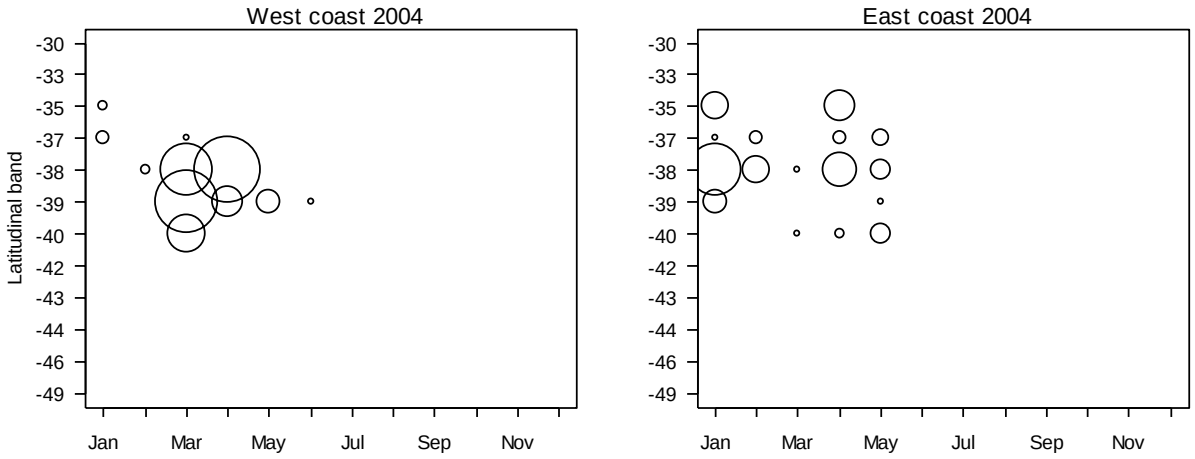


Figure 6: Distribution of purse seine effort (number of sets), for the calendar year 2004, by latitude, and season, off the west and east coasts of the North Island. The vertical axis labels approximate the lower boundary of latitudinal bands, the area of the circle is proportionate to the number of sets in a latitudinal band and month.

3 Bycatch in New Zealand Tuna fisheries

Bycatch is a feature of many tuna fisheries, particularly those using longline and purse seine. Fishers are required to furnish returns for all species taken and landed (both target and bycatch). In New Zealand tuna fisheries only longline fisheries have received adequate observer coverage to enable independent characterization of the bycatch including discards of non-commercial species. The Ministry of Fisheries is planning to extend observer coverage to the purse seine fishery and is in the process of developing observer data collection forms for the troll fishery using SPC forms as a starting point. The target observer coverage for the longline fishery is 10% of the catch.

Fish and non-fish bycatch in the New Zealand longline fishery is regularly assessed and a summary of tuna longline catch for 2000-2002 was presented to the Ecosystem Working Group at SCTB-17 (paper ECO-6). Briefly, the top non-tuna or billfish species taken in the tuna longline fishery are blue shark, Ray's bream, porbeagle shark, dealfish, lancetfish, and moonfish. In October 2004, all but lancetfish and dealfish were introduced into the QMS. Key tuna longline target and bycatch species are subject to the QMS and have total allowable commercial catches set. Furthermore, we have recently undertaken studies of the biological characteristics of blue shark, Ray's bream, porbeagle shark, shortfin mako shark, moonfish, and swordfish to determine their likely vulnerability to overexploitation.

A full report of tuna longline and domestic tuna purse-seine bycatch will be presented at the next meeting of the WCPFC-SC in 2006.

4 Markets

The two main markets for New Zealand caught tuna are canning (skipjack and albacore) and the fresh-chilled and frozen sashimi market (other large tunas and swordfish). Canning is done outside of New Zealand. Spain, Thailand and American Samoa are important destinations for albacore and for skipjack, with Australia and Iran also being important for skipjack. Fresh and frozen southern bluefin, Pacific bluefin, and yellowfin tunas and swordfish are exported primarily to Japan, Australia and the United

States of America (Table 5). Export documentation is required for southern bluefin tuna. Some domestic consumption of fresh and smoked tuna occurs, but the volume is small.

Fisheries represent New Zealand's fourth largest export earner, but has undergone a significant decline, largely due to currency exchange rates. Export revenues that peaked at $NZ 1.5 billion in 2001 and 2002 have subsequently declined, primarily due to the strength of the New Zealand dollar against the US dollar[3]. Tuna export earnings began to decline in 2001 and there was a 20% drop in earnings despite an increase in the amount exported over the period (**www.seafood.co.nz** based on data from Statistics New Zealand).

5 Future prospects and developments

Tuna longline species, swordfish and key bycatch species entered into the QMS from October 2004 (bigeye, southern bluefin, Pacific bluefin and yellowfin tunas and swordfish: blue, mako and porbeagle sharks, moonfish and Ray's bream). With entry into the QMS, fishers with recognized catch history received a property right to these fisheries in the form of an individual transferable quota (ITQ). It is expected that fishers will rationalize their investments in fishing and optimize their tuna catching, as has occurred in other New Zealand fisheries. Fishers are now required to cover any catch with Annual Catch Entitlement (ACE generated by ITQ) or pay a financial penalty. In essence we expect to see a continued rationalization of the domestic tuna fleet as a result.

New Zealand is also in the process of developing its NPOA-sharks and this could result in changes to the management of sharks taken as bycatch in tuna fisheries.

Swordfish can legally be targeted from the date of entry into the QMS, they could previously only be taken as bycatch. This may result in changes to fishing practices in the longline fishery that could affect the catch rates of other tuna species.

The significant increase seen in 2004 in purse seine fishing effort by New Zealand flagged Class-6 purse seiners within the New Zealand EEZ is expected to increase in 2005. Only two large seiners were involved during 2004 but it is likely that all four New Zealand flagged Class-6 vessels will be fishing in this manner next year.

Most tuna fishing to date has been conducted around the New Zealand coastal zone. There is an extensive area of New Zealand fisheries waters surrounding the Kermedec Islands that has had little fishing to date and future development of this area is anticipated.

6 Acknowledgements

This report is based on work done for project TUN2003-02 on contract to the Ministry of Fisheries, New Zealand.

[3] Ministry of Fisheries Statement of Intent 2004/08.

Table 5: **Final market destinations of catches. Export statistics from the Seafood Industry Council (www.seafood.co.nz) based on data from Statistics New Zealand). Destinations accounting for less than 1% by species/ processed state, have been excluded in this summary**.

		Equivalent	Destination (% of processed type)								
Species	**Processed state**	**Wholeweight (kgs)**	**JAP**	**AUS**	**USA**	**EUR**	**THAIL**	**SPAIN**	**PAC.ISL**	**A.SAMOA**	**IRAN**
SKJ	Frozen whole	9,812,473		37			38	9		7	9
ALB	Chilled, Headed & gutted	419	100								
	Chilled whole	40,875	100								
	Frozen whole	4,747,843				1	11	74		14	
	Total albacore	**4,789,137**									
SBT	Chilled, headed & gutted	33,374	99		1						
	Chilled other form	123,485	98			2					
	Chilled whole	14,945	95	4	1						
	Frozen fillets	831	18	82							
	Frozen whole	141,454	100								
	Total southern bluefin	**314,089**									
BET	Chilled, Headed & gutted	78,740	94		6						
	Chilled other form	125,983	40	2	58						
	Chilled whole	15,083	88		12						
	Frozen whole	7,290	100								
	Total bigeye	**227,096**									
YFT	Chilled, headed & gutted	8,249	56	3	33	9					
	Chilled other form	1,125	60	40							
	Chilled whole	2,864	52	47		1					
	Frozen whole	36,200		100							
	Processed, cans, jars	67,558		21			25		54		
	Total yellowfin	**115,996**									
PBF	Chilled, headed & gutted	132	100								
	Chilled other form	3,095	100								
	Chilled whole	4,174	86	1	13						
	Total Pacific bluefin	**7,401**									