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 New Zealand 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 is shown in Figure 1 (domestic fishery) and Figure 2 (charter fleet).

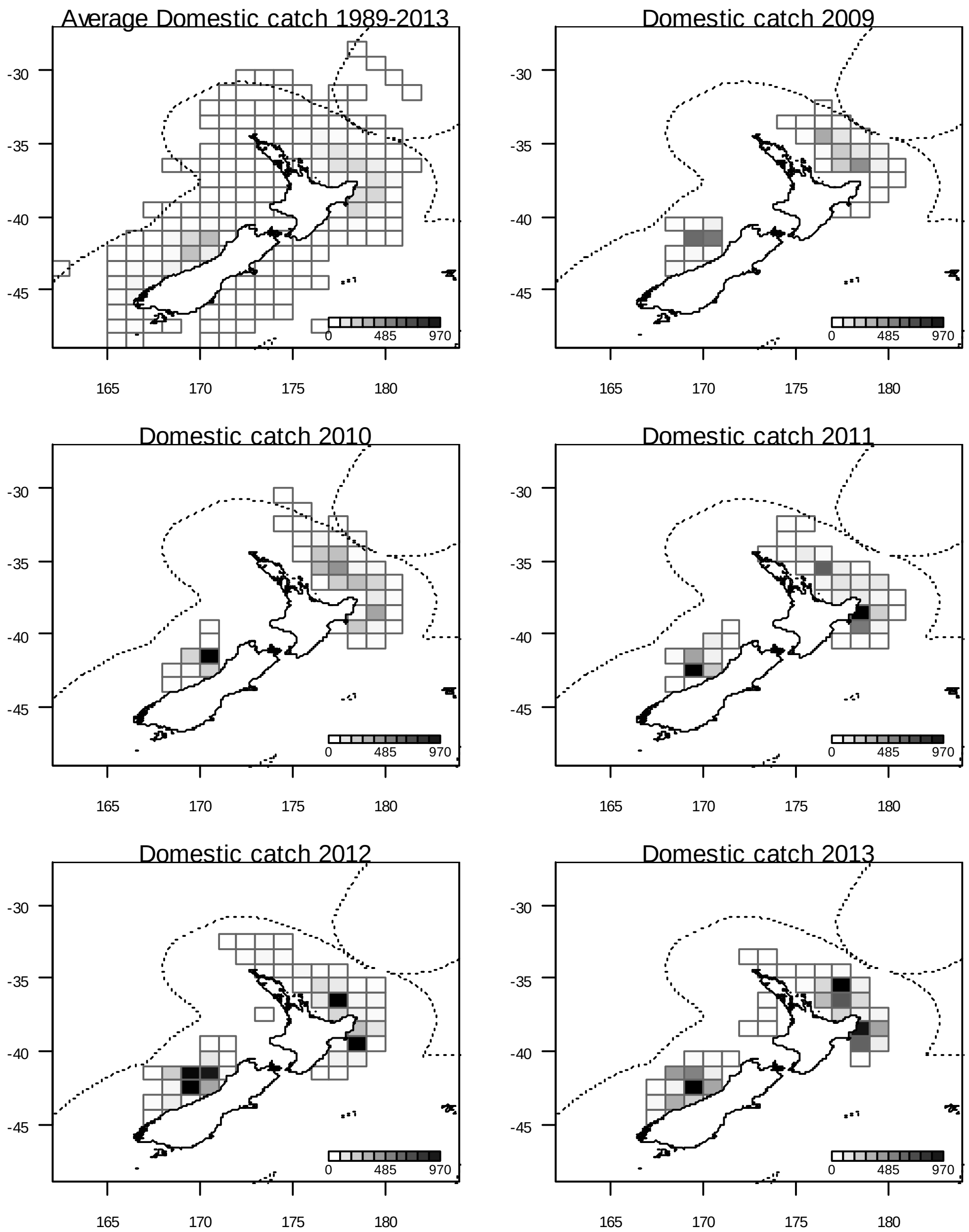

Figure 1: Distribution of longline catches (number of SBT per 1 degree square) for the domestic fleet: average for the time series (1989-2013), and annually for 2009 to 2013.

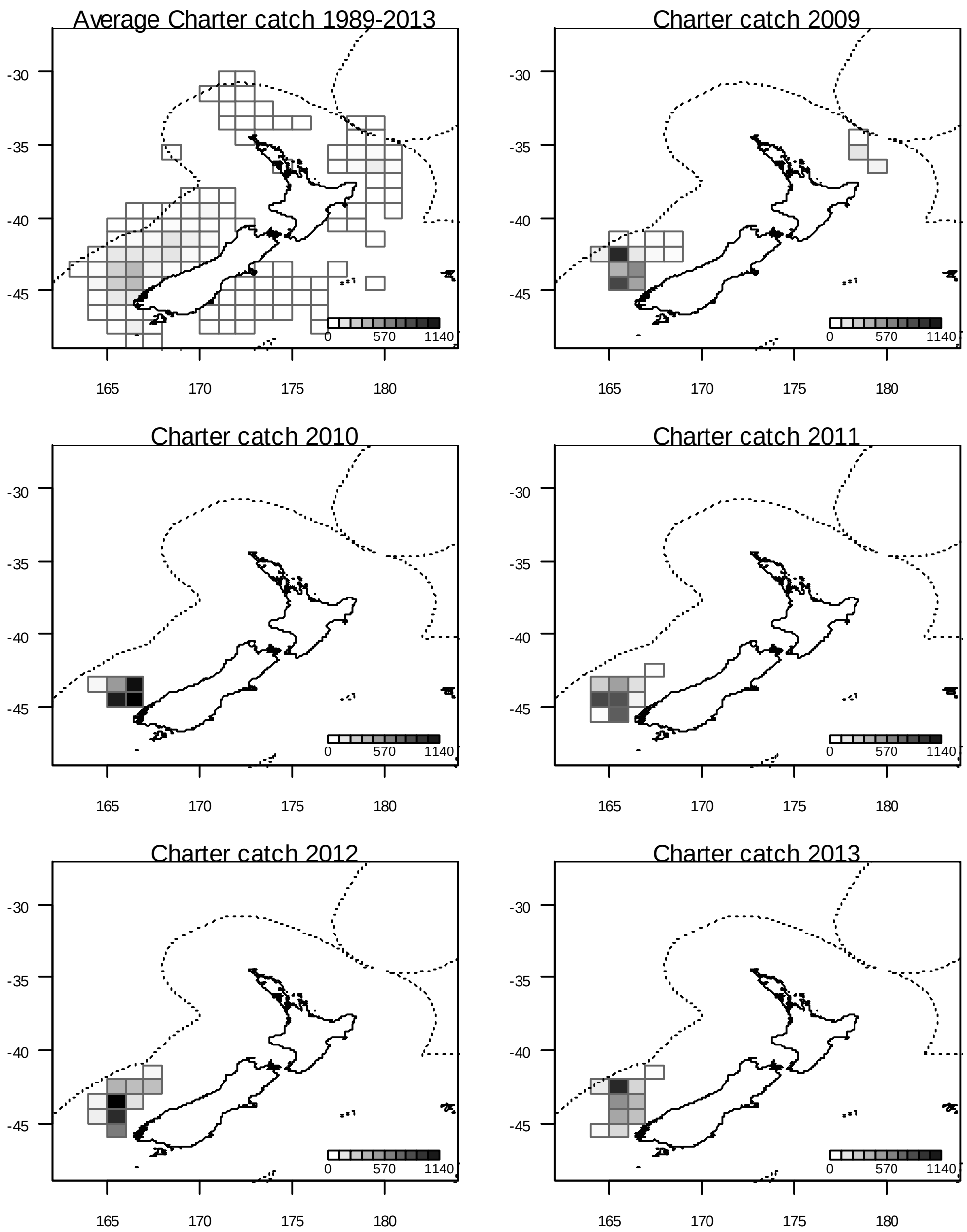

Figure 2: Distribution of longline catches (number of fish per 1 degree square) for the Charter fleet: average for the time series (1989-2013), and annually for 2009 to 2013.

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 fewer of the smaller domestic owned and operated vessels operate in this area. The majority of these smaller "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. Seven taxa of seabirds were recorded as bycatch during 2012-13 and 13 taxa in 2011-12, with conservation status of the species ranging from Endangered to Least Concern. New Zealand fur seals were captured during fishing for SBT during 2010-11 through 2012-13, almost all of which were released alive. Whales and sea turtles are also encountered by surface longline fisheries for SBT from time to time, although such captures are rare.

New Zealand has National Plans of Action in place for seabirds and sharks. 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, de-hookers, and nets).

Note that Appendix I contains a very brief summary of the meeting papers submitted by New Zealand to ERSWG 11.

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 (domestic fishery) and Figure 4 (charter fleet) show the distribution of SBT effort.

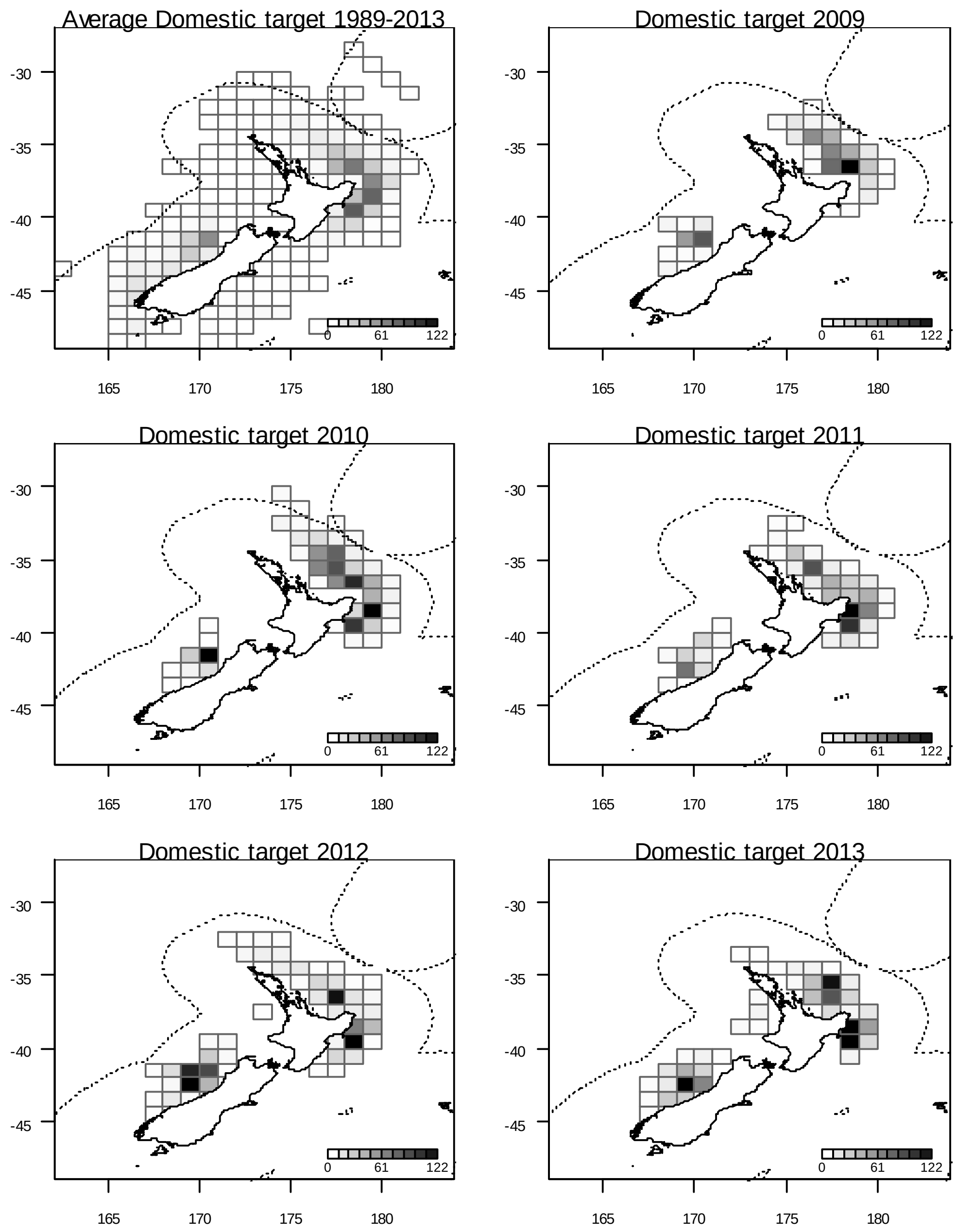

Figure 3: Distribution of longline effort (thousands of hooks per 1 degree square) for the domestic fleet that was targeted at southern bluefin tuna: average for the time series (1989-2013), and annually for 2009 to 2013.

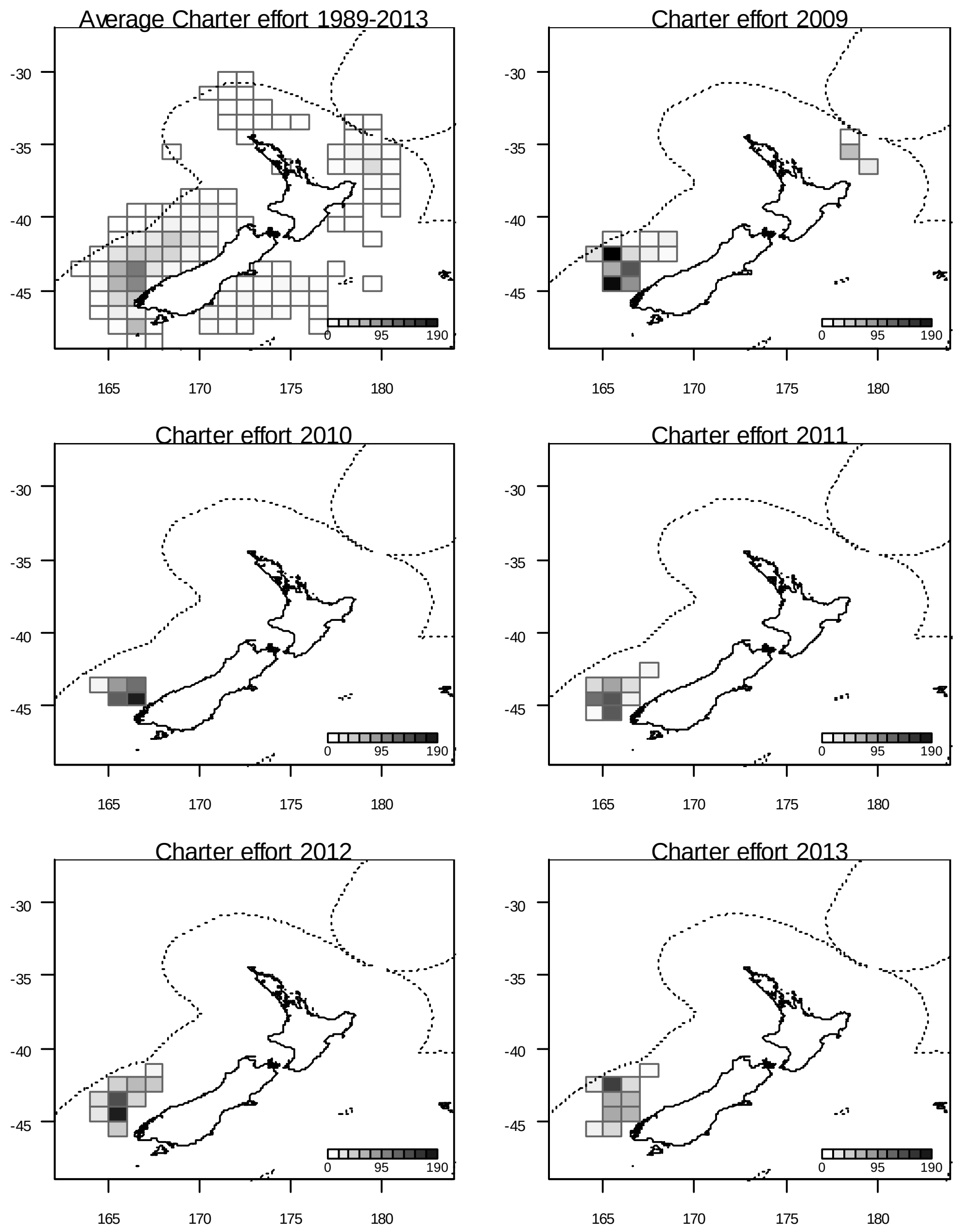

Figure 4: Distribution of longline effort (thousands of hooks per 1 degree square) for the charter fleet: average for the time series (1989-2013), and annually for 2008 to 2013.

The number of vessels fishing by surface longline in 2012-13 was 39, most of which are small vessels (< 50 GRT). Four charter vessels have also fished New Zealand waters in recent years.

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. There was a subsequent small increase to 44 vessels in 2012, dropping to 39 vessels in 2013.

Distribution of Catch and Effort

Table 1 gives the total estimated SBT catch by gear type since 1999. With the advent of domestic longline fishing (starting in 1990) longline effort has almost completely replaced fishing effort by trolling and handline. A small occasional SBT bycatch still occurs in the mid-water trawl fishery (for example 0.6t in 2012-13).

Table 1: The annual southern bluefin tuna catch (tonnes whole weight) for calendar years 1999 to 2013, 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				
Calendar year	Longline	Troll	Handline	Other	Total
1999	455.8	3.0	1.8	0.0	460.6
2000	379.5	0.7	0.2	0.0	380.3
2001	358.3	0.1	0.1	0.0	358.5
2002	449.7	0.6	0.0	0.0	450.3
2003	389.3	0.1	0.2	0.0	389.6
2004	391.2	1.4	0.7	0.0	393.3
2005	261.4	3.0	0.0	0.0	264.4
2006	235.9	0.1	2.2	0.0	238.2
2007	377.2	1.3	0.0	4.0	382.6
2008	318.6	0.0	0.0	0.4	319.0
2009	411.6	7.2	0.0	0.0	418.7
2010	500.6	0.1	0.0	0.0	500.7
2011	546.1	0.9		0.1	547.2
2012	769.9	5.6			775.5
2013	755.6	0.9			756.4

Table 2 summarises total SBT catches by calendar year and New Zealand fishing year (1 October to 30 September).

Table 2: 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	382.6	383.1
2008	319.0	318.8
2009	418.5	417.3
2010	500.8	500.0
2011	547.1	547.2
2012	775.5	775.4
2013	756.4	758.2

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 (see Figure 3 and Figure 4). 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

Recent Observer Coverage

New Zealand has a scientific Observer Programme that covers both domestic and charter longline vessels. In recent years, all trips made by the charter vessels are covered by at least one observer. The target coverage level for the domestic fleet is 10% of the effort to reflect 10% of the catch.

Coverage is measured in two ways, proportion of catch (in numbers of fish) observed (Table 3) and proportion of hooks observed (Table 4). In 2013, 24% of the total catch and 22% of the total effort was observed. Around 84% of the catch was observed (and measured) in the charter fleet in 2013 and around 80% in 2012. For the domestic fleet, 5% of the catch was observed in 2013 and 9% in 2012.

Table 3: Observer coverage in terms of catch (proportion of numbers observed) for the charter (NZC) and domestic (NZD) fleets for 2012 and 2013.

Calendar year	NZC	NZD
2012	0.80	0.09
2013	0.84	0.05

In terms of effort, 78% of hooks were observed on the charter vessels in 2013, and 84% in 2012. For the domestic fleet 4% of the effort was observed in 2013 and 7% in 2012. The small size of domestic owned and operated vessels and the short length of the trips involved have made it difficult for MPI to realise the 10% target for observer coverage in this fleet.

Table 4: Observer coverage in terms of effort (proportion of hooks observed) for the charter (NZC) and domestic (NZD) fleets for 2012 and 2013.

Calendar year	NZC	NZD
2012	0.84	0.07
2013	0.78	0.04

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 scientific Observer Programme are responsible for collecting biological data on SBT and bycatch data for catch characterisation.

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

Full biological information is recorded for non-fish species (e.g. seabirds, turtles, marine mammals).

Fish Bycatch Estimates

Data from the Observer Programme are 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.

Other Data Collection

Southern Bluefin Tuna

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.

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.

Table 5: Total allowable catches of the main fish bycatch species associated with the SBT surface longline fishery within the NZ EEZ as at 1 October 2014.

Fish species	TAC (tonnes)
Bigeye tuna	740
Yellowfin tuna	358
Pacific bluefin tuna	145
Swordfish	919
Moonfish	527
Blue shark	2080
Mako shark	276
Porbeagle shark	129
Ray's bream	1045

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 further below.

4. SEABIRDS

From early 2013, data describing seabird captures in New Zealand fisheries have been available on a public website (http://data.dragonfly.co.nz/psc/). The website provides a summary of protected species captures in trawl and longline fisheries, from the 2002–03 to 2010–11 fishing year (fishing years run from October 1 to September 30). At ERSWG10 New Zealand presented data up to 2010-11. In this report we present data for 2011-12 and for 2012-13.

Seabird captures in 2011-12 and 2012-13

In the 2011–12 fishing year, there were 50 observed captures of all birds in southern bluefin longline fisheries (Figure 5). Observed captures were of southern Buller's albatross (31), New Zealand white-capped albatross (7), Campbell black-browed albatross (4), grey petrel (2), Antipodean albatross (2), white-chinned petrel (1), black-browed albatrosses (1), Salvin's albatross (1), and Gibson's albatross (1). (Abraham and Thompson 2012a).

In the 2012–13 fishing year, there were 23 observed captures of all birds in southern bluefin longline fisheries (Figure 5). Observed captures were of New Zealand white-capped albatross (11), southern Buller's albatross (8), white-chinned petrel (1), southern royal albatross (1), Gibson's albatross (1), and Campbell black-browed albatross (1). (Abraham and Thompson 2012b).

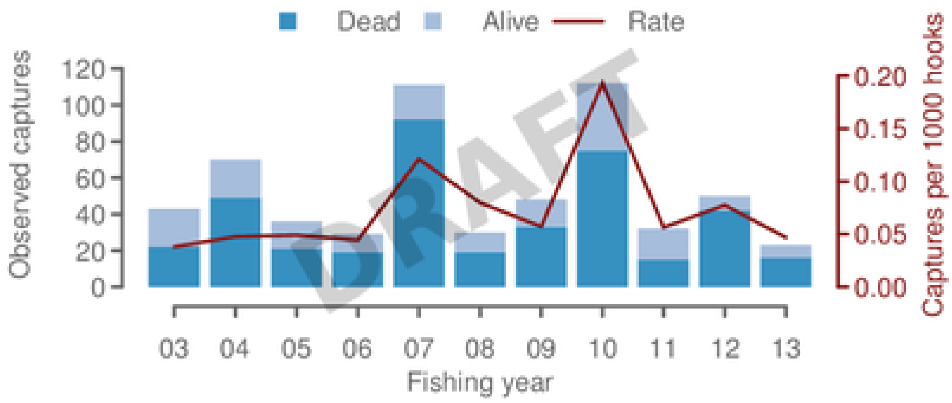

Figure 5: Captures of birds, proportion caught dead/alive and captures per 1000 hooks in the southern bluefin longline fisheries 2002-03 through 2012-13.

The birds were landed both dead and alive (Figure 5) and 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. Seabirds are caught across virtually all areas in which the fishery occurs (Figures 6 and 7). Fishing effort is highly seasonal, with a peak in May/June and the season finishing in August (Figure 8). The observer coverage generally follows the same pattern and observed captures follow a similar pattern (Figure 8).

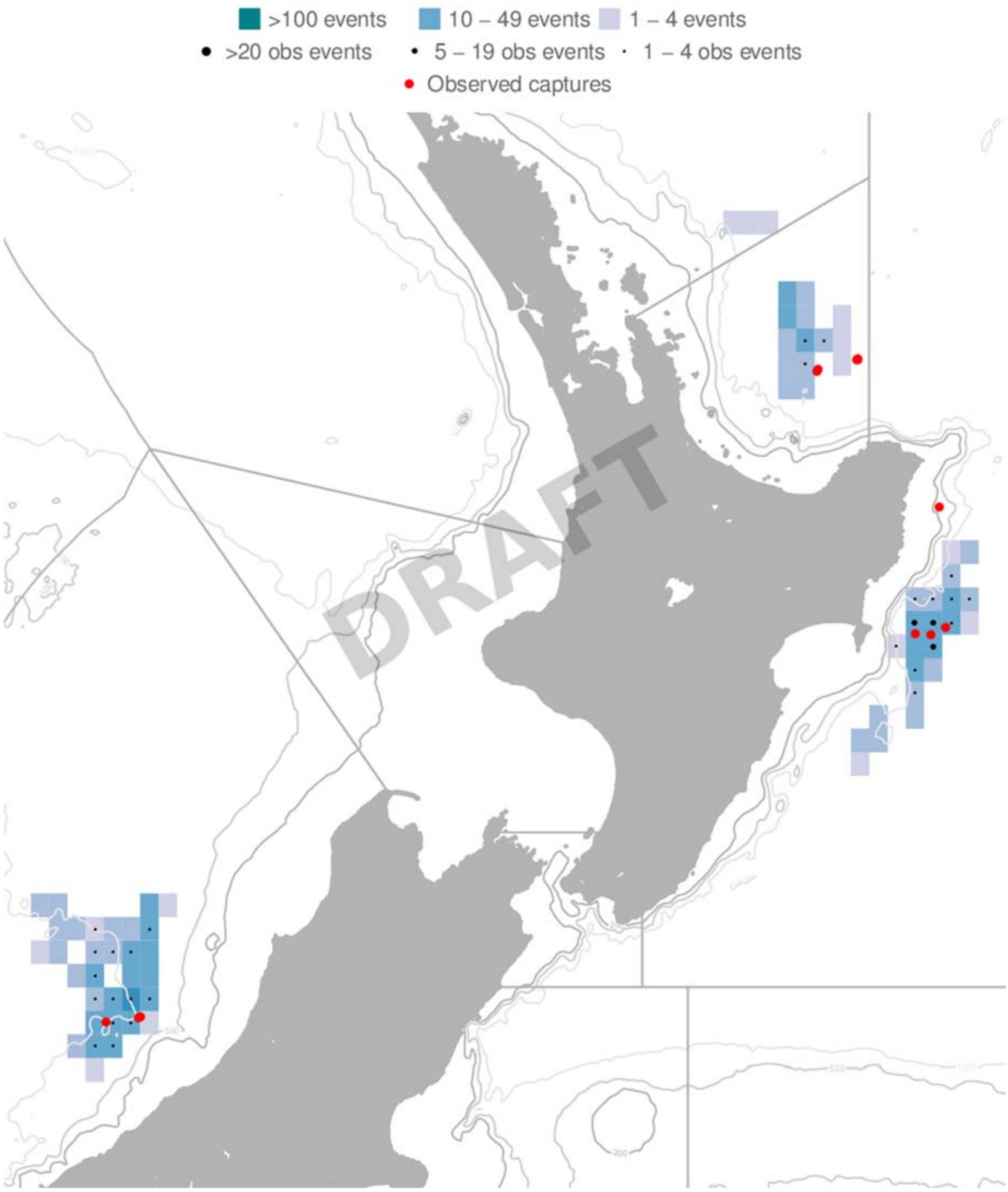

Figure 6: Map of fishing effort and observed captures, 2011–12. Fishing effort is mapped into 0.2-degree cells, with the colour of each cell being related to the amount of effort. Observed fishing events are indicated by black dots, and observed captures are indicated by red dots. Fishing is only shown if the effort could be assigned a latitude and longitude, and if there were three or more vessels fishing within a cell. In this case, 61% of the effort is shown.

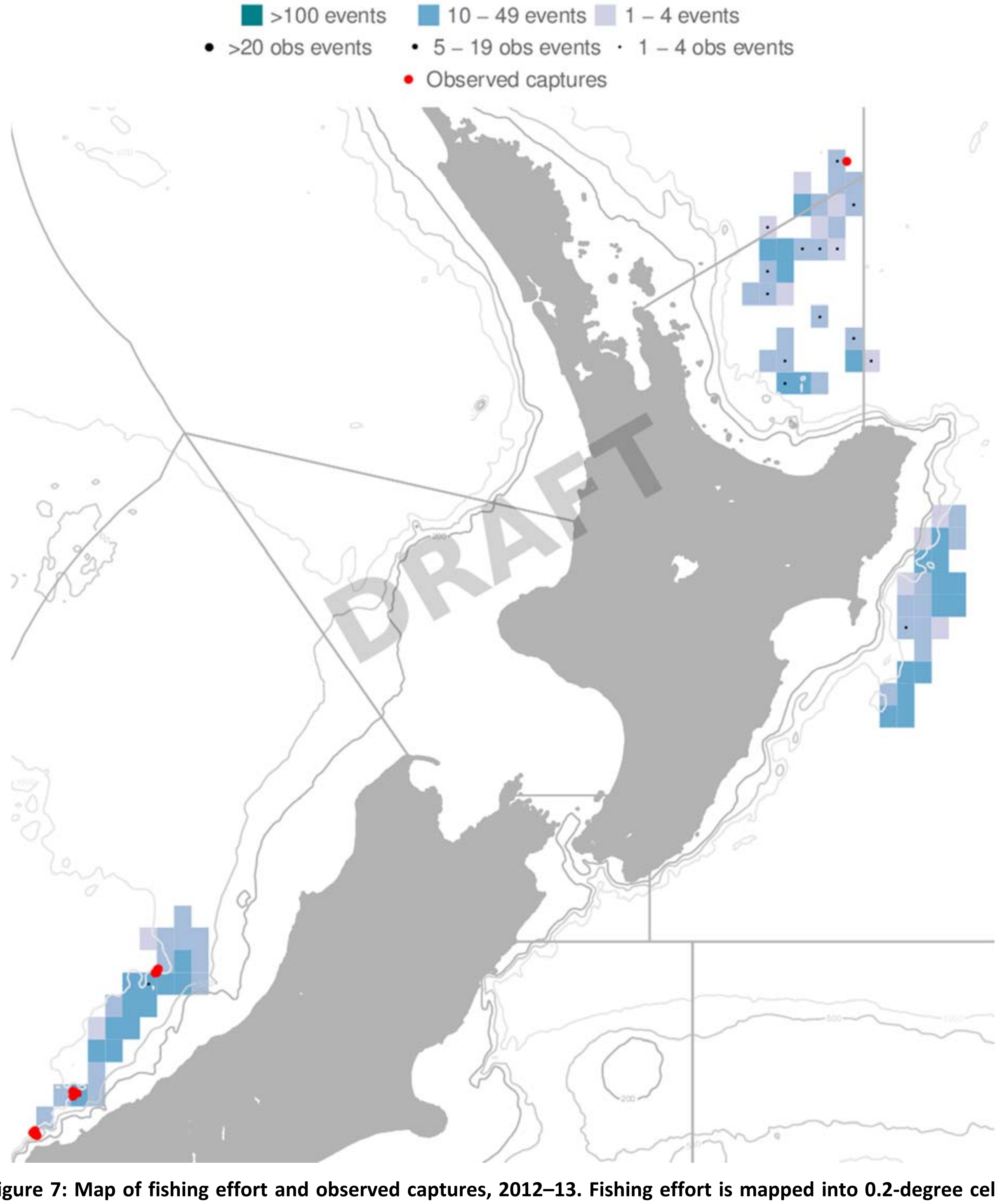

Figure 7: Map of fishing effort and observed captures, 2012–13. Fishing effort is mapped into 0.2-degree cells, with the colour of each cell being related to the amount of effort. Observed fishing events are indicated by black dots, and observed captures are indicated by red dots. Fishing is only shown if the effort could be assigned a latitude and longitude, and if there were three or more vessels fishing within a cell. In this case, 64.3% of the effort is shown.

Figure 8: Fishing effort and observed captures of birds by month, during the 2012–13 fishing year.

Seabird bycatch estimates for 2011-12 and 2012-13

As observers are only present on some fishing vessels, to estimate total captures in a fishery, it is necessary to use statistical methods to extrapolate from the observed fishing to the unobserved fishing. The total observable captures are an estimate of the captures that would have been reported, had observers been present on all fishing vessels. There may be additional mortalities (such as birds that are struck by fishing gear but not brought on board the vessel) that are not recorded by observers. These are referred to as ‘cryptic mortalities’ and are not included in the estimates of total captures, nor is there any evaluation of potential survival of seabirds recorded as captured but subsequently released alive. The methods used for the estimation follow those described in technical reports on bycatch estimation for seabirds (Abraham and Thompson 2011, Abraham et al. 2013).

For 2011-12, it was estimated that there were a total of 362 (95% c.i.: 255–558) captures in southern bluefin longline fisheries. For 2012-13, it was estimated by a statistical model that there were a total of 271 (95% c.i.: 186–442) captures in southern bluefin longline fisheries. (Figure 9) (Abraham et al. 2013).

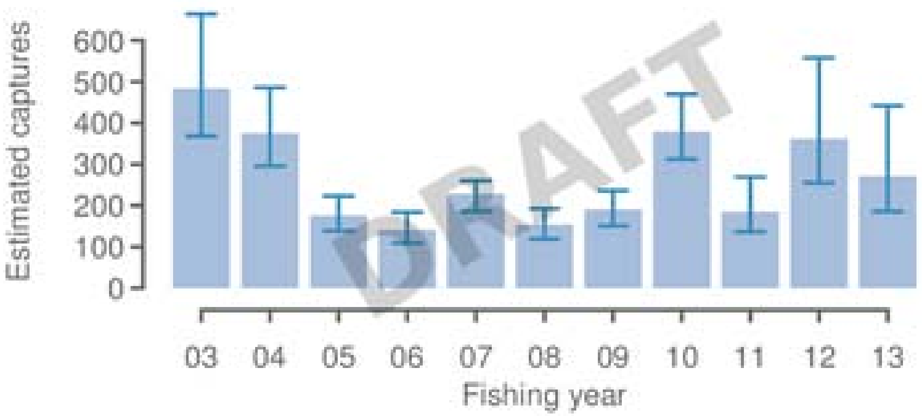

Figure 9: Estimated captures of birds (with 95%c.i.) in southern bluefin longline fisheries 2002-03 through 2012-13.

5. NON-TARGET FISH

This section summarises fish catches taken in tuna longline sets that either targeted or caught southern bluefin tuna. Numbers of fish observed, and estimated numbers scaled from observer to the commercial fishing effort during the 2012 and 2013 calendar years are shown in Table 6. Catch per unit effort is also shown in Table 6. The scaled estimates provided for the domestic fleet can be considered less reliable than those of the charter fleet as they are based on lower observer coverage (Tables 3 and 4).

Table 6: 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 2012 and 2013 calendar years.

2012	Japanese Charter			New Zealand Domestic		
	Observed	Scaled	CPUE	Observed	Scaled	CPUE
Blue shark	5 798	6 895	12.581	6 839	73 072	62.652
Rays bream	3 089	3 673	6.703	1 404	14 222	12.862
Albacore tuna	113	134	0.245	672	8 606	6.156
Porbeagle shark	84	100	0.182	491	4 824	4.498
Deepwater dogfish	544	647	1.180	0	0	0
Swordfish	26	31	0.056	357	4 542	3.270
Lancetfish	2	2	0.004	375	5 957	3.435
Dealfish	237	282	0.514	3	43	0.027
Mako shark	24	29	0.052	202	2 036	1.851
Escolar	13	15	0.028	82	1 237	0.751
Bigscale pomfret	84	100	0.182	1	8	0.009
Butterfly tuna	17	20	0.037	67	575	0.614
Sunfish	11	13	0.024	71	1 338	0.650
Moonfish	25	30	0.054	56	581	0.513
Oilfish	0	0	0	48	432	0.440
Rudderfish	29	34	0.063	7	194	0.064
School shark	25	30	0.054	4	58	0.037
Pelagic stingray	3	4	0.007	12	376	0.110
Flathead pomfret	14	17	0.030	0	0	0
Thresher shark	2	2	0.004	11	87	0.101
Pacific bluefin tuna	1	1	0.002	5	46	0.046
Striped marlin	0	0	0	2	22	0.018
Skipjack tuna	0	0	0	0	0	0
Yellowfin tuna	0	0	0	0	0	0

Table 6: continued.

2013	Japanese Charter			New Zealand Domestic		
	Observed	Scaled	CPUE	Observed	Scaled	CPUE

Blue shark	5 310	6 820	14.710	4 771	112 595	90.116
Rays bream	4 432	5 693	12.278	65	1 534	1.228
Albacore tuna	178	229	0.493	625	14 750	11.805
Deepwater dogfish	576	740	1.596	0	0	0
Lancetfish	17	22	0.047	413	9 747	7.801
Porbeagle shark	118	152	0.327	175	4 130	3.305
Swordfish	54	69	0.150	158	3 729	2.984
Dealfish	184	236	0.510	0	0	0
Mako shark	70	90	0.194	97	2 289	1.832
Moonfish	65	83	0.180	73	1 723	1.379
Escolar	56	72	0.155	29	684	0.548
Rudderfish	58	74	0.161	10	236	0.189
Butterfly tuna	13	17	0.036	43	1 015	0.812
Bigscale pomfret	52	67	0.144	0	0	0
Sunfish	11	14	0.030	33	779	0.623
Pelagic stingray	13	17	0.036	15	354	0.283
Oilfish	11	14	0.030	9	212	0.170
Thresher shark	7	9	0.019	10	236	0.189
School shark	16	21	0.044	0	0	0
Flathead pomfret	9	12	0.025	0	0	0
Pacific bluefin tuna	3	4	0.008	3	71	0.057
Skipjack tuna	1	1	0.003	4	94	0.076
Striped marlin	0	0	0	5	118	0.094
Yellowfin tuna	0	0	0	0	0	0

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 (in descending order of abundance for the 2012 and 2013 years combined) deepwater dogfish (Squaliformes of various species, mostly Owstons dogfish), lancetfish (*Alepisaurus ferox* & *A. brevirostris*), porbeagle shark (*Lamna nasus*), swordfish (*Xiphias gladius*), dealfish (*Trachipterus trachypterus*), mako shark (*Isurus oxyrinchus*), moonfish (*Lampris guttatus*), escolar (*Lepidocybium flavobrunneum*), rudderfish (*Centrolophus niger*), butterfly tuna (*Gasterochisma melampus*), bigscale pomfret (*Taractichthys longipinnis*), and sunfish (*Mola mola*).

The next most abundant non-target fish species were, Pelagic stingray (*Pteroplatytrygon violacea*), oilfish (*Ruvettus pretiosus*), thresher shark (*Alopias vulpinus*), school shark (*Galeorhinus galeus*), and flathead pomfret (*Taractes asper*). Some other non-target tunas and billfish were caught in 2012 and 2013, including Pacific bluefin tuna (*Thunnus orientalis*), skipjack tuna (*Katsuwonus pelamis*), and striped marlin (*Tetrapturus audax*). There were no observed captures of yellowfin tuna (*Thunnus albacares*), a species formerly seen in the top 25.
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 40°S. It also reflects different targeting behaviour, since some of the catch of southern bluefin tuna by the domestic fleet is as

bycatch when targeting other species (including bigeye tuna and swordfish), whereas southern bluefin tuna is the target species for the charter vessels.

In both years, the charter fleet fished predominately off the West Coast of the South Island with 2 sets targeting bigeye in the north at the end of their fishing season in 2012 and 11 sets in 2013. Their catch composition was similar in both years.

In both 2012 and 2013, blue shark, Ray's bream, and albacore were predominant in the catches, with these three species making up 70% of the catch in 2012, and 62% in 2013.

Dealfish and deepwater dogfish were caught in the south by charter vessels, while domestic vessels fishing in the north caught lancetfish and swordfish, and higher proportions of porbeagle sharks and mako sharks. Both fleets caught moonfish and butterfly tuna. Ray's bream, bigscale pomfret, rudderfish and school shark were mainly caught in the south, while escolar, oilfish, sunfish, pelagic rays, and thresher sharks were mainly caught in the north.

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 and porbeagle sharks were finned by the charter fleet, and while some were retained for their flesh in 2012, none were retained for their flesh in 2013. The charter fleet retained most of the mako sharks for their flesh (as well as fins) and some were only finned. Domestic vessels released or discarded most of their catch of these three shark species. School shark was normally retained by both fleets, and thresher sharks were usually discarded by domestic vessels and some were kept by the charter vessels. Rules relating to shark catches were changed from 1 October 2014 to prohibit shark finning (retaining just the fins and discarding the remainder of the fish). Since 1 October 2014, fishers are required to retain and land the whole shark (not just its fins) if wishing to retain the fins (some processing at sea is permitted). The rules around retention and release of sharks have also changed, with fishers now able to discard dead mako, porbeagle, and blue sharks (such discards must be reported, and are recorded against quota; previously only fish that were alive and likely to survive were permitted to be released).

Tunas (other than butterfly tuna) and swordfish were seldom discarded. The charter vessels kept most of the butterfly tuna they caught while domestic vessels retained about two thirds of it. Almost all of the lancetfish, deepwater dogfish, dealfish, and sunfish and pelagic rays caught were discarded. Charter vessels discarded oilfish and rudderfish, and escolar, while domestic vessels retained the majority of oilfish, rudderfish, and escolar. Charter vessels kept about half of their bigscale pomfret in 2012 and most of it in 2013.

Southern Bluefin tuna that were discarded dead were typically damaged, while live discards were mostly small fish. 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 of the albacore, butterfly tuna, and swordfish discarded by the domestic vessels were dead when landed. The majority of the other fish bycatch species that were commonly discarded were landed alive, except for lancetfish and dealfish that were usually dead. Most of the Ray's bream that were discarded dead were damaged.

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 de-hooking process.

6. MARINE MAMMAL AND MARINE REPTILE BYCATCH

Data describing all protected species captures in New Zealand fisheries is available on a public website. The website provides a summary of all protected species captures in trawl and longline fisheries, from the 2002–03 to 2010–11 fishing year (fishing years run from October 1 to September 30). At ERSWG10 New Zealand presented data for marine mammals and marine reptiles up to 2010-11. In this report we present data for 2011-12 and for 2012-13.

Marine mammals

In the 2011–12 fishing year, there were 40 observed captures of New Zealand fur seals (*Arctocephalus forsteri*) in southern bluefin longline fisheries (Figure 10). In the 2012–13 fishing year, there were 21 observed captures of New Zealand fur seals in southern bluefin longline fisheries (Figure 11). In 2012-13 there were three fur seals reported dead. Fur seals are caught across virtually all areas in which the fishery occurs. Fishing effort is highly seasonal, with a peak in May/June and the season finishing in August (Figure 8). The observer coverage generally follows the same pattern and observed captures follow a similar pattern (Figure 8).

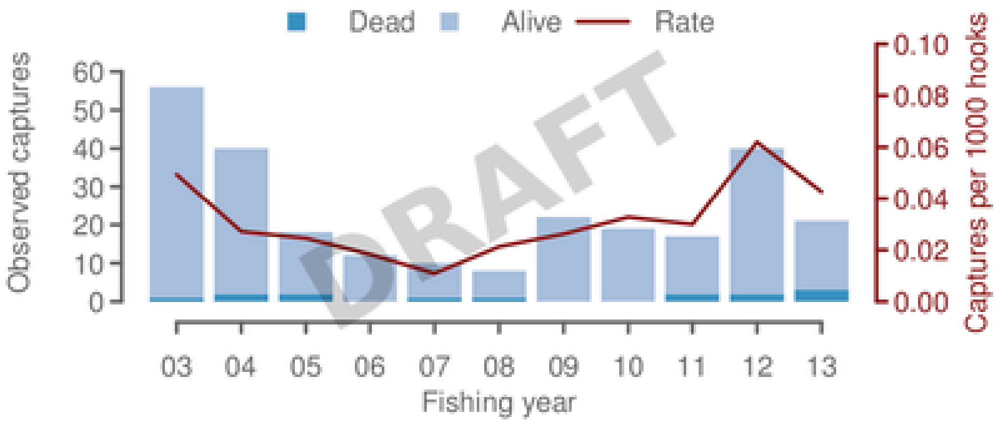

Figure 10: Observed captures of fur seals in southern bluefin longline fisheries 2002-03 through 2012-13.

No other marine mammal captures were observed during fishing for southern bluefin tuna in 2011-12 or 2012-13 (Figure 11).

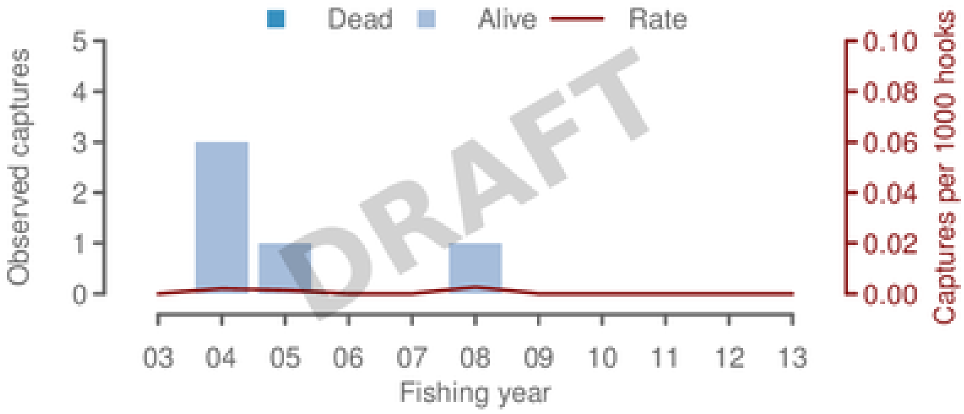

Figure 11: Observed captures of whales and dolphins in southern bluefin longline fisheries 2002-03 through 2012-13.

Marine reptiles

Marine reptiles are rarely encountered in New Zealand waters (Figure 12). None were observed caught in 2012-13 during fishing for southern bluefin tuna. In the 2010–11 fishing year, there were three observed captures of turtles in southern bluefin longline fisheries (all alive). Observed captures were of Leatherback turtle (2), and Olive ridley turtle (1). All were caught on the east coast of the North Island. No estimates of total captures were made.

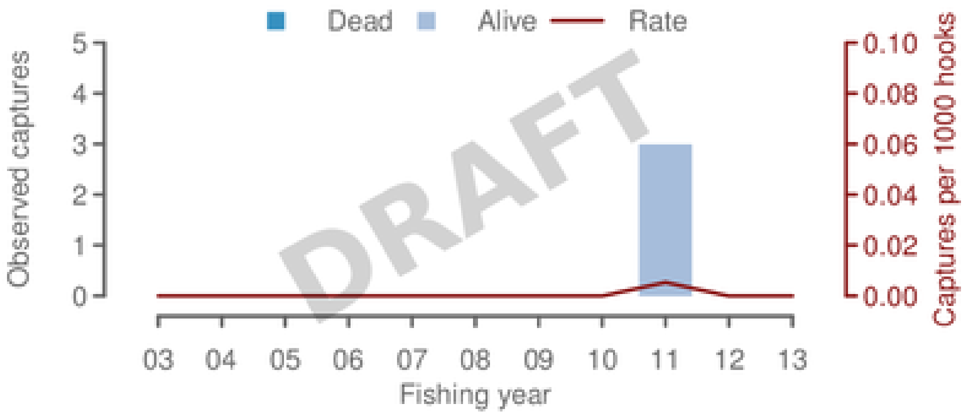

Figure 12: Observed captures of turtles in southern bluefin longline fisheries 2002-03 through 2012-13.

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 seabird 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 were updated in 2014 to bring them in line with agreements reached in the Western and Central Pacific Fisheries Commission (Appendix II). 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.

Compliance with these measures is monitored through at-sea and in-port inspections from Fisheries Officers, aerial surveillance from military aircraft, and the placement of observers on board vessels.

No breaches of seabird mitigation measures were identified as part of inspections carried out during the 2012-13 fishing year. Compliance with measures is an ongoing concern however with reports from some observed trips indicating various levels of implementation.

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 in place for domestic tuna vessels (see Appendix II in CCSBT-ERS/1203/Annual Report - New Zealand). For charter vessels operated through the New Zealand Japan Tuna Co. Ltd., a Code of Practice is in place that stipulates a range of additional measures that can be used to reduce seabird captures. The specific measures used vary both from vessel to vessel, and in response to specific circumstances (e.g. in response to seabird captures), but include:

- One or two additional tori lines, which can help maximise the coverage of tori lines over the baited hooks;
- Various line weighting regimes;
- Bait casters (these are not a mitigation device per se but can help distribute hooks within the zone covered by the tori line);
- Offal retention;
- Particular attention to the need for and importance of mitigation measures over the period of the full moon, when captures are most likely;
- Haul mitigation including water cannons or hoses and bird curtains; and
- 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.

Compliance with voluntary measures is not currently recorded as part of inspection reports and therefore it is not possible to estimate the level of uptake amongst the fleet. The Code of Practice does however have the support of relevant commercial fishing organisations that encourage their members to abide by the measures.

Measures under development - measures to improve the safety of line weighting

In 2013, New Zealand trialled safe leads and 60-g lumo leads on one vessel each. In 2014, 40-g lumo leads and hook pods were tested on a third vessel. All vessels operated in New Zealand's surface-longline fishery, and targeted tunas and swordfish. The deployments of safe leads and 60-g lumo leads were overseen by government fisheries observers. Time-depth recorders (TDRs) were deployed on snoods to measure sink rate.

There was considerable variation in longline sink rates amongst the experimental weighting approaches tested and the sets using skippers' normal gear setups. Fish catch was dominated by tunas, swordfish and blue shark. For tunas and swordfish, catch rates on snoods carrying 40-g lumo leads did not differ from catch on normal snoods.

The catch rate of sharks on snoods carrying lumo leads was significantly lower than for normal gear. Shark catch was also reduced on snoods with weighted swivels at the clip, whereas snoods with weighted swivels and lightsticks showed reduced tuna catch.

The crews of all vessels readily adapted to the addition of the experimental weights to the fishing gear. While the experimental weights tested were designed to reduce safety risks associated with weighting surface longline snoods, they did not eliminate them and caution and vigilance are still required to minimise ongoing safety risks.

A copy of the draft final report has been submitted to this meeting as information paper CCSBT-ERS/1503/Info/7

8. PUBLIC RELATIONS AND EDUCATION ACTIVITIES

The New Zealand government continues to engage with fishers to increase their awareness of bycatch issues in New Zealand fisheries. These public relations activities, education, and information exchange with respect to SBT fisheries are described below.

The primary means of engagement with surface longline fishers is through bi-annual workshops, where mitigation of captures of seabirds and other ERS are routinely discussed. The Ministry for Primary Industries continues to distribute equipment to release tangled or hooked animals (for example marine turtles) to new vessels entering the fleet, along with associated education materials. The Ministry for Primary Industries, in conjunction with an industry organisation Seafood NZ, has also produced a Code of Best Practice for fishers. The code of practice is distributed to quota holders and vessel masters, as well as licensed receivers of fish.

In addition to Government activities, the organisation Southern Seabird Solutions (www.southernseabirds.org), formed in 2002, continued its work in education and awareness of seabird conservation. The organisation's priority projects at present include:

- An **International Mitigation Mentor Programme** to provide feedback and advice to fishers and other inventors on their mitigation ideas;
- A **Seabird Smart Training Programme** that educates and inspires fishers to carry out seabird smart fishing practices while on the water; and
- Working with communities to raise awareness of the importance of **black petrel breeding grounds** on Aotea/Great Barrier Island.
- Run **Seabird Smart Awards** every second year that celebrate individuals who are voted by their peers and a judging panel as making significant effort and leadership towards seabird smart fishing.

9. INFORMATION ON OTHER ECOLOGICALLY RELATED SPECIES (NON-BYCATCH)

Since 1994, Ministry for Primary Industries 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 was made for SBT and eight other ecologically related species and was summarised in document CCSBT-ERS/0602/8. Collection of stomach content information continued through to the present.

In 2011 work began to analyse new data subsequent to 2006 and to re-analyse historic data. This review included data collected up to 2012. An update on that work whilst in progress was provided to ERSWG10 (CCSBT-ERS/1309/WP05). The research has subsequently been published (Ballara et al 2013, CCSBT-ERS/1503/11). The research examined 97,701 stomachs of highly migratory species caught on surface longlines around New Zealand from 1994 to 2012. Dietary items are tabulated for 26 species and analysed in detail for 13 of these (ie. mako, porbeagle, and blue sharks, longsnouted and shortsnouted lancetfish, moonfish, Ray's bream, albacore, butterfly, yellowfin, bigeye, and southern bluefin tunas, and swordfish). Within- and between-species dietary differences are discussed. That work included recommendations to improve observer data collection (which have subsequently been implemented), ie. a new Stomach Sample Log is now in use.

The same data were utilised to explore factors affecting the distribution of highly migratory species in New Zealand waters and a publication on that research is pending.

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 for Seabirds

The Minister of Conservation and the Minister of Fisheries jointly approved the first NPOA-Seabirds in April 2004. During 2012 and early 2013 the NPOA-Seabirds was reviewed and revised and in April 2013 the Minister for Primary Industries approved a new NPOA-Seabirds (CCSBT-ERS-1308-Info-06).

The National Plan of Action (NPOA) - Seabirds 2013 recognises New Zealand's unique place in the world for seabirds and our desire to be at the leading edge of international seabird conservation.

More seabirds breed in New Zealand than anywhere else in the world. New Zealand seabirds should be able to thrive in New Zealand waters and around the world without pressure from fishing-related mortality.

The long term objective of the NPOA-Seabirds 2013 is:

> New Zealand seabirds thrive without pressure from fishing related mortalities, New Zealand fishers avoid or mitigate against seabird captures and New Zealand fisheries are globally recognised as seabird friendly.

The NPOA-Seabirds 2013 sets out objectives for five years to guide management of incidental seabird catch in New Zealand fisheries. The current management approach will see the objectives achieved through integration into MPI's annual and five year plans for fisheries.

Research and information underpin management of seabird interactions with fisheries. A quantitative risk assessment approach, following an exposure-effects approach, is updated annually and used to determine management priorities (CCSBT-ERS-1308-20 and CCSBT-ERS-1308-21).

Summaries of seabird interactions with fisheries and modelled total bycatch estimates are updated annually. Information about the seabird captures and modelled estimates are available in an online database.

National Plan of Action Sharks

As a member nation of the FAO, New Zealand is expected to establish a NPOA-Sharks, and to regularly review this plan. New Zealand adopted its first NPOA-Sharks in 2008, and reviewed its implementation in 2012.

The review highlighted that New Zealand has strong systems in place to conserve and manage sharks, including a number of fully protected shark species, and the majority (90%) of commercial catches managed under a quota management system with catch limits and robust reporting and monitoring systems. However, opportunities for improvements were also identified, including in relation to improving the utilisation of shark species that are caught. In accordance with the goals of the NPOA-Sharks 2013, a ban on shark finning was implemented in New Zealand on 1 October 2014.

12. ACKNOWLEDGEMENTS

MPI acknowledges Terese Kendrick and Johanna Pierre for assistance with various parts of this report.

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APPENDIX I – ABSTRACTS OF NEW ZEALAND MEETING PAPERS FOR ERSWG11

#	CCSBT-ERS/1503/9
Title	Update on Porbeagle Shark Stock Assessment
Authors	Neville Smith
Abstract	An initial analysis of porbeagle shark stock status has been completed for some components of the Southern hemisphere stock. To develop this work further, and make it more comprehensive, a revised approach to joint assessment of porbeagle shark stock status is proposed. Support for the proposed approach to assessment, and sharing of data is sought from Extended Commission for the Conservation of Southern Bluefin Tuna (CCSBT) members. It would be particularly useful if CCSBT members were able to agree on a future approach at the 2015 Ecologically Related Species Working Group (ERSWG) meeting.

#	CCSBT-ERS/1503/10
Title	Update on Seabird Ecological Risk Assessment
Authors	Neville Smith
Abstract	Progress on a CCSBT-wide seabird ecological risk assessment since ERSWG 10 has been limited. Several methodological developments have occurred in the related New Zealand seabird ecological risk assessment. In particular substantive progress has been made on approaches to estimate absolute risk (c.f. relative risk). Accordingly it is proposed that upcoming work on a southern hemisphere seabird ecological risk assessment will shift the CCSBT approach from an assessment of relative risk to absolute risk. It would be particularly useful if CCSBT members were able to identify data contributions to such an approach at the 2015 Ecologically Related Species Working Group (ERSWG) meeting.

#	CCSBT-ERS/1503/11
Title	Evaluation of the diets of highly migratory species in New Zealand waters
Authors	P. Horn, S. Ballara, P. Sutton, and L. Griggs
Abstract	Data were available from 97 101 stomachs of highly migratory species examined by observers on surface longline trips from 1994 to 2012. The prey samples were from 65 taxonomic groups (i.e., species, genus, or family). However, 52% of examined stomachs were empty, and 13% contained only bait or parasites, leaving 33 978 stomachs (35%) containing non-bait food items. Most of the prey items were identified only into the broad categories ‘fish’, ‘crustacean’, ‘squid’, ‘salp’, and ‘other’, but some items were identified more precisely. The dietary items were tabulated for 26 species where more than 10 nonempty stomachs were available. More comprehensive descriptions of diet were produced for the 12 species

	sampled most frequently (mako shark, Isurus oxyrinchus; porbeagle shark, Lamna nasus; blue shark, Prionace glauca; longsnouted lancetfish, Alepisaurus ferox; moonfish, Lampris guttatus; Ray's bream, Brama sp.; butterfly tuna, Gasterochisma melampus; albacore, Thunus alalunga; yellowfin tuna, Thunnus albacares; southern bluefin tuna, Thunnus maccoyii; bigeye tuna, Thunnus obesus; swordfish, Xiphias gladius), and the shortsnouted lancetfish, A. brevirostris (to enable a comparison between the short and longsnouted species)). Spatial distributions are presented for the samples of each of these predators relative to the area fished by the surface longline fishery in New Zealand waters, as are comparisons of the distributions of predators with and without items in their stomachs. Diet compositions (expressed as mean percentage volume of various prey categories) were determined for each predator species overall and by various categories (i.e., by predator length class, sample area, month, and year). Identified fish prey were combined into a series of categories, generally small mesopelagic species, large mesopelagic species, and other fish, but sometimes into more concise categories like 'tunas' or 'dealfish' when these sub-groups comprised more than about 2% of the recorded items. Similarly, sub-groups of the 'squid' (e.g., nautilus) and 'other' (e.g., anthropogenic rubbish, plant material, bird remains) categories were introduced for some predator species. Ontogenetic changes in diet were apparent for most of the 13 predator species examined in detail, and some distinct within-species dietary differences were also apparent between the northern (centred on the Bay of Plenty) and southern (centred on the west coast South Island) areas. Temporal differences in diet were less obvious. The diets determined from the current study were compared with literature reports for the same species elsewhere. A discussion is presented on how the differences in diet between the main predator species might reduce any conflicts in resource use between them.

#	CCSBT-ERS/1503/21
Title	Indicator based analysis of the status of New Zealand blue, mako and porbeagle sharks
Authors	M. Francis, S. Clarke, L. Griggs, and S. Hoyle
Abstract	Cartilaginous fishes generally have low productivity because of their low to moderate growth rates, and their low fecundity. Despite their vulnerability to over-fishing, a lack of suitable data means that conventional stock assessments are rarely possible. To address that limitation, this report performs indicator analyses for blue, porbeagle and mako sharks – three shark species that are taken primarily as bycatch in the New Zealand tuna longline fishery. The main data sources were the Ministry for Primary Industries (MPI) commercial catch-effort database for the 2005 to 2013 fishing years, and the MPI observer database for the 1993 to 2013 fishing years. Our analyses were restricted to the surface longline fishery, and divided into two regional strata – North region comprising Fisheries Management Areas (FMAs) 1, 2, 8, and 9, and South region comprising FMAs 5 and 7. The following indicators were calculated: high-CPUE (the proportion of half-degree rectangles having unstandardised catch per unit effort (CPUE) greater than a specified threshold); proportion-zeroes (the proportion of half-degree rectangles

	having zero reported catches in a fishing year); geometric mean index (the geometric mean of the species abundances in catches, for both the catch of all species including teleosts, and the catch of just the three sharks); standardised CPUE (for both commercial and observer data); proportion of males in the catch; and median lengths of males and females. None of the indicators for the period 2005−2013 suggested that any of the shark species were declining in either North or South regions. In fact, some of the indicators suggested positive trends for all three species. We caution that there are a number of important caveats associated with our indicator analyses, especially relating to data quality and availability, and goodness of model fit in the CPUE analyses. Nevertheless we conclude that there is no evidence that the stocks of blue, porbeagle and mako sharks in New Zealand waters have been adversely affected by fishing at the levels experienced since 2005, and that there are good signs that they are increasing. Observer data, which span a longer time period than commercial fishery data, suggest that blue and mako shark abundance may have declined during the late 1990s and early 2000s, and then increased since the mid 2000s, an interpretation that is consistent with the indicators based on the more recent commercial data. Porbeagle shark abundance may have declined rapidly in the early 2000s before stabilising at a relatively low level. The indicators presented here cover only the most recent portion of a longer fishing history that was characterised by greater effort levels in the 1980s and early 1990s by foreign fishing vessels. There is no information on the effect of this earlier fishing effort, as there are no shark catch data from that period, nor effort data from before 1980. Furthermore, the three shark species are capable of migrating outside the New Zealand Exclusive Economic Zone where foreign fishing may also have impacted on the wider South Pacific stocks of these species. In order to understand trends in the wider stocks, and to quantify their status in relation to management reference points, regional stock assessments are now required.

#	CCSBT-ERS/1503/Info/7
Title	Novel approaches to line-weighting in New Zealand's inshore surface longline fishery
Authors	J. Pierre, D. Goad, and E. Abraham
Abstract	Seabird bycatch has been reported from surface-longline fisheries for more than two decades. Characteristics of surface-longline gear that exacerbate the likelihood of seabird captures include its light weight, the long length of lines and snoods to which hooks are attached, and the attractiveness of baits to seabirds. Despite a well-researched suite of measures that have been shown to be effective in reducing seabird bycatch on this fishing gear, ongoing bycatch occurs in New Zealand and internationally. This continuing bycatch may be due to the inconsistent or insufficient implementation of existing measures, or the incompatibility of existing measures with gear types or fishing operations. In particular, safety issues associated with line-weighting — one effective method proven to reduce seabird bycatch risk — appears to have reduced uptake of this measure in New Zealand.

In this project, we trialled four devices intended to reduce the risk of seabird bycatch in surface-longline fisheries. These devices were (i) safe leads, weighing 60 g and comprising two lead pellets secured with O-rings around a rubber core, through which the monofilament snood passes, (ii) luminous plastic-covered "lumo" leads, weighing 40 g (iii) lumo leads weighing 60 g, respectively comprising a partly or fully lead-filled tapered plastic cylinder which attaches to longline snoods via a screw cap, and (iv) hook pods, which completely enclose longline hooks during setting until the fishing depth is reached.

All vessels tested operated in New Zealand's surface-longline fishery, and targeted tunas and swordfish. The deployments of safe leads and 60-g lumo leads were overseen by government fisheries observers. A dedicated technician implemented the 40-g lumo lead and hook pod trials. Trials of safe leads and lumo leads followed a broadly balanced design with half the snoods on longlines being weighted with the devices being tested, and the other half comprising "normal" fishing gear, configured and deployed as per the skipper's typical operations. Across the experimental and normal snoods, weighted swivels and lightsticks were deployed in accordance with the skipper's preference. Time-depth recorders (TDRs) were deployed on snoods to measure sink rate, generally at three approximately equally spaced locations in a longline basket.

Fish catch was dominated by tunas, swordfish (Xiphias gladius) and blue shark (Prionace glauca). For tunas and swordfish, catch rates on snoods carrying 40-g lumo leads did not differ from catch on normal snoods. However, the catch rate of sharks on snoods carrying lumo leads was significantly lower than for normal gear. Shark catch was also reduced on snoods with weighted swivels at the clip, whereas snoods with weighted swivels and lightsticks showed reduced tuna catch.

The crews of all vessels readily adapted to the addition of the experimental weights to the fishing gear. One incidence of potentially dangerous recoil involved a safe lead, and there were 12 incidents involving the recoil of lumo leads. However, cases where the experimental weights had slid under tension were also recorded. Recommendations for improving the design of lumo leads and hook pods include refining the shape of the devices and how they attach to the monofilament snoods. While the experimental weights tested were designed to reduce safety risks associated with weighting surface longline snoods, they do not eliminate them. Caution and vigilance is still required to minimise ongoing safety risks, especially when hauling longline gear.

APPENDIX II – FISHERIES SEABIRD MITIGATION MEASURES FOR SURFACE LONGLINES

Extract from *New Zealand Gazette:*

Fisheries (Seabird Mitigation Measures—Surface Longlines) Circular 2014

Pursuant to regulation 58A of the Fisheries (Commercial Fishing) Regulations 2001, the Deputy Director-General, Regulation and Assurance, of the Ministry for Primary Industries gives the following circular.

Circular

1 Title

This circular is the Fisheries (Seabird Mitigation Measures—Surface Longlines) Circular 2014.

2 Commencement

This circular comes into force on 1 July 2014.

3 Interpretation

In this circular,—
aerial extent means the distance from the back of a vessel to the place where the streamer line backbone enters the water under normal setting speed in calm sea
nautical dawn means the time at sunrise when the centre of the sun is at a depression angle of 12° below the ideal horizon for the place
nautical dusk means the time at sunset when the centre of the sun is at a depression angle of 12° below the ideal horizon for the place
set, in relation to a surface longline, means releasing the surface longline into the water
surface longline means a line— (a) to which hooks(whether baited or not) are attached; and (b) that is suspended by floats; and (c) that is not attached to the sea floor
streamer line means a type of seabird-scaring device also known as a tori line and required to be used in accordance with clauses 6 to 9.

4 Restrictions on use of surface longlines
A commercial fisher must not set surface longlines in New Zealand fisheries waters during the period of time between half an hour before nautical dawn and half an hour after nautical dusk on the same day unless the line is weighted in accordance with clause 5.

5 Weighting of surface longlines
For the purposes of clause 4, for each hook attached to a surface longline, weights must be attached to that line as follows:

(a) 1 weight equal to or greater than 40 g must be attached within 50 cm of the hook; or
(b) 1 or more weights equal to or greater than a total of 45 g must be attached within 1 m of the hook; or
(c) 1 or more weights equal to or greater than a total of 60 g must be attached within 3.5 m of the hook; or
(d) 1 or more weights equal to or greater than a total of 98 g must be attached within 4 m of the hook.

6 Streamer line required if surface longlines set
A commercial fisher must not set a surface longline in New Zealand fisheries waters unless—

(a) the vessel carrying the surface longline also carries a streamer line; and

(b) the streamer line is, at all times, configured and used in accordance with clauses 7 to 9 when the surface longline is set.

7 Specifications for all streamer lines
(1) A streamer line must be attached to the vessel.
(2) When deployed, a streamer line must be in a position that protects the baited hooks, including in crosswinds.
(3) A streamer line must use streamers that are—

(a) brightly coloured; and

(b) resistant to damage from ultraviolet light.

(4) A streamer line must be configured so that—

(a) streamers long enough to reach the surface of the sea in calm conditions are attached at intervals of no more than 5 m along at least the first 55 m of the streamer line; and

(b) streamers with a minimum length of 1 m are attached at intervals of no more than 1 m along at least the aerial extent of the streamer line.

(5) The streamers described in subclause (4)(a) must be attached to the streamer line with swivels that prevent streamers from wrapping around the line.
(6) If the streamer line in use breaks or is damaged, it must be repaired or replaced so that the vessel meets the specifications in this clause and clauses 8 and 9 before any further hooks enter the water.

8 Specifications for streamer lines on vessels less than 35 m in length
(1) On a vessel that is less than 35 m in overall length, a streamer line must—

(a) be set in a way that achieves an aerial extent of at least 75 m; and

(b) be at least 100 m long; and

(c) be suspended from a point on the vessel that is at least 6 m above the surface of the sea in calm conditions.

(2) If the streamer line is less than 150 m long,—

(a) it must have a towed object attached to the end; and

(b) the towed object must be sufficient to maintain the aerial extent of the line over the sinking baited hooks.

9 Specifications for streamer lines on vessels equal to or greater than 35 m in length
On a vessel that is equal to or greater than 35 m in overall length, a streamer line must—

(a) be set in a way that achieves an aerial extent of at least 100 m; and

(b) be at least 200 m long; and

(c) be suspended from a point on the vessel that is at least 7 m above the surface of the sea in calm conditions.

10 Circular does not apply to additional or secondary device
This circular does not apply to an additional or secondary seabird-scaring device.

11 Best practice guidelines
The Schedule sets out best practice guidelines for—

(a) the configuration and use of streamer lines; and

(b) the weighting of surface longlines.

12 Revocation

The Fisheries(Seabird Sustainability Measures-Surface Longlines) Circular 2011 (Gazette 2011, p 4923) is revoked.

Best practice guidelines

Streamer lines

1 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 crosswinds, it is expected commercial fishers will have to make adjustments to the configuration of the streamer line as conditions change.

2 Streamer lines should be made of line that is as light as practical and sufficiently strong.

3 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.

4 In order to maximise aerial extent, it is necessary to create tension in the streamer line. Towing an object on the terminal end of the streamer line is viewed as a preferred option for creating tension (and is required in some cases). The object could be a cone or buoy, a section of heavy rope, or any other object that creates sufficient drag to maintain the streamer line's aerial extent. Tension in the line can also be created by doing 1 or more of the following:

(a) towing extra length of streamer line:

(b) having short streamers along the in-water section of the streamer line:

(c) increasing the diameter of the in-water section of the streamer line.

5 In order to be effective at scaring seabirds away from the line of baited hooks, the streamers should not become tangled, either with each other or with the streamer line. In order to prevent streamers from becoming tangled,—

(a) each long streamer should be attached so that it reaches the surface of the sea in calm conditions:

(b) a swivel or similar device should be placed on the streamer line in a way that prevents streamers from twisting around the streamer line:

(c) each streamer should have a swivel or other device at its attachment point on the streamer line.

6 To ensure streamers are visible to birds, streamers should be made of brightly coloured fluorescent rubber or plastic tubing or other material that is resistant to damage from ultraviolet light. Bright colours such as red, yellow, orange, and 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.

7 A mixture of long and short streamers should be used. Long streamers (long enough to reach the surface of the sea) should be spaced at 5-m intervals along the aerial extent of the line. Long streamers that are hanging in the water can be prone to tangling. Although 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, fishers may not wish to have long streamers the whole way down the line because the far end of the streamer line will frequently be in the water. Short streamers may be used on the in-water portion of the line to increase drag.

8 Short streamers (of at least 1 m in length) should be spaced at 1-m intervals along at least the aerial extent of the streamer line. Short streamers may extend along the entire length of the line, including the in-water portion, as this may help create drag and increase the aerial extent. Short streamers should be made of a material that creates an erratic flapping movement. Weak

links (breakaways) should be incorporated into the in-water section of the line to limit safety and operational problems if lines become tangled.

9 If the streamer line that is in use breaks or is damaged, it should be repaired or replaced before any further hooks enter the water. For this reason, a complete additional streamer line should be carried as a spare.

10 Vessels are encouraged to use a second streamer line at times of high seabird abundance or activity. If 2 streamer lines are used, the streamer lines should be deployed on opposing sides of the main line of baited hooks.

Schedule Surface longline weighting

11 Surface longlines should be weighted to sink the baited hooks rapidly out of the diving range of feeding seabirds. Weights will shorten, but not eliminate, the zone behind the vessel in which birds can be caught.

12 Lead weights (such as safety leads or Lumo Leads) are recommended forsurface longline weighting. (Information about Lumo Leads is available at http://www.fishtekmarine.com/lumolead.php)

13 Scientific studies have demonstrated that a surface longline weighting configuration with more mass close to the hook is more likely to reduce seabird mortalities because it sinks the hooks faster and therefore reduces seabird attacks on baits.

14 Initial and final sink rates are important for reducing seabird catches (fast initial rates reduce bait visibility near the surface and fast final rates reduce accessibility at deeper depths). In order to maximise both sink rates,—

(a) lead weights should be placed at the hook (so no leader is used); or

(b) if the commercial fisher considers that shark bite-offs are excessive in the fishery, lead weights should be placed on leaders that are less than 0.5 m long.

Long leaders (2 to 4 m long), even with very heavy weights, have initial sink rates that are very slow due to the lag created by the long leader.

15 The mass of the weight depends on fishery risk to seabirds. Recent advice of the advisory committee for the Agreement on the Conservation of Albatrosses and Petrels suggests that lead weights of more than 60 g should be used where the risk to seabirds is—

(a) medium to high; or

(b) unknown.

16 Surface longline weights can fly back when the line is under tension at hauling. The safety of surface longline weighting may be improved by taking the following actions:

(a) safety leads or Lumo Leads may be used instead of conventional leads. Safety leads and Lumo Leads are designed to slide down the line instead of recoiling:

(b) the risk of injury can be reduced through co-ordination between the skipper and crew members unclipping branch lines from the main line. For example, a skipper may allow the crew time to act when a shark is on the line by clipping the branch line to a low point on the vessel to reduce the chance of it hitting someone:

(c) helmets may reduce the risk of injury and are used in some fisheries (for example, in Australia). There may, however, be practical reasons for not using helmets.

Dated at Wellington this 23rd day of June 2014.