New Zealand Country Report: Ecologically Related Species in the New Zealand Southern Bluefin Tuna Longline Fishery

July 2009

1. Introduction

Since the start of New Zealand's domestic southern bluefin tuna (SBT) fishery, handline, trolling and longline have been used to target SBT in the NZ Exclusive Economic Zone (EEZ). All but a few tonnes of the domestic SBT catch is now taken by longline.

SBT is seasonally present in New Zealand from March/April to August/September. Fishing takes place in two areas, off the east coast of the North Island north of 42° S and off the west coast of the South Island south of 42° S. The distribution of SBT catches are shown in Figures 1 (domestic fishery) and 2 (charter fleet).

Longlining off the west coast of the South Island is almost entirely targeted at SBT. The fleet operating off the southwest coast is primarily composed of the larger –60º freezer vessels of the charter fleet. The generally heavier weather conditions off the west coast of the South Island compared to the east coast of the North Island means that few of the smaller domestic owned and operated vessels operate in this area. Smaller domestically owned and operated "ice boats" operate in the longline fishery off the east coast of the North Island. These vessels are typically at sea for only a few days, and land SBT both as a target and as a bycatch of bigeye target sets.

Non-target fish species such as sharks, Ray's bream, albacore and dealfish are caught in large numbers as bycatch on tuna longlines. Thirteen taxa of seabirds were recorded as bycatch during 2006-07 and 2007-08, with conservation status of the species ranging from Endangered to Least Concern. New Zealand fur seals were captured during fishing for SBT during 2006-07 and 2007-08, 80% of which were released alive. One capture of a whale was also observed; the whale was released alive. Sea turtles are also caught in surface longline fisheries for SBT from time to time, although such captures are rare.

New Zealand has implemented a National Plan of Action for Sharks, and is currently reviewed its National Plan of Action for Seabirds, which was established in 2004. Mandatory seabird mitigation measures are in place, in line with agreements in the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and the Western and Central Pacific Fisheries Commission (WCPFC). Surface longline vessels also carry turtle mitigation equipment (line cutters, dehookers, and nets).

2. Review of Southern Bluefin Tuna Fisheries in the New Zealand Exclusive Economic Zone

Fleet size and distribution

Annual Fleet Size and Distribution

Longline fishing targeting SBT primarily occurs off the west coast of the South Island south of 42º S and along the east coast of the North Island north of 42º S. SBT also comprises a bycatch in the bigeye target fishery in the Bay of Plenty. Figure 3 shows the position of all longline sets targeting SBT in 2007/08 (charter and owner-operator vessels combined) (observer coverage of the fleet is also shown).

The number of vessels fishing by surface longline peaked in 2002 and has since declined to 35 vessels in 2008, most of which are small vessels (< 50 GRT). In 2005 and 2006 only two charter vessels fished for SBT in New Zealand fisheries waters, but in 2007 and 2008 this increased again to four.

Historical Fleet Size and Distribution

The New Zealand SBT fishery began off the west coast of the South Island as a winter small boat handline and troll fishery in the early 1980s. Most fishing by these vessels was in July and August. Since 1990, however, these methods have comprised only a minor component of the fishery as longline vessels had generally caught the SBT quota by the time the handline fishery started.

During the 1980s to mid-1990s most longlining was conducted by foreign licensed longliners from Japan. However, declining catch rates, shortened seasons of availability and reports of increased operating costs in the EEZ resulted in the foreign licensed fleet ceasing operations in 1995. Domestic longlining began in 1991 and steadily increased to over 150 vessels in 2002 before declining to 35 vessels by 2008.

Distribution of Catch and Effort

Table 1 gives the total estimated SBT catch by gear type since 1999. The New Zealand SBT fishery, initially a handline and troll fishery, has essentially become a longline fishery. With the advent of domestic longline fishing (starting in 1990) longline effort has almost completely replaced fishing effort by trolling and handline. A small SBT bycatch still occurs in the mid-water trawl fishery (for example 0.3t in 2008). Table 2 summarises total SBT catches by calendar year and fishing year (1 October to 30 September).

The charter fleet primarily operates off the west coast of the South Island while smaller domestic owned and operated vessels primarily operate off the east coast of the North Island. The fishing season for SBT is essentially the same for both areas and generally begins in April/May and finishes in July/August.

3. Fisheries Monitoring

Observer coverage

New Zealand has a Scientific Observer Programme that covers both domestic and Charter longline vessels. Before 2006 all trips on Charter vessels were covered by at least one observer, but in 2007 and 2008 only two of the four vessels were observed. The target coverage level for the domestic fleet is 10% of the effort to reflect 10% of the catch. In 2007 and 2008, the 10% observer coverage target was achieved.

Coverage is measured in two ways, proportion of catch (in numbers of fish) observed (Table 3) and proportion of hooks observed (Table 4). In terms of catches, around 60% of the catch was observed (and measured) in the Charter fleet in 2007 and around 46% in 2008. For the domestic fleet, 16% of the catch was observed in 2007 and 9% in 2008.

In terms of effort, 54% of hooks were observed on the Charter vessels in 2007, and 45% in 2008. For the domestic fleet 11% of the effort was observed in 2007 and 15% in 2008. In the past, the small size of domestic owned and operated vessels and short trips has made it difficult for the Ministry of Fisheries to realise the 10% target for observer coverage in this fleet, but coverage has improved in recent years.

Because only one observer is present on the vessel, and the observer takes breaks during the long hauling process on the Charter vessels, it is not possible to observe all hooks on these vessels. The observer accurately reports the portions of the haul that are not observed. The proportion of the catch observed is higher than hooks observed, because some unobserved catches are recorded (and sometimes measured) as they are available to the observer after their break. Unobserved catches which are measured are noted.

Observer collection of information

Biological information

Observers from the MFish Scientific Observer Programme are responsible for collecting biological data on SBT and bycatch data for catch characterisation.

In 2006/07, 1,748 SBT were measured for length (out of 1,846 observed), otoliths were collected from 716 SBT and observers recovered 2 tags (CSIRO dart tags). In addition, observers tagged 19 SBT with Mk9 archival tags (and dart tags) and 15 with satellite PAT tags.

In 2007-08, 1,403 SBT were measured for length (out of 1,439 observed), otoliths were collected from 745 SBT and observers recovered 6 tags (2 CSIRO dart tags and 4 CCSBT dart tags). In addition, observers tagged 22 SBT with Mk9 archival tags and two with satellite PAT tags. Tag recovery data was provided to each tagging agency.

Length, weight (both processed and whole weights) and sex are recorded regularly for SBT and all major fish bycatch species.

Fish bycatch estimates

Data from the Observer Programme is used to quantify the extent of fish bycatch caught on tuna longlines in New Zealand waters. These data provide information on which species appeared as bycatch, the catch per unit effort (CPUE) of the most common species, and estimates of total catch.

Catch monitoring

SBT

From 1 October 2004, when SBT was introduced into the quota management system (QMS), the catch monitoring and catch balancing systems in place for all other New Zealand quota species were applied to SBT. All fishers are required to furnish monthly returns of catch (in addition to furnishing log books). These monthly returns are then matched to individual holdings of quota entitlement. Financial penalties will apply to fishers (on a monthly basis) who catch SBT other than under the authority of quota. Fishers have the opportunity to reconcile their catch and quota entitlements up until the end of the fishing year and if they do not do so the financial penalties increase.

Prior to 1 October 2004, MFish operated an in-season catch monitoring system for SBT. This system required that on-shore processing companies and freezer vessels (including all of the chartered fleet) report their catch by e-mail or fax to the Ministry of Fisheries during the season. Weekly reporting was required once 25% of the catch allocation was reached; daily reporting was required when 50% of the catch allocation had been reached. Reports were collated and analysed by the Ministry of Fisheries. The season was closed as close as possible to reaching the national allocation. All SBT permit holders were then notified that the season was closed and that it would be an offence to take southern bluefin tuna for the remainder of the fishing year.

Fish Bycatch

Quota species

The main fish species associated with the SBT fishery within the New Zealand EEZ were introduced into the QMS on 1 October 2004. All fishers are required to furnish monthly returns of catch for these associated species (in addition to furnishing log books). Financial penalties apply to fishers who do not furnish returns, do not hold quota entitlement, or whose catch exceeds their entitlements.

The total allowable catch of each of the main fish bycatch species associated with New Zealand's SBT longline fishery is presented in Table 5.

Non-quota species

Some species caught as bycatch in the SBT fishery are not managed under the QMS. Examples include albacore and striped marlin. However, fishers are required to report the catch of all species, including any non-QMS species, when furnishing their monthly returns. As a result, the commercial reporting requirements provide information on total catch and effort of fish bycatch in the SBT fishery.

For additional information on quota and non-quota species bycatch, see section 5 below.

4. Seabirds

This section summaries paper CCSBT-ERS/0909/14. A total of 143 seabirds from 13 taxa were observed caught during 2006-07 and 2007-08 in New Zealand's SBT longline fishery. Species ranged in conservation status from rare to abundant, with seven species having vulnerable to endangered threat classifications. The birds were landed both dead and alive, with 21% landed alive. This indicates that birds were caught both at the set and during the haul, and mitigation techniques need to be applied during both parts of the fishing operation to avoid seabird captures.

Total seabird bycatch estimates for 2006-07 and 2007-08

A total of 143 seabirds were observed caught in the southern bluefin tuna longline fishery in 2006-07 and 2007-08. Reasonable observer was achieved in these years, 42.9% and 31.2%, respectively. It has been estimated that the total seabird catch was approximately 249 in 2006-07 and 93 in 2007-08.

The observed seabird bycatch rate per 1000 hooks was 0.134 in 2006-07 and 0.087 in 2007-08.

5. Non-Target Fish

This section summaries fish catches taken in tuna longline sets that either targeted or caught southern bluefin tuna. Numbers of fish caught reported on commercial catch effort returns, the number observed, and estimated numbers scaled from observer reports and total fishing effort during the 2006–07 and 2007–08 fishing years are shown in Table 7. Catch per unit effort is also shown in Table 7.

The species most commonly caught were blue shark (*Prionace glauca*), Ray's bream (*Brama brama*), and albacore (*Thunnus alalunga*). Other non-target fish caught in relatively large numbers were bigscale pomfret (*Taractichthys longipinnis*), porbeagle shark (*Lamna nasus*), mako shark (*Isurus oxyrinchus*), moonfish (*Lampris guttatus*), swordfish (*Xiphias gladius*), dealfish (*Trachipterus trachypterus*), deepwater dogfish (Squaliformes of various species, mostly Owstons dogfish), lancetfish (*Alepisaurus ferox* & *A. brevirostris*), and butterfly tuna (*Gasterochisma melampus*).

The next most abundant non-target fish species were oilfish (*Ruvettus pretiosus*), rudderfish (*Centrolophus niger*), school shark (*Galeorhinus galeus*), hoki (*Macruronus novaezelandiae*), escolar (*Lepidocybium flavobrunneum*), and thresher shark (*Alopias vulpinus*).

Bycatch composition from the charter fleet and the domestic fleet is different. This is likely to be due to differences in waters fished, with the charter fleet mostly operating in southern waters, and the domestic vessels fishing primarily in waters north of about 40ºS. Charter vessels fished off East Cape late in the 2006–07 season but only fished off the West Coast of the South Island in 2007-08 and this resulted in a different catch composition in the two years.

In both 2006–07 and 2007–08, blue shark, Ray's bream, and albacore were predominant in the catches overall, with these three species making up over 70% of the catch. Greater proportions of Ray's bream were caught by the charter vessels,

followed by blue sharks, while blue sharks dominated the catches of the domestic vessels. The next most abundant species in domestic catches was albacore.
Bigscale pomfret, dealfish and deepwater dogfish were caught in the south by charter vessels, while domestic vessels caught lancetfish in the north. Both caught swordfish, porbeagle sharks, mako sharks and moonfish, with a greater proportion of swordfish and mako sharks in the catches of the domestic fleet. Oilfish and escolar appeared in greatest numbers in the charter catches in the north. Bigscale pomfret and escolar have been more important components of the catch in recent years than in earlier years, possibly because of improved identification.

Observers onboard both the charter and domestic fleets reported on fish that were caught and subsequently discarded, and fish that were lost before they could be brought aboard the vessel. Observers also recorded whether fish were landed alive or dead.

Since their introduction into the QMS, most Ray's bream and moonfish have been retained. Blue, porbeagle and mako sharks have also been discarded less frequently since their introduction into the QMS. There were some differences between the domestic and charter fleet, with the domestic fleet more likely to discard sharks.

Most blue sharks are finned; mako sharks are often retained for their flesh (as well as fins); and porbeagle sharks are usually finned and sometimes retained for their flesh. However domestic vessels discarded much of their catch of these shark species. School shark was normally retained and thresher sharks were usually discarded although some were kept by the charter vessels.

Tunas (other than butterfly tuna) and swordfish were seldom discarded. Almost all of the lancetfish, deepwater dogfish, and dealfish caught were discarded. Japanese charter vessels discarded oilfish and escolar and most of their bigscale pomfret and rudderfish, while domestic vessels retained the majority of these fish (with discards ranging from 8% to 33%). Japanese vessels kept most of the butterfly tuna they caught while domestic vessels discarded more than half of it.

Tunas that were discarded were usually dead (and typically damaged). Most of the sharks that were discarded were alive when they were landed, although some dead sharks were discarded by domestic vessels. Porbeagle sharks did not survive as well on longlines as the other sharks. Most butterfly tuna discarded by the domestic vessels was dead when landed. The majority of the other fish bycatch species that were commonly discarded were landed alive.

Observers record life status on landing but they do not record if live fish are still alive at time of discard. Fish that are landed alive and subsequently discarded are not necessarily returned to the sea alive. Many fishers retrieve their hooks prior to discarding fish and this often damages the fish and reduces its ability to survive. Some species such as dealfish do not survive the dehooking process. Quota species released under provisions in the Sixth Schedule of the Fisheries Act are supposed to be released in such condition that they are expected to survive. When an observer is present on board a vessel, the observer may sign an authority for the vessel to discard quota species. These practices are very variable between vessels and it is not known

how these vessels operate without observers, and how the majority of the fleet, which are not observed, operate.

6. Marine Mammal and Marine Reptile Bycatch

Marine mammals

Eighteen New Zealand fur seals (*Arctocephalus forsteri*) were observed captured during fishing for southern bluefin tuna during 2006-07 and 2007-08. All but two of these were released alive.

One capture of a whale was also observed during fishing for southern bluefin tuna during 2006-07 and 2007-08; the whale was released alive.

Total fur seal bycatch estimates for 2006-07 and 2007-08

This section summaries paper CCSBT-ERS/0909/14. A total of eighteen fur seals were observed caught in the southern bluefin tuna longline fishery in 2006-07 and 2007-08. Reasonable observer was achieved in these years, 42.9% and 31.2%, respectively. It has been estimated that the total fur seal bycatch was approximately 25 in 2006-07 and 23 in 2007-08.

Marine reptiles

No marine reptiles were observed caught in 2006-07 and 2007-08 during fishing for southern bluefin tuna.

7. Mitigation Measures to Minimise Seabird and Other Species Bycatch

Current measures

Mandatory measures for each fleet

Tori lines are mandatory as a mitigation measure in place to avoid capture of non-fish species for tuna longliners in New Zealand waters. The use of tori lines was regulated in 1993. Specifications of the required minimum tori line refer to its length and attachment point, as well as the number, size and distance between streamers. These specifications have been recently updated to bring them in line with agreements reached in the Western and Central Pacific Fisheries Commission. In addition, fishers must set their lines at night, or, if fishing during the daytime, use approved line weighting.

Similar provisions are also outlined in high seas permit conditions for any New Zealand vessels fishing on the high seas.

Voluntary measures for each fleet

Voluntary mitigation measures stipulated in any formal way are done so through Codes of Practice. A Code of Practice is currently in development for domestic tuna vessels (see appendix two). For charter vessels operated through the New Zealand Japan Tuna Co. Ltd., a Code of Practice is in place that stipulates:

- Use of night setting with minimal vessel lighting

- Use of at least one tori line that meets government specifications, plus one other, and encouragement to use a third line particularly at times of high risk
- Availability of back-up tori lines ready for immediate use if needed
- Offal discharge from the port side only
- Use of thawed bait only
- Reduced deck lighting at night
- Use of a sonic gun if fitted to discourage birds from around the vessel
- Use of 'bird frighteners' during hauling
- A catch limit for 'at risk' species of birds

In addition, vessels are encouraged to try out mitigation methods they believe may be effective. It is also noted that vessels may need to deploy additional mitigation devices at times of high risk such as immediately before and after the full moon.

Measures under development

Blue-dyed bait

In 2004, a pilot experiment was undertaken to test the potential effect of blue-dyed bait on incidental seabird mortalities and on fish catch rates in the New Zealand domestic tuna longline fishery (Lydon and Starr 2004). The East Cape region on the east coast of the North Island of New Zealand was chosen as the area to conduct the experiment because fisheries in this area are known to have a relatively high rate of interactions with seabirds and this high rate potentially would maximise the probability of observing encounters between fishing gear and seabird species.

Seven longline sets were observed over an eleven day trip. A total of 10,040 hooks were set, 4,999 of which held control baits (undyed squid) and the other 5,041 hooks held blue-dyed squid. Two juvenile male Antipodean wandering albatross (*Diomedea antipodensis*) were caught in the first set on the control bait section of the longline, but no bird strikes were observed for the remainder of the experiment. Lydon and Starr (2004) report observations from the experiment on how dyed bait affects seabird interactions with the longline and make recommendations for future research. An aversion response by seabirds, rather than a camouflage effect of bait, is put forward as a possible mechanism for how the use of blue-dyed bait might reduce the attractiveness of longline baited hooks.

Further trialling of the effectiveness of blue dyed bait was initiated in 2008-09 with a comparison of blue-dyed bait with undyed bait (using weighted snoods with SafeLeads) and a control of undyed bait on unweighted snoods. Experimental sets were carried out during the day in order to test the efficacy of blue-dyed bait and weighted snoods as an alternative to night setting. Limited numbers of experimental sets were carried out, and it is hoped that further experimentation will continue when possible.

8. Public Relations and Education Activities

Paper CCSBT-ERS/0909/19 summarises New Zealand government activities on public relations and education. In addition, the organisation Southern Seabird Solutions (www.southernseabirds.org), formed in 2002, continued its work in

education and awareness of seabird conservation. The organisation's three priority areas for 2009/10 are:

- To assess the level of knowledge and understanding of seabird issues in New Zealand fisheries, and to outline the key steps and potential barriers to achieving widespread deployment of best practice in fisheries that may pose a risk to seabirds
- To develop a resource for fishers and inventors on how best to manage their promising new mitigation ideas from conception through to testing and widespread adoption
- To work with South American and South African countries to help them develop government, industry and NGO partnership models similar to Southern Seabird Solutions

9. Information on Other Ecologically Related Species (non-bycatch)

Since 1994, MFish observers aboard tuna longline vessels in New Zealand waters have recorded data on stomach contents of fish taken in longline operations. A preliminary examination of these data has been made for SBT and eight other ecologically related species. Proportions of empty stomachs did not appear to show significant trends through time for any of the nine species, but did vary among species. Observers reported that for most samples, only one prey type was evident in the stomach. Prey-type occurrence appeared to differ between the species. Sampling protocols may account for these findings. The full report is provided as CCSBT-ERSWG document: CCSBT-ERS/0602/8.

10. Others

New Zealand has no information to report on ERS-related fishing activities of non-party fleets.

11. Implementation of the IPOA-Seabirds and IPOA-Sharks

National Plan of Action to Reduce the Incidental Catch of Seabirds in New Zealand Fisheries

The NPOA-Seabirds is the principal framework for mitigating the impact of fisheries mortalities on seabirds. Its purpose is to set out a long-term strategy to reduce the incidental catch of seabirds in New Zealand fisheries. The Minister of Conservation and the Minister of Fisheries jointly approved the NPOA-Seabirds in April 2004.

The goals of the NPOA-Seabirds are:

- To ensure that the long-term viability of protected seabird species is not threatened by their incidental catch in New Zealand fisheries waters or by New Zealand flagged vessels in the high seas; and
- To further reduce incidental catch of protected species as far as possible, taking into account advances in technology, knowledge and financial implications.

The NPOA-Seabirds sets out a range of management measures to reduce seabird bycatch. Management measures include codes of practice, input controls, economic instruments, legal action against individual vessels, and bycatch limits. A mix of voluntary and mandatory measures can be used.

The NPOA-Seabirds is currently being revised to ensure that it is effective, taking into account the recent IPOA Guidelines issued by the FAO. The revised approach is likely to use a risk assessment methodology to determine priority fisheries where additional management action may be necessary to reduce mortalities to biologically acceptable levels. The proposed methods for conducting relevant seabird risk assessments are supplied in documents CCSBT-ERS/0909/15 and CCSBT-ERS/0909/16.

In addition, best practice measures will likely be implemented across all fisheries that pose a risk to seabirds, with the aim of minimising seabird interactions in a safe and practical manner. Mandatory measures are already in place in all longline fisheries and for larger trawl vessels. In addition, a range of voluntary measures are in place or being developed for other high risk fisheries.

National Plan of Action Sharks

New Zealand finalised its NPOA-Sharks for New Zealand fisheries waters in October 2008. The NPOA-sharks recognises that New Zealand has already taken a number of management actions in recent years to ensure the sustainable management of New Zealand shark fisheries. These actions include introducing a range of shark species into the QMS and providing complete protection for some vulnerable species. The NPOA-Sharks also identifies additional actions in order to achieve the objectives identified in the IPOA-Sharks.

Literature Cited

Lydon, G. and Starr, P. (2005) Effect of Blue Dyed Bait on Incidental Seabird Mortalities and Fish Catch Rates on a Commercial Longliner Fishing Off East Cape, New Zealand. Unpublished Conservation Services Programme Report. Department of Conservation, Wellington, 12 pp.

Table 1. The annual southern bluefin tuna catch (tonnes whole weight) for calendar years 1999 to 2008, by fishing method. Annual total catch estimates are scaled to Licensed Fish Receiver returns for 1999 to 2001, and to Monthly Harvest Returns since 2002, 0.0 = less than 100 kg.

Fishing method	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Longline	453.3	375.6	355.8	460.0	387.2	387.0	257.9	238.0	377.0	318.2
Troll	4.3	2.2	0.1	0.5	0.1	0.24	<0.1	0.1	<0.1	0
Handline	2.0	0.3	0.0	0.0	0.0	<0.1	0	<0.1	<0.1	0
Other	1.1	2.3	2.5	2.1	1.4	5.9	6.5	0.11	1.5	0.3
Total	460.6	380.3	358.5	462.6	388.7	393.3	264.4	238.2	378.5	318.6

Table 2: Recent catches of southern bluefin tuna in New Zealand fisheries waters (tonnes whole weight) by Calendar year and New Zealand fishing year (1 October to 30 September).

Year	Calendar year catches	Fishing year catches
1980	130.0	130.0
1981	173.0	173.0
1982	305.0	305.0
1983	132.0	132.0
1984	93.0	93.0
1985	94.0	94.0
1986	82.0	82.0
1987	59.0	59.0
1988	94.0	94.0
1989	437.2	437.1
1990	529.2	529.3
1991	164.5	164.5
1992	279.2	279.2
1993	216.6	216.3
1994	277.0	277.2
1995	436.4	434.7
1996	139.3	140.4
1997	333.7	333.4
1998	337.1	333.0
1999	460.6	457.5
2000	380.3	381.7
2001	358.5	359.2
2002	450.3	453.6
2003	389.6	391.7
2004	393.3	394.0
2005	264.4	264.0
2006	238.2	238.2
2007	378.5	379.0
2008	318.6	318.4

Table 3: Observer coverage in terms of catch (proportion of numbers observed) for the Charter (NZC) and domestic (NZD) fleets for 2007 and 2008.

Calendar year	NZC	NZD
2007	0.60	0.16
2008	0.46	0.09

Table 4: Observer coverage in terms of effort (proportion of hooks observed) for the Charter (NZC) and domestic (NZD) fleets for 2007 and 2008.

Calendar year	NZC	NZD
2007	0.54	0.11
2008	0.45	0.15

Table 5. Total allowable catches of the main fish bycatch species associated with the SBT surface longline fishery within the NZ EEZ (2003/04).

Fish species	TAC (tonnes)
Bigeye tuna	740
Yellowfin tuna	358
Pacific bluefin tuna	120
Swordfish	919
Moonfish	527
Blue shark	2080
Mako shark	512
Porbeagle shark	249
Ray's bream	1045

Table 6. Seabirds species identified by experts via necropsy studies, caught during fishing for southern bluefin tuna in New Zealand waters in 2006-07 and 2007-08.

			2006-07		2007-08	
Species Common name	Scientific Name	IUCN threat classification	Observed captures	Necropsy	Observed captures	Necropsy
Buller's albatross	*Thalassarche bulleri*	Near Threatened	50	35	18	9
White-capped albatross	*Thalassarche steadi*	Near Threatened	28	25	3	3
Grey petrel	*Procellaria cinerea*	Near Threatened	17	17	1	1
White-chinned petrel	*Procellaria aequinoctialis*	Vulnerable A4bcde	3	3	4	4
Gibson's albatross	*Diomedea gibsoni*	Vulnerable D2	3	3		
Campbell albatross	*Thalassarche impavida*	Vulnerable D2	3	3		
Black-browed albatross	*Thalassarche melanophrys*	Endangered A4bd		0	11	0
Antipodean albatross	*Diomedea antipodensis*	Vulnerable D2	1	1	1	1
Salvin's albatross	*Thalassarche salvini*	Vulnerable D2	1	1	1	0
Cape petrel	*Daption* spp.	Least concern	1	0		
Sooty shearwater	*Puffinus griseus*	Near Threatened	1	0		
Wandering albatross	*Diomedea exulans* spp.	Vulnerable A4bd			1	1
Unidentified albatross	Diomedeidae (Family)		1	0		

Table 7: Numbers of fish caught reported on commercial catch effort returns (Reported), observed, estimated from observer reports and total fishing effort (Scaled), and catch per unit effort (CPUE) for fish species caught on longline sets where southern bluefin tuna was either targeted or caught during the 2006–07 and 2007–08 fishing years.

2006–07 fishing year:

	Japanese charter				New Zealand domestic			
	Reported	Observed	Scaled	CPUE	Reported	Observed	Scaled	CPUE
Blue shark	10 559	8 275	15 029	10.955	20 665	3 324	25 325	41.665
Rays bream	16 630	11 744	21 329	15.548	1 423	172	1 310	2.156
Albacore tuna	2 071	1 450	2 633	1.920	6 111	807	6 148	10.115
Southern bluefin tuna	2 410	1 531	2 781	2.027	1 609	315	2 400	3.948
Big scale pomfret	2 187	1 616	2 935	2.139	4	1	8	0.013
Porbeagle shark	756	628	1 141	0.831	374	92	701	1.153
Mako shark	438	324	588	0.429	1 092	170	1 295	2.131
Moonfish	837	616	1 119	0.816	799	75	571	0.940
Swordfish	151	115	209	0.152	784	112	853	1.404
Dealfish	918	613	1 113	0.812	0	0	0	0.000
Deepwater dogfish	777	604	1 097	0.800	1	0	0	0.000
Lancetfish	0	171	311	0.226	338	115	876	1.441
Butterfly tuna	175	125	227	0.165	483	82	625	1.028
Oilfish	450	352	639	0.466	48	11	84	0.138
Bigeye tuna	11	8	15	0.011	207	41	312	0.514
Rudderfish	158	102	185	0.135	85	14	107	0.175
School shark	363	234	425	0.310	9	2	15	0.025
Hoki	236	247	449	0.327	0	0	0	0.000
Escolar	29	50	91	0.066	89	16	122	0.201
Thresher shark	104	75	136	0.099	22	10	76	0.125
Pacific bluefin tuna	8	6	11	0.008	13	2	15	0.025
Striped marlin	0	0	0	0.000	2	0	0	0.000
Yellowfin tuna	0	0	0	0.000	4	0	0	0.000

Table 7. continued.

2007–08 fishing year:

	Japanese charter				New Zealand domestic			
	Reported	Observed	Scaled	CPUE	Reported	Observed	Scaled	CPUE
Blue shark	6 496	2 747	6 141	10.806	25 461	5 082	32 003	55.321
Rays bream	8 349	3 975	8 886	15.637	1 435	79	497	0.860
Albacore tuna	431	170	380	0.669	7 550	1 401	8 822	15.251
Southern bluefin tuna	2 804	1 301	2 908	5.118	1 462	138	869	1.502
Big scale pomfret	1 248	534	1 194	2.101	5	2	13	0.022
Porbeagle shark	130	49	110	0.193	901	393	2 475	4.278
Mako shark	36	16	36	0.063	991	241	1 518	2.623
Moonfish	106	41	92	0.161	429	74	466	0.806
Swordfish	19	3	7	0.012	1 060	214	1 348	2.330
Dealfish	806	192	429	0.755	0	0	0	0.000
Deepwater dogfish	603	250	559	0.983	0	0	0	0.000
Lancetfish	0	0	0	0.000	627	302	1 902	3.287
Butterfly tuna	17	5	11	0.020	233	94	592	1.023
Oilfish	0	1	2	0.004	105	23	145	0.250
Bigeye tuna	0	0	0	0.000	400	84	529	0.914
Rudderfish	50	38	85	0.149	128	17	107	0.185
School shark	25	10	22	0.039	1	1	6	0.011
Hoki	15	7	16	0.028	0	0	0	0.000
Escolar	0	0	0	0.000	232	20	126	0.218
Thresher shark	29	12	27	0.047	32	9	57	0.098
Pacific bluefin tuna	1	1	2	0.004	20	3	19	0.033
Striped marlin	1	0	0	0.000	15	1	6	0.011
Yellowfin tuna	0	0	0	0.000	11	0	0	0.000

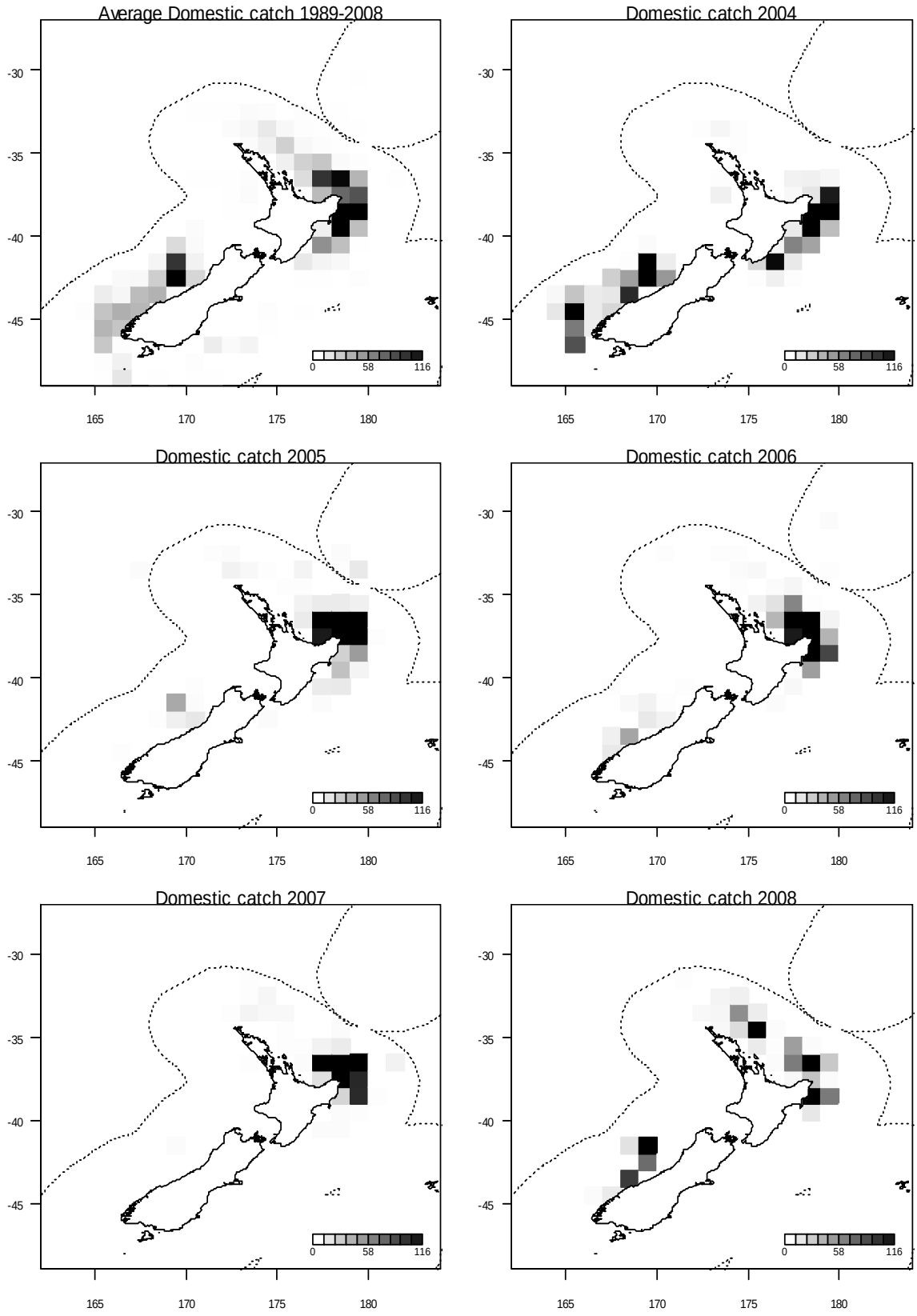


Figure 1: Distribution of longline catches (number of fish per 1 degree square) for the domestic fleet: average for the time series (1989-2008), and annually for 2004 to 2008.

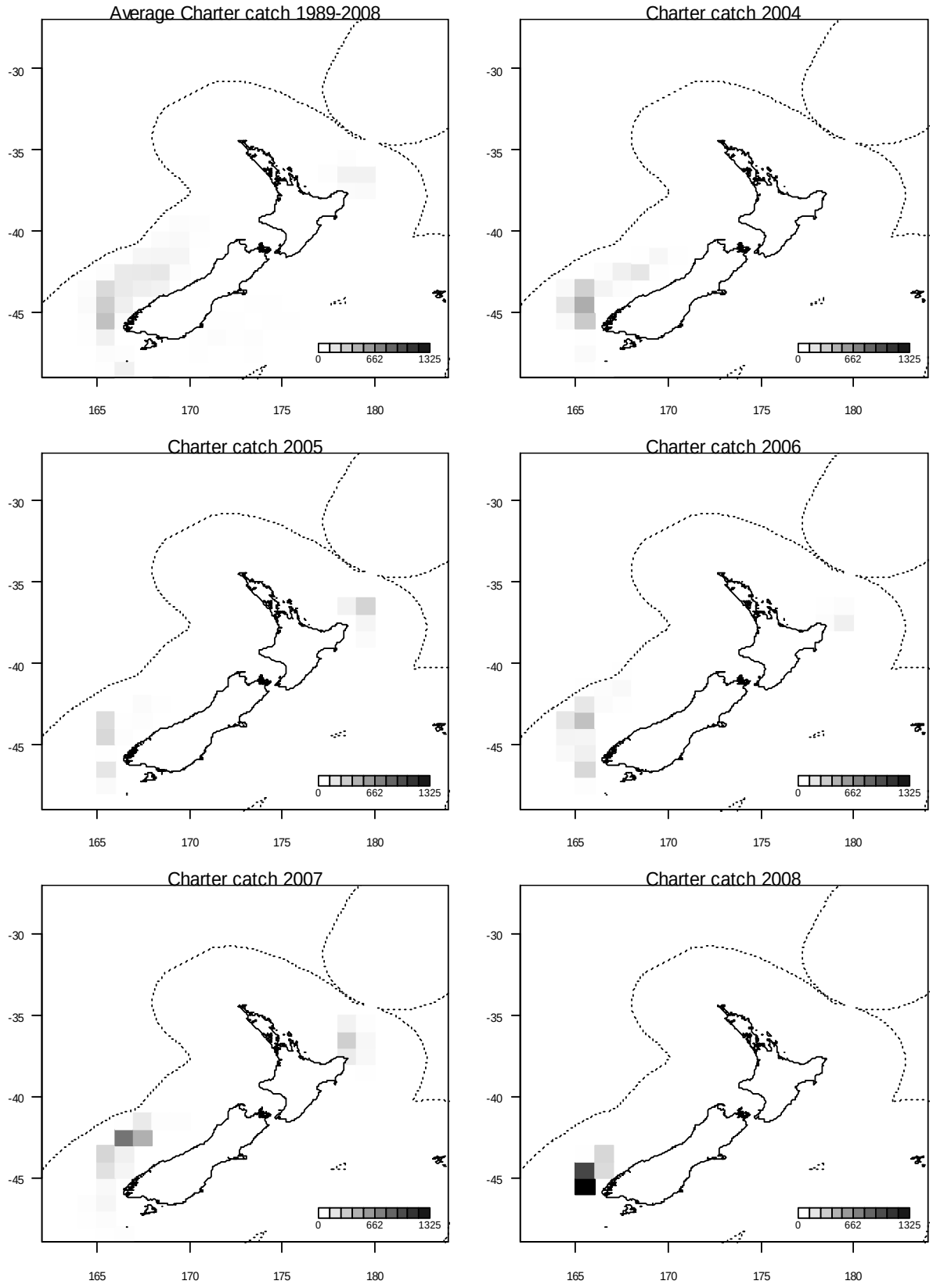


Figure 2: Distribution of longline catches (number of fish per 1 degree square) for the Charter fleet: average for the time series (1989-2008), and annually for 2004 to 2008.

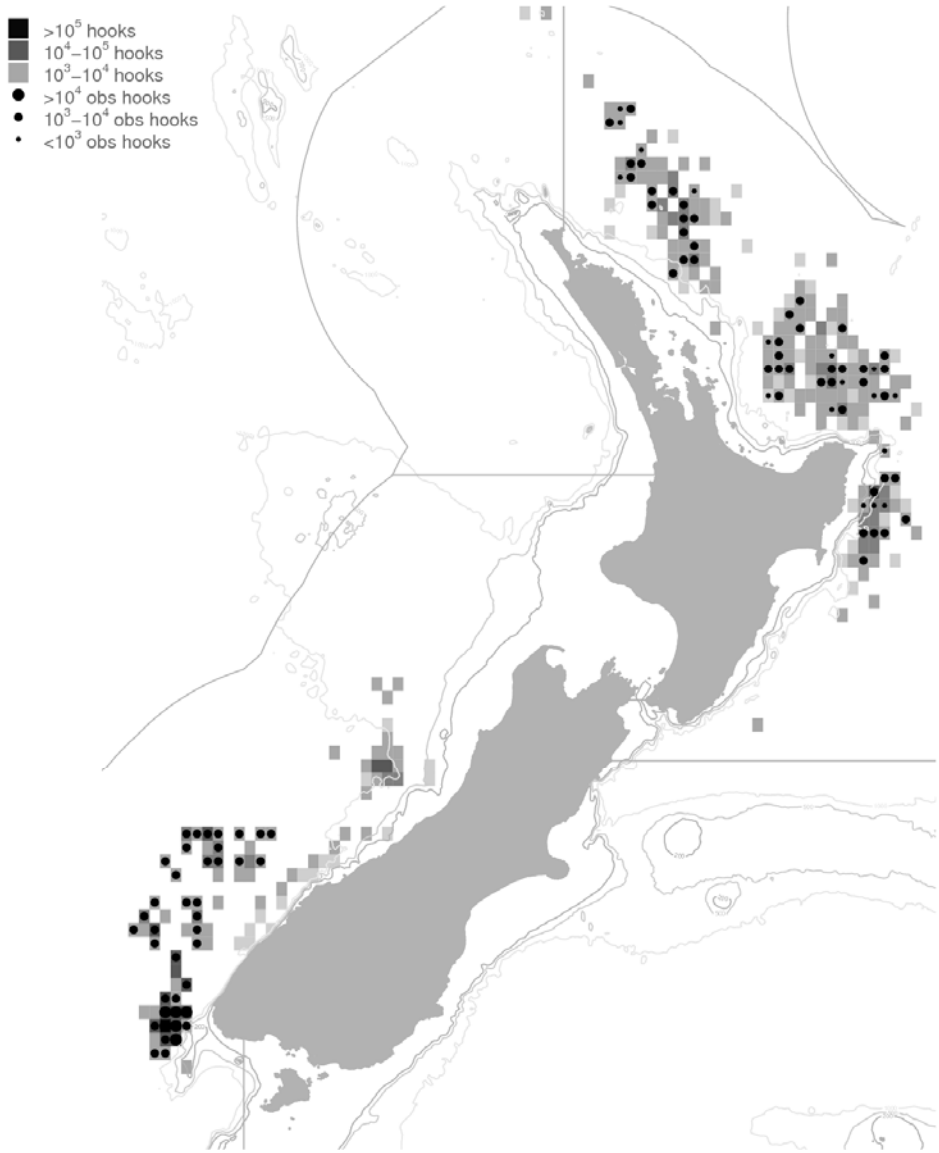


Figure 3. Map of the effort and observations for the 2007-08 fishing year. Cells are shaded by the fishing effort within each 0.2^{o}x0.2^{o} area. The number of observations is shown by a black dot, where the increasing size of the dot reflects increasing number of observations. Shaded cells with no black dot indicate unobserved effort.

Appendix One – Abstracts of New Zealand Meeting Papers for ERSWG7

DISCUSSION PAPERS

Title ***Incidental capture of seabirds and New Zealand fur seals in southern bluefin tuna fisheries in New Zealand waters in 2006-07 and 2007-08 (CCSBT-ERS/0909/14)***

Authors Nathan Walker, Finlay Thompson and Edward Abraham

Abstract Incidental catch rates and estimated total captures of seabirds and New Zealand fur seals, *Arctocephalus forsteri*, are reported for vessels fishing in New Zealand waters for southern bluefin tuna *Thunnus maccoyi*.

Title ***Level 1 Risk Assessment Methodology for incidental seabird mortality associated with New Zealand fisheries in the NZ-EEZ*** **(CCSBT-ERS/0909/15)**

Authors Stephanie Rowe

Abstract The paper describes the work of a Seabird Stakeholder Advisory Group to develop a risk assessment framework that could be applied to a proposed standard of mitigation of seabird bycatch, along with New Zealand's revised NPOA-Seabirds.

Title ***A risk assessment framework for incidental seabird mortality associated with New Zealand fisheries in the NZ-EEZ*** **(CCSBT-ERS/0909/16)**

Authors Ben R. Sharp, Susan M Waugh, Nathan A. Walker

Abstract This report outlines the risk assessment framework as developed at a workshop held on the 18th and 19th of February 2009 to support the revision of New Zealand's National Plan of Action – Seabirds. This report does not seek to specify the detail of the methods used to deliver results in subsequent risk assessment projects, but to detail the steps that make up the framework that should be used in those projects. Note that various methods could be used to deliver the framework.

Title ***Optimizing Tori Line Designs for Pelagic Tuna Longline Fisheries. Report of work under New Zealand Ministry of Fisheries Special Permit 355*** **(CCSBT-ERS/0909/17)**

Authors Edward F. Melvin and Nathan Walker

Abstract Observations of seabird interactions with pelagic longlines were carried out aboard one of four Japanese vessels participating in the joint venture fishery for southern bluefin tuna in the New Zealand EEZ

off the Fiordland coast from 23 April to 2 May 2008. The purpose of the project was to establish protocols to monitor seabird behaviour in response to tori lines (also called streamer lines), and to begin to establish essential design elements for effective tori lines. This project was a collaboration of the New Zealand Japan Tuna Company, Ltd, the New Zealand Ministry of Fisheries, and Washington Sea Grant.

Title ***Summary of education and mitigation activities in the New Zealand longline fishery (CCSBT-ERS/0909/19)***

Authors Department of Conservation and Ministry of Fisheries

Abstract The New Zealand government continues to engage with fishers to increase their awareness of bycatch issues in New Zealand fisheries. This paper summarises those initiatives.

Appendix Two – Draft Code of Practice

Code of Best Practice

For the Mitigation of the Effects of Fishing in New Zealand Pelagic Longline Fisheries

December 2008

Version 2.0

Summary of the Code of Best Practice

The signatories to the Code of Best Practice ('the Code') are committed to minimising the incidental capture of protected species during their commercial fishing operations. To ensure success, signatories to the Code have committed to abide to the following measures:

- Accurate records of protected species capture are to be recorded on the MFish 'Non-Fish and Protected Species Catch Return'.
- To accurately identify seabirds, all vessels operating under this code will have on board the booklet "A fisher's guide to New Zealand seabirds". DOC 2007.

A fisher's guide to New Zealand seabirds (PDF, 1200K)

- Fishermen will carry and know how to operate the turtle dehooker.
- If MFish Observers are on a trip, they will provide independent verification that this Code is being adhered to.
- Signatories of this Code will train all their crew using this Code, to ensure that the crew is able to effectively employ the mitigation measures.
- Signatories to this Code will encourage non-members to (a) join the pelagic longline working group* and (b) be proactive in using mitigation techniques.
- Where parties to this document (signed up members to the code) transfer tuna ACE to third parties, then the contracted third party will also be required to comply with this Code.

* The Pelagic Longline Working Group consists of pelagic longline fishermen, who meet with the Ministry of Fisheries and the Seafood Industry Council twice a year.

SIGNATORIES

"We accept the challenge of protected species captures by implementing proactive mitigation measures to ensure that pelagic longline fishing is a sustainable activity."

The purpose of the Code of Best Practice:

This Code sets out principles and standards of behaviour for responsible practices and acts as an agreed guide to existing and improved fishing practices by pelagic longline fishermen within the New Zealand Exclusive Economic Zone. It is a demonstration of the long-term commitment to ensuring we maintain a well managed sustainable fishery. This will ensure the effective management and development of the fishery with due respect for the ecosystem, biodiversity, economics, community benefits and other users of the resource.

The Code will enable us to self regulate and keep up with legal obligations and avoid the need for legislation to take control of industry activities.

The main purpose of this Code is to provide a suite of mitigation measures that will help minimise the incidental capture of protected species. They are measures that are practical, sensible and are known to work. In addition, the Code helps pelagic longline fishermen manage their activities in accordance with best practice and consistent with obligations arising from National Plans of Action.

The Code will evolve over time, incorporating new knowledge, research results, and technology to mitigate protected species capture. Signatories to the code will actively support research and the development of new mitigation techniques. A watching brief will be kept on international research in this area. The Code will be reviewed in 2010.

The code will improve over time as it evolves, feedback and new ideas are very welcome.

The contact person for any issues surrounding this code and other matters:

Contact: Greg Lydon (SeaFIC) on 027) 244 9070

email: greg@seafood.co.nz

Introduction

Any actions that threaten endangered marine species is now a global concern. The NZ seafood industry is constantly reviewing its operating standards to ensure that its fishing practices are environmentally responsible. The Fisheries Act 1996 provides for the utilisation of fisheries resources while ensuring sustainability. Fishermen must take into account the effects of fishing on the environment and on associated species by avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.

Having a clean green fishery is crucial not only for the ecosystem but in today's global market. By keeping protected species away from our lines we will have more hooks available to catch fish.

Scope of the fishery

The tuna fishery in New Zealand is complex and dynamic with many factors changing within and between fishing seasons. The fishery operates across several geographic areas and the presence, abundance and behaviour of tuna and the protected species that interact with the fishery are constantly changing in response to the environment. Similarly, vessels and fishing techniques vary widely within the fishery, as does fishing effort in response to market demand.

In general, tuna are seasonal in their distribution in New Zealand waters, and this distribution is governed to a large degree by temperature, and 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.

Pelagic longline fisheries overlap with the known ranges of various seabird species, marine mammals and turtles, including some ranked 'Critically Endangered'. The overlap of fishing operations with protected species inevitably leads to occasional fisheries interactions.

Role of Pelagic Longline Working Group

The Pelagic Longline Working Group will:

- Be the Industry group responsible for the environmental performance of pelagic longline fisheries within the NZ EEZ.
- Be a forum for discussion and communication within Industry.
- Interact constructively with Government agencies.
- Review and update the Code at specific intervals.
- Have representatives take part in protected species Working Groups.
- Support research on protected species mitigation measures.
- Educate crews on protected species issues.
- Keep up to date with international developments on mitigation.
- Monitor the effectiveness of mitigation measures used by Code signatories.

Objectives of the Code:

1. Protected species captures in target tuna fisheries will be minimised and will reduce over time.
2. The effectiveness of mitigation measures will be monitored and improved over time.
3. New mitigation measures will continue to be investigated and reported to the Tuna Working Group. Where new measures prove to be effective and safe they will be included in the Code.
4. Mitigation measures will not cause unsafe working conditions. The health and safety of the crew is paramount at all times.

Review

The Code will be reviewed from time to time by the Pelagic Longline Working Group.

photo by: North Pacific Longline Association

Seabirds

The islands that make up New Zealand support the world's most diverse community of seabirds. 47 albatross and petrel species breed or forage in New Zealand waters, 20 of which only breed here. They are all protected. This hotspot of seabird biodiversity is often called 'the seabird capital of the world'. Unfortunately, interactions between seabirds and fishing vessels are inevitable. Some seabird species are particularly vulnerable and now have a threatened status.

Seabirds are incidentally caught in a variety of fisheries and by all fishing methods each year. For some seabird species, fishing activity is a major threat, while for others the main threats are from other sources, such as loss of habitat, competition for breeding sites with fur seals and predation by introduced predators. Pollution, plastic ingestion, human disturbance on land, boat strikes and hunting are lesser threats. In addition some species have a small breeding population but a wide oceanic range which exposes them to many fisheries in different countries jurisdiction.

In New Zealand, 13 albatross and 17 petrel species have been recorded as having been caught during commercial fishery operations since 1996. Incidental mortality through interactions with fisheries operations has been linked with global declines of some albatross and petrel species. Nearly half of the world's 125 petrel species and 16 of the 21 albatross species are classified as threatened, so effective measures to mitigate against seabird bycatch are urgently needed.

The Problem:

The type and abundance of seabirds attending fishing vessels will differ depending on; the number of fishing vessels present in the same fishing grounds, the location, time of day, and season. Whether or not seabird species get caught depends on their feeding method, how deep they dive, and the size of the seabird. Smaller birds are unable to swallow large food items such as longline baits, and so are rarely found captured in this way. However, large scavenging seabirds often have wide bill gapes and are able to swallow large food items whole; this increases their likelihood of getting caught on longline hooks.

Seabirds that forage behind longline fishing vessels risk getting caught on the hook or entangled in the line if baited hooks are within the range they would normally dive to retrieve food. In some cases they are also at risk when deeper diving species are present that can bring a baited hook to the surface. For instance, shallow diving albatrosses can take a baited hook from a smaller deeper diving petrel, putting themselves at risk when baits are well beyond their own diving depth.

Seabirds are natural scavengers and appear to learn that fishing vessels provide a reliable easy meal during fishing operations and when used baits and offal are discarded at sea. Seabirds can become hooked during line setting and less frequently during the haul. Seabirds can get caught by either swallowing baited hooks or by being foul hooked. They are at risk not just from the New Zealand fishery, but from other international fisheries as well.

Mitigation Measures to be Used to Minimise Incidental Seabird Captures

There's no silver bullet for seabird conservation in longline fisheries – it generally involves a range of different measures, and some experimentation. In general mitigation technologies work in one of five ways:

- Shrink the window of time in which seabirds can access baits, either by line weighting or delivering baits below the area where birds can access baits;
- Scare bird away when baits are deployed or retrieved;
- Make baits 'cryptic' using blue dye or wrapping baits up so they are unrecognizable as food;
- Manage offal from fish processing in a way that minimizes interactions during line setting and hauling; and
- Time area-closures, which generally aim to minimize fishing at times and in areas when birds are breeding and most aggressive.

The following mitigation methods will help to reduce the likelihood of accidentally catching a seabird. Using a combination of methods improves the likelihood of preventing birds from taking baited hooks.

1. Tori Lines

It is mandatory to always use a bird scaring line(s) when setting a longline.

Regulation 58 of the Fisheries (Commercial Fishing) Regulations 2001 makes it mandatory use a streamer/tori line when setting a longline when fishing for tuna or swordfish. The line has to comply with specifications issued by the Chief Executive – most recently in November 2007 (see Appendix 1).

Tori lines are designed to trail out behind the fishing boat to deter birds from entering the area where the fishing lines are set and hauled. They need to be deployed so they adequately protect your vessel's 'Danger Zone' – i.e. the area where birds can access baited hooks.

Seabirds sit on, or fly low over the water behind a boat when diving and attacking baits. A bird-scaring line or lines (originally designed by the Japanese, hence 'Tori') are suspended some distance above the deck, and are positioned over or in the area where baited hooks enter the water. They are relatively cheap to make and install and are designed to trail out behind the fishing boat to create a 'moving fence' that deters birds from entering the area where the fishing lines are set and hauled i.e. the 'scarecrow' effect prevents seabirds accessing baited hooks.

NB. Each vessel's Tori line will be slightly different, or specific to each vessel, to increase the effectiveness in reducing interactions with seabirds. The length of your tori line relates to your setting speed - setting faster generates a larger aerial distance for the tori line (however slower setting speed allows the line to sink at a faster rate which is also good). So an effective tori line will take time to perfect for your vessel and is a juggling act between aerial length, setting speed and crucially the ability to keep it above your hooks while not getting entangled with your backbone. It's not easy but once you have the tori line working well it will keep birds away from your line.

Research worldwide has shown that tori lines significantly reduce seabird bycatch – by up to 70% in comparison to vessels not using them. Research in Alaskan Longline Fisheries has shown that paired streamer lines are more effective and significantly reduce incidental seabird capture. This is also the case in NZ trials as paired tori lines are robust in a wide range of wind conditions and require little adjustment as physical conditions change.

Tori line design specifications vary by vessel, fishing operation, and location, however the tori line needs to:

- Have a minimal risk of entanglement with fishing gear
- Be simple to construct and repair
- Have streamers that move freely, unpredictably and not wrap around the backbone of the tori line.
- Set and retrieve with ease (its an advantage to use a small winch).

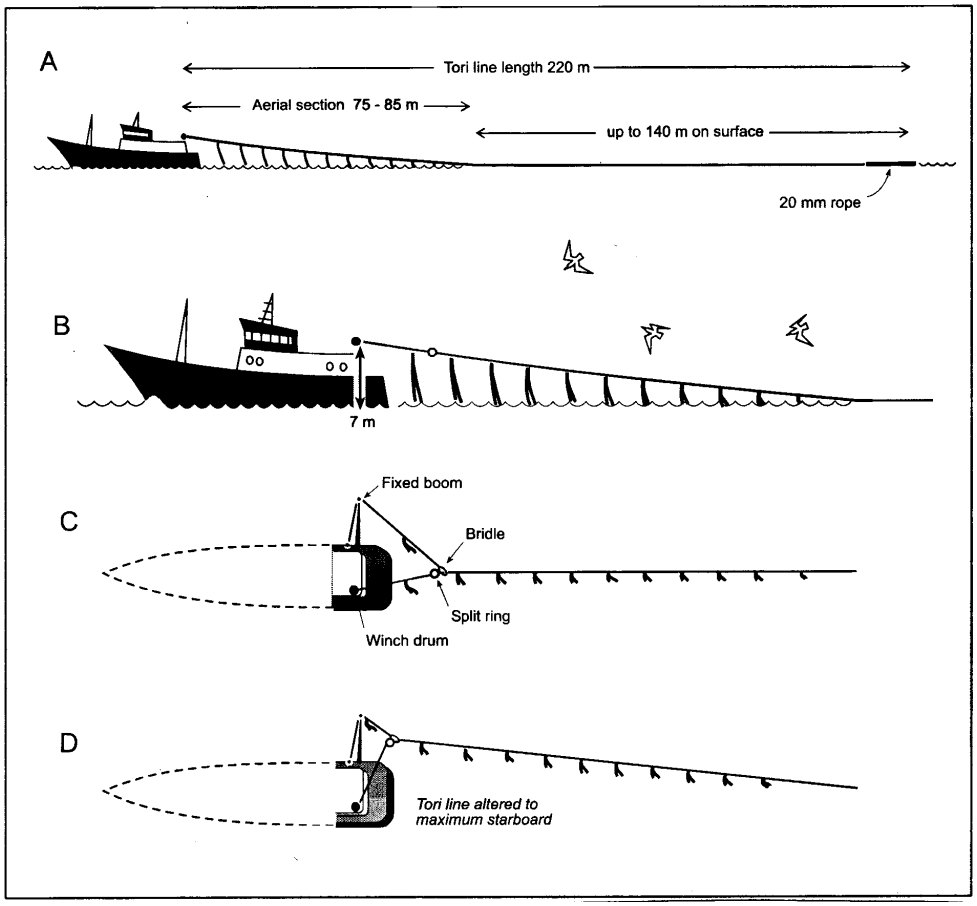


Figure **An example of a Tori Line with Bridle and Boom system** (Smith 2001)

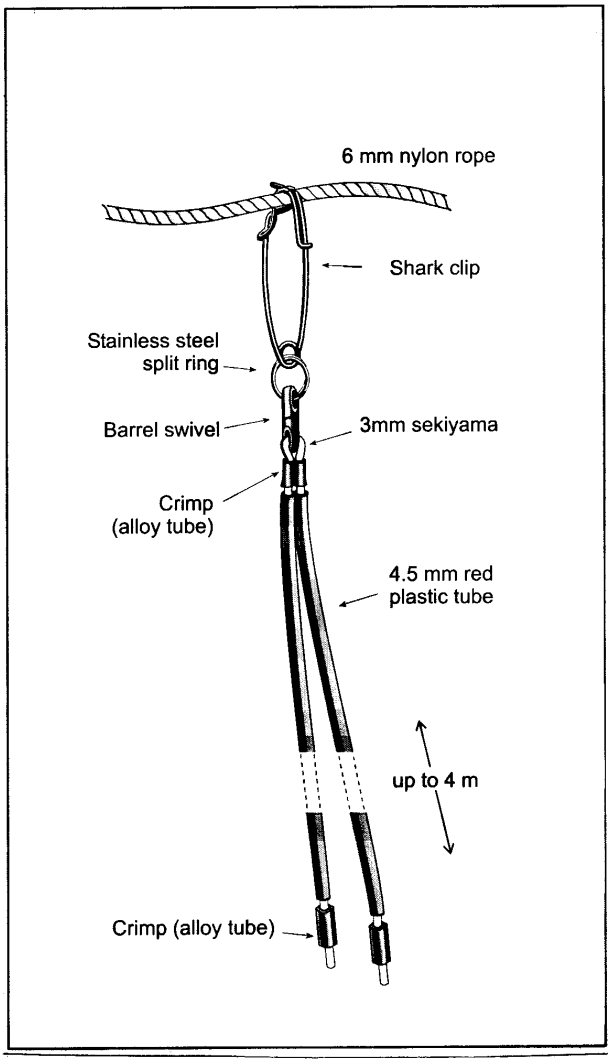


Figure **An example of Materials Used in a Tori Line** (Smith 2001)

2. Disposal of Waste, Baits and Offal

Offal will not be discharged during setting and will be discharged only on the opposite side to the hauling station when hauling.

Seabirds can benefit from fishing activities due to the increase in food supply from discarded fish and waste. However, disposal of waste attracts seabirds to the longlining operation.

Line setting is the danger time for seabird capture – the disposal of waste overboard during this time attracts seabirds to the longlining operation and puts seabirds in danger from baited hooks.

- ***Offal is only allowed to be released when the vessel is steaming or on the opposite side of the hauling station when hauling.***
- Offal will not be discharged during setting - this includes the bait that is missed during setting.
- If offal or missed baits are drifting into the area where the line is being set – then steps must be taken immediately to prevent this happening.
- **All efforts must be made to remove embedded hooks from offal.**

3. Night Setting

Setting longlines at night is mandatory practice* at present because the visibility of the bait is reduced for most seabirds

(*unless using an approved line weighting regime – see item 6)

Night = 0.5 hours after nautical dusk to 0.5 hours before nautical dawn

- Research indicates that more seabirds are caught on longlines set during the day.
- Setting lines at night reduces the visibility of the bait for most seabirds. However care must be taken:

1. In the hour after sunset and the hour before sunrise. This is when many seabirds are most actively feeding so are danger times; and
2. In the three days before and after a full moon. Additional mitigation measures may be required at such times.

- The effectiveness of setting longlines at night depends on various factors e.g. fishing method, season, seabird species behaviour, weather, mitigation measures already in place etc.
- Vessel lighting needs to be shielded to avoid shining out onto the longline, less light on the longline helps reduce the ability of the bird to see the baited hooks.
- Crew safety is paramount so light levels must be safe on board the vessel.
- The stern deck lights should be switched off when not required for shooting and hauling as lights attract seabirds to the vessel

4. Thawing of Bait

The use of totally frozen bait is to be avoided.

- **Generally, totally frozen bait sinks at a slower rate.**
- **Bait must be taken out of the freezer or ice several hours before the set.**

5. Blue Dyed Bait

Fishermen in the United States during the mid-1970s were the first to experiment with dyed baits to improve swordfish fish catch in the Atlantic Ocean longline fishery. The dyes that have been used internationally are commercially available non-toxic food colouring dyes. Dyed bait is considered by fishermen to be more visible to target fish. The dying of bait with an environmentally safe blue dye has been shown to reduce seabird interactions in experiments in Hawaii, Australia and Japan. Birds either find it harder to see blue baits or distrust the unusual appearance of the bait. The catch rate of fish when using blue bait is not reduced.

Method:

Squid bait turns a darker blue than sanmar or pilchard (due to their oily skin and large scales). It is recommended that blue is the only colour of dye used and squid bait is used to obtain best results.

Bait is dyed blue at sea using 30 grams (five heaped standard teaspoons) of *Brilliant Blue* dye placed in a one litre container in the sheltered wheelhouse and then thoroughly mixed with 800 millilitres of freshwater. The concentrated dye mixture is poured into a 200 litre plastic drum on deck which contains 40 litres of seawater and 400 squid (the process is repeated for a second drum containing another 400 baits). To ensure that all the bait surfaces had maximum exposure to the dye and that the bait had thawed, the bait and dye mixture is regularly stirred with a broom over the course of one hour before the longline set commences. The result is a consistent dye uptake by the squid bait (i.e. an even blue colour).

Blue dyed squid compared to normal squid bait.

6. Weighting of Hooks or Longline Gear

Weighting of longline gear increases the sinking speed of baited hooks. This reduces the exposure time of baited hooks to seabirds.

Setting in the daytime is permitted ONLY if line weighting is used i.e.

"A metal weight of 45g or more must be attached to every hook deployed. The position of the weight must correspond to one of the following:

(a) Weights less than 60g must be within 1m of the hook or
(b) Weights of 60-98g must be within 3.5m of the hook or
(c) Weights greater than 98g must be within 4m of the hook"

More info: see gazette notice 1185, February 2008

- **Weights can also be added to the line if other mitigation measures are not being effective. Avoid jerking the line to the surface and exposing the hooks to birds.**

N.B. Care must be taken - this procedure can be very dangerous especially during the hauling operation when weights can "fly" over the overboard roller.

The weighting regime depends on:

- the diameter of the backbone (thinner backbones generally sink more rapidly),
- the weather (large swells create more line jerks and slow sink rate), and
- the vessels setting speed (slower setting speeds allow the line to sink to greater depths in shorter over ground distances).

Branch lines with weights at or near the hook cause baits to begin sinking instantly, removing the visual cue for seabirds. They also increase sinking speeds, and shorten the time that seabirds are vulnerable to being caught.

Using weighted swivels at the hook end of branch lines can be dangerous under certain circumstances. When sharks are hooked, they tend to swim to the surface; if they turn while on the surface the branch line can run across their teeth and break. If at the time the branch line is under tension, the swivel can become a projectile and travel at high speed towards the vessel, creating a danger to crew. The following practices are used to mitigate risks:

- In Australia, some fishers clip their branch lines between pairs of crimps fitted at regular intervals on the mainline. This prevents the branch lines sliding along the backbone and tangling. However, in some situations this could increase the risk (if the branch line comes under tension from a shark, the clip cannot slide along the backbone). This could shorten the amount of time crew has to unclip the branch line to reduce the risk of injury.
- Hauling the line through a ring at waist height is considered to reduce the risk of serious injuries to the head and upper body (in comparison to hauling fishing lines through a block at or above head height).
- The risk of injury can be reduced through good coordination between the person driving the boat and those unclipping the branch lines from the mainline. For instance the forward speed of the vessel along the fishing line needs to match the pace at which crew can work, so that as soon as a branch line arrives at the ring, it is unclipped and hauled in. Under these circumstances, if a shark is caught, crew will see this sooner and can quickly clip the branch line to a low point on the vessel to reduce the chance of it hitting someone.
- In Australia, some crew wear lightweight safety helmets with face visors to protect themselves if a hook or swivel does fly back towards the boat.
- A UK company has developed a "Smart Lead" that falls off the branch line if the weight reaches dangerous speeds. This is currently being tested in New Zealand.

7. Careful Handling of Live Seabirds

If seabirds are caught alive, every reasonable effort should be made to ensure that birds are released alive and unharmed.

The Department of Conservation can supply a DVD by Johanna Pierre:

"Seabird Handling after Captures in Fisheries" – how to help yourself and the birds.

- When you see a bird caught on your line, stop drag on the gear (take vessel out of gear/reverse to bring bird alongside).
- You will need gloves, long sleeves, a dip net, and another crewman to help you.
- When you can reach the bird, bring it gently onboard by hand or with the long-handled dip net.
- Once the bird is onboard, keep it calm, move slowly around the bird - covering the bird's eyes and head with a cloth can help calm it.
- Hold the wings gently but firmly to the bird's body, support the head/neck and feet, gently but securely.
- Your crewmate then needs to gently isolate the hooked or tangled area.
- Carefully cut all line off the bird.
- To remove hooks – if hooking is through a body part, trim the line and cut barbs off the hook. Use bolt-cutters or cut the hook in two and thread the hook out.
- If the hook has been swallowed do not pull on the visible line. Cut the line as close as possible to the swallowed hook and leave the hook in place.
- After removing the bird from fishing gear, if the bird is waterlogged, put it in a safe space, e.g. an empty fish crate, box, or an open, safe area on deck.
- Let the bird dry out. When the bird is dry or active again ease the bird back into the water as close to the water surface as possible.
- Do not throw seabirds into the air!

Reporting information:

- Accurate records of seabird capture (dead or alive) are to be recorded on the new 'Non-Fish and Protected Species Catch Return'.

Turtles

Although sea turtles are typically thought of as tropical animals living around Hawaii and northern Australia, there are five species that we think visit New Zealand waters from time to time. These are Leatherback, Loggerhead, Hawksbill, Green and Olive Ridley turtles. All these turtles lay eggs in nest holes dug on sandy beaches overseas. When the eggs hatch, the little turtles dig their way to the sand surface, and scuttle down the beach to reach the ocean. Globally, sea turtles are in trouble. All species in New Zealand waters are threatened with extinction, and two of these are critically endangered. Only one in a thousand turtles is thought to survive from hatching to breeding age.

Turtles are amazing creatures and have been on this planet for over 200 million years. Unfortunately they are critically endangered and face threats from hunting, egg collection, boat strike, pollution, climate change and accidental capture by fishing. Fortunately they are usually caught alive when they get entangled in pelagic longlines and can be safely released by the careful use of line cutters.

The following two DVDs have been supplied to you with the dehooking kit, they are excellent guides on how to release turtles alive. Please make sure your crew has also watched them.

‘**Crossing the Line’** – Sea Turtle Handling Guidelines

‘Hooks Out and Cut the Line’ – dehookers and linecutters

Large circle hooks (18/0) and setting deeper (below 40m) helps to avoid interactions with turtles.

N.B. turtles may appear lifeless but are not necessarily dead – they may just need time on board to recover.

In summary, if a turtle is caught by being hooked or more commonly entangled in your longline:

1. If a turtle is noticed on the line, slow down to reduce trauma to the animal.
2. If the turtle is too large to bring on board, bring it as close to the boat as possible without putting strain on the line – then cut the line as close to the turtle as possible. Don’t jump in the water to untangle the line.
3. If the turtle is small – use the supplied dip net to lift on board the boat. Make sure you don’t use a gaff or pull on the line, or grasp the eye sockets of the turtle.
4. Place a piece of round wood (a broom handle) in the turtles mouth so that it cannot bite you – bites can be nasty.
5. If the hooks barb is visible use bolt cutters to cut off the point. Then remove the two parts of the hook separately.
6. If the hook is not visible remove as much line as possible without pulling too hard. Then cut the line close to the turtle.
7. If the turtle is active then you can carefully release it after noting tag numbers (if it has tags).

8. If the turtle is not active then it may have water in its lungs. Raise the rear flippers by 20cm while it is recovering.
9. Place the turtle in a shaded location on the boat. Cover the turtle's body with wet towels, avoiding the nostrils. Spray the towels with salt water, again avoiding the face.
10. Keep the turtle on board for at least 4 hours. Assess its recovery – it can be released when it is lively again – this can take up to 24 hours.
11. Carefully return the turtle to the water when it has recovered. Release it headfirst while the boat is stopped and the engine is out of gear.
12. Ensure the turtle is well clear of the boat before starting your engine.

Do not land animals on board if there is the possibility this will cause further injury and stress. Hauling animals to the deck using the line may result in increased tissue damage by the hook, possibly piercing the oesophagus or stomach or pulling organs from connective tissue and killing the animal. Cut the line off as close as possible to the animal.

Where practical use the DOC supplied line cutters to cut as much line as possible off an entangled animal. Where practical use de-hooking devices to remove hooks from internally (eg. throat hooked) or externally hooked animals.

Line cutter

Where practical use dip-nets (long enough to reach the animal from the fish door) to retrieve small animals that require further treatment. For animals that can be brought aboard, land them gently to avoid damage. If you're using the dehooking or line cutting gear for fish, remember rough handling will increase the amount of damage and create a greater risk of fungal and bacterial infection that can cause death after release. As a fish's skin is particularly prone to injury, handling that causes a loss of scales and damage to the skin's mucus producing cells should be avoided. Use wet gloves when handling fish.

Dehooking device

Sharks

Some of the world's shark stocks are at risk from over-fishing. We now know that as a top predator, sharks play an important role in maintaining healthy ocean ecosystems. The New Zealand EEZ is home to over 100 species of shark, and New Zealand has a global responsibility to manage and conserve our shark species. The Ministry of Fisheries has produced a National Plan of Action for Sharks (2008) to address this responsibility. The overarching goal of the NPOA-Sharks is *'to ensure the conservation and management of sharks and their long-term sustainable use'*. The Great White shark became fully protected in 2007.

If you intend to retain the shark, it must be killed humanely before being processed. To ensure that the shark is dead, cut through the backbone behind the head and then behind the dorsal fin.

Live finning of sharks constitutes ill-treatment and is an offence under the Animal Welfare Act.

Porbeagle, blue, and mako sharks can be released alive under the 6th Schedule. Returning live sharks to the sea – particularly juveniles and large females – helps protect the species from becoming overfished, which is of global concern. All sharks released under 6th Schedule provisions need to be recorded on landing returns (not just catch effort returns). There is a special code ('destination X') so that released catch doesn't count against ACE.

The 6th Schedule also applies to rough and smooth skates and spiny dogfish. Conditions require all these species to be released as soon as practicable after capture; the fish must be alive at the time of release and considered likely to survive on return to the sea. Spiny dogfish is the exception – they may be returned to the sea alive or dead (but all releases must be recorded, and count against ACE). When releasing sharks, make sure that the hook is carefully removed. If you cannot safely remove the hook – cut the nylon as close to the shark as possible.

Marine Mammals

Marine mammals include whales, dolphins and seals.

New Zealand fur seals (*Arctocephalus forsteri*) are protected under the Marine Mammals Protection Act 1978, and are listed by DOC (2005) as 'not threatened' and are currently increasing in numbers and expanding their breeding distribution northwards around the New Zealand coast.

Fur seals are occasionally caught alive. Gently pull the animal alongside the boat and use line cutters to cut of all of the line as close to the animal as possible. All material needs to be cut away or untangled because any line left can result in a slow death for the animal. Be very careful as a bite from a fur seal is nasty. Never jump in the water to untangle line.

Dolphins, Small Toothed Whales and Pilot Whales

Dolphins and small whales are very occasionally caught alive (it is a rare event). Gently pull the animal alongside the boat and use line cutters to cut of all of the line as close to the animal as possible. All material needs to be cut away or untangled because any line left can result in a slow death for the animal. This must be done quickly or the animal will drown. It is best to support the head above the water at the side of the boat using a thick piece of rope placed under the body. Never hang the dolphin or whale up by its tail as it may suffer spinal injury. Never jump in the water to untangle line.

Loss of Gear

All reasonable precautions will be taken to prevent the loss of longline fishing gear.

Appendix 1 Gazette Notice for Tori Lines

Fisheries (Commercial Fishing) Regulations 2001

Fisheries (Seabird Scaring Devices Minimum Standard and Procedures) Notice 2007 (No. F414)

Pursuant to Regulation 58 of the Fisheries (Commercial Fishing) Regulations 2001, the Chief Executive of the Ministry of Fisheries gives the following notice.

Notice

1. Title—This notice is the Fisheries (Seabird Scaring Devices Minimum Standard and Procedures) Notice 2007.

2. Commencement—This notice shall come into effect the day after the date of its notification in the *New Zealand Gazette*.

3. Interpretation—In this notice:

"streamer line" means the type of bird scaring device, also known as a tori line, as described in clause 5 of this notice.

4. Seabird scaring devices (streamer lines) approved by the Chief Executive of the Ministry of Fisheries—(1) All vessels taking tuna by using longlines from a vessel in New Zealand fisheries waters are required to carry a seabird scaring device in accordance with the specifications set out in this notice.

(2) A seabird scaring device contained in this notice must be deployed while setting surface longlines at all times, in accordance with Regulation 58 of the Fisheries (Commercial Fishing) Regulations 2001.

(3) Streamer lines are currently the only approved seabird scaring device for surface longline vessels.

5. Seabird scaring device (streamer line) specifications—(1) The seabird scaring device must meet the following specifications:

(a) The streamer line must be attached to the vessel so that when deployed the baits are protected by the streamer line, even in cross winds;

(b) The streamer line must be a minimum of 150 metres in length;

(c) The streamer line must achieve a minimum aerial extent of 50 metres;

(d) Streamers must be brightly coloured, and must be spaced at a maximum of 5 metres, commencing not more than 5 metres from the stern of the vessel and extending thereafter along the aerial extent of the line. When a streamer line is deployed, each of the streamers must reach the sea surface in the absence of wind and swell. Streamer length will therefore vary depending on the height of their attachment point above the water;

(e) The streamer line of the seabird scaring device must be suspended from a point on the vessel at least 5 metres above the water in the absence of swell;

(f) If the streamer line that is in use breaks or is damaged, it must be repaired or replaced so that it meets these specifications before any further hooks enter the water.

(2) The specifications do not apply to additional or secondary seabird scaring devices fishers may choose to use (such as a second tori or streamer line).

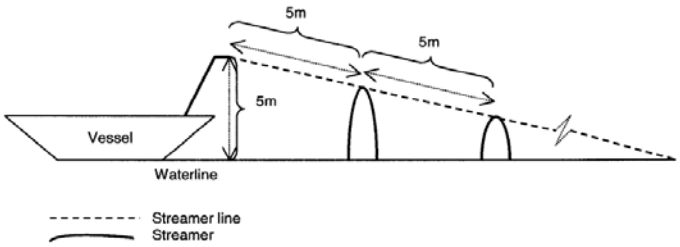
6 The Schedule—(1) The Schedule provides further guidelines on the design and deployment of streamer lines as seabird scaring devices.

(2) The Schedule is not part of the specifications.

(3) If there is any inconsistency between the guidelines in the Schedule and the specifications, the specifications prevail.

(4) This notice is to be read in addition to the Fisheries (Seabird Sustainability Measures) Notice 2007, published as a Supplement to the *New Zealand Gazette*, 26 January 2007, No. 8, page 176.

Seabird Scaring Device (Streamer line)
Diagram not to scale
Not all specifications illustrated



(i) The streamer line needs to protect baited hooks from seabirds. This means that the streamer line should be positioned in such a way that streamers are flapping in an unpredictable fashion, above the area in which the baited hooks enter the sea, so that seabirds are deterred from attempting to take bait from the hooks. In order to achieve this even during cross-winds, it is expected fishers will have to make adjustments to the configuration of the streamer line depending on the conditions.

(ii) It is generally recognised as best practice to maximise the aerial extent of the streamer line, because this maximises the area in which the baited hooks are protected from seabirds. Best practice would be to achieve an aerial extent of 100 metres. In order to maximise aerial extent, it is necessary to create tension in the streamer line. This can be achieved by:

- towing an object on the terminal end of the streamer line; or
- towing extra length of streamer line; or
- increasing the diameter of the in-water section of the streamer line.

(iii) In order to be effective at scaring seabirds away from the line of baited hooks, the streamer lines should not become tangled, either with each other or with the branchline. Each streamer shall be attached to the streamer line in a manner to prevent fouling of individual streamers with the streamer line, and to ensure individual streamers reach the waterline in the absence of wind or swell. Swivels or a similar device can be placed in the streamer line in such a way as to prevent streamers being twisted around the streamer line. Each streamer may also have a swivel or other device at its attachment point to the streamer line to prevent fouling of individual streamers.

(iv) Streamers are to be spaced at 5-metre intervals along the aerial extent of the line. The total number of streamers in use will vary depending on how the line is configured. Streamers that are hanging in the water can be prone to tangling. Because the far end of the streamer line will frequently be in the water, fishers may not wish to have streamers the whole way down the line. However, it is important that streamers are present to deter birds from taking baited hooks all along the part of the line that remains above water, as outlined in the specifications.

(v) To ensure streamers are visible to birds, they should stand out against the surroundings. Streamers should be made of brightly coloured fluorescent plastic tubing or other material. Bright colours such as red, yellow, orange or pink are most effective during day setting. For night setting, the streamers should be of a colour that contrasts with the surroundings. Colours such as blue and green are less likely to be effective, because they are less likely to be highly visible to birds.

(vi) In order to comply with the regulations, a seabird scaring device (streamer line) must be used when setting surface longlines. If the streamer line that is in use breaks or is damaged, it must be repaired or replaced so that it meets these specifications before any further hooks enter the water. For this reason, a complete additional streamer line should be carried as a spare.

7. Revocation—All previous minimum specifications are revoked.

Dated at Wellington this 5th day of November 2007.

STAN CROTHERS, Acting Chief Executive, Ministry of Fisheries.

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