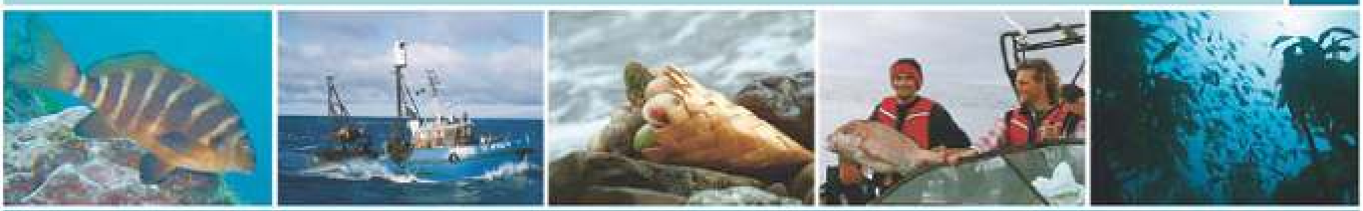
Ministry of
Fisheries
Te Tautiaki i nga tini a Tangaroa

Appendix B: Supporting information (large pelagic species)



New Zealand Government

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SUPPORTING INFORMATION (LARGE PELAGICS)

Scope of this information brief

1 This information brief provides information on fisheries for large pelagic species. The document summarises the current situation for these fisheries under the following headings:

- **Ecosystem information:** information on the biology of large pelagic species, and the ecosystems in which they are found;
- **Use and value information:** how these fisheries are used and the values achieved from them; and
- **Management information:** how these fisheries are managed, including research and other services currently provided.

2 The following species are included:

- Bigeye tuna
- Yellowfin tuna
- Albacore
- Striped, blue, and black marlin
- Blue shark
- Porbeagle shark
- Southern bluefin tuna
- Pacific bluefin tuna
- Swordfish
- Short-billed spearfish
- Mako shark

Further information:

General information on the management of highly migratory species is contained in a summary document available at http://fpcs.fish.govt.nz/FishPlanComplex.aspx?ID=27

ECOSYSTEM INFORMATION

Harvest strategies (international and national)

3 Most of the stocks in this plan are managed under section 14 of the Fisheries Act 1996. In general, New Zealand fisheries are managed in a way that will move a stock towards or enable it to be maintained at or above the biomass that can produce the maximum sustainable yield (section 13). Section 14 outlines some situations in which this might be difficult or not possible to achieve. For highly migratory species, only a small part of the fishery is generally taken within New Zealand fisheries waters. Maximum sustainable yield could not be determined just for the New Zealand portion of the stock. In addition, a national catch limit may be set as part of an international agreement (for example, southern bluefin tuna is managed in this way).

4 Such stocks are listed on the Third Schedule of the Fisheries Act 1996. Their catch limit must be set in a way that ensures use of the stock is sustainable, and meets the purpose of the Fisheries Act to enable utilisation while ensuring sustainability, but may not relate directly to a measurement of maximum sustainable yield.

5 The following table summarises information on how catch limits have been set for these stocks, including both national and international factors.

Stock status

6 Information on the status of these stocks is summarised in table 2 below. Most stocks are assessed in relation to the reference point of maximum sustainable yield. Stocks that are smaller than the stock size that can produce the maximum sustainable yield are considered to be *overfished.*

7 Calculations can also be made on the level of fishing effort (or fishing mortality) that will tend to maintain a stock around the level that can produce maximum sustainable yield. Stocks that are being fished at a greater rate are considered to be subject to *overfishing.*

Table 1: Catch limits and other management controls for stocks caught in SLL fisheries in the HMS plan

Stock	s. 13 or s. 14?	TAC (Date into QMS)	Basis for setting TAC	Relevant RFMO	Additional international obligations (catch limit and/or effort controls)
Bigeye **BIG1**	s. 14	740t (2004)	Not possible to estimate MSY for the part of the stock that is found within NZ fisheries waters. The TAC was based on current utilisation and allowances, with some allowance for expansion of the New Zealand fishery (slightly greater than a 50% increase in the best annual catch of the fishery in recent years (466 tonnes).	WCPFC	For longline fishing: - The total LL catch of BIG in the Convention area will be reduced by 30% from the average catch in 2001-2004 over a 3 year period starting in 2009. - The reductions do not apply to Member and Cooperating Non-Members (CCMs) (including New Zealand) that caught less than 2,000 t of BIG in 2004, who shall instead ensure their catch does not exceed 2,000t in each of the next 3 years. For purse-seine fishing: - a range of measures including seasonal closures to fishing using Fish Aggregation Devices (FADs); effort limits; FAD management plans; catch retention; and juvenile tuna catch mitigation research, which in combination are aimed at reducing BIG catches by purse seine by 30% over the 3 year period starting in 2009.
Blue shark **BWS1**	s. 14	2080t (2004)	Not possible to estimate MSY for the part of the stock that is found within NZ fisheries waters. 6th Schedule applies subject to conditions.[i] TACs were based on the best estimates of current use. Average commercial catch between 2000-01 and 2002-03 was estimated at 1,843t (based on licensed fish receiver data, including blue shark landed as fins). In the absence of information on sustainable yields and regional catch limits, the aim was to prevent an increase in catch beyond current levels, while not unduly restricting utilisation of target fisheries.	WCPFC	WCPFC is not currently actively managing blue shark at present, except through *shark finning measures* – see para 58.
Mako shark **MAK1**	s. 14	512t (2004)	Not possible to estimate MSY for the part of the stock that is found within NZ fisheries waters. 6th Schedule applies subject to conditions. TACs were based on the best estimates of current use. Average commercial catch between 2000-01 and 2002-03 was estimated at 406t (based on licensed fish receiver data, including mako landed as fins). In the absence of information on sustainable yields and regional catch limits, the aim was to prevent an increase in catch beyond current levels, while not unduly restricting utilisation of target fisheries.	WCPFC	WCPFC is not currently actively managing mako shark at present, except through *shark finning measures* – see para 58.
Moonfish	s.14	527t (2004)	Not possible to estimate MSY for the part of the stock that is found within NZ fisheries waters. Most moonfish (70%) is	-	-

Stock	s. 13 or s. 14?	TAC (Date into QMS)	Basis for setting TAC	Relevant RFMO	Additional international obligations (catch limit and/or effort controls)
MOO1			caught as a bycatch of HMS LL fisheries. The TAC was set to provide an opportunity for development of the fishery, since there were no known sustainability concerns.		
Porbeagle shark **POS1**	s. 14	249t (2004)	Not possible to estimate MSY for the part of the stock found within NZ fisheries waters. 6th Schedule applies subject to conditions. TACs were based on best estimates of current use. Average commercial catch between 2000-01 and 2002-03 was estimated at 215t (based on licensed fish receiver data, including porbeagle landed as fins). In the absence of information on sustainable yields and regional catch limits, the aim was to prevent an increase in catch beyond bycatch levels of the time, while not unduly restricting utilisation of target fisheries.	WCPFC	WCPFC is not currently actively managing porbeagle shark at present, except through *shark finning measures* – see para 58.
Rays bream **RBM1**		1045t (2004)	Not possible to estimate MSY for the part of the stock that is found within NZ fisheries waters. Ray's bream are primarily taken as a trawl by-catch. There were no known sustainability issues in the fishery at the time of introduction. A catch limit was set that did not impede utilisation of the target fisheries. Average catches were expanded by 50% to form the TAC and TACC.	-	-
Southern bluefin tuna **STN1**	s. 14	420t (2004)	National allocation determined as part of an international agreement. The TAC applies to all NZ fisheries waters, and catches by NZ nationals in all waters beyond the outer boundary of the EEZ. 6th Schedule applies subject to conditions.	CCSBT	At its Thirteenth annual meeting the CCSBT agreed to an overall TAC for 2007-2009 of 11,810 tonnes, which is a TAC reduction of 3,115 tonnes. NZ's allocation is 420 tonnes. Catch limits for most countries were set until 2009, and will be reviewed at CCSBT's annual meeting in October 2009.
Sword-fish **SWO1**	s.14	919t (2004)	Not possible to estimate MSY for the part of the stock found within NZ fisheries waters. The TAC was based on current catches. Scientific evaluation did not suggest problems with levels of use at the time, and swordfish are considered relatively productive, but there were some concerns large swordfish may be vulnerable to localised over-fishing. 6th Schedule applies subject to conditions.	WCPFC	Both vessel and catch limits have been established for SWO. The number of vessels fishing for SWO in the Convention Area south of 20°S, shall be limited to the number in any one year between 2000-2005 for each CCM. A maximum of 185 NZ vessels may fish for SWO within the area covered by the measure. Swordfish catches shall be limited by each CCM to the amount caught in any one year during the period 2000 – 2006. The relevant catch limit for New Zealand is 1027t (including catches in NZ fisheries waters and on the high seas).
Pacific bluefin	s. 14	120t (2004)	Not possible to estimate MSY for the part of the stock found within NZ fisheries waters. The TAC was set to provide for a	WCPFC; Inter-	None at present.

Stock	s. 13 or s. 14?	TAC (Date into QMS)	Basis for setting TAC	Relevant RFMO	Additional international obligations (catch limit and/or effort controls)
tuna TOR1			level of development of the fishery. In the absence of sustainability concerns, the TAC was set to allow for some development of the fishery beyond historical catch levels.	American Tropical Tuna Commission (IATTC)	
Yellowfin YFN1	s. 14	358t (2004)	Not possible to estimate MSY for the part of the stock found within NZ fisheries waters. The TAC was based on current utilisation and allowances, allowing for a 50% increase in the best annual catch of the fishery in recent years.	WCPFC	There are no specific measures for yellowfin, but catches are expected to be limited by the measures for bigeye tuna (see above).
Albacore ALB	N/A			WCPFC	CCMs shall not increase the number of their fishing vessels actively fishing for South Pacific albacore in the Convention Area south of 200S above current (2005) levels or recent historical (2000-2004) levels. For NZ, this equates to 445 vessels based on the number of vessels reporting albacore tuna landings in 2001.
Striped marlin STM	N/A			WCPFC	CCMs shall limit the number of their vessels fishing for STM in the Convention Area south of 15°S to the number in any one year between 2000-2004. The measure does not apply to coastal state CCMs south of 15°S in the Convention who have already established a commercial moratorium on the landing of striped marlin caught within waters under their national jurisdiction. The latter provision applies in NZ's case. There is a small bycatch of STM by NZ fishers in waters outside of the NZ EEZ.

[i] The Sixth Schedule of the Fisheries Act 1996 lists stocks which may be returned to the sea or other waters in accordance with stated requirements. Blue shark, mako shark, porbeagle shark, Southern bluefin tuna, and swordfish are all listed on the 6^{th} Schedule. In general, the requirements for these species are that the fish is likely to survive on return; and the return takes place as soon as practicable after the fish is taken. Swordfish to be returned must have a lower jaw to fork length of less than 1.25m.

Table 2: Stock status information

Stock	Stock status	Date of assessment	NZ catches (2007)	Regional catches (2007)
ALB	South Pacific albacore is not being overfished, and the stock is greater than that which can support MSY (i.e. is not overfished). The 2008 assessment indicated lower levels of stock size and maximum sustainable yield, which appear to be more realistic than previous assessments. There is uncertainty regarding the sustainability of the South Pacific albacore stock and the SC recommended that catches of South Pacific albacore remain at current levels, considering the current rates of fishing mortality on adult albacore.	2008	2,092t	South Pacific albacore: 59,495 t
BIG1	There is a very high probability that overfishing of bigeye tuna is occurring in the WCPO. Total biomass is not yet less than that which can produce MSY, but the stock is moving in that direction. Furthermore, spawning stock biomass may already be below the level required to produce MSY.	2008	213t	143, 059 t
BWS1	There is no assessment for this stock so it is not known if the stock is at or above a level capable of producing the maximum sustainable yield. Furthermore, it is not known whether current catches or the TAC are at levels that will allow the stock to move towards the biomass that would support the maximum sustainable yield. Due to its biological characteristics, blue shark is possibly less vulnerable to overexploitation than mako or porbeagle sharks.	-	787t*	?
MAK1	There is no assessment for this stock so it is not known if the stock is at or above a level capable of producing the maximum sustainable yield. Furthermore, it is not known whether current catches or the TAC are at levels that will allow the stock to move towards the biomass that would support the maximum sustainable yield. Due to its biological characteristics, mako shark is vulnerable to overexploitation. Compared with a wide range of shark species, the productivity of mako sharks is low. Females have a high age at maturity, moderately high longevity (and therefore low natural mortality rate), and low annual fecundity. The low fecundity is cause for strong concern, as the ability of the population to replace sharks removed by fishing is very limited.	-	78t*	?
MOO1	While there is no information on stock status, available data suggests that moonfish are moderately productive and that most (71%) of New Zealand's catches are of mature fish. Provided that juvenile moonfish are not experiencing high fishing mortality elsewhere in their range, it is unlikely that there are any sustainability concerns for moonfish at this time.	-	79t	NZ landings appear to be ~70% of reported catches in the South Pacific, based on UN FAO data (likely to be underestimated).
POS1	There is no assessment for this stock so it is not known if the stock is at or above a level capable of producing the maximum sustainable yield. Furthermore, it is not known whether current catches or the TAC are at levels that will allow the stock to move towards the biomass that would support the maximum sustainable yield. However, declining catches over a period when effort has increased rapidly, low CPUE in recent years, combined with the low productivity of the species and a history of fishery collapses in the North Atlantic, are all cause for concern.	-	53t*	?
RBM1	It is not known whether overall removals from the stock are sustainable or if they are at levels that will allow the stock to move towards a size that will support the maximum sustainable yield.	-	153t	Up to 16,000t (including southeast Pacific catches)
STM	Several of the plausible model scenarios investigated for southwestern Pacific striped marlin indicate current levels of fishing mortality may be close to or more than the level that would lead to the stock staying around the level of	2007	164†	~2,300t

	biomass that would support MSY. Similarly, current spawning biomass levels may be around or below B_{MSY}. On the basis of this preliminary assessment, the WCPFC Scientific Committee recommended as a precautionary measure that there should be no increase in fishing effort on striped marlin in the southwestern Pacific. This recommendation applies particularly to the area encompassing the Coral Sea and the Tasman Sea as these fisheries account for most of the striped marlin catch in the southwest Pacific.			
STN1	The CCSBT has set a reference point that the parental stock should be rebuilt to the level seen in the 1980s. This level of parental biomass coincided with a period when recruitment (on average) had been stable. Spawning stock biomass is currently at a very low level (generally below 10% of pre-exploitation spawning stock biomass, a level at which recruitment may be at risk of further decline). This is well below the 1980 level and below the level that could produce maximum sustainable yield. Rebuilding the spawning stock biomass would almost certainly increase sustainable yield and provide security against unforeseen environmental events. Presently, however, there is no sign of spawning stock biomass rebuilding. Recruitments in the last two decades are estimated to be well below the levels in the period 1950-1980.	2006 (updated 2008; full stock assessment to be done in 2009)	379t	11,540t
SWO1	Swordfish taken in New Zealand are part of a regional stock in the south west Pacific ocean. The assessment undertaken for swordfish in this region indicated an increase in stock abundance in recent years, and model projections predict further increases at current fishing mortality levels. Plausible assessment results indicate that overfishing is not occurring and that the stock is not in an overfished state. However, due to the uncertainty in the assessment, the SC recommended that there be no further increase in catch or effort in order to keep the stock above its associated reference points. Constraining fishing mortality to current levels was recommended until there is a better understanding of fishing impacts in the south-central Pacific stock and the relationship between this stock and other South Pacific stocks is more certain.	2008	392t	~5,800t for WCPFC convention area south of 20S
TOR1	The stock assessment model estimates variable recruitment through the model period, resulting in three major peaks in spawning biomass through the model period. Fishing mortality rates have increased during the last 10 years, principally for the youngest age classes. The current level of fishing mortality should not be increased. If fishing mortality and environmental conditions both remain stable, then recruitment should be sufficient to maintain current yields. However, a reduction in fishing mortality, in combination with favourable environmental conditions, should lead to greater yield per recruit and spawning stock biomass per recruit and, after some lag, greater sustained yield.	2008	14t	~23,000t
YFN1	The WCPO yellowfin fishery can be considered to be fully exploited. The possibility of overfishing occurring at present for yellowfin is high (47%), although the 2007 assessment is somewhat more optimistic than the 2006 one. Advice from SC in 2007 was that in order to reduce the likelihood of overfishing, and if WCPFC wishes to maintain averagfe biomass at levels greater than 5% above B_{MSY} then reductions in fishing mortality would be required.	2007	25t	431,814 t

* Reported landings do not include sharks discarded alive under the provisions of the 6^{th} Schedule.

† Much of this is recreational tag and release (83.5t) or discarded by commercial fishers, including live fish (16.1t).

Productivity

8 The productivity of different fish species is an important characteristic for helping to determine the appropriate harvest strategy. Numerous factors influence productivity, including:

- the natural mortality rate (what portion of the population dies through natural causes such as old age or predation in a given year). The higher the natural mortality rate of a stock, the more its biomass may fluctuate from year to year.
- how many young the species produces (this can vary from only a few, live young in shark species, to millions of eggs in many other species);
- how frequently the species reproduces (annually, or more or less frequently than that);
- the age at maturity;
- growth rate; and
- how long the species lives.

9 Natural mortality can be a good proxy for indicating how vulnerable a species will be to fishing. In general, species with high natural mortality are less vulnerable to fishing. Such species are often short-lived, and even in the absence of fishing there is high population turn-over from year to year. Longer-lived species tend to have more stable populations, but tend to be more vulnerable to overfishing.

10 Tuna species tend to have relatively high productivity. Some of the HMS bycatch species including pelagic sharks are less productive, and have life history characteristics that make them more vulnerable to overfishing.

11 Annex 1 summarises the available information on factors that contribute to the productivity (and level of vulnerability to fishing) for large pelagic species.

Information status and research

12 Stock assessments for the major western and central Pacific Ocean tuna species are undertaken by the Oceanic Fisheries Program of the Secretariat of the Pacific Community (SPC). The Scientific Committee of the WCPFC reviews these assessments, except for southern bluefin. CCSBT assesses southern bluefin tuna.

13 For the major tuna species, stock assessments occur regularly, although there are gaps in available data, including detailed catch and effort information for some fleets. Information is more limited for the bycatch species including the pelagic sharks, rays bream, and moonfish. At its annual meeting in 2008, WCPFC agreed that the Scientific Committee would, in 2010, provide preliminary advice on the stock status of key shark species including blue shark, oceanic whitetip shark, mako sharks and thresher sharks.

14 The distribution and abundance of these species within New Zealand fisheries waters is inferred from information from the fishery. Most research currently focuses on obtaining basic biological information (e.g. growth and natural mortality), catch information, non-target catch information, and time series of abundance indices for most species. This information is needed in order to estimate biomass and sustainable yield, and assess the effects of fishing on non-target species. Annex 2 provides additional information on the distribution of large pelagic species.

Further information:

- New Zealand Pelagic Fisheries. Medium Term Research Plan 2007/08 to 2009/10. August 2007. Prepared by the Ministry of Fisheries Science Group, the Pelagic Fisheries Managers & the Pelagic Fisheries Research Planning Group

Biodiversity

Effects of fishing on biodiversity

15 Most of the pelagic species in this plan are 'apex' or 'top' predators. They consume a range of fish and squid species. Adults of the species have few natural predators, although juveniles are likely to be an important food source for various HMS. Animals that hold such a position are thought to play a crucial role in maintaining the health of an ecosystem. Apex predators may exert substantial control over the sizes of the populations of many species on lower levels of the food web. Consequently, they may contribute to the stability of marine ecosystems, and maintain biodiversity.

Habitats of particular significance to fisheries management

16 Distribution of HMS varies by species (see annex 2). In general, tuna are seasonal in their distribution in New Zealand waters, and this distribution is governed to a large degree by temperature, and potentially the distribution of food. While there are known fishing grounds for species such as bigeye and southern bluefin, the timing and detail of their distribution can vary from year to year.

17 Key areas of importance for fisheries management – for example spawning and juvenile grounds – are outside of New Zealand fisheries waters.

Ecologically related species

Seabirds

18 Scaled estimates of seabird captures based on observer coverage are provided in Table 3. These estimates are uncertain. Seabirds are landed both dead (76%) and alive (24%).

Table 3: Observed and estimated seabird interactions for pelagic longline vessels based on fisher and observer records. Data are provided by 1 Oct – 30 Sept fishing year. (Source: Abraham and Thompson[1])

	2006–07	2005–06	2004–05	2003–04	2002–03
Thousands of hooks	2 639	3 658	3 644	7 314	10 625
No. observed	955	636	703	1 470	1 883
% observed	36.2%	17.4%	19.3%	20.1%	17.7%
Observed captures	187	37	41	71	115
Estimated captures	948	660	192	384	140
Confidence interval	585 - 1 445	280 - 1 150	98 - 315	168 - 656	133 - 149
% eff. in estimate	100.0%	93.0%	86.0%	91.1%	22.5%
Captures					
White-capped albatross	29	2	3	17	2
White-chinned petrel	5	1	3	2	3
Sooty shearwater	2	0	0	3	10
Other albatross	122	23	30	42	73
Other birds	29	11	5	7	27

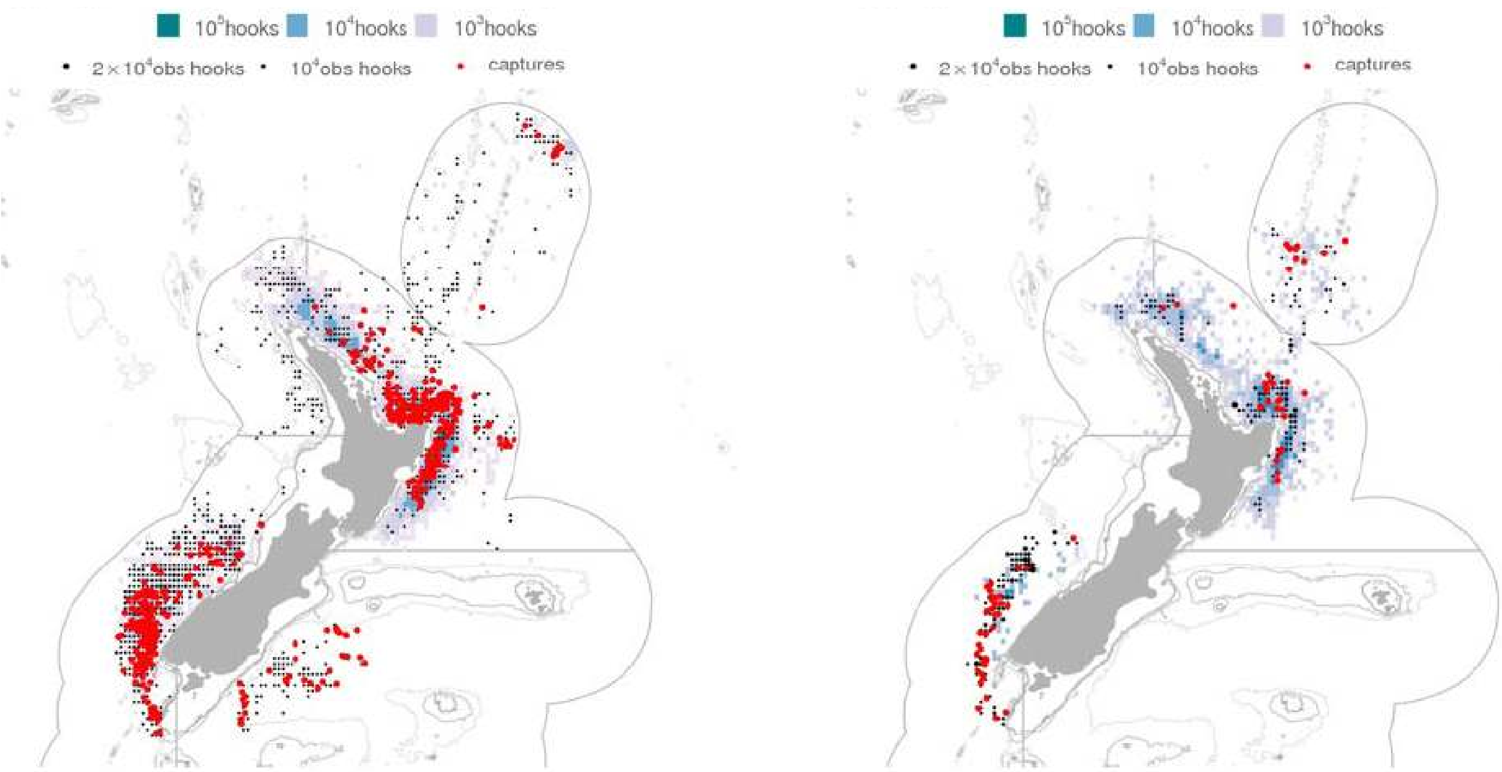


Figure 1: All bird captures in the surface longline fishery: a) mapped effort and captures from 1995-96 to 2006-07 (showing annual averaged effort and observations, but all captures); b) 2006-07 effort and captures.

[1] Abraham, E.R. and Thompson, F.N. (2008) Capture of protected species in New Zealand commercial fisheries, 1995–96 to 2006–07. Draft New Zealand Aquatic Environment and Biodiversity report.

Bycatch monitoring

19 Monitoring in the Joint Venture tuna fishery provides coverage of high quality. The fisheries covered in this plan have monitoring that allows estimation of the total protected species caught in all areas (CV is less than 20%) and the species composition of catch is well known. More than 80% of all effort is covered by observers, and more than 75% of all fishery areas are sampled. The estimated total captures for each protected species are known.

20 For domestic tuna and swordfish fisheries, the data is of poor to inadequate quality. The available data do not allow estimation of total protected species captures, nor robust sampling of species composition. Observer coverage is not representative, or covers only some parts of the fishery with representative sampling.

Mitigation

21 Mandatory mitigation requirements in surface longline fisheries are:

- Setting at night, with the use of an approved streamer line (tori line); or
- Setting during the day, with an approved line weighting regime and approved streamer line

22 Seabird mitigation measures for pelagic longliners were revised after an incident in which a single vessel targeting swordfish and tuna in the Kermadec Fisheries Management Area caught a large number of birds. Measures introduced at that time were:

a) Commercial fishers set surface longlines in New Zealand's Exclusive Economic Zone only at night (0.5 hours after nautical dusk to 0.5 hours before nautical dawn[2]);
b) Commercial fishers using the method of surface longlining in New Zealand's Exclusive Economic Zone must deploy a streamer line consistent with existing regulations at all times whilst setting; and
c) Commercial fishers intending to use the method of surface longlining in New Zealand's Exclusive Economic Zone must provide at least five days' notice of departure on a fishing trip to the Ministry of Fisheries.

23 Further revisions were made in February 2008, when the option of setting during the day, if using line weighting and a streamer line, was approved.

24 Table 23 outlines the relevant regulations. MFish recently revised the specifications for bird scaring devices (streamer or tori lines) that must be used when setting surface longlines.

25 WCPFC's resolution on seabird bycatch mitigation outlines a range of mitigation measures – including streamer lines, night setting, and line weighting – from which fishers will be required to use a combination. It is generally accepted that mitigation measures are most effective when used in combination (e.g. use of streamer line and line weighting). Further work is being done on the specifications for various methods.

26 Other factors thought to affect seabird capture rates are fishing area, bait

[2] "Nautical dusk" means the time in the evening when the sun is 12 degrees below the horizon. "Nautical dawn" means the time in the morning when the sun is 12 degrees below the horizon.

thawing, fishing season, and the length of time that baits remain in the surface waters where seabirds can access them by diving. Other measures known to reduce seabird captures in similar fisheries include seasonal fishery closures (e.g. avoiding high-risk areas and seasons), and reduction of discards of fisheries waste during setting and hauling.

Marine mammal and marine reptile bycatch

Marine mammals

27 Thirty nine New Zealand fur seals (*Arctocephalus forsteri*) were captured by surface longline fisheries during 2005 and 2006. Almost all of these were released alive.Captures are more common in the charter fishery that operates for southern bluefin tuna off the west coast of the south island, although the domestic fishery does catch some fur seals off the east coast of the north island.

28 Between 2003-04 and 2005-06, surface longline fisheries captured 5 cetaceans, including two pilot whales and one whale of unidentified species that were caught and released alive.

Marine reptiles

29 Over the period 2001 to 2007, 14 turtles have been reported from the longline fishery (based on reported catches and observer coverage – table 4).

Table 4: Sea turtle interactions for pelagic longline vessels based on fisher and observer records. All turtles, except the one green turtle caught in 2001 were alive on capture and released.

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

30 Ten of the turtles were leatherbacks, whilst the remainder were reported as green turtles (two), loggerhead (one), and one was unidentified. When an observer is onboard, a photograph is usually taken which makes it easier to confirm the species of turtle caught. All but one of the turtles were alive when caught, and were released alive.

31 Almost all of the sea turtle interactions occurred during the period of highest sea surface temperatures in New Zealand (February – May), with the others caught in November and June. Based on these records, it is hypothesised that turtles are predominantly found within New Zealand waters during the Austral summer. Confirmation of this assumption will be important when attempting to scale up these observations to provide an overall estimate of sea turtle interactions for the fleet.

32 Most sea turtle interactions occurred in the north of New Zealand, though one leatherback turtle interaction occurred off the southwestern tip of New Zealand. While most longline fishing effort during the first half of the year occurs off the east coast of the North Island, most sea turtle interactions occurred in the Bay of Plenty region, slightly to the north.

Mitigation

33 Members of WCPFC have committed to implementing international guidelines to reduce sea turtle mortality, enhance the implementation of mitigation measures and

report all available information on sea turtle interactions.

34 If commercial fishers accidentally catch sea turtles, the turtle must be released immediately to the sea if uninjured. Injured or drowning marine turtles must be treated in accordance with standards and specifications issued by the chief executive from time to time. This will allow fishers catching turtles regardless of fishing method to make use of new guidelines (effective 1 October 2008) for treating and releasing sea turtles. These guidelines will allow drowning turtles to be treated on board fishing vessels and for improved handling techniques to be used such as de-hookers or dip-nets – designed to reduce sea turtle injury (see annex 3). The Non-Fish Reporting Regulations that came into effect on 1 October 2008 also outline requirements for reporting of any turtle captures.

Fish bycatch

35 The major bycatch species in the longline fishery are now managed under the Quota Management System. 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 managed within the QMS that are taken in tuna fisheries within New Zealand fisheries waters. 1 Oct – 30 Sept fishing year. Includes catches from non-tuna fisheries for some species.

Species	Scientific name	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006-07
Blue shark	*Prionace glauca*	1 415	1 105	914	649	734	656	782
Mako shark	*Isurus oxyrinchus*	319	245	216	100	107	84	76
Moonfish	*Lampris guttatus*	351	342	239	156	111	79	83
Porbeagle shark	*Lamna nasus*	150	119	142	65	60	55	54
Ray's bream	*Brama brama*	926	536	357	157	259	215	149

36 Bycatch figures can also be estimated from observer records of the longline fishery (table 6). Observer coverage is important for estimating catches of the less valuable species that are less likely to be retained or recorded. However, levels of coverage in the longline fishery have historically been low, making it difficult to obtain reasonable estimates.

37 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 more likely to be retained, but may also be discarded alive (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.

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 2006 – 30 September 2007 fishing year.

Species	QMS?	2005-06	2006-07	% Retained	% Alive
Blue shark	Y	98 912	53 297	67.5	94.7
Ray's bream	Y	16 079	28 934	96.8	3.3
Lancetfish	N	10 778	24 961	0.2	31.6
Shortfin mako shark	Y	6 560	3 859	66.1	84.8
Moonfish	Y	2 783	3 728	93.0	75.0
Sunfish	N	-	3 255	3.9	98.5
Bigscale pomfret	N	769	3 098	1.3	82.0
Porbeagle shark	Y	2 817	2 743	78.1	83.2
Escolar	N	1 141	2 425	65.2	70.3
Pelagic stingray	N	-	2 350	0.0	91.8
Rudderfish	N	578	1 352	29.8	88.8
Oilfish	N	1 854	1 229	7.9	90.8
Dealfish	N	237	1 160	0.5	17.1
Deepwater dogfish	N	971	1 141	0.7	95.1
Butterfly tuna	N	737	842	71.3	6.9
Hoki	Y	-	467	87.9	0.0
School shark	Y	75	455	97.9	100.0

Benthic impacts

38 The method of pelagic longlining is not known to have adverse effects on benthic habitats.

USE AND VALUES INFORMATION

Allocations

High Seas

39 Southern bluefin tuna has a national catch allocation set by an RFMO (see table 7). The New Zealand allocation is in turn allocated as individual transferable quota which applies to the catch of southern bluefin by New Zealand nationals throughout the range of the stock (including both within and outside of New Zealand's zone).

40 Conservation and management measures established by WCPFC also place various effort controls on fishing for other HMS stocks in the Pacific (see table 1).

41 New Zealand nationals may only fish on the high seas under the authority of a high seas permit, and in other jurisdictions under bilateral or multilateral fishing arrangements. Vessels operating on the high seas must be listed on the WCPFC and/or CCSBT register of fishing vessels (depending on species caught).

Table 7: Allocated catches of Southern bluefin tuna for Members, Cooperating Non-members and Observers

	Allocated catch (t)
Australia	5265
Fishing Entity of Taiwan#	1140
Japan	3000
New Zealand	420
Republic of Korea#	1140
European Community	10
Indonesia	750
Philippines	45
South Africa	40

The Fishing Entity of Taiwan and the Republic of Korea have both agreed to voluntarily limit their catches to 1000t.

In zone

42 Most HMS stocks were introduced into the QMS in 2004. Skipjack and albacore are managed outside of the QMS. In setting or varying any total allowable commercial catch (TACC), the Minister of Fisheries shall have regard to the TAC for that stock and shall allow for:

- Maori customary non-commercial fishing interests;
- recreational interests; and
- all other mortality to the stock caused by fishing.

43 The following table outlines how the TAC and allowances are set for HMS stocks.

44 Where they have been set, allowances for these stocks were based on historical use of the fishery (e.g. commercial landings data, estimates of recreational take from national diary surveys). Table 1 provides information on the basis on which the

overall catch limit was set.

45 For southern bluefin tuna, the TAC is set as part of an international arrangement (see table 7). Before southern bluefin tuna was managed under the QMS environment, when the New Zealand allocation was exceeded, the domestic catch limit was reduced in the following year by an equivalent amount. CCSBT has not formalised any under and over fishing arrangements. There is an expectation that overfishing of national allocations would be repaid in the following year. Domestically, under fishing rights currently apply to southern bluefin tuna. Individuals can carry forward 10% of unfished ACE to the following year. This has the potential to result in a 10% overcatch in any one year.

46 A commercial moratorium applies to the landing of striped marlin caught within New Zealand's zone. The history of this moratorium is outlined in annex 4.

Table 8: TACs, TACCs, allowances and commercial landings for HMS stocks (2007-08)

Stock	TAC	TACC	Maori customary allowance	Recreational allowance	Allowance for other sources of fishing-related mortality	Commercial landings (tonnes) (within zone)
ALB	N/A	N/A	N/A	N/A	N/A	3,631
BIG1	740	714	4	8	14	141
BWS1	2080	1860	10	20	190	681
MAK1	512	406	10	50	46	74
MOO1	527	527	0	0	0	43
POS1	249	215	2	10	22	41
RBM1	1045	980	5	10	50	151
STM	N/A	N/A	N/A	N/A	N/A	
STN1	420	413	1	4	2	318
SWO1	919	885	10	20	4	350
TOR1	120	116	0.5	1	2.5	13
YFN1	358	263	30	60	5	22

Use and value

Commercial use

Landings and fleet characteristics

47 In numbers, the New Zealand tuna fleet has historically been dominated by around 200 domestically owned and operated vessels (mostly 15 to 25m) that fish for tunas using troll and longline gear. Some of the vessels switch between gear types with the season, or operate part of the year in non-tuna fisheries. Some of these vessels also undertake a limited amount of pole and line and handline fishing.

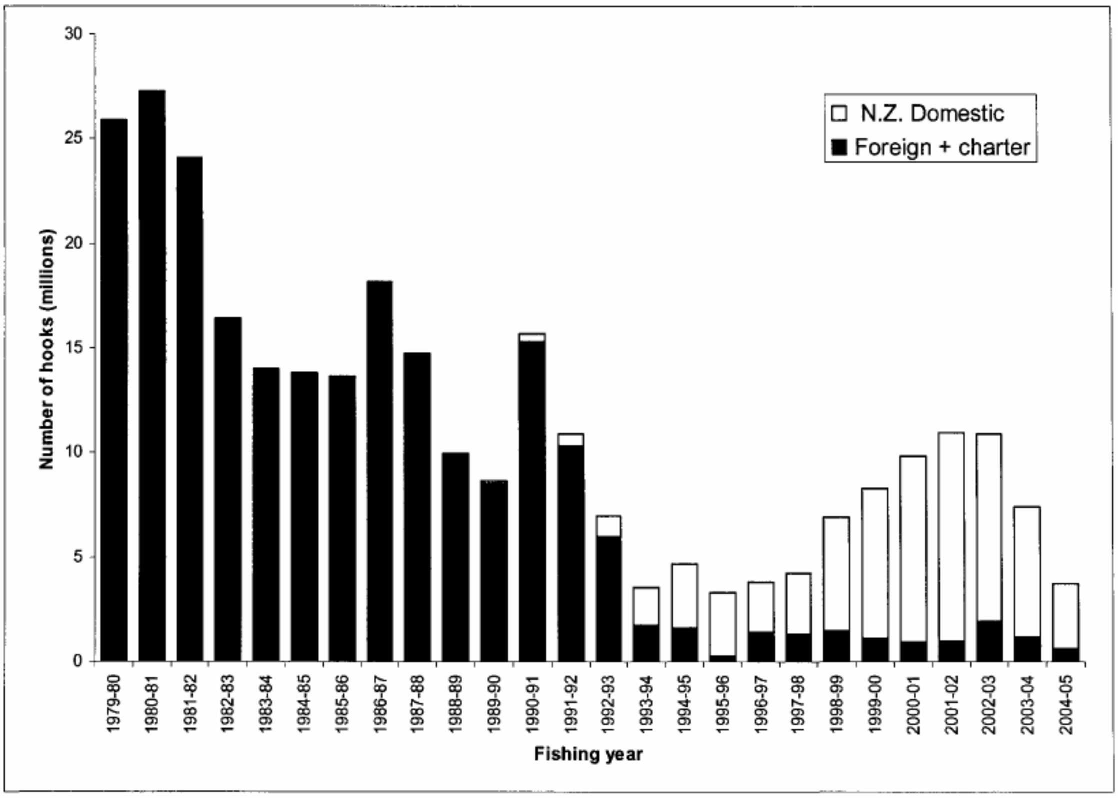
48 However, there has been a significant reduction in the New Zealand tuna fleet since 2001 (see table 11). Most of the reduction has occurred in vessels with a capacity of less than 50 t, although some reduction was also seen in larger vessels.

49 Only vessels operated by New Zealand companies can fish in New Zealand

fisheries waters. There has been no foreign licensed access for tuna longline fishing in New Zealand fisheries waters since 1995, but foreign and charter effort has been substantial in the past (see figure 2).

50 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. In one year, two other foreign owned longline vessels were chartered to target albacore tuna. In 2006 some Australian flagged vessels entered the longline fishery under charter arrangements, targeting bigeye tuna and swordfish.

Figure 2: Number of hooks set by fishing year and fleet from 1979-80 to 2005-05. "Foreign + charter" includes Japanese foreign licensed and charter vessels, Korean foreign licensed vessels, Philippine charter vessels, and one large New Zealand domestic vessel which fished with the charter fleet.



51 Table 9 shows catches in New Zealand fisheries waters, and by New Zealand vessels outside of New Zealand's zone, compared to total catches in the Pacific for the major tuna species.

Table 9: 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, 2001–2007 (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. Regional catches are included where available.

		Calendar year						
		2001#	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Albacore *Thunnus alalunga*								
South Pacific catches		54,666	65,477	60,873	65,106	58,168	69,273	59,495
	NZFW	5,352	5,546	6,677	4,459	3,448	2,540	2,092
	ET	0	12	16	2	1	1	0
	NZ Total	5,352	5,558	6,693	4,461	3,449	4,546	2,092
NZ catches as % South Pacific		9.8	8.5	11	6.9	9.4	6.6	3.5
Bigeye *Thunnus obesus*								
WCPO catches		115,802	131,626	114,830	155,476	163,592	125,874	143,059
	NZFW	481	201	204	185	176	178	213
	ET*	0	7	9	0	335	428	524
	NZ Total	481	208	213	185	511	606	737
NZ catches as % WCPO		0.4	0.2	0.2	0.1	0.3	0.5	0.5
Pacific bluefin *Thunnus orientalis*								
	NZFW	50	55	41	67	20	21	14
	ET	0	0	0	0	0	0	0
	NZ Total	50	55	41	67	20	21	14
Swordfish *Xiphias gladius*								
	NZFW	1 027	919	635	532	326	571	392
	ET	0	0	1	6	18	10	0
	NZ Total	1 027	920	635	538	344	581	392
Yellowfin *Thunnus albacares*								
WCPO catches		430,071	414,735	453,501	370,868	429,299	426,726	431,814
	NZFW	138	25	38	20	36	14	25
	ET*	955	3,531	3,646	2,658	2,600	1,282	1,874
	NZ Total	1,093	3,556	3,684	2,678	2,636	1,296	1,899
NZ catches as % WCPO		0.3	0.9	0.8	0.7	0.6	0.3	0.4
Southern bluefin *Thunnus maccoyii*								
Stock-wide catches**		16,356	16,076	17,776	19,529	15,472	11,738	10,578
	NZ Total	358	450	389	393	264	238	379
NZ catches as % stock-wide		0.8	2.1	1.9	2.4	2.5	2.0	3.6

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.

** These figures are likely underestimates as they do not incorporate the findings from the Market and Farming Reviews

Table 10: Percentage catch by gear type for 2005, 2006, and 2007 for major species taken in New Zealand tuna fisheries in the western and central Pacific Ocean convention area. 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
Southern bluefin	>99				
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	15	<1	0	0	85
Southern bluefin	>99				
Swordfish	100	0	0	0	0
Yellowfin tuna	<1	<1	0	0	100
2007	**Longline**	**Troll**	**Handline**	**Pole & Line**	**Purse seine**
Albacore	17	83	<1	<1	0
Bigeye tuna	29	<1	0	0	71
Southern bluefin	>99				
Swordfish	100	0	0	0	0
Yellowfin tuna	1	<1	<1	0	99

Table 11: Number of New Zealand flagged vessels fishing for tuna in the WCPF 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. Excludes purse seining.

	Calendar	**Total no.**	**Vessels size range (GRT)**			
Fishing Method	**Year**	**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
	2007	44	19	21	3	1
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		
	2007	2	2			
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		
	2007	137	118	19		

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
	2006-07	135	116	19

Fishing patterns

52 Between 1992 and 2005, when most of the large pelagics of significance were introduced into the QMS, tuna fisheries were open to application for target fishing permits. All other non-QMS species were subject to a moratorium on the issue of new fishing permits.

53 The key target species in the longline fishery are southern bluefin tuna and bigeye tuna. Since introduction to the QMS, target fishing for swordfish has increased. Different fishing techniques have been introduced to target swordfish and the application of this method has resulted in concern regarding seabird bycatch (see the section on mitigation of seabird bycatch, above).

54 Longline effort for the domestic longline fleet by quarter is presented in figure 3. Table 12 shows total longline effort by target species.

55 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 (primarily foreign charter vessels). The remainder of the year is focussed around bigeye tuna, swordfish, and other minor target species.

56 Fishing 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 were able to delay catching their quota until later in the season when prices were better. This resulted in more effort off the east coast of the North Island in Jul – Sep 2005 than typically occurred during this time of the year.

Table 12: Annual longline effort (1000s of hooks) by target species. The category other includes Pacific bluefin, yellowfin tuna, and swordfish (since 2005/06).

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	1,669	1,771	129	290	3,859
2006	1,495	1,816	60	322	3,693
2007	1,939	1,525	14	212	3,690

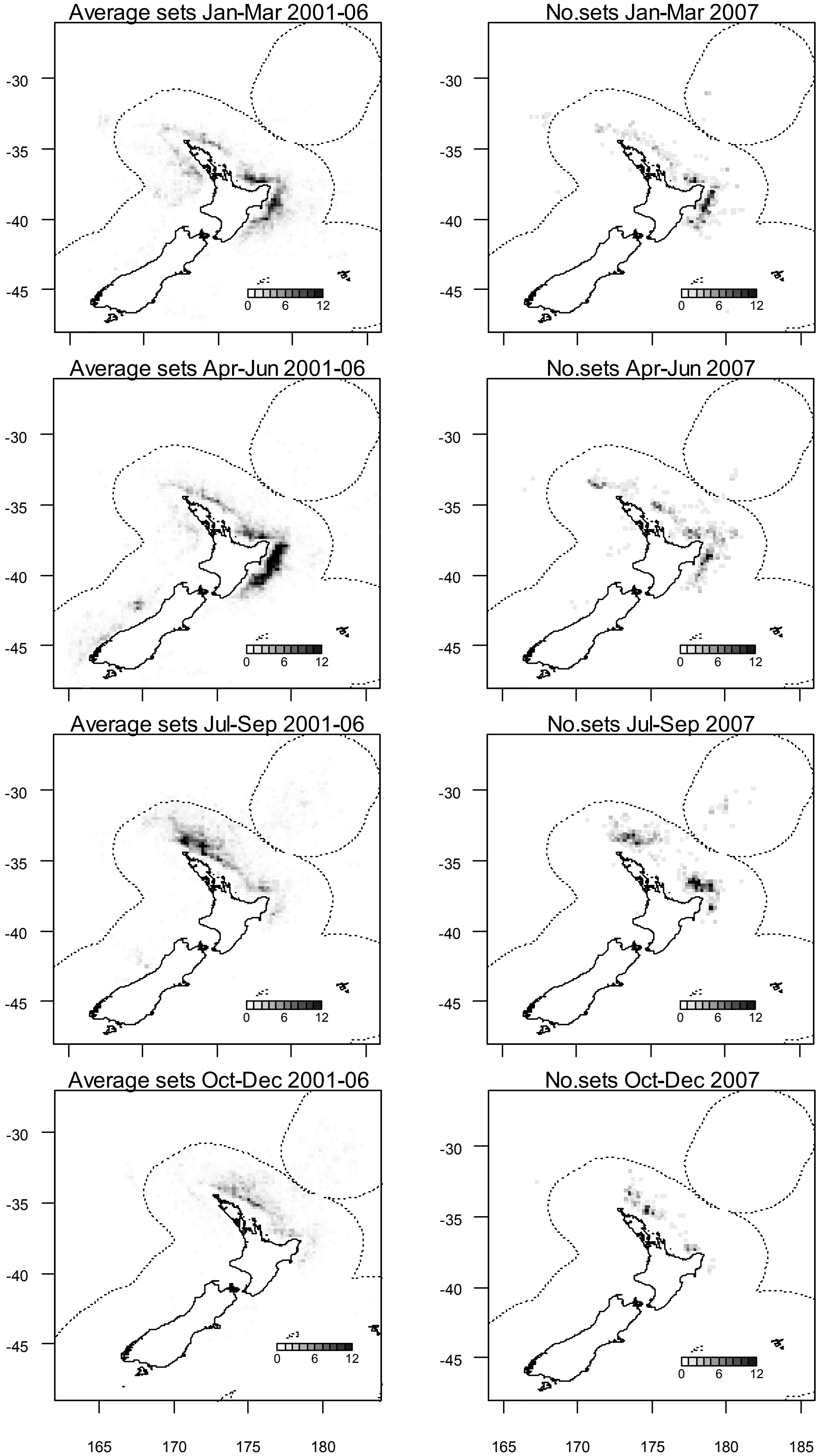


Figure 3: Number of sets per 1/5 degree square for the domestic longline fleet by quarter for 2001-2006 (average) and 2007. Max grey scale is 90th percentile for Apr-Jun.

Processing

57 Different species are processed in different ways. Most albacore is landed whole (greenweight). Limited processing of bigeye, yellowfin, southern bluefin and Pacific bluefin tuna occurs, generally to a gutted or gilled and gutted state. The pelagic sharks are mostly landed as fins.

Table 13: Landed states of HMS stocks (2005-06 fishing year) (kgs). Note that landings returns include some fish that are returned to the sea or eaten on board.

Species	Greenweight	Fins‡	Headed and gutted*	Gilled and gutted**	Dressed	Fish meal	Not specified / other	Fillets †	Shark fins (secondary landed state)	Total
ALB	2,795,744		98	401	1,297	113	1,940	100		2,799,693
BIG	1,148		60	171,542	2,007			45		174,802
BWS	25,187	773,831	755		59,409	715		9	360	860,266
MAK	2,111	57,522	2,676	4	33,856	300		24	0	96,492
MOO	29,927		29,602		20,012	1,536				81,076
POS	5,305	57,151	869	33	7,737	1,043			0	72,137
RBM	46,886		34	6,244	168,113	14,694	4	100		236,074
STM	400		3,048	265						3,713
STN	1590		58	248,053	260	188	256	124		250,529
SWO	3,347		536,831	8,423	12,124	200		455		561,379
TOR	832			20,264						21,096
YFN	984		201	8,651	104			90		10,031
Total	2,913,461	888,504	574,232	463,880	304,919	18,789	2,200	947	360	5,167,288

* Includes Headed and gutted; Headed, gutted, and tailed; Headed, gutted, and finned
** Includes gilled and gutted tail off, tail on; and gutted
†Includes skin-off and skin on
‡ Weights listed here for fins refer to greenweight of whole fish, not to weight of fins (except for fins secondary landed state category).

Shark finning conservation and management measure

58 The practice of live shark finning is of interest internationally. The WCPFC has resolved that:

- CCMs shall implement the FAO International Plan for Action for the Conservation and Management of Sharks, and shall advise the Commission annually on their implementation of the plan (including a National Plan of Action if required);
- National Plans of Action or other relevant policies for sharks should include measures to minimise waste and discards from shark catches and encourage the live release of incidental catches of sharks;
- CCMs shall report on annual shark catches and effort to the Commission.

59 The Commission has further adopted the following measures, that entered into force on 1st January 2008 (initially applying to vessels greater than 24m overall length, but following the Commission meeting in December 2008, extending to all vessels including those less than 24m):

- CCMs shall take measures necessary to require that their fishers fully utilise any retained catches of sharks (defined as retention by the fishing vessel of all parts of the shark except head, guts, and skins, to the point of first landing or transhipment);
- CCMS shall require their vessels to have on board fins that total no more than 5% of the weight of sharks onboard, up to the first point of landing. Alternatively, CCMS may require vessels to land sharks with fins attached to the carcass, or that fins not be landed without the corresponding carcass;
- CCMS shall encourage the release of live sharks caught as bycatch;

60 Coastal States may apply alternative measures for managing and conserving sharks within areas of their national jurisdiction. For New Zealand, setting sustainable catch limits for pelagic sharks under the QMS within its zone fits within this provision. However, New Zealand vessels fishing on the high seas have permit conditions attached to implement the measure.

Commercial value indicators

61 Domestic longlining developed in the early 1990s. The domestic tuna fleet peaked in 2001, and has subsequently declined. Rapid expansion, particularly in the late 1990s through to 2000, initially occurred because tuna fisheries were among the few open access fisheries in New Zealand at that time. Potential eligibility for quota on the basis of fishing history when tuna species entered the QMS also encouraged participation in the fishery. The number of vessels targeting tuna declined following government decisions on catch history years for several important species in the longline fishery (only fishing history prior to 30 September 2000 was used to set quota allocations for these species).

62 A further driver for rationalisation in the tuna longline fleet was the allocation of southern bluefin tuna quota. Many fishers received uneconomic quota amounts when individual shares were allocated. Some responded by purchasing further quota, but many chose to exit the fishery.

63 Recent economic conditions have resulted in further decreases in participation in

domestic longlining and trolling. These conditions include a high New Zealand dollar, rapidly increasing fuel costs and static market value.

64 Quota owners are allocated 'annual catch entitlements' (ACE) which give them the right to harvest a portion of the TACC (table 14). Quota owners may either fish their entitlement themselves, or sell it.

Table 14: Number of quota owners and quota owning concentration as of June 2007

Stock	Number of quota owners	Smallest quota holding	Largest quota holding (% of total shares)	CR3 (% quota holding) *
BIG1	154	3,833	5,076,549 (5.1%)	13.9
BWS1	234	50	12,423,648 (12.4%)	22.9
MAK1	237	246	4,564,209** (4.6%)	13.5
MOO1	171	380	5,769,396 (5.8%)	13.8
POS1	138	155	23,642,791 (23.6%)	41.6
RBM1	294	30	20,824,954 (20.8%)	52.8
STN1	154	3,400	21,027,925 (21.0%)	34.6
SWO1	78	226	34,193,102 (34.2%)	67.3
TOR1	138	14,518	4,564,209 (4.6%)	12.8
YFN1	191	2,281	4,700,760** (4.7%)	13.3

* CR3 is the concentration ratio (% of quota) for the top three quota holding companies (including the Crown and TOKM where they are one of the top three quota share owners) in each stock.
** Owned by the Crown.
Quota shares sum to 100,000,000.

65 Both quota and ACE are traded on the market; the average prices for ACE and quota for HMS stocks are shown below (tables 15 and 16; figures 4 and 5).

Table 15: Average quota share price ($/share and $/tonne) for HMS stocks 2004-05 to 2006-07.

	$/share				**$/tonne**			
Stock	**2004-05**	**2005-06**	**2006-07**	**Average 2004-07**	**2004-05**	**2005-06**	**2006-07**	**Average 2004-06**
BIG1	0.2881	0.1286	0.0865	0.2092	40,350.14	18,011.20	12,114.85	35,619.60
BWS1	0.0795	0.0392	0.0111	0.0295	4,274.19	2,107.53	596.77	2,111.87
MAK1	0.0087	0.0078	0.0029	0.0067	2,142.86	1,921.18	714.29	1,935.65
MOO1		0.0102	0.0051	0.0092		1,935.48	967.74	1,947.13
POS1		0.0031	0.0010	0.0030		1,441.86	465.12	1,447.71
RBM1	0.0114	0.0103	0.0119	0.0111	1,163.27	1,051.02	1,214.29	1,114.31
STN1	0.4858	0.1414	0.1063	0.3514	117,627.12	34,237.29	25,738.50	100,371.00
SWO1	0.1381	0.0460	0.1315	0.0505	15,604.52	5,197.74	14,858.76	5,222.20
TOR1	0.1601	0.0112	0.0217	0.0906	138,017.24	9,655.17	18,706.90	121,192.00
YFN1	0.0428	0.0063	0.0079	0.0274	16,273.76	2,395.44	3,003.80	13,469.90

Table 16: Average ACE price ($ per kg and $/tonne) for HMS stocks from 2004-05 to 2006-07.

	average/kg				average/tonne		
Stock	**2004-05**	**2005-06**	**2006-07**		**2004-05**	**2005-06**	**2006-07**
BIG1	4.2530	2.1793	2.4500		4,253.00	2,179.30	2,450.00
BWS1	0.0619	0.0513	0.0572		61.90	51.30	57.20
MAK1		0.0548	0.0572			54.80	57.20
MOO1	0.2305	0.1695	0.1460		230.50	169.50	146.00
POS1	0.0540	0.0638	0.0594		54.00	63.80	59.40
RBM1	0.1167	0.0630	0.1010		116.70	63.00	101.00
STN1	7.1964	6.2222	7.6210		7,196.40	6,222.20	7,621.00
SWO1	0.9377	0.6633	1.0571		937.70	663.30	1,057.10
TOR1	8.2005	4.0647	4.3407		8,200.50	4,064.70	4,340.70
YFN1	1.2491	1.4948	1.2182		1,249.10	1,494.80	1,218.20

Figure 4: Average quota prices ($ per tonne) 2004 to 2007

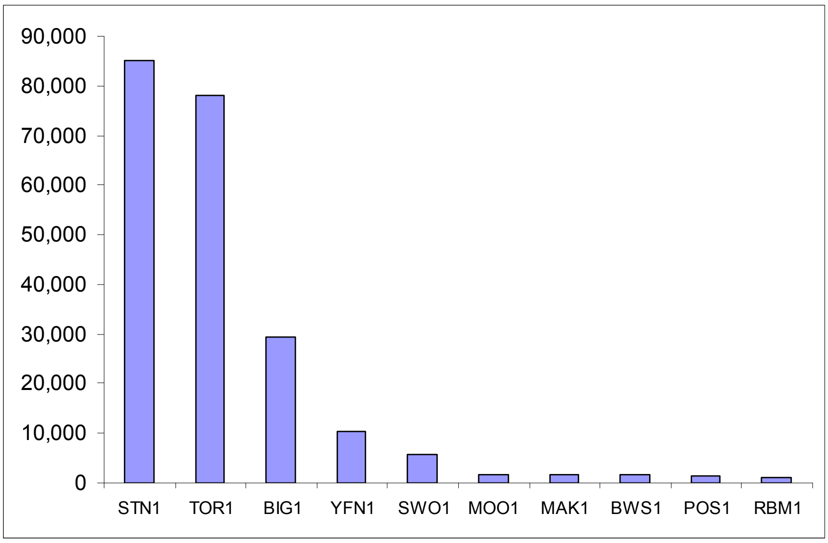
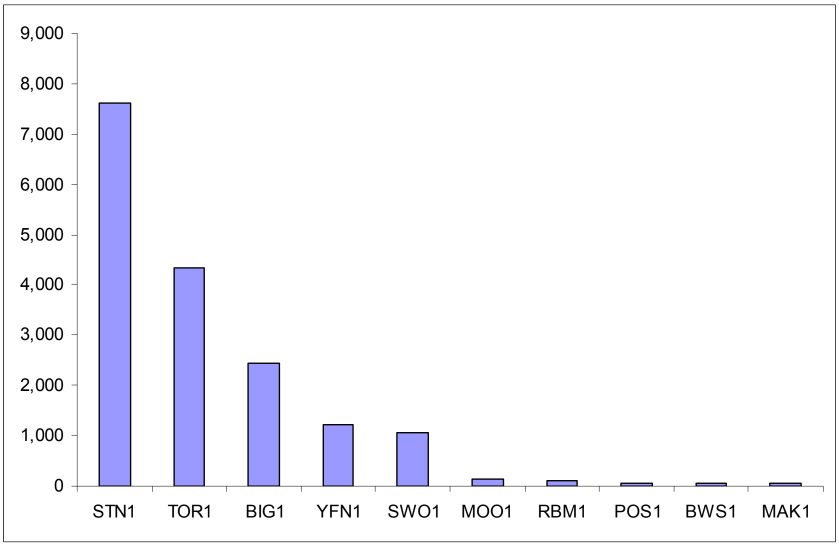


Figure 5: Average ACE prices ($/tonne) 2006-07



66 Most tuna caught in New Zealand waters is exported. Table 17 shows the main product forms, and the volume and value of export products. Although the volume of exported products dropped slightly between 2005 (12,157 tonnes) and 2006 (10,774 tonnes), the value of exports was higher in 2006 ($31,963,516) than in 2005 ($28,639,892). The price per kg ranges from NZ$1.20 for skipjack up to NZ$41.50 for Pacific bluefin (table 18). There is no domestic price information other than port price (Table 20).

67 The destination of exports varies depending on the species (Table 19). 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. In the most recent year most albacore was exported to Spain.

Table 17: Export information for 2006 calendar year

	Nett weight volume (kgs) of exported catch for year to December 2006							
Species	**Frozen whole**	**Chilled whole**	**Frozen fillets**	**Frozen H&G**	**Chilled H&G**	**Chilled other form**	**Other**	**Total**
Albacore	2,711,514	3,490	0	43,000	0	115	0	2,758,119
Bigeye	1,438	2,103	0	0	74,771	118,081	0	196,393
Bluefin	0	2,556	0	0	1,648	34,223	0	38,427
Other	859	2,703	15,005	636	8,433	124,088	95	151,819
Skipjack	7,397,351	0	0	0	0	0	1,840	7,399,191
Southern bluefin	91,514	14,061	26,472	75	7,697	45,041	0	184,860
Yellowfin	0	36	0	0	17,427	4,485	0	21,948
Other processed products*								22,815
TOTAL	**10,202,676**	**24,949**	**41,477**	**43,711**	**109,976**	**326,033**	**3,870**	**10,773,572**
	Value (NZ$) of exported catch for year to December 2006 (FOB+)							
Species	**Frozen whole**	**Chilled whole**	**Frozen fillets**	**Frozen H&G**	**Chilled H&G**	**Chilled other form**	**Other**	**Total**
Albacore	8,602,683	99,837	0	151,283	0	803	0	8,854,606
Bigeye	29,899	39,016	0	0	1,130,834	1,674,200	0	2,873,949
Bluefin	0	93,047	0	0	25,069	1,477,510	0	1,595,626
Other	959	21,344	38,196	1,173	58,946	785,366	1,164	907,148
Skipjack	8,859,224	0	0	0	0	0	18,077	8,877,301
Southern bluefin	3,092,233	285,155	316,561	132	147,929	745,887	0	4,587,897
Yellowfin	0	736	0	0	161,109	48,431	0	210,276
Other processed products*								4,056,713
TOTAL	**$20,584,998**	**$539,135**	**$354,757**	**$152,588**	**$1,523,887**	**$4,732,197**	**$19,241**	**$31,963,516**

* Tunas and AtBonito can, jar; KahBarr Tuna pack other
+ FOB - Free on board. The value of export goods, including raw material, processing, packaging, storage and transportation up to the point where the goods are about to leave the country as exports. FOB does not include storage, export transport or insurance cost to get the goods to the export market.
H&G = headed and gutted

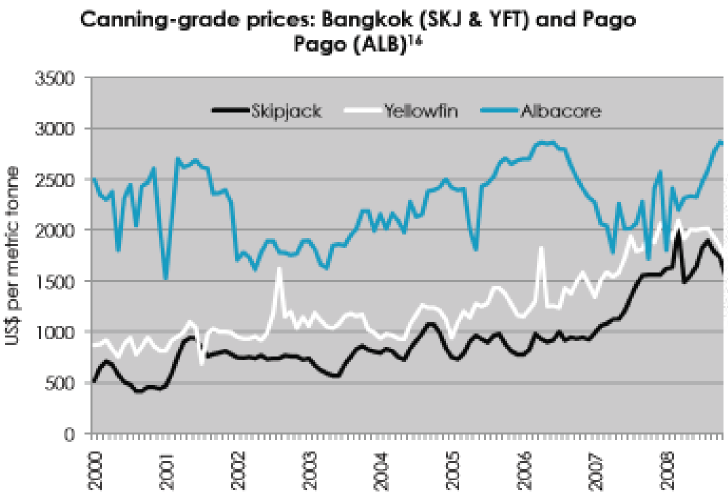
Table 18: Average price per kilo (FOB NZ$ 2006)

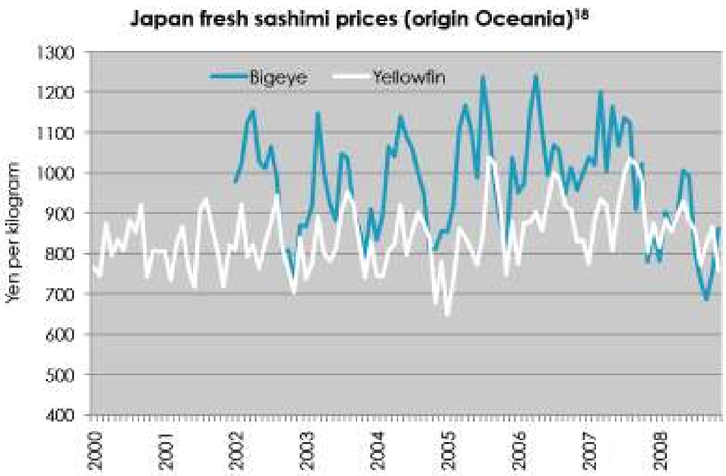
Species	Price/kg
Albacore	$3.21
Bigeye	$14.63
Pacific bluefin	$41.52
Other	$5.98
Skipjack	$1.20
Southern bluefin	$24.82
Yellowfin	$9.58
Processed products	$177.81
TOTAL	$2.97

Table 19: Main export markets (2006)

Species	Principal markets
Albacore	Spain, American Samoa
Bigeye	Japan
Pacific bluefin	Japan
Other	US, American Samoa
Skipjack	Spain, Thailand, Iran
Southern bluefin	Japan
Yellowfin	US, Japan

68 Prices for tuna are set on the global commodity market, and can change from month to month. The following graphs give an indication of price trends since 2000, for canning grade and fresh product.





Source: FFA Fisheries Trade News – January 2009

Further information:

Fisheries trade news (FFA) http://www.ffa.int/trade_news

Table 20: Port price information for HMS stocks ($/kg greenweight)

Fishstock	2006/07	2005/06	2004/05	2003/04
ALB	2.00	2.00	2.18	3.23
BIG1	14.30	6.50	20.18	15.39
BWS1	0.17	0.17	0.69	
MAK1	0.48	0.48	0.84	
MOO1	1.65	1.72	1.96	
POS1	0.47	0.07	0.69	
RBM1	0.83	0.83	0.73	1.18
SKJ	0.68	0.68	0.68	0.68
STN1	22.83	16.00	23.46	21.91
SWO1	6.11	5.07	5.66	6.46
TOR1	10.02	16.00	37.65	
YFN1	7.94	5.00	8.99	10.57

Deemed values and catch balancing

69 Deemed values are set to encourage fishers to balance their catch against ACE. Differential deemed values (that increase the deemed value rate if a fisher exceeds their entitlement by 20% or more) apply to the tuna target stocks, but generally do not apply to bycatch stocks (table 21). Differential deemed values further encourage fishers to hold the ACE necessary for the catch they are likely to take. Table 22 shows deemed value charges in large pelagic fisheries between 2005-06 and 2006-07. All stocks except for Pacific bluefin (TOR 1) have had deemed value charges.

Table 21: Annual and interim deemed values for HMS stocks as at October 2008

Fishstock	Interim	Annual	Differential deemed value?	Maximum differential*
BIG1	7.57	15.14	Y	30.28
BWS1	0.08	0.15	N	N/A
MAK1	0.08	0.15	N	N/A
MOO1	0.25	0.5	N	N/A
POS1	0.08	0.15	N	N/A
RBM1	0.09	0.18	N	N/A
STN1	23.46	46.92	Y	93.84
SWO1	1.50	3.00	N	N/A
TOR1	13.88	27.75	Y	55.1
YFN1	3.37	6.74	Y	13.48

* This figure would apply if a fisher caught 200% or more of their available ACE.

Table 22: Deemed value charges for HMS stocks, number of permit holders charged deemed values, and available ACE.

	2005/06			2006/07			2007/08		
Stock	DV charge	No. permit holders	Available ACE (kgs)*	DV charge	No. permit holders	Available ACE (kgs)*	DV charge	No. permit holders	Available ACE (kgs)*
BIG1	$1,211	2	605,149	$4,133	2	788,730	$500	1	647,298
BWS1	$133	13	1,373,527	$1,089	9	2,055,566	$645	7	1,371,446
MAK1	$957	30	361,319	$164	13	448,602	$69	6	375,604
MOO1	$175	4	497,171	$61	3	582,895	$0	-	-
POS1	$109	9	180,337	$75	7	237,798	$19	1	196,255
RBM1	$1,211	45	860,701	$554	13	1,084,441	$710	34	934,406
STN1	$10,585	2	214,242	$31,991	2	454,200	$0	-	-
SWO1	$12,529	3	418,151	$1,156	3	973,980	$4	1	613,539
YFN1	$1,266	3	279,526	$1,570	1	291,534	$0	-	-

* i.e. ACE available at the end of the fishing year. These figures indicate that deemed values were paid despite ACE being available to cover catches.

Recreational use

70 There are significant gamefisheries for various HMS stocks. Marlins (striped, blue and black), broadbill swordfish, and yellowfin, albacore, Pacific bluefin and southern bluefin tuna are all recognised target species, as are mako, blue and hammerhead sharks. Bigeye and skipjack tuna are recognised bycatch species, along with shortbilled spearfish, mahimahi, wahoo, thresher and porbeagle sharks.

71 The main gamefish season runs from late December to April and focuses, in the North Island, on striped marlin and yellowfin tuna. Fishing for broadbill swordfish can extend the gamefish season beyond the warmest months. There is a developing winter fishery for bluefin tunas.

72 The NZBGFC considers there is potential for world class fisheries in New Zealand waters for striped marlin, Pacific and Southern bluefin tuna, broadbill swordfish, shortbilled spearfish, thresher and blue shark. Various areas in New Zealand already have an international reputation for world class fisheries. The longest established is the Bay of Islands area, for striped marlin. More recently, vessels have increased their fishing range. The King Bank and Middlesex Bank north of the Three Kings Islands have drawn fishers from around the country and the world, targeting striped marlin and swordfish. Westport and Greymouth are drawing bluefin tuna fishers. The abundance of marlin, tuna, and sharks in specific areas changes from year to year. Gamefishers are highly mobile, and tend to congregate in areas of recent fishing success.

History of gamefishing in New Zealand

73 Big game fishing was given international exposure in the early 1920s when Zane Grey wrote about his New Zealand fishing experiences. New Zealand was recognised as the place to catch plentiful and very large striped marlin, swordfish, kingfish and mako sharks.

74 Several clubs were formed around the upper north island, and rivalry between them was fierce. However this rivalry changed in 1956 when the Governor General, Lord Norrie, a very keen angler gifted a gold trophy to the sport. This served to unite the Big Game Fishing

Clubs. The five founding clubs were the Bay of Islands Swordfish Club, Whangaroa Big Gamefish Club, Whangarei Deep Sea Anglers Club, Tauranga Game Fishing Club and the Mercury Bay Game Fishing Club. Initial growth of the New Zealand Big Game Fishing Council (NZBGFC) was slow. From the 1970s, anglers started successfully game fishing from trailer boats, and many began fishing areas not previously noted for game fishing. This led to additional clubs joining the Council, which today has 58 affiliated clubs.

75 The core business of the NZBGFC is collating World and National gamefish records, hosting a yearly 'National' tournament and awarding council trophies. Between 1200 and 1500 anglers compete in the National competition every year. Other functions include submission writing, attending stock assessment working group meetings and supporting / funding tagging and other research on gamefish species.

Recreational catches

76 Gamefish clubs in New Zealand keep good records of the fish that cross their weigh station or are tagged and released. These club records provide a useful starting point for describing the quantum and trends in the catch of gamefish species, although not all fish are covered by these records. Club and IGFA rules determine which fish qualify for inclusion in the records. Rules include minimum weights or lengths, and gear and handling restrictions. The total catch of smaller tuna, and sharks are probably under- represented in club records. Almost all billfish landed are recorded.

77 The NZBGFC's yearbook lists annual tallies by species and club for affiliated clubs. Fish landed are separated from fish tagged and released. Annex 5 gives more information on landed catches and tagged and released fish from NZBGFC records.

78 Area-specific information is also available from catch records of individual fish (landed and tagged) from the main gamefish clubs for the 5 seasons 1999–00 to 2003–04. Although the data set is not complete (in particular lacking data from Gisborne, Hawkes Bay and New Plymouth clubs), it is indicative of the distribution of gamefish catch. Figures 7 to 9 show average annual catches by species group (tuna, billfish, shark) in 40 national recreational fishing zones.

79 Information from national recreational harvest surveys also provides national landed catch estimates for a few gamefish species. The national landed harvest for albacore in 1996 was estimated at 51,000 fish. In 2000, 32 diarists caught 168 fish for a national harvest estimate of 62,000 fish. By comparison, in the 1999-00 season, gamefish club and tagging records recorded 477 albacore.

80 The 2000 diary survey estimated 15,000 yellowfin, 4,000 marlin, and 1,500 mako sharks were landed. Because the sample size was small for these species, these estimates have a high uncertainty. In the 1999-00 season, gamefish club and tagging records recorded 1,112 yellowfin, 1,516 marlin, and 736 mako. The 2000 harvest estimates are considered to be at the high end of the range, but do indicate only a small proportion of the smaller tuna are present in club records. The estimates of large shark and marlin catch, while higher than the catch recorded by clubs, are not too different (probably within the range of estimates if c.v.s were calculated).

81 Recently, an off-season game fishery for bluefin tuna has developed off the west coast South Island (base ports Greymouth/West Port). Fishing is highly seasonal, between July and

September. Fishing success mostly depends on the presence of hoki trawlers for attracting fish to the surface. Both bluefin species are caught, especially at the beginning of the season, but Pacific bluefin is more sought after because of its greater size. MFish has implemented a web-based system for monitoring gamefish catches from charter vessels for the 2007 and 2008 seasons. Eleven tonnes of Pacific bluefin were reported taken during 2007, with a further twenty two tonnes tagged and released.

Customary use

82 Estimates of current customary catch are not available for these species, but in most cases customary catch is considered to be low (particularly because of the offshore and seasonal distribution of many of these species).

83 Maori traditionally ate a wide variety of seafood. No specific records have been found to date of fishing for some of these species, but they were nonetheless potentially part of customary catches, given the distance offshore that Maori fished, and the quality of their fishing materials. Maori trolled lures (for kahawai) that are very similar to those still used by Tahitian fishermen for small tunas and also used large baited hooks capable of catching large southern bluefin tuna. However, Maori names are not commonly known for most of the tunas. Other HMS including pelagic sharks, swordfish (paea), and striped marlin (taketonga or tekeketonga) are named. Customary fishers consider moonfish (aro kura) good eating.

84 Prior to European settlement, Maori caught large numbers of cartilaginous fishes, including blue sharks (ngerongero) and mako. The customary catch of porbeagle sharks was probably negligible, because porbeagles usually occur over the outer continental shelf or beyond.

85 Various commentators have noted mako shark as a traditional target species. The teeth of the mako shark – called ngutukao – were greatly-prized. In the north, the mako was usually caught at or near the North Cape. The mako was attracted alongside by the bait, when a strong mahanga (noose) was passed over its head below the dorsal fin and then pulled tight around the small of the body. It was never caught with a hook, for fear of injuring the teeth. Four teeth were considered of special value, two in the upper and two in the lower jaw. While mostly found near the North Cape, stray specimens are occasionally met with between Rangaunu Heads and Cape Karikari.

Figure 6: Tuna (albacore, bigeye, bluefin, slender and yellowfin) average annual catch by recreational

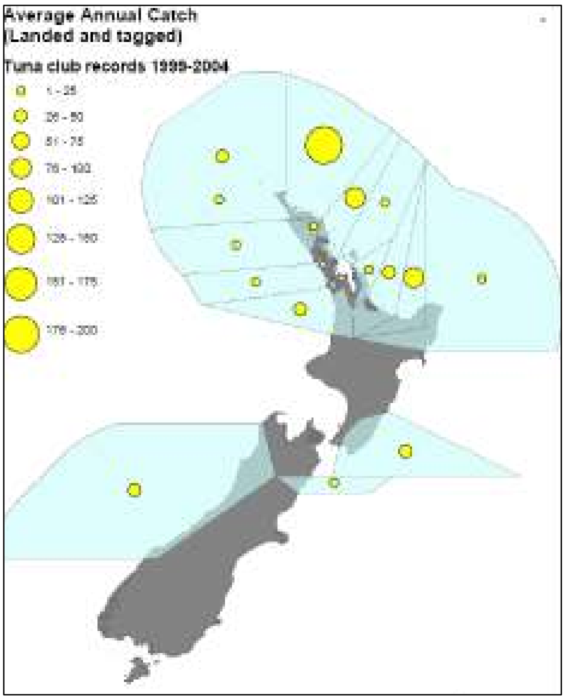


Figure 7. Billfish average annual catch by recreational fishing zone from club records.

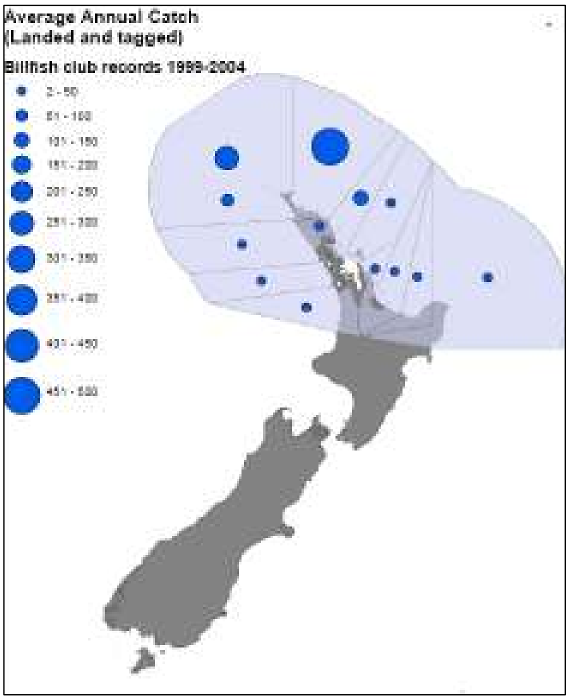
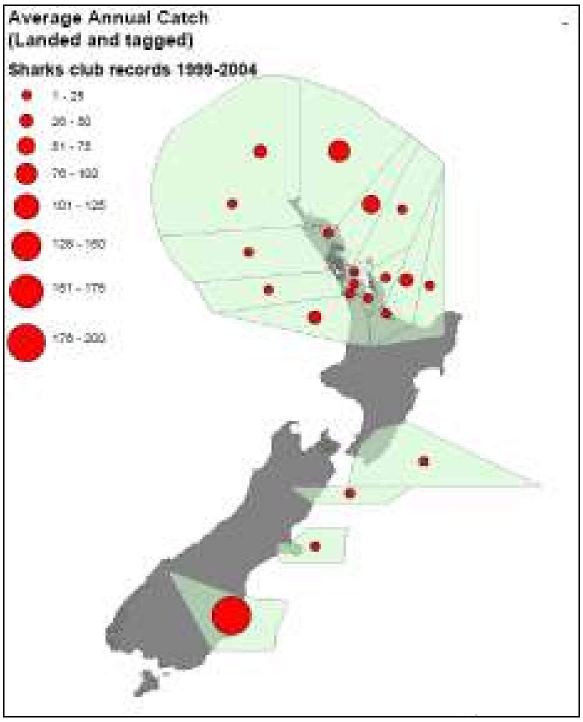


Figure 8: Shark average annual catch by recreational fishing zone from club records.



Further information:

Characterisation of the New Zealand Recreational Gamefish Fishery

Final Research Report. REC2004/02. J. Holdsworth K. Walshe, T. Sippel. 2005.

MANAGEMENT INFORMATION

Stakeholder engagement

86 The advisory group for this fisheries plan includes members from the following groups:

- Customary – Customary input into the plan is facilitated by Pou Takawaenga, who provide updates to contacts including regional forums. Members from Te Hiku o te Ika and Mai i Nga Kuri A Wharei ki Tihirau forums attend advisory group meetings. Te Ohu Kai Moana is also involved.
- Recreational – members of the Big Game Fishing Council and the Recreational Fishing Council are part of the advisory group. Members of MFish recreational forums are provided with updates on the plan.
- Commercial – Commercial attendees include individual fishers and companies, as well as the New Zealand Federation of Commercial Fishermen, SeaFIC, Te Ohu Kai Moana and the New Zealand Tuna Management Association Inc.
- Environmental –ECO and Forest and Bird (as well as Birdlife International) members

International obligations

87 A summary of New Zealand's implementation of WCPFC conservation and management measures is provided in the front section of this report. Measures specific to large pelagic fisheries include those on swordfish, bigeye and yellowfin tuna, striped marlin, seabirds, sea turtles, sharks, and albacore.

Further information:
The full text of WCPFC conservation and management measures and resolutions is available at: http://www.wcpfc.int/decisions.htm

Relevant regulations

88 The main regulations that apply to large pelagic fisheries are:

- Fisheries (Commercial Fishing) Regulations 2001 and regional commercial fishing regulations;
- Fisheries (Foreign Fishing Vessel) Regulations 2001;
- Fisheries (Western and Central Pacific Ocean Highly Migratory Fish Stocks) Regulations 2003;
- Fisheries (Reporting Amendment) Regulations 2005;
- Fisheries (Amateur Fishing) Regulations 1986 and regional amateur fishing regulations;
- Fisheries (Seabird Sustainability Measures—Surface Longlines) Notice 2008

Table 23: Fisheries regulations relevant to large pelagic fisheries

Regulation	Who does it apply to	Date introduced	Purpose of regulation when introduced
Fisheries (Commercial Fishing) Regulations 2001, r 24(2) Foreign owned New Zealand fishing vessels (tuna longliners) must not fish in fish in the Auckland Fisheries Management Area between 1 October of any year and 31 May of the following year.	Commercial	2001	
Fisheries (Commercial Fishing) Regulations 2001, r 25 Operator, notified user or master of vessel has responsibility to tag and release marlin, sailfish and spearfish taken in the Auckland management area	Commercial	2001	
Fisheries (Commercial Fishing) Regulations 2001, r 30 No person may sell or possess for sale marlin taken from New Zealand fisheries waters. Commercial fishers who take marlin— (a) may tag them with a tag supplied by the chief executive, but must return them to the sea; or (b) if the marlin has been tagged already, may retain and land the marlin, but must surrender them to a fishery officer; or (c) in other cases, must return them, whether alive or dead, to the sea.	Commercial	1988	To make marlin a non-commercial only fishery.
Fisheries (Commercial Fishing) Regulations 2001, r 58 Commercial fishers taking tuna by using longlines from a vessel must ensure that— (a) seabird scaring devices approved by the chief executive are carried on a vessel whenever the vessel is being used to take tuna by longline fishing; and (b) seabird scaring devices are used in accordance with specifications (if any) issued by the chief executive.	Commercial	2001	To minimise the environmental impact of longline fishing practices on seabirds.
Fisheries (Seabird Sustainability Measures—Surface Longlines) Notice 2008 (No. F429), 4 Commercial fisher must give written notification to the chief executive of their intention to use surface longlines to take tuna or swordfish within the exclusive economic zone of New Zealand at least 5 days before doing so. The chief executive may exempt any particular commercial fisher from this requirement if satisfied in the circumstances that the requirement is not necessary.	Commercial	2007	
Fisheries (Seabird Sustainability Measures—Surface Longlines) Notice 2008 (No. F429), 5 If a commercial fisher uses a surface longline to take fish, aquatic life, or seaweed within the exclusive economic zone of New Zealand, the commercial fisher must— (a) carry a seabird scaring device approved by the chief executive on board the vessel used by the commercial fisher; and (b) use the seabird scaring device in accordance with the written requirements issued by the chief executive (if any); and (c) permit inspection of the seabird scaring device on board the vessel used by the commercial fisher at any reasonable time by a fisheries officer or an observer appointed under section 223(2) of the Act.	Commercial	2007	
Fisheries (Seabird Sustainability Measures—Surface Longlines) Notice 2008 (No. F429), 6, 7 6. No commercial fisher may set surface longlines to take fish, aquatic life, or seaweed within the exclusive economic zone of New Zealand between the hours of 0.5 hours before nautical dawn and 0.5 hours after nautical dusk, unless line weighting is employed in accordance with clause 7 of the notice. 7. Line weighting—(1) For the purposes of clause 6, a metal weight of 45g or more must be attached for every hook deployed.	Commercial	2008	

Regulation	Who does it apply to	Date introduced	Purpose of regulation when introduced
(2) The position of the weight must correspond to one of the following: (a) Weights less than 60g must be within 1 m of the hook, or (b) weights of 60g—98g must be within 3.5m of the hook, or (c) weights greater than 98g must be within 4m of the hook.			
Fisheries (Auckland and Kermadec Areas Commercial Fishing) Regulations 1986, r 18AA No commercial fisher shall use a set net or longline within 1 nautical mile of seaward of the mean high water mark off the coast of Mayor (Tuhua) Island.	Commercial	2001	Environment protected.
Fisheries (Commercial Fishing) Amendment Regulations 2008 Any marine turtle taken by a commercial fisher that is not injured must immediately be returned to the waters from which it was taken. Injured or drowning marine turtles must be treated in accordance with standards and specifications issued by the chief executive from time to time. Any sea turtle captures, whether alive or dead or irrespective of fishing method must be reported to the chief executive of the Ministry of Fisheries within 48 hours of the arrival of the vessel in port. The report must include the location where the turtles were caught; the species (if known) of the turtles or a general description of them; and a description of tags found on the turtles; and a description of the conditions and circumstances in which each catch occurred.	Commercial	2008	Sea turtles protected, where necessary treated and all catches reported
Fisheries (Reporting) Amendment Regulations 2005, 4(1) A permit holder who targets tuna or swordfish, or on whose behalf tuna or swordfish are targeted, by the method of longlining from a vessel (including a foreign fishing vessel) must complete, and provide to the chief executive, tuna longlining catch effort returns for that vessel.	Commercial	2005	
Fisheries (South-East Area Amateur Fishing) Regulations 1986, 3A Maximum daily number of marlin, blue shark or mako shark that can be taken or possessed in the South-East Fishery Management Area is 1.	Amateur	1986	To control the number of marlin, blue shark and mako shark taken.
Fisheries (Southland and Sub-Antarctic Areas Amateur Fishing) Regulations 1991, 4 Maximum daily number of marlin, blue shark or mako shark that can be taken or possessed in the Southland and Sub-Antarctic Management Areas is 1.	Amateur	1991	To control the number of marlin, blue shark and mako shark taken.

Compliance

89 The main drivers for fishing offences involving HMS include the high value of many of the species, the high demand in international markets, and the extensive and remote areas where these stocks can be found. Information about compliance levels on HMS fisheries is limited, mainly because of recent rationalisation of the domestic fleet, and various HMS stocks entering into the QMS and thus being subject to a different management regime.

90 Ensuring correct species identification is important for these high value tuna species, including in the following situations:

- Pacific bluefin (TOR) have been introduced into the QMS. Northern bluefin tuna

(NTU) were not introduced into the QMS, on the basis that they were not found in New Zealand waters. No catch limit applies to this species. Occasional catches of NTU are still reported, although all genetic testing conducted by MFish confirms that only Pacific bluefin is present here. Unless confirmed by genetic testing, future reports of NTU will be considered as misreporting of TOR, a quota species.

- There is a risk of southern bluefin tuna being mislabelled as bigeye in order to avoid quota constraints. It would be a significant risk to New Zealand's international reputation if mislabelled tuna were exported and discovered in international markets.

91 There are also some incentives to discard southern bluefin tuna of lower quality, even when they are dead. This contravenes the provisions of the 6th Schedule of the Fisheries Act 1996.

92 International requirements are in place to track the catch and trade of major HMS such as tuna and swordfish, regardless of where in the region these are fished or landed. For instance, statistical documents are to accompany exports of bigeye and swordfish, just as exports of southern bluefin tuna require CCSBT Trade Information Scheme (TIS) documents. Agreement was reached in October 2008 for members of CCSBT to implement a more comprehensive catch documentation scheme (CDS) for southern bluefin tuna by 1 January 2010. The CDS will involve tagging, measurements and documentation for individual tuna.

Specific fishery services

93 The following tables outline planned research and observer services for these fisheries (tables 24-27), along with cost recovery information for 2008-09 (table 28). Annex 6 lists the details of the research projects that were cost recovered in 2008-09, and general cost recovery information for 2007-08.

Table 24: Scheduled research services (2007/08)

Project	Description
STM2007/01	Multi-year stock monitoring of striped marlin including logbook programme implementation
SWO2007/01	Stock assessment of swordfish
TUN2007/01	Characterisation of New Zealand tuna fisheries for international obligations
STN2007/01	Catch at age of Southern bluefin tuna
TUN2007/02	Commercial catch sampling programme for highly migratory species
OBS2007/05	Research Observer Services – Pelagic Fisheries
PRO2007/01	Estimating the nature and extent of incidental captures of seabirds in New Zealand commercial fisheries

Table 25: Planned research services (2008/09)

Project	Description
ALB2008/02	Relative abundance of troll caught albacore
PEL2008/02	Analysis of observer data from pelagic fisheries
OBS2007/05	Research Observer Services – Pelagic Fisheries

Table 26: Planned observer days for 2008/09 and 2009/10:

	2008/09	2009/10
	Planned days	Proposed days
Tuna Domestic	457	457
Tuna Charter	368	387
ALB Troll	50	100

Table 27: Observer sea days planned and sea days achieved from 2001/02 – 2007/08.

	2002/03		2003/04		2004/05	
	Plan	Actual	Plan	Actual	Plan	Actual
Tuna Domestic	200	127	200	122	450	260
Tuna Charter	200	194	200	258	300	225

Table 27: continued

	2005/06		2006/07		2007/08	
	Plan	Actual	Plan	Actual	Plan	Actual
Tuna Domestic	550	439	560	242	457	399
Tuna Charter	250		251	254	276	169
ALB Troll	-		-	11	20@	9

* Includes Department of Conservation days.
@ Exploratory coverage to provide fishery characterisation, not intended to provide a statistical sample.

Table 28: Cost recovery information (2008-09 levy) for HMS stocks.

	MFish Research		DoC Research		MFish Departmental				Total Cost Recovery Levy
Stock	Stock	Env.	Fishing interactions	Pop. studies	Compliance	Registry	MFish Observers	DoC Observers	
ALB	$27,143	$7,905	-	-	$71,464	$34,895	$30,246		**$171,653**
BIG1	-	$22,265	$2,190	$4,604	$148,264	$72,395	$127,170	$37,392	$414,281
BWS1	-	$1,020	-	-	$9,224	$4,504	-	-	$14,747
MAK1	-	$251	-	-	$2,265	$1,106	-	-	$3,621
MOO1	-	$1,323	-	-	$11,956	$5,838	-	-	$19,116
POS1	-	$118	-	-	$1,066	$521	-	-	$1,705
RBM1	-	$1,115	-	-	$10,084	$4,924	-	-	$16,123
SKJ	-	$650	-	-	$80,552	$39,332	$60,491		$181,025
STN1	$19,210	$20,045	$1,972	$4,145	$133,479	$65,176	$73,559	$33,664	$351,249
SWO1	$33,790	$7,901	$1,055	-	$71,425	$34,876	$157,627	$18,013	$324,686
TOR1	-	$5,630	-	-	$37,491	$18,306	$20,661	-	$82,087
YFN1	-	$3,418	$336	$707	$22,758	$11,112	$46,843	$5,740	$90,913
TOTAL	**$80,143**	**$71,640**	**$5,553**	**$9,455**	**$600,027**	**$292,985**	**$516,597**	**$94,809**	**$1,671,209**

Stakeholder measures

94 There is a long history of stakeholder negotiations and agreements relating particularly to the management of billfish species of importance to recreational fishers. Annex 4 outlines a history of these agreements in more detail.

ANNEXES

Annex 1: Productivity information for large pelagic species

Table 29: Key biological characteristics of HMS stocks. 'm' and 'f' refer to male and female respectively. FL refers to fork length.

Species	Natural mortality rate (M)*	Fecundity*	Length & age at maturity	Maximum age/size	Recruitment to commercial fishery	Growth	Spawning / juvenile areas
Albacore	M = 0.34 per year is estimated (constant over all age classes).		71cm FL (m); 82cm FL (f)	~141.7cm ~60 kg	The troll fishery catches juvenile ALB typically 5-8kg, 1-3 years; mean size for 1996–97 to 2004–05 was 63.7cm. LL fleets typically catch much larger albacore over a broader size range. The mean length of longline-caught albacore from 1987 to 2004 is 80cm.		Female albacore from New Caledonian and Tongan waters are reported to spawn during the November–February summer season.
Bigeye tuna	~0.5 for fish > 40cm (age specific).	Serial spawner; millions of eggs per spawning event, near daily over long periods. Throughout the year within 10E of equator; seasonally at slightly higher latitudes.	3-4 yrs	11 yrs; 210 kg; 250cm.	The LL fishery catches adult BIG. Juvenile BIG occur in mixed schools with small YFN and SKJ throughout the equatorial Pacific. Juveniles are therefore vulnerable to large-scale purse seine fishing, particularly when fish aggregating devices (FADs) are set on.	Rapid initial growth (first 2 years), slowly significantly after that.	Spawning takes place in the equatorial waters of the western Pacific Ocean in spring and early summer.
Blue shark	0.19–0.21	Gestation lasts 9–12 months; 4–135 pups (averaging 26–56), born alive. Pups are probably born at ~50 cm FL	8 yrs (m); 7-9 yrs (f); 190–195 cm FL (m); 170–190 cm FL (f)	22 yrs (m); 19 yrs (f) 3 m total length; 200 kg	Fully recruited to the commercial LL fishery by their 2nd year. Commercial catch sampled by the MFish observer programme contains both mature and immature fish.	Female blue sharks appear to approach a lower mean asymptotic maximum length and grow at a faster rate than males. This contradicts studies on the age and growth of blue shark from other oceans, where females typically approach a larger mean asymptotic maximum length than males.[ii]	?
Mako	0.10–0.15	Live young. Litter	7–9 yrs (m);	29 yrs (m);	Makos recruit to NZ	Males and females grow at similar	Only one pregnant female has been

Species	Natural mortality rate (M)*	Fecundity*	Length & age at maturity	Maximum age/size	Recruitment to commercial fishery	Growth	Spawning / juvenile areas
shark		size is 4–18. If the reproductive cycle lasts 3 years and mean litter size is 12, mean annual fecundity would be 4 young.	19–21 yrs (f); 180–185 cm FL (m); 275–285 cm FL (f)[iii]	28 yrs (f) ~ 366 cm FL	commercial fisheries during their first year at ~70 cm FL. Much of the commercial catch is immature. Sharks < 150 cm FL are rarely caught south of Cook Strait, where most of the tuna longline catch consists of subadult and adult males.	rates until age 7–9 years, after which the relative growth of males declines.	recorded from New Zealand, but newborn young are relatively common.
Moonfish	0.2-0.25[iv]		~80 cm fork length; ~ 4–5 yrs[v]	13 or 14 yrs +; 200cm; 270 kg.	Most of the catch taken by the tuna longline fishery was aged 2 to 14 years. Most (71%) of the commercial catch appears to be of adult fish.	Growth curves suggest rapid early growth.	A few spawning females were collected in the Kermadec region, and at East Cape, suggesting that moonfish spawn in northern New Zealand.
Porbeagle shark	0.05–0.10	Live-bearers. Length at birth is 58–67 cm FL in the South-west Pacific. Gestation is ~8–9 months. Litter size is usually four; mean litter size in the SW Pacific is 3.75. If the reproductive cycle lasts 1 year, annual fecundity would be ~3.7 young per female.	8–10 yrs (m); 15–19 yrs (f) 140–150 cm FL (m); 170–180 cm FL (f).[vi]	At least 40 years, possibly up to 80	In NZ, POS recruit to commercial fisheries during their first year at ~70 cm FL. Much of the commercial catch is immature. Most sharks caught by tuna longliners are 70–170 cm FL. The size and sex distribution of both sexes is comparable up to about 150 cm, but few mature females are caught.		
Rays bream	?	?	~43cm FL (f)	25 yrs	The length distribution for Ray’s bream caught on tuna longlines shows a single prominent mode centred around 45–55 cm fork length with most fish in the 34–62 cm range.	Rapid initial growth, reaching 40-50 cm in 3-5 years, with little increase in length after this time. Existing information is based on studies that may have involved Southern Ray’s bream, although characteristics are thought to be similar.[vii]	Little is known about spawning of Ray’s bream in New Zealand. Some ripe fish have been observed in Southland, the west coast of the South Island, and on the Chatham Rise. In the North Atlantic, Ray’s bream spawn over a protracted period between spring and autumn. Spawning may occur at different times of year in different latitudes, with a preference for temperatures greater than 19.5°C.

Species	Natural mortality rate (M)*	Fecundity*	Length & age at maturity	Maximum age/size	Recruitment to commercial fishery	Growth	Spawning / juvenile areas
Southern bluefin tuna	0.2 – 0.4.[viii]		Estimates of age at 50% maturity range from 8-12 yrs. Size at maturity: 138.2cm - 165cm.[ix]	30+ yrs	Longline fisheries catch older juveniles and adults (age-4 year old up to age-40+). Surface fisheries (now mainly Australian purse seine fisheries) catch juveniles (age-1 to age-3 year olds).	Growth rates have changed significantly between pre-1970 and post 1980, although the differences between the growth curves seem slight. The change in growth rate for juveniles and young adults has been attributed to a density dependant effect of over fishing.	Southern bluefin tuna consist of a single stock, primarily distributed between 30º S and 45º S, which is only known to spawn in the Indian Ocean south of Java.
Swordfish	M has been estimated elsewhere in the Pacific to be 0.22. This value is consistent with the maximum estimated ages for swordfish in Australia and New Zealand.	Batch spawners, perhaps every few days over several months. Egg production varies with size (1-29 million for 68-272kg females respectively).	Ages at 50% maturity: 0.9 (m) and 9.9 (f) yrs.[x]	~ 20 yrs;[xi] 445 cm total length (includes the bill and furthest extension of the tail); about 540 kg.	In the New Zealand EEZ, SWO size varies markedly with latitude. Larger SWO (and hence fewer males) are caught south of 40ºS. Average length (lower jaw to fork length) of SWO caught in the EEZ has been relatively stable since 1991, averaging 196.6 cm for the Japanese charter fleet and 163.9 cm for the domestic owned and operated fleet (based on limited observer data). Most males are smaller than 189 cm (77%) while most females (51%) are larger than 189 cm for all fleets.	Growth rates have been estimated for Pacific Ocean swordfish caught off Taiwan. Estimates indicate rapid growth during the first year to about 1m in lower jaw to fork length. Growth rate progressively slows with age. The differences in growth parameters between males and females are significant.	Spawning takes place in the tropical waters of the western Pacific Ocean and to a lesser extent the equatorial waters of the central Pacific Ocean.
Striped marlin	0.49–1.33 0.389–0.818		~170 cm lower jaw-fork length; 36 kg (estimates from Coral Sea fish).	In NZ: Up to 12 yrs; 224.1 kg[xii]	Striped marlin captured in NZ are rarely less than 200 cm lower jaw-fork length, suggesting these fish are all mature.		Spawning occurs in water warmer than 24°C mainly in November and December in the southern hemisphere. Known spawning areas in the southwest Pacific are in the Coral Sea in the west and French Polynesia in the east of the region. The southern hemisphere spawning season is out of phase with the north Pacific. There is no clear evidence of striped marlin reproductive activity in New Zealand waters.
Pacific	0.1 - 0.4 (age specific)	270 to 300 kg fish produce about 10	3-5 yrs	15+ yrs; 550 kg;	Pacific bluefin caught in the southern hemisphere,		Spawning takes place between Japan and the Philippines in April, May and

Species	Natural mortality rate (M)*	Fecundity*	Length & age at maturity	Maximum age/size	Recruitment to commercial fishery	Growth	Spawning / juvenile areas
bluefin tuna		million eggs; there is no information on the frequency of spawning.		300cm	including those caught in New Zealand waters, are primarily adults.		June, spreading to the waters off southern Honshu in July and to the Sea of Japan in August.
Yellowfin tuna	Natural mortality is assumed to vary with age.	Multiple spawners, spawning every few days throughout the peak of the season.	First maturity is reached at 60 to 80cm (1-2 yrs old). Size at 50% maturity: 105cm.	8 yrs; 200 kg; 239cm.	Individuals found NZ waters are mostly adults. It is thought large numbers of small YFN are taken in surface fisheries in Indonesia and the Philippines. Juvenile YFN are also taken in purse seine fisheries in the equatorial Pacific.	Rapid initial growth to 2 years.	Spawning takes place at the surface at night mostly within 10º of the equator when temperatures exceed 24-25º C. Spawning takes place throughout the year but the main spawning season is November to April.

* Indicates the life history strategy, e.g. broadcast spawner, laying fertilised eggs, bearing live young

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[ii] Age and growth estimates are available for blue sharks in New Zealand waters. These estimates were derived from counts of opaque growth zones in X-radiographs of sectioned vertebrae and assumed one opaque zone is formed per year. This assumption is untested. Female blue sharks appear to approach a lower mean asymptotic maximum length and grow at a faster rate than males. This contradicts studies on the age and growth of blue shark from other oceans, where females typically approach a larger mean asymptotic maximum length than males. This is thought to result from the presence of relatively few large (> 250 cm FL), old female blue sharks in length-at-age dataset analysed. The MFish Observer Programme data suggest large (> 250 cm FL) female blue sharks are missing from the catch, despite reliable personal observations to the contrary from commercial and recreational fishers. There is evidence of size and sex segregation in the distributions of blue sharks in the North Pacific, with large, pregnant female blue sharks tending to be found nearer the equator than male or smaller female blue sharks. Given the biases in MFish Observer Programme coverage, it is possible large female blue sharks in the NZ EEZ have not been adequately sampled, despite the probable presence of these sharks in the catch.

[iii] Estimates of mako shark age and growth in New Zealand were derived by counting vertebral growth bands, and assuming that one band is formed each year (this assumption requires validation).

[iv] Using a maximum age of 14 years, Hoenig's method provides an M estimate of 0.30. If moonfish live to 20 years, this would reduce to 0.21. The Chapman-Robson estimate of Z is 0.13–0.14 for ages at recruitment of 2–4 years. However, the sample used for this estimate was not randomly selected and so this is probably unreliable. The best estimate of M may be around 0.20–0.25.

[v] Until recently, little was known about the biology of moonfish in New Zealand waters. Recent studies have examined, growth rates, natural mortality, and maturity for moonfish. Age and growth of moonfish (*Lampris guttatus*) in New Zealand waters was studied from counts of growth bands on cross sections of the second ray of the dorsal fin. Ministry of Fisheries observers working on tuna longline vessels collected fin samples. Observers also collected maturity data, and length-frequency data were obtained from the longline observer database. Readability scores were poor and the four readers who examined the fin rays came to two different interpretations. Von Bertalanffy growth curves were fitted to the age estimates of both readers individually, and also to the mean ages of the two readers. The mean age provides the best available age estimate for moonfish samples. However, because of differences between readers, and the un-validated nature of our estimates, the growth curves must be interpreted with caution, especially for younger fish. Although there was insufficient data to determine accurately length and age at maturity, it appears fish longer than about 80 cm fork length are mature. The corresponding age at maturity would be 4.3 years. Sexual maturity may therefore be attained at about 4–5 years.

[vi] A study of the age and growth of New Zealand porbeagles produced growth curves and estimates of the natural mortality rate. Attempts to validate ages using bomb

radiocarbon analysis were unsuccessful, and suggested the ages of porbeagles older than about 20 years were progressively under-estimated; for the oldest sharks the age under-estimation may have been as much as 50%. Consequently, the growth curves developed are probably only accurate for ages up to about 20 years.

[vii] Until recently, little was known about the biology of Ray's bream in New Zealand waters. A recent otolith study examined growth rates, natural mortality, and maturity for Ray's bream. Unfortunately, the actual species examined in this study could not be determined. It is possible more than one species was involved, and the one (or more) species may not have been representative of the New Zealand catch recorded as Ray's bream. Until further samples are collected, the identification cannot be confirmed, but it is likely the study was based wholly or partly on Southern Ray's bream (*Brama australis*). It is expected the main biological characteristics of Ray's bream will be similar to Southern Ray's bream, so the general findings of the recent study are reported here. The small otoliths proved to be extremely difficult to age.

[viii] Prior to 1995, natural mortality rates were assumed to be constant and M = 0.2 was used. More recently values of M ≥ 0.2 were considered likely to be too high. Tagging results of juveniles' ages 1 to 3 years also suggests that M for these fish is high (possibly as high as M = 0.4). M for fish of intermediate years is unknown. In the CCSBT stock assessments, a range of natural mortality vectors are now used.

[ix] The age at which 50% of STN are mature is uncertain, because only limited sampling has occurred (on the spawning ground off Java). Recent sampling of the Indonesian catch suggests that 50% age-at-maturity may be as high as 12 years, while interpretations of available data since 1994 have used 8 years and older fish as representing the adult portion of the stock in the population models. The growth rate has changed over the course of the fishery, so the size at maturity depends on when the fish was alive (prior to the 1970s, during the 1970s, or in the period since 1980), as well as which maturity ogive is used. A simple linear interpolation is assumed for the 1970s. The table below shows the range of sizes (cm) for southern bluefin tuna aged 8 to 12 years for the two von Bertalanffy growth models used.

Differences in southern bluefin tuna size at ages 8 – 12 between the 1960s and 1980s (lengths in cm).

Age	1960s	1980s
8	138.2	147.0
9	144.6	152.7
10	150.2	157.6
11	155.1	161.6
12	159.4	165.0

[x] Based on Australian estimates of lengths at 50% maturity for males and females of 101 and 221 cm, respectively, applied to NZ growth curves.

[xi] Estimates range from 10 years (m) and 12 (f) - Taiwanese estimate, to 15-18 years – NZ and Australian estimates.

[xii] Unvalidated age and growth estimates are available for striped marlin in New Zealand waters. These estimates were derived from counts of opaque growth zones in thin sections of the third dorsal spine and assume that one opaque zone is formed per year. This assumption is untested. Female striped marlin, on average, are lager than males but sexual dimorphism is not as marked as that seem in blue and black marlin.

Annex 2: Distribution and stock information for large pelagic species

Species	Distribution and stock information
Albacore	Two albacore stocks (North and South Pacific) are recognized in the Pacific Ocean based on location and seasons of spawning, low longline catch rates in equatorial waters and tag recovery information. The South Pacific albacore stock is distributed from the coast of Australia and archipelagic waters of Papua New Guinea eastward to the coast of South America south of the equator to at least 49ºS. However, there is some suggestion of gene flow between the North and South Pacific stocks based on an analysis of genetic population structure. Most catches occur in longline fisheries in the EEZs of other South Pacific states and territories and in high seas areas throughout the geographical range of the stock.
Bigeye tuna	Tagged bigeye tuna have been shown to be capable of movements of over 4000 nautical miles over periods of one to several years. Juveniles and small adults school near the surface in tropical waters while adults tend to stay deeper. Individuals found in New Zealand waters are mostly adults. Adult bigeye tuna are distributed broadly across the Pacific Ocean, in both the northern and southern hemisphere.
Blue shark	Blue shark are found throughout the world's oceans in all tropical and temperate waters from about 50° N to 50° S.
Mako shark	Makos occur worldwide in tropical and warm temperate waters, mainly between latitudes 50 ^{o}N and 50^{o}S. In the South Pacific, makos are rarely caught south of 40 ^{o}S in winter–spring (August–November) but in summer–autumn (December–April) they penetrate at least as far as 55 ^{o}S. Makos occur throughout the New Zealand EEZ (to at least 49 ^{o}S), but are most abundant in the north, especially during the colder months. The stock structure of mako sharks in the Southern Hemisphere is unknown. However, given the scale of movements of tagged sharks, it seems likely that sharks in the South-west Pacific comprise a single stock. There is no evidence to indicate whether this stock also extends to the eastern South Pacific or the North Pacific.
Moonfish	Moonfish is a pelagic species that occurs in surface waters to depths of about 500m, typically well offshore. Moonfish occurs in tropical and temperate waters of the Pacific Ocean as well as all other major oceans of the world. There is no information on its stock structure.
Porbeagle shark	Porbeagles live mainly in the latitudinal bands 30–50 ^{o}S and 30–70 ^{o}N. They occur in the North Atlantic Ocean, and in a circumglobal band in the Southern Hemisphere. Porbeagles are absent from the North Pacific Ocean, where the closely related salmon shark, *Lamna ditropis*, replaces them. In the South Pacific Ocean, porbeagles are caught north of 30 ^{o}S only in winter–spring; in summer they are not found north of about 35 ^{o}S. They appear to penetrate further south during summer and autumn, and are found near many of the sub-antarctic islands in the Indian and South-west Pacific Oceans. The stock structure of porbeagle sharks in the Southern Hemisphere is unknown. However, given the scale of movements of tagged sharks, it seems likely that sharks in the South-west Pacific comprise a single stock. There is no evidence to indicate whether this stock extends to the eastern South Pacific.
Rays bream	Ray's bream probably come from a wide-ranging single stock found throughout the South Pacific Ocean and southern Tasman Sea.

Species	Distribution and stock information
Southern bluefin tuna	Adults are broadly distributed in the South Atlantic, Indian and western South Pacific Oceans, especially in temperate latitudes while juveniles occur along the continental shelf of Western and South Australia and in high seas areas of the Indian Ocean. Southern bluefin tuna caught in the New Zealand EEZ appear to represent the easternmost extent of a stock whose centre is in the Indian Ocean. Historically, juvenile STN were more abundant around the coast of the South Island and East Cape than they are at present.
Swordfish	Swordfish are found in all tropical and temperate oceans and large seas. Based on longline catches, swordfish range from 50º N to 45º S in the western Pacific Ocean and from 45º N to 35º S in the eastern Pacific Ocean. In the New Zealand EEZ, swordfish size varies markedly with latitude. Larger swordfish (and hence fewer males) are caught south of 40º S. Average size of both males and females is larger in the southern region compared to the north. Stock structure is uncertain. Recent genetic studies have indicated there may be multiple Pacific Ocean stocks, including one in the south west Pacific. For management purposes a southwest pacific stock of swordfish is assumed.
Striped marlin	Striped marlin are found in the tropical, subtropical and temperate pelagic ecosystem of the Pacific and Indian Oceans. Juveniles generally stay in warmer waters of the range, while adults move into higher latitudes and temperate water feeding grounds in summer (southern hemisphere 1st quarter of the calendar year; 3rd quarter in the northern hemisphere). The latitudinal range estimated from longline data extends from 45°N to 40°S in the Pacific and from continental Asia to 45°S in the Indian Ocean. Striped marlin are not uniformly distributed, having a number of areas of high abundance. Tagged individuals have undergone extensive seasonal migrations. The stock structure of striped marlin in the Pacific Ocean is not well known, but is the focus of current research activities. The two most frequently considered hypotheses are: (1) a single-unit stock in the Pacific, which is supported by the continuous "horseshoe-shaped" distribution of striped marlin; and (2) a two-stock structure, with the stocks separated roughly at the Equator, albeit with some intermixing in the eastern Pacific.
Pacific bluefin tuna	Pacific bluefin are found within the upper few hundred meters of the water column. Adult Pacific bluefin occur broadly across the Pacific Ocean, especially the waters of the North Pacific Ocean. There is a single Pacific-wide stock that is primarily distributed in the northern hemisphere. Individuals found in New Zealand fisheries waters are mostly adults.
Yellowfin tuna	Yellowfin tuna are found from the surface to depths where low oxygen levels are limiting (about 250 m in the tropics but probably deeper in temperate waters). Yellowfin tuna in New Zealand waters are part of the western and central Pacific Ocean stock that is distributed throughout the North and South Pacific Ocean west of about 150º W. Individuals found in New Zealand waters are mostly adults.

Annex 3: Non-fish bycatch reporting guide

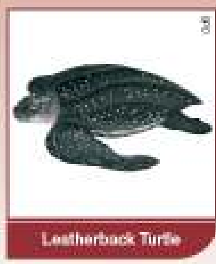
Guide to Species Groups for the Non-fish / Protected Species Catch Return and guidelines for handling live or injured turtles and snakes (effective from 1 October 2008).

MARINE REPTILES

TURTLES:

TLE

- **Leatherback turtles** (LBT) are up to 2.7 m in length and weigh up to 900 kg. They have 3 prominent ridges running the length of the shell instead of plates. They are dark green to grey in colour with small patches of lighter colour over the body.



Leatherback Turtle

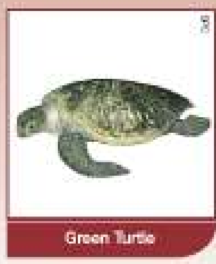
TURTLES

MARINE REPTILES

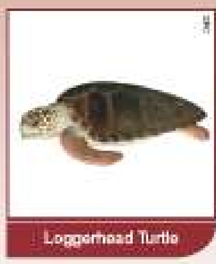
TURTLES:

TLE

- **Green turtles** (GNT) are up to 1.5 m in length, and weigh up to 200 kg. They have a hard shell of bony scutes (plates), olive green to brown in colour.
- **Loggerhead turtles** (LHT) are around 1 m in length and reddish-brown to orange-brown in colour. They can be up to 100 kg in weight.



Green Turtle



Loggerhead Turtle

TURTLES

HOW TO HANDLE LIVE OR INJURED TURTLES AND SNAKES:

Handling animals correctly is safer for you and gives them a better chance of survival.

- Turtles need to be handled with great care to avoid damaging them.
- Sea snakes are venomous. Don't handle a live animal. To return a live snake to the sea, gently hose it off the deck with water.

RELEASE ANIMALS GENTLY

Gently bring hooked turtles on board with a net.

Place a piece of wood across the mouth to avoid bites. Remove any hook, or lines, cutting off the barb and pulling the hook through to the outside if possible.

Pack up the rear of the turtle to drain it. Keep it moist and shaded while it recovers (4 - 24 hr).

HOW TO HANDLE LIVE OR INJURED TURTLES AND SNAKES

Annex 4: History and current status of billfish moratorium

History	

1987	• Billfish moratorium introduced
	  o No foreign licensed access to the Auckland Fisheries Management Area (AFMA)
	  o Foreign charter access restricted during period 1 October to 31 May each year in FMA 1
	• Recreational fishers commence large scale tag and release

1988	• Regulations prohibit the commercial taking of all billfish in the AFMA

1990	• A billfish memorandum of understanding between representatives of commercial fishers and recreational interests provided a framework for billfish management. The MOU was updated periodically between 1993 and 1996. The MOU stipulated:
	  o Regulations should prohibit the taking of marlin in the EEZ;
	  o Swordfish to be taken as incidental bycatch of tuna fishing;
	  o No tuna surface longlining within the 200m depth of the Auckland Fisheries Management Area except around Great Barrier Island;
	  o No tuna surface longlining within the 1000m contour of Poor Knights Ridge;
	  o Minimum sizes of swordfish agreed for both recreational and commercial fishing but between 1993- 96 the commercial size restriction was dropped.

1991	• Regulations were amended to give effect to some aspects of the MOU. It became illegal to possess marlin for sale.
1992	• A moratorium on the issue of new fishing permits was introduced in 1992. Unless fishers held existing target fishing permits for swordfish they could only take this species as bycatch. A large number of domestic surface longline vessels entered the tuna fisheries during the 1990s. Both catch and more importantly catch rates of swordfish rose during this period.
1995	• Prohibition on taking broadbill swordfish in the AFMA removed • Prohibition on taking marlin for sale extended to all NZ fisheries waters • Prohibition on taking sailfish and shortbill spearfish in the AFMA remains
1996	• The MOU was last ratified in 1996. Acrimony levels between commercial and non-commercial sectors increased based on alleged breeches of the MOU concerning swordfish. Reports from both sectors that unlawful targeting of swordfish was occurring exacerbated tensions. Rapidly increasing catch rates of swordfish supported claims of unlawful targeting. In addition, commercial fishers no longer observed the voluntary closed areas outlined in the MOU.
1997	• Following negotiations between commercial and non-commercial fishers, regulations were amended to change the prohibition on possession of marlin for sale to possession of marlin taken **from New Zealand fisheries waters**.
1999, 2002	• Reports to MFish in 1999 and 2002 concluded some level of swordfish targeting had been occurring since the mid 1990s[1]. The later report noted that swordfish targeting whether intentional or not was increasing. Several aspects of longline fishing operations were found to be contributing to increased catch rates of swordfish, including time of setting, setting on or near the full moon, number of hooks set and the use of light sticks. Of all the factors the use of light sticks was found to have the most dramatic effect on swordfish catch rates. An increase in the swordfish catch relative to the catch of some of the tuna species was also noted with the transition from foreign to domestic catch.

[1] Murray T.; Richardson K.; Dean, H.; Griggs, L 1999 New Zealand tuna fisheries with reference to stock status and swordfish bycatch. NIWA and MFish Unnumbered Report
Murray, T.; Griggs, L; 2002 Factors affecting swordfish (*Xiphias gladius*) catch rate in the New Zealand tuna longline fishery. NIWA and MFish Unnumbered Report

2000	• MFish and stakeholders met in 2000 to discuss the increasing commercial catch of swordfish. At this meeting, non-commercial fishers expressed their concerns that the commercial swordfish catch may not be sustainable, and requested management action. Commercial representatives responded that swordfish was part of a wide-ranging Pacific stock, that the New Zealand swordfish catch was only a small part of the Pacific catch, and there was no information to suggest a sustainability concern for the Pacific swordfish stock.
2001	• In 2001 MFish considered, but subsequently did not proceed with, commercial catch limits for the fishery because of concern at rapidly increasing catches. In submissions, Tuna New Zealand, a commercial stakeholder group, indicated that they would take steps to better control fishers who might be targeting swordfish.
2004	• Swordfish was included in the Quota Management System on 1 October 2004.
Current status	
	• Commercial fishers may not take marlin in New Zealand fisheries waters or possess for sale marlin taken from those waters. • No foreign licensed access to the Auckland Fishery Management Area • Foreign charter vessels may only fish in the Auckland Fishery Management Area from 1 June to 30 September in each year. • New Zealand fishers may take marlin on the high seas and land these in New Zealand subject to conditions.
General legislative provisions	
	• Fish taken in New Zealand fisheries waters must be landed in New Zealand • Fish landed in New Zealand is deemed to be taken in New Zealand fisheries waters • New Zealand has an obligation to manage the fishing activities of its nationals on the high seas. • A high seas permitting regime has been established.
Conditions relating to fishing on the high seas	
	A New Zealand national may only fish with a New Zealand registered fishing vessel and requires a high seas fishing permit. High seas fishing permits are conditioned so that: • Vessels may not fish within and outside New Zealand fisheries waters on one trip without specific authority. • A condition of any specific authority is that an observer accompanies the vessel • All high seas vessels are required to have an ALC • Vessels are required to notify MFish of departure and landing to allow for vessel inspections on departure and return High seas permit holders must furnish high seas fishing returns and, if the fish is landed in New Zealand, catch landing returns. Vessels that fish for highly migratory species are required to be registered on the Western and Central Pacific fisheries register.
Monitoring	
	• The activities of vessels are monitored by the MFish national compliance unit • ALCs provide the opportunity to determine vessel locations and activity • Catches can be monitored from high seas returns

Annex 5: Recreational gamefishing records

Table 30: National landed catch tallies for the big gamefish HMS species by season, largest tallies by species sorted to the left, does not include tag and release (NZBGFC data unless specified)

Season	Striped marlin	Yellowfin tuna	Mako shark	Blue shark	Blue marlin	Broadbill swordfish	Black marlin	Pacific bluefin†	Southern bluefin†	Big Eye tuna	Total
1993/94	663	996	220	96	41		3				2019
1994/95	910	1 997	288	235	28	5	9				1475
1995/96	705	2 187	424	198	40	8	7				1382
1996/97	619	2 325	352	114	17	10	7				1119
1997/98	543	1 268	455	177	76	12	10				1273
1998/99	823	1 235	320	70	140	6	15				1374
1999/00	398	1 085	338	79	234	27	24			5	1105
2000/01	422	988	255	54	142	25	9			3	1898
2001/02	430	262	155	100	112	22	8			2	1091
2002/03	495	211	109	30	26	17	3			8	899
2003/04	592	838	82	18	47	33	8			8	1626
2004/05	834	1219	61	25	93	13	8				2253
2005/06	630	346	44	30	103	6	6				1165
2006/07	688	283	34	15	99	20	2	44	35		1220
Total	8752	5143	3137	1241	1198	204	119	44	35	26	19899

† MFish data

Table 31: National catch tallies for the smaller and bycatch gamefish HMS species by season, largest tallies by species sorted to the left, does not include tag and release (NZBGFC data).

Season	Albacore tuna	Skipjack tuna	Mahi mahi	Shortbill spearfish	Hammerhead shark	Porbeagle shark	Thresher shark	Wahoo	Slender tuna	Total
1993/94	703		159	71	57		6			996
1994/95	617	48	83	87	49		14			898
1995/96		373	38	27	44		5	1		488
1996/97	803	138	2	16	44	9	9			1021
1997/98	993	367	41	19	47	25	13			1505
1998/99	599	236	103	62	36	14	11	35		1096
1999/00	453	765	23	17	50	16	11	7	8	1350
2000/01	803	702	96	28	40	28	18		5	1720
2001/02	576	377	115	35	39	12	14		23	1191
2002/03	1005	167	39	41	24	18	9			1303
2003/04	789	479	53	38	12	1	4		2	1378
2004/05	839	243	22	58	9	2	3	1		1177
2005/06	868	481	107	53	7		5			1521
2006/07	970	221	25	38	8	1	1	1		1265
Total	10018	4597	906	590	466	126	123	45	38	16909

Table 32: Gamefish tag and release records by HMS species by season in New Zealand waters, largest tallies by species sorted to the left (NZBGFC data unless specified).

Season	Striped marlin	Mako shark	Blue shark	Yellowfin tuna	Blue marlin	Shortbill spearfish	Pacific Bluefin†	Broadbill swordfish	Black marlin	Southern bluefin†	Total
1993/94	928	666	162	92	10	17		3			1878
1994/95	1202	1529	175	200	4	29		10			3149
1995/96	1102	1158	163	110	7	13		3	3		2559
1996/97	1301	920	343	33	6	5		4	5		2617
1997/98	895	518	724	3	8	1			1		2150
1998/99	1541	754	276	17	36	6		2	1		2633
1999/00	787	398	314	27	51	2		2	2		1583

Season	Striped marlin	Mako shark	Blue shark	Yellowfin tuna	Blue marlin	Shortbill spearfish	Pacific Bluefin†	Broadbill swordfish	Black marlin	Southern bluefin†	Total
2000/01	851	277	203	17	34	1		6			1389
2001/02	768	346	163	7	22	13		3	2		1324
2002/03	671	155	78	76	6	14		3	1		1004
2003/04	1051	188	106	184	8	8		2			1547
2004/05	1345	241	101	81	29	7		6	5		1815
2005/06	922	193	95	5	17	11		5	2		1250
2006/07	963	150	156	8	26	14	87	16	2	20	1442
Total	14327	7493	3059	860	264	141	87	65	24	20	26340

† MFish data

Annex 6: Detailed cost recovery information for 2008-09

Southern bluefin tuna			
Research			
Research Project	Project Description		Cost Recovered
STN2007-01	Catch at age of Southern bluefin tuna		$19,209.53
GEN2008/01	DNA database for commercial marine invertebrates		$1,077.21
PRO2006-01	Estimate capture rates per unit effort and total captures of seabirds		$7,550.09
PRO2006-02	Modelling the effects of fishing on population viability of selected seabirds		$1,401.98
PRO2007-01	Estimating the nature and extent of incidental captures of seabirds in NZ commercial fisheries		$3,378.24
PRO2007-02	Estimating the nature and extent of marine mammal captures in NZ commercial fisheries		$3,520.69
PRO2008/01	Risk assessment of protected species bycatch in NZ fisheries		$1,357.33
PRO2008/03	Necroscopy of marine mammals captured in NZ fisheries		$1,759.16
DOC-INT2007-02	Seabird autopsy project		$1,971.87
DOC-POP2005-02	White-capped Albatross		$4,144.65
Observers			
	DOC observers		$33,663.73
	MFish observers		$73,559.21
Generic costs			
	Commercial fisheries compliance		$133,479.46
	Registry services managed		$65,176.15
Final Levy MFish	**TACC**	**Levy/share/month**	**Levy/tonne**
$311,469.06	413	0.00026	754.16
Final Levy - DOC	**TACC**	**Levy/share/month**	**Levy/tonne**
$39,780.25	413	0.000033	96.32

Bigeye tuna		
Research		
Research Project	Project Description	Cost Recovered
GEN2008/01	DNA database for commercial marine invertebrates	$1,196.53
PRO2006-01	Estimate capture rates per unit effort and total captures of seabirds	$8,386.37
PRO2006-02	Modelling the effects of fishing on population viability of selected seabirds	$1,557.27
PRO2007-01	Estimating the nature and extent of incidental captures of seabirds in NZ commercial fisheries	$3,752.43

PRO2007-02	Estimating the nature and extent of marine mammal captures in NZ commercial fisheries		$3,910.66
PRO2008/01	Risk assessment of protected species bycatch in NZ fisheries		$1,507.67
PRO2008/03	Necroscopy of marine mammals captured in NZ fisheries		$1,954.01
DOC-INT2007-02	Seabird autopsy project		$2,190.28
DOC-POP2005-02	White-capped Albatross		$4,603.73
Observers			
	DOC observers		$37,392.47
	MFish observers		$127,170.16
Generic costs			
	Commercial fisheries compliance		$148,264.22
	Registry services managed		$72,395.35
Final Levy MFish	**TACC**	**Levy/share/month**	**Levy/tonne**
$370,094.68	714	0.000308	518.34
Final Levy - DOC		**Levy/share/month**	**Levy/tonne**
$44,186.48		0.000037	61.89

Yellowfin tuna			
Research			
Research Project	Project Description		Cost Recovered
GEN2008/01	DNA database for commercial marine invertebrates		$183.66
PRO2006-01	Estimate capture rates per unit effort and total captures of seabirds		$1,287.28
PRO2006-02	Modelling the effects of fishing on population viability of selected seabirds		$239.04
PRO2007-01	Estimating the nature and extent of incidental captures of seabirds in NZ commercial fisheries		$575.98
PRO2007-02	Estimating the nature and extent of marine mammal captures in NZ commercial fisheries		$600.27
PRO2008/01	Risk assessment of protected species bycatch in NZ fisheries		$231.42
PRO2008/03	Necroscopy of marine mammals captured in NZ fisheries		$299.93
DOC-INT2007-02	Seabird autopsy project		$336.20
DOC-POP2005-02	White-capped Albatross		$706.66
Observers			
	DOC observers		$5,739.61
	MFish observers		$46,842.79
Generic costs			
	Commercial fisheries compliance		$22,758.02
	Registry services managed		$11,112.42
Final Levy MFish	**TACC**	**Levy/share/month**	**Levy/tonne**
$84,130.83	263	0.00007	319.89
Final Levy - DOC	**TACC**	**Levy/share/month**	**Levy/tonne**
$6,782.47	263	0.000006	25.79

Swordfish			
Research			
Research Project	Project Description		Cost Recovered
SWO2002-01B	Swordfish stock structure		$6,219.47
SWO2007-01	Stock assessment of swordfish		$27,570.61
GEN2008/01	DNA database for commercial marine invertebrates		$576.41
PRO2006-01	Estimate capture rates per unit effort and total captures of seabirds		$4,040.04
PRO2006-02	Modelling the effects of fishing on population viability of selected seabirds		$750.20
PRO2007-01	Estimating the nature and extent of incidental captures of seabirds in NZ commercial fisheries		$1,807.69
PRO2008/01	Risk assessment of protected species bycatch in NZ fisheries		$726.30
DOC-INT2007-02	Seabird autopsy project		$1,055.14
Observers			
	DOC observers		$18,013.39
	MFish observers		$157,626.88
Generic costs			
	Commercial fisheries compliance		$71,424.57
	Registry services managed		$34,875.62
Final Levy MFish	**TACC**	**Levy/share/month**	**Levy/tonne**
$305,617.79	885	0.000255	345.33
Final Levy - DOC	**TACC**	**Levy/share/month**	**Levy/tonne**
$19,068.53	885	0.000016	21.55

Table 33: Cost recovery information (2007-08 levy) for HMS stocks.

	MFish Research		DoC Research		MFish Departmental						
Stock	Env.	Stock Assessment	Fishing interactions	Pop. studies	Compliance	Statutory	Registry	MFish Observers	DoC Observers	Pre unders/overs levy	Total Cost Recovery Levy ($)
ALB	5096.2	54334.19	-	-	$50,719.35	$1,719.73	$25,934.72	$9,877.05	-	$147,681.24	$221,679.41
BIG1	$19,706.58	$32,551.28	$2,793.82	$4,653.97	$136,894.17	$4,641.64	$69,999.16	$93,203.64	$33,048.87	$397,493.13	$355,540.59
BWS1	$855.69	$489.76	-	-	$8,516.18	$288.76	$4,354.64	-	-	$14,505.03	$14,694.03
MAK1	$210.13	$120.27	-	-	$2,091.27	$70.91	$1,069.35	-	-	$3,561.92	$3,683.42
MOO1	$1,109.18	$662.81	-	-	$11,039.10	$374.30	$5,644.71	-	-	$18,830.11	$19,333.57
POS1	$98.90	$56.61	-	-	$984.40	$33.38	$503.36	-	-	$1,676.66	$1,684.55
RBM1	$935.52	-	-	-	$9,310.57	$315.69	$4,760.84	-	-	$15,322.61	$14,367.07
SKJ	$7,527.28	-	-	-	$71,268.64	$2,416.49	$36,442.35	$69,139.33	-	$186,794.10	$183,604.76
STN1	$17,741.45	$59,385.38	$2,515.23	$4,189.88	$123,243.21	$4,178.78	$63,018.91	$53,911.91	$29,753.27	$357,938.03	$275,305.50
SWO1	$6,626.28	$117,773.88	$1,345.89	-	$65,947.17	$2,236.06	$33,721.28	$115,525.52	$15,920.91	$359,096.99	$294,489.70
TOR1	$4,983.08	$5,465.31	-	-	$34,615.53	$1,173.70	$17,700.23	$15,142.33	-	$79,080.17	$77,861.14
YFN1	$3,024.90	$4,028.61	$428.84	$714.37	$21,012.76	$712.48	$10,744.62	$34,331.31	-	$80,070.75	$71,975.58
TOTAL	**$67,915.19**	**$274,868.10**	**$7,083.78**	**$9,558.22**	**$535,642.35**	**$18,161.92**	**$273,894.17**	**$391,131.09**	**$78,723.05**	**$1,662,050.74**	**$1,534,219.32**