Ministry for Primary Industries
Manatū Ahu Matua

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

New Zealand Country Report

Paper presented to the 12th Meeting of the Ecologically Related Species Working Group (ERSWG12)

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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.

Longline fishing targeting SBT primarily occurs off the west coast of the South Island, south of 40º S (**WCSI**) and along the east coast of the North Island, north of 40º S (**ECNI**). The fishing season for SBT is essentially the same for both areas and generally begins in April/May and finishes in July/August.

Non-target fish species such as mako sharks, blue sharks, Ray's bream, albacore, and dealfish are caught in large numbers as bycatch on tuna longlines. Eight taxa of seabirds were recorded as bycatch during 2014 and 2015 calendar years. 94 New Zealand fur seals were captured by SBT longliners during 2014 and 2015, all but five 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 obligations under the Western and Central Pacific Fisheries Commission (**WCPFC**)[1]. Surface longline vessels also carry turtle mitigation equipment (line cutters, de- hookers, and nets).

2 Review of SBT Fisheries in the New Zealand EEZ

2.1 HISTORY AND FLEET CHARACTERISATION

The New Zealand SBT fishery began off the WCSI as a 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.

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 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 34 vessels in 2015. Foreign charter vessels[2] began fishing for SBT in the late 1980s. As of 1 May 2016, all vessels operating in New Zealand waters must be flagged to New Zealand. This change has led to changes in the size and structure of the longline fleet, specifically the fleet targeting SBT.

In 2015, the SBT fishery off the WCSI was primarily composed of the larger –60º longline freezer vessels of the charter fleet. The generally heavier weather conditions off the WCSI compared to the ECNI has meant that fewer of the smaller domestic owned and operated vessels have operated in this area. The majority of these smaller "ice boats" operate in the longline fishery off the ECNI. 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.

[1] CMM 2015-03, Conservation and Management Measure for Mitigating Impacts of Fishing on Seabirds
[2] In New Zealand, a foreign charter vessel is defined as a foreign-owned, foreign-flagged vessel that is on charter to a New Zealand-based operator.

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 completely replaced fishing effort by trolling and handline. A small occasional SBT bycatch still occurs in the mid-water trawl and troll fishery. **Table 2** summarises total SBT catches by calendar year and New Zealand fishing year (1 October to 30 September).

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	0.0	0.1	547.2
2012	769.9	5.6	0.0	0.0	775.5
2013	755.6	0.9	0.0	0.0	756.4
2014	824.3	1.3	0.0	0.0	825.6
2015	922.2	0.1	0.0	0.0	922.3

Table 1: The annual SBT catch (tonnes whole weight) for calendar years 1999 to 2015, 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.

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
2014	825.6	824.6
2015	922.3	923.1

Table 2: Catches of SBT in New Zealand fisheries waters (tonnes whole weight) by calendar year and New Zealand fishing year. (e.g. If the calendar year is 2015, the fishing year runs 1 October, 2014 to 30 September, 2015.)

2.2 CATCH AND EFFORT DISTRIBUTION

Effort information is provided in **Figure 1 and 2**. Most catch and effort occurs in Region 6, which covers the WCSI fishing grounds.

The spatial distribution of fishing effort and SBT catches of the charter fleet are provided in **Figures 3 and 4** respectively. In the years up to and including 2015, most of the charter catch and effort occurred off the WCSI. In 2015, both the effort and catch of the charter fleet moved northward along the WCSI, and were spread more widely than in 2014. The spatial distribution of SBT target fishing effort and catch, respectively, of the domestic fleet are provided in **Figures 5 and 6**. While most domestic vessels target effort occurs off the ECNI, domestic vessels have also operated off the WCSI since 2008. The distribution of catches is similar to that of target effort. In 2015, both targeted effort and catch for the domestic fleet were similar to that in 2014.

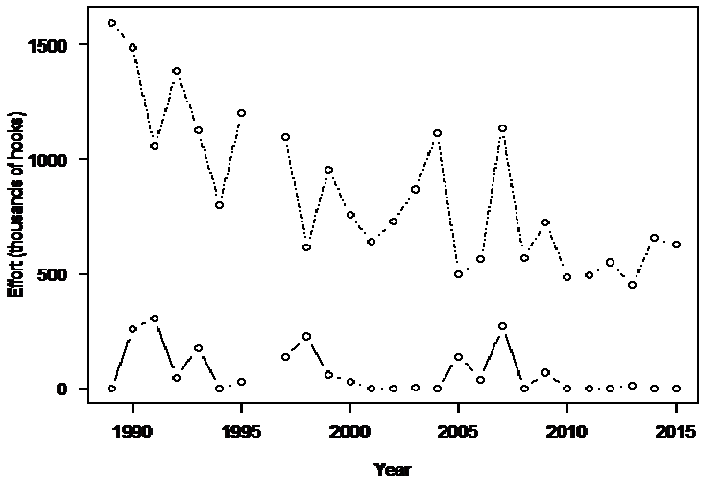

Figure 1: Effort (thousands of hooks) for the charter fleet in Region 5 (solid line – east coast North Island) and Region 6 (dashed line – west coast South Island). Note that this includes some non-SBT target effort in Region 5 and that no charter vessels fished in 1996.

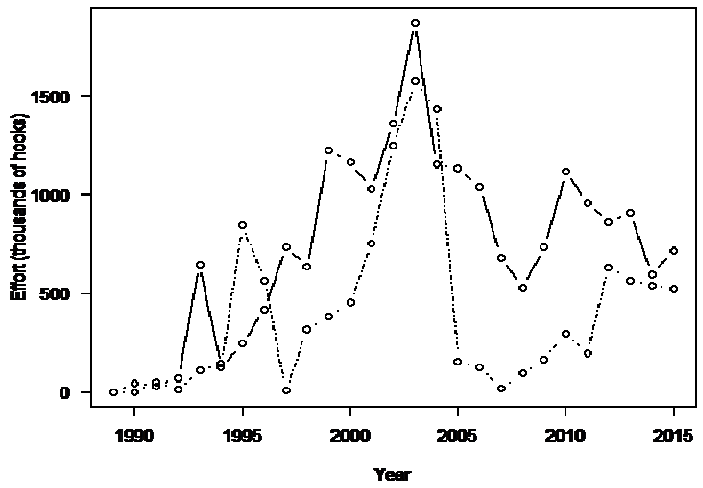

Figure 2: Target effort (hooks from sets that either targeted or caught SBT – thousands of hooks) by the domestic fleet for Region 5 (solid line – east coast North Island) and Region 6 (dashed line – west coast South Island).

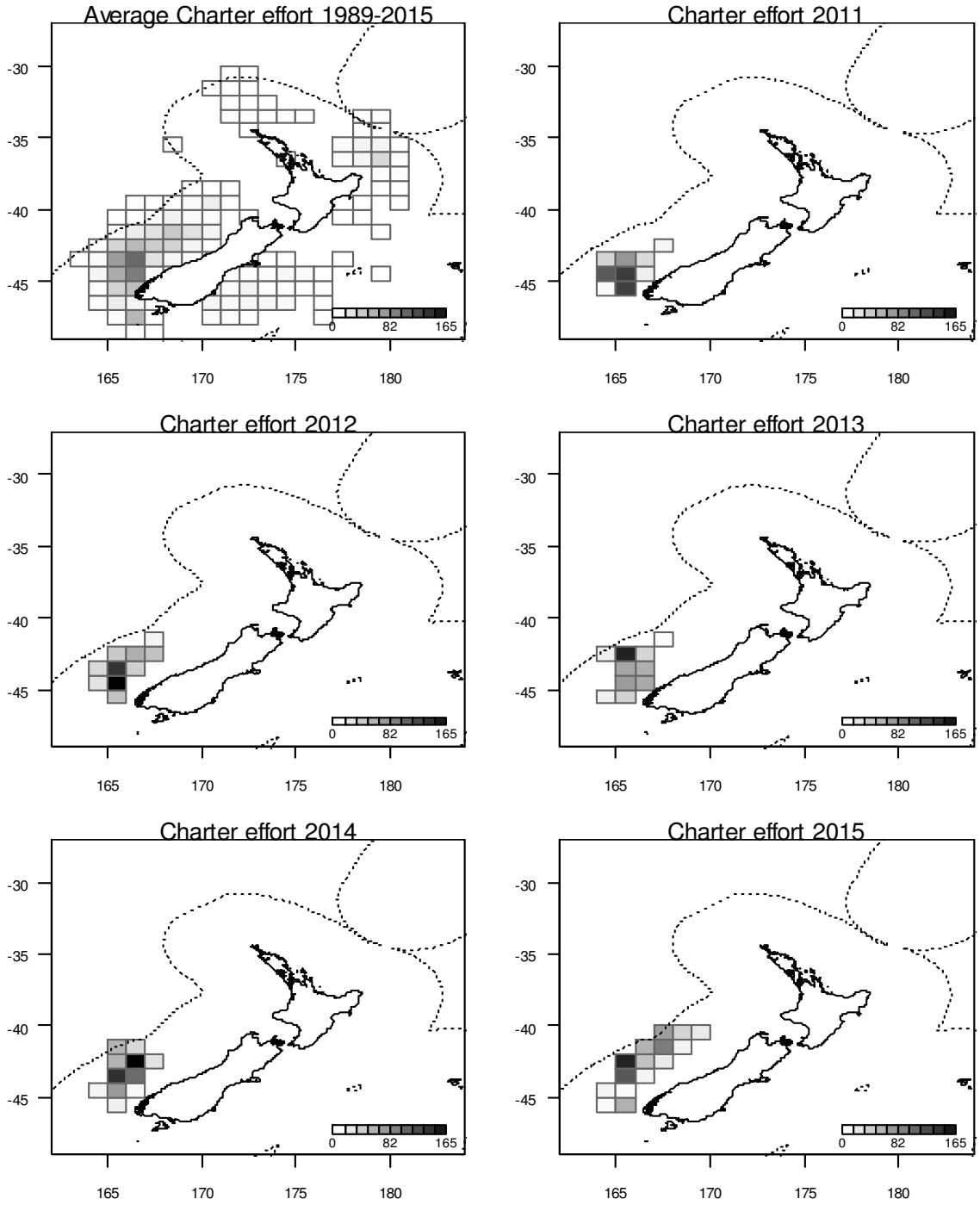

Figure 3: Distribution of longline <u>effort</u> (thousands of hooks per 1 degree square) for the charter fleet: average for the time series (1989-2015), and annually for 2011 to 2015.

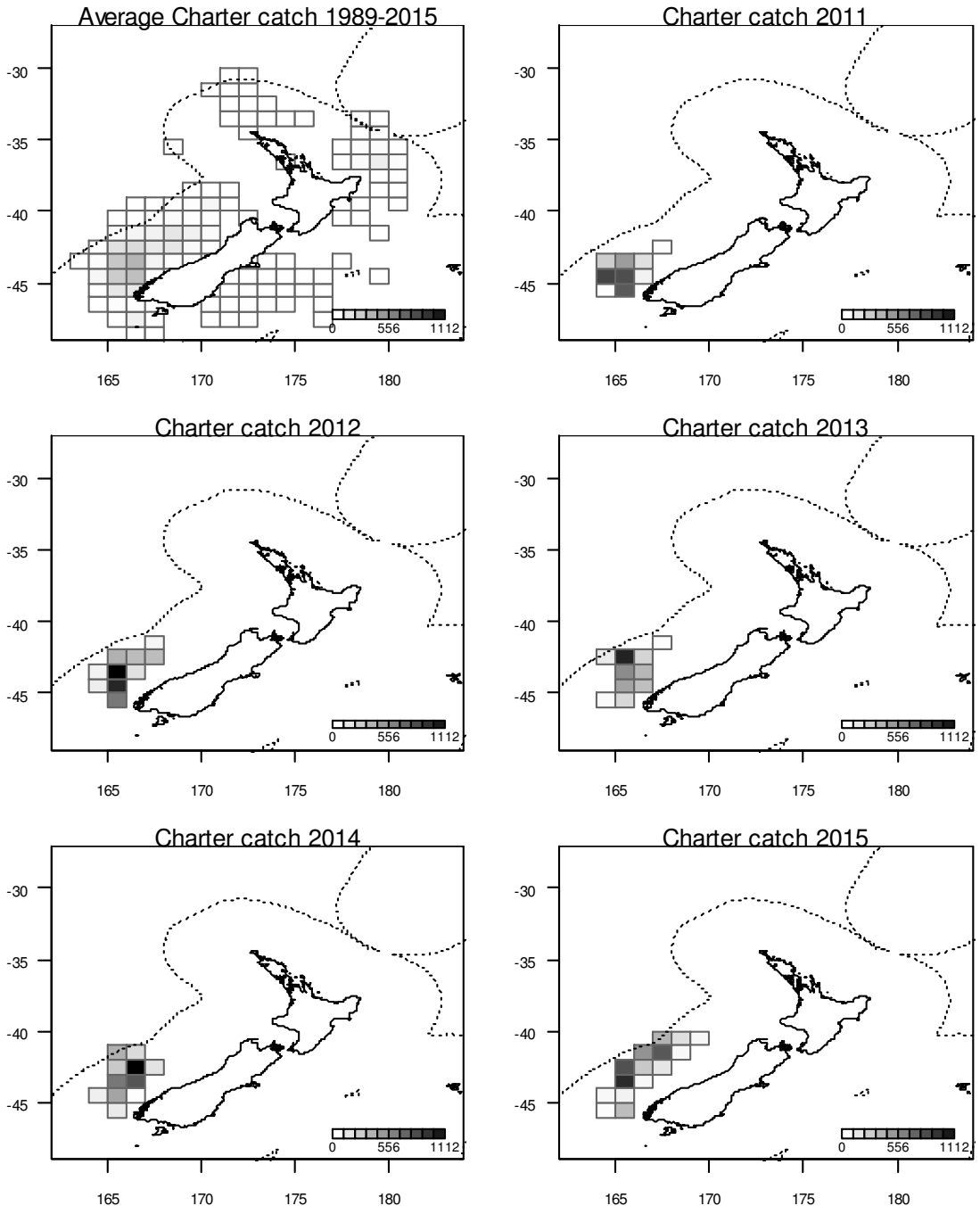

Figure 4: Distribution of longline <u>catches</u> (number of fish per 1 degree square) for the charter fleet: average for the time series (1989-2015), and annually for 2011 to 2015.

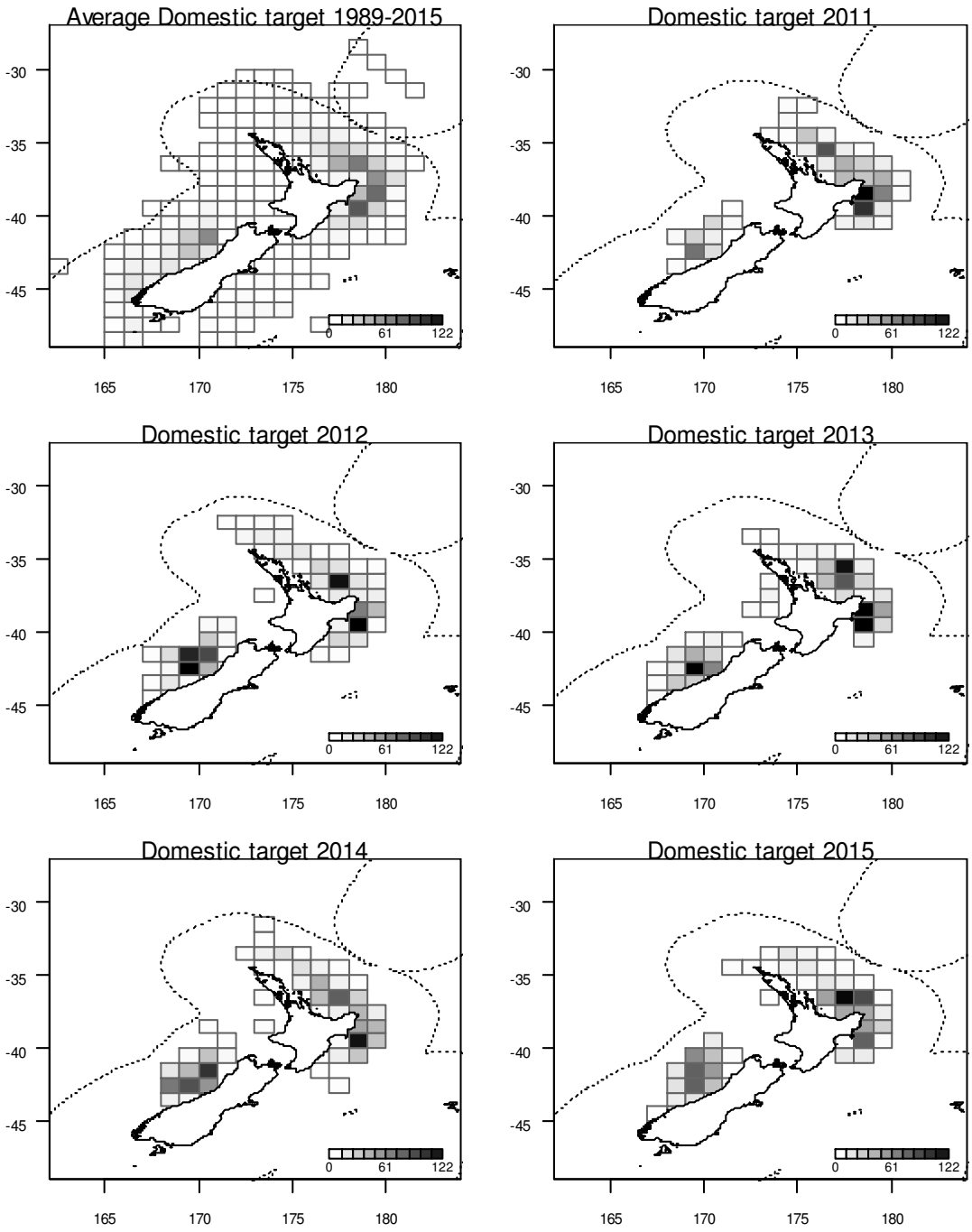

Figure 5: Distribution of longline <u>effort</u> (thousands of hooks per 1 degree square) for the domestic fleet that was targeted at SBT: average for the time series (1989-2015), and annually for 2011 to 2015.

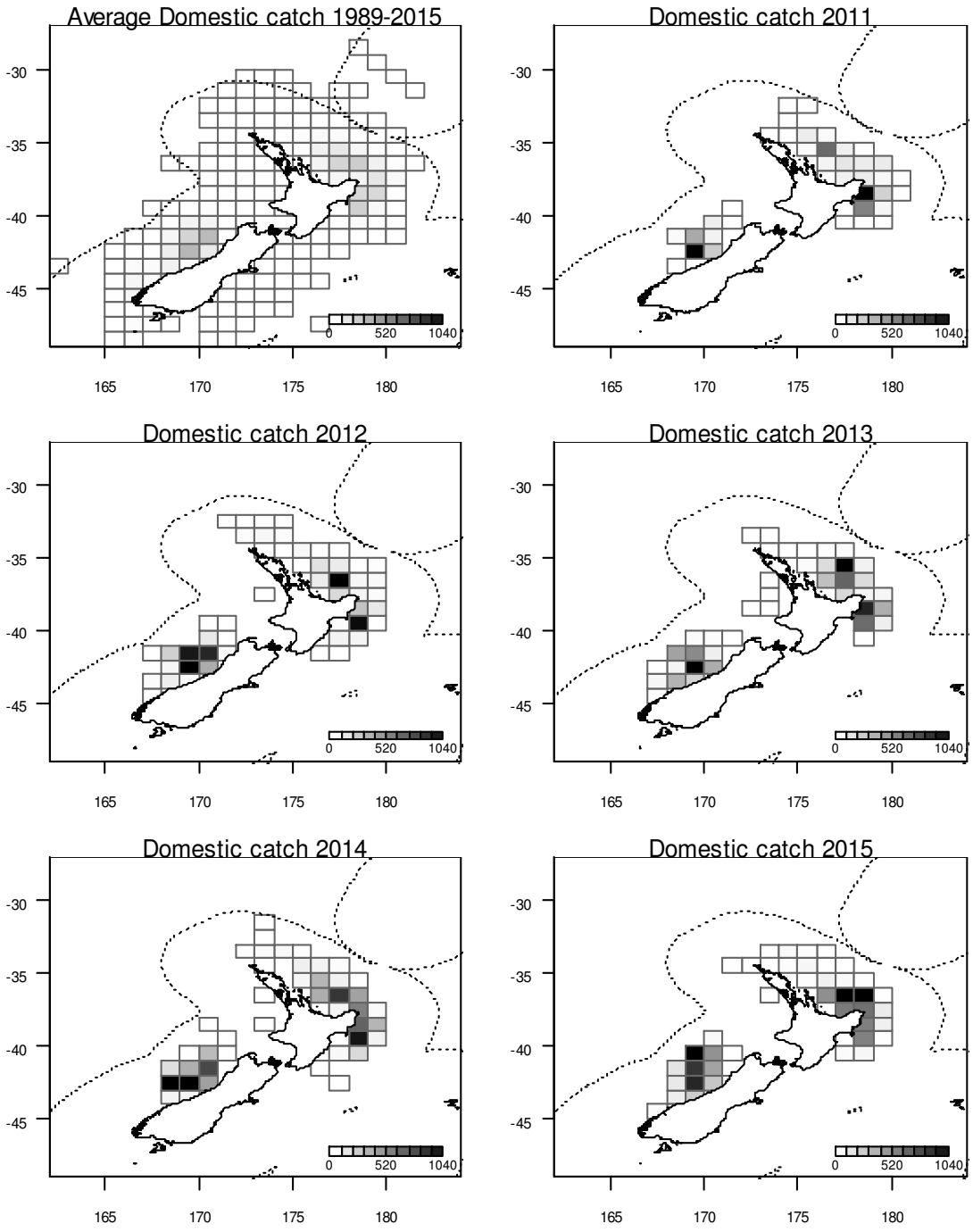

Figure 6: Distribution of longline <u>catch</u> (number of fish per 1 degree square) for the domestic fleet: average for the time series (1989-2015), and annually for 2011 to 2015.

3 Fisheries Monitoring for Each Fleet

3.1 OBSERVER COVERAGE

3.1.1 Recent Observer Coverage

New Zealand's Observer Programme covers both domestic and charter longline vessels. In 2015 calendar year, 25% of the total catch and 34% of the total effort was observed. All four charter vessels were covered by observers in 2015. The target coverage level for the domestic fleet is 10% effort and 10% catch.

The proportion of the catch observed is generally higher than hooks observed. With only one observer on the boat, it is not possible for all effort to be observed, however catches are observable for a longer period.

Around 79% of the catch was observed in the charter fleet in 2015 while 81% of the hooks were observed. For the domestic fleet, 10% of the catch and 7% of the hooks were observed in 2015.

Coverage is measured in two ways, proportion of catch (in numbers of fish) observed **(Table 3)** and proportion of hooks observed **(Table 4).**

Calendar year	Charter	Domestic
2014	0.79	0.10
2015	0.79	0.10

Table 3: Observer coverage in terms of catch (proportion of numbers observed) for the charter (NZC) and domestic (NZD) fleets for 2014 and 2015.

Calendar year	Charter	Domestic
2014	0.84	0.10
2015	0.81	0.07

Table 4: Observer coverage in terms of effort (proportion of hooks observed) for the charter and domestic fleets for 2014 and 2015.

3.1.2 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. Observers onboard the charter vessels have also collected otoliths from as many SBT as possible. Due to the smaller size of the domestic vessels and the different processing practices, it is often not feasible to collect otoliths from the domestic fleet.

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.

CCSBT Dart Tags

During the 2015 calendar year, six dart tags were recaptured during observed trips. Of those, five came from CCSBT region 6, the other coming from region 5. All six fish had a fork length within the range of 150-160 cm.

3.2 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).

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).

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

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

Table 5: TACs of the main fish bycatch species associated with the SBT surface longline fishery within the NZ EEZ as at 1 October 2015.

Fish Bycatch - Non-quota Species

Some species caught as bycatch in the SBT fishery are not managed under the QMS, for example 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 fish species bycatch, see section 5 below.

Non-fish and Protected Species Bycatch Reporting

Events of non-fish bycatch and protected species bycatch are reported by fishers on separate Non-fish and Protected Species Returns. This applies to both observed and unobserved trips.

Electronic Monitoring and Reporting

New Zealand is in the planning stages for the phased implementation of an integrated system of electronic monitoring and reporting in its commercial fishing fleet with electronic reporting currently planned for 1 October 2017.

4 Seabirds

The majority of seabirds are protected in New Zealand under legislation. 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 2013–14 fishing year (fishing years run from October 1 to September 30). At ERSWG11 New Zealand presented data up to 2012-13. In this report we present data by calendar year[3] through 2015.

4.1 OBSERVED SEABIRD CAPTURES FOR 2014 AND 2015 CALENDAR YEARS

New Zealand is a centre of seabird diversity, with over 80 species breeding in the New Zealand region. Seabirds are regularly reported as bycatch in commercial fisheries, with most reported captures being either of albatrosses (family *Diomedeidae*), or petrels (family *Procellariidae*).

Figure 7 shows the number of observed captures of seabirds in surface longline fisheries for SBT in New Zealand, and the proportion of those captures reported as dead and alive. It also provides, for each year, the rate of observed captures per 1000 observed hooks.

[3] Data is presented in calendar year to correspond with other CCSBT reporting.

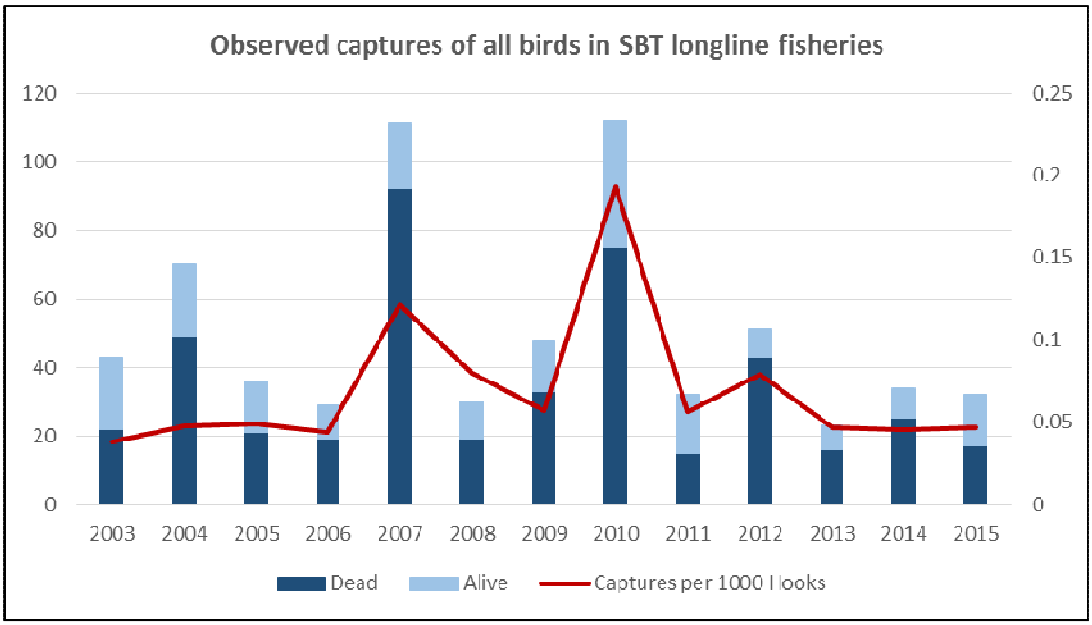

Figure 7: Observed captures of birds, proportion caught dead/alive and, captures per 1000 hooks in the southern bluefin longline fisheries 2003 to 2015.

In the 2014 calendar year, there were 34 observed captures of all birds in southern bluefin longline fisheries. (**Table 6**) Observed captures were of southern Buller's albatross (22), New Zealand white-capped albatross (7), grey petrel (1), great albatrosses (1), Westland petrel (1), Gibson's albatross (1), and Campbell black-browed albatross (1).

Species	Dead	Alive
Campbell black-browed albatross	1	0
Gibson's albatross	0	1
Great albatrosses	1	0
Grey petrel	1	0
New Zealand white-capped albatross	7	0
Southern Buller's albatross	14	8
Westland petrel	1	0

Table 6: Observed captures of birds, by species and life status, 2014 calendar year.

In the 2015 calendar year, there were 32 observed captures of all birds in southern bluefin longline fisheries. (**Table 7**) Observed captures were of southern Buller's albatross (21), New Zealand white-capped albatross (6), black-browed albatross (3), Westland petrel (1), and Campbell black-browed albatross (1).

Species	Dead	Alive
Black-browed albatross	3	0
Campbell black-browed albatross	1	0
New Zealand white-capped albatross	5	1
Southern Buller's albatross	7	14
Westland petrel	1	0

Table 7: Observed captures of birds, by species and life status, 2015 calendar year.

The birds were landed dead or alive, indicating that birds were caught during the set and the haul. Seabirds are caught across virtually all areas in which the fishery occurs (**Figure 8**).

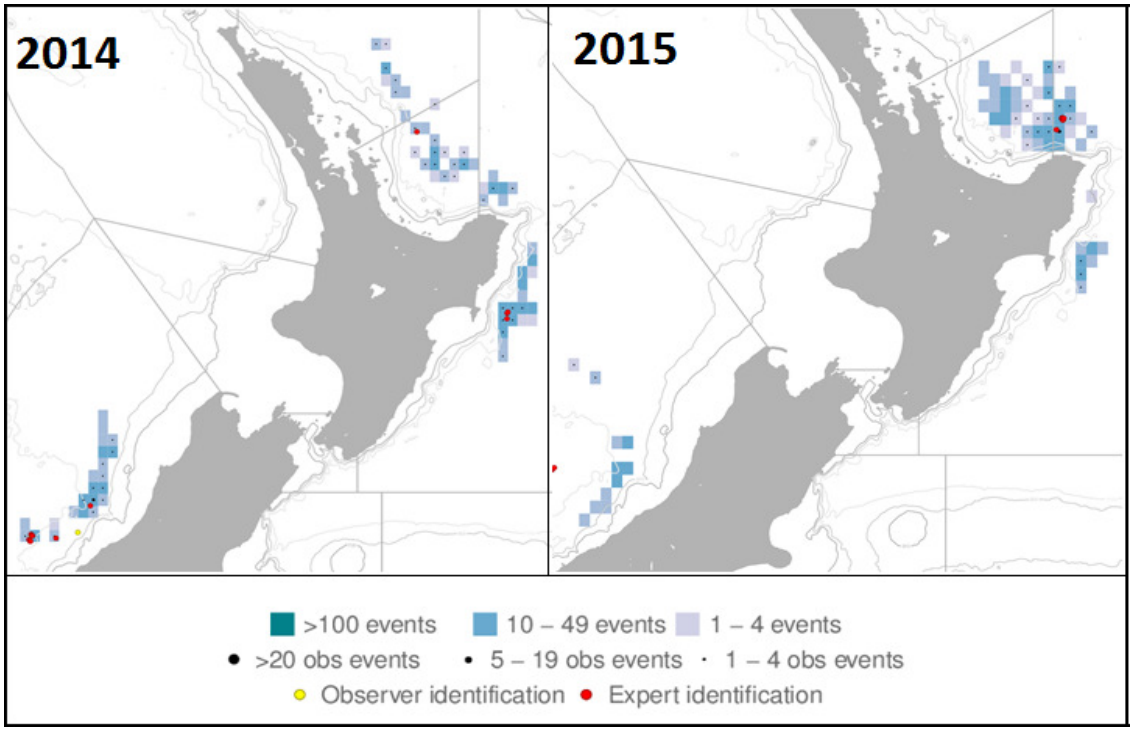

Figure 8: Map of fishing effort and observed captures, 2014 and 2015 calendar years. Fishing effort is mapped into 0.2-degree cells, with the colour of each cell being related to the amount of effort. Observed fishing events are indicated by black dots, and observed captures are indicated by red dots. 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. For 2014, case, 49.3% of the effort is shown. For 2015, 44.5% of the effort is shown.

Fishing effort is typically highly seasonal, with a peak in May/June and the season finishing in August. The observer coverage and observed captures generally follow the same pattern (**Figures 9 and 10**).

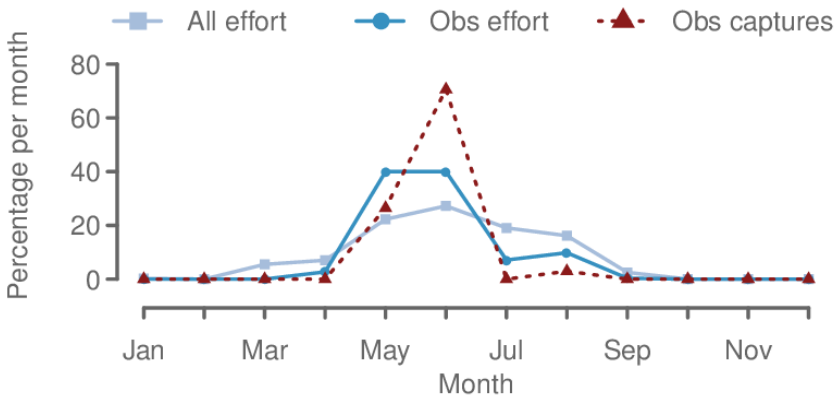

Figure 9: Fishing effort and observed captures of all birds by month, 2014 calendar year.

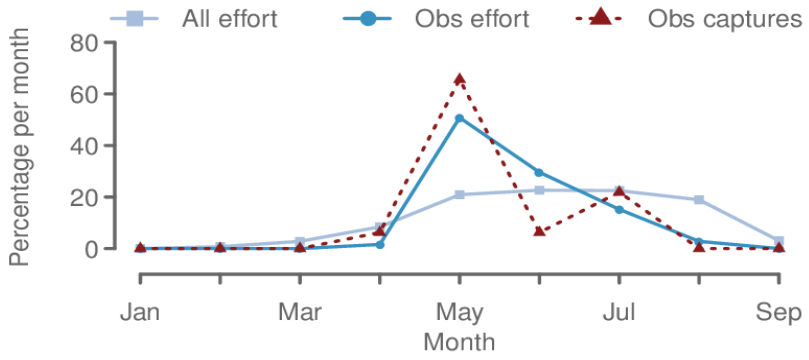

Figure 10: Fishing effort and observed captures of all birds by month, 2015 calendar year.

4.2 SEABIRD BYCATCH ESTIMATES FOR 2013-2014 AND 2014-2015 FISHING YEARS

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.[4]

Please note that capture estimates using the above method are made by fishing year, rather than by calendar year. (**Figure 11**).

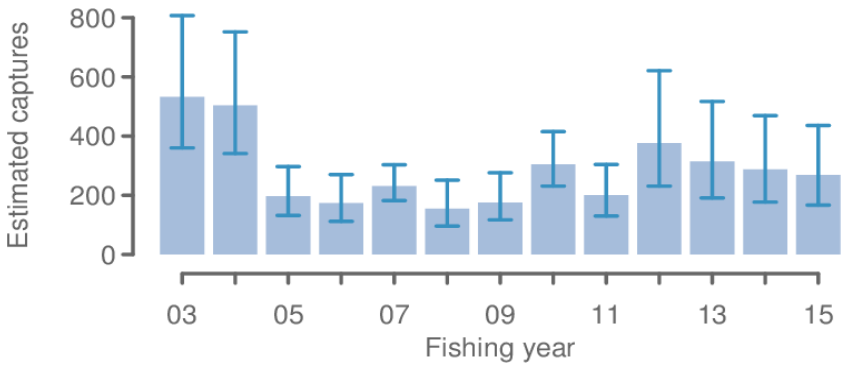

Figure 11: Estimated captures of birds (with 95% c.i.) in southern bluefin longline fisheries 2002-2003 through 2014-2015 fishing years.

[4] See Abraham and Thompson 2011 and Abraham, et al. 2013.

Table 8: Reporting form for estimation of total mortality of ERS in CCSBT fisheries

Country New Zealand
Year (calendar year) 2014
Species (or group) seabirds

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures				
Stratum (*CCSBT Statistical Areas or finer scale*)	Total Effort[5]	Total Observed Effort[5]	Observer Coverage[6]	Captures (*number*)	Capture Rate[7]	Mortalities (*number*)	Mortality Rate[7]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[8]	TP + WB[8]	NS + WB[8]	TP + WB + NS[8]	NI[8]
Domestic Fleet														
5	533,393	56,579	10.6%	5	0.09	4	0.07	1	37	21.7%	0%	0%	0%	0%
6	484,112	43,632	9.0%	14	0.32	13	0.29	1	144	95.7%	0%	0%	0%	0%
Charter Fleet														
6	653,330	545,265	83.5%	16	0.03	8	0.01	8	9	100%	0%	0%	0%	0%
2014 TOTAL	**1,670,835**	**645,476**	**38.6%**	**35**	**0.05**	**25**	**0.04**	**10**	**190**	**92.8%**	**0%**	**0%**	**0%**	**0%**

[5] For longline provide number of hooks, for purse seine provide number of sets.
[6] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[7] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[8] TP = tori poles, NS = night setting, WB = weighted branchline, NIL = no mitigation measures used.

Table 9: Reporting form for estimation of total mortality of ERS in CCSBT fisheries

Country New Zealand
Year (calendar year) 2015
Species (or group) seabirds

Fishery		Observed							Estimate	Proportion of observed effort with specific mitigation measures				
Stratum (*CCSBT Statistical Areas or finer scale)*	Total Effort[9]	Total Observed Effort[5]	Observer Coverage [10]	Captures (*number*)	Capture Rate[11]	Mortalities (*number*)	Mortality Rate[7]	Live releases (*number*)	Estimated total mortalities (*number*)	TP + NS[12]	TP + WB[8]	NS + WB[8]	TP + WB + NS[8]	NIL[8]
Domestic Fleet														
5	631,889	53,888	8.5%	7	0.13	7	0.13	0	82	33.3%	0%	0%	0%	0%
6	463,335	20,640	4.5%	7	0.34	6	.29	1	133	86.4%	0%	0%	0%	0%
Charter Fleet														
6	622,300	502,755	80.8%	23	0.05	8	0.02	15	9	100%	0%	0%	0%	0%
2015 TOTAL	**1,717,524**	**577,283**	**33.6%**	**37**	**0.06**	**21**	**0.04**	**21**	**224**	**93.3%**	0%	0%	0%	0%

[9] For longline provide number of hooks, for purse seine provide number of sets.
[10] For longline provide as a percentage of the number of hooks, for purse seine provide as a percentage of the number of shots.
[11] For longline provide as captures per thousand hooks, for purse seine provide as captures per set.
[12] TP = tori poles, NS = night setting, WB = weighted branchline, NIL = no mitigation measures used.

Using CCSBT's reporting template (**Tables 8 and 9**), it was estimated that there were a total of 190 seabird captures in southern bluefin longline fisheries in 2014 and 224 seabird captures in 2015.

5 Other Non-target Fish

This section summarises fish catch in tuna longline sets that either targeted or caught SBT. Numbers of fish observed, and estimated numbers scaled from observer records to the commercial fishing effort during the 2014 and 2015 calendar years, as well as CPUE for fish species caught on longline sets, are shown in **Table 10 and 11.** The scaled estimates provided for the domestic fleet have greater uncertainty than those of the charter fleet as they are based on lower observer coverage.

2014	Charter			Domestic		
Species	Observed	Scaled	CPUE	Observed	Scaled	CPUE
Albacore tuna	533	639	0.98	1,054	10,702	10.52
Bigscale pomfret	89	107	0.16	6	61	0.06
Blue shark	7,757	9,294	14.23	5,872	59,622	58.60
Butterfly tuna	64	77	0.12	64	650	0.64
Dealfish	584	700	1.07	20	203	0.20
Deepwater dogfish	493	591	0.90	0	0	0.00
Escolar	0	0	0	28	284	0.28
Flathead pomfret	50	60	0.09	1	10	0.01
Lancetfish	8	10	0.01	294	2,985	2.93
Mako shark	21	25	0.04	188	1,909	1.88
Moonfish	114	137	0.21	121	1,229	1.21
Oilfish	0	0	0	19	193	0.19
Pacific bluefin tuna	1	1	0.00	8	81	0.08
Pelagic stingray	2	2	0.00	13	132	0.13
Porbeagle shark	319	382	0.59	445	4,518	4.44
Rays bream	2,301	2,757	4.22	149	1,513	1.49
Rudderfish	117	140	0.21	14	142	0.14
School shark	43	52	0.08	7	71	0.07
Skipjack tuna	0	0	0	3	30	0.03
Striped marlin	0	0	0	0	0	0.00
Sunfish	18	22	0.03	76	772	0.76
Swordfish	28	34	0.05	255	2,589	2.54
Thresher shark	4	5	0.01	13	132	0.13
Yellowfin tuna	0	0	0	0	0	0.00

Table 10: Numbers of fish caught reported on commercial catch effort returns (Reported), observed, estimated from observer reports and total fishing effort (Scaled), and CPUE for fish species caught on longline sets where SBT was either targeted or caught during the 2014 calendar year.

2015	Charter			Domestic		
Species	Observed	Scaled	CPUE	Observed	Scaled	CPUE
Albacore tuna	228	282	0.45	464	6,819	6.23
Bigscale pomfret	39	48	0.08	1	15	0.01
Blue shark	7,762	9,608	15.44	3,866	56,813	51.87
Butterfly tuna	44	54	0.09	94	1,381	1.26
Dealfish	564	698	1.12	4	59	0.05
Deepwater dogfish	440	545	0.88	0	0	0.00
Escolar	0	0	0.00	7	103	0.09
Flathead pomfret	18	22	0.04	1	15	0.01
Lancetfish	26	32	0.05	138	2,028	1.85
Mako shark	27	33	0.05	132	1,940	1.77
Moonfish	50	62	0.10	68	999	0.91
Oilfish	7	9	0.01	14	206	0.19
Pacific bluefin tuna	1	1	0.00	3	44	0.04
Pelagic stingray	1	1	0.00	12	176	0.16
Porbeagle shark	248	307	0.49	220	3,233	2.95
Rays bream	5,741	7,106	11.42	301	4,423	4.04
Rudderfish	35	43	0.07	13	191	0.17
School shark	19	24	0.04	2	29	0.03
Skipjack tuna	0	0	0.00	0	0	0.00
Striped marlin	1	1	0.00	3	44	0.04
Sunfish	24	30	0.05	26	382	0.35
Swordfish	35	43	0.07	162	2,381	2.17
Thresher shark	3	4	0.01	13	191	0.17
Yellowfin tuna	0	0	0.00	2	29	0.03

Table 11: Numbers of fish caught reported on commercial catch effort returns (Reported), observed, estimated from observer reports and total fishing effort (Scaled), and CPUE for fish species caught on longline sets where SBT was either targeted or caught during the 2015 calendar year.

The non-target fish species most commonly caught were blue shark (*Prionace glauca*), albacore tuna (*Thunnus alalunga*), Ray's bream (*Brama spp*).[13] In both 2014 and 2015, blue shark, albacore tuna, and Ray's bream were predominant in the observed catches, with these three species making up 83% of non-target catch in 2014, and 88% in 2015 (Table 11).

Other non-target fish caught in relatively large numbers (in descending order by total scaled captures in both years) were porbeagle shark (*Lamna nasus*), lancetfish (*Alepisaurusferox & A. brevirostris*), swordfish (*Xiphias gladius*), mako shark (*Isurus oxyrinchus*), moonfish (*Lampris guttatus*), butterfly tuna (*Gasterochisma melampus*), dealfish (*Trachipterus arcticus*), sunfish (*Mola mola*), and deepwater dogfish (*Squaliformes* of various species, mostly Owstons dogfish).

[13] Based on the scaled estimated total catch for 2014 and 2015 combined.

Other non-target fish species caught were rudderfish (*Centrolophus niger*), oilfish (*Ruvettus pretiosus*), escolar (*Lepidocybium flavobrunneum*), thresher shark (*Alopias vulpinus*), Pelagic stingray (*Pteroplatytrygon violacea*), bigscale pomfret (*Taractichthys longipinnis*), school shark (*Galeorhinus galeus*), and flathead pomfret (*Taractes asper*).

Some other non-target tunas and billfish were caught in 2014 and 2015, specifically Pacific bluefin tuna (*Thunnus orientalis*) and striped marlin (*Tetrapturus audax*). There were no observed captures of skipjack tuna (*Katsuwonus pelamis*) or 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 areas 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 SBT by the domestic fleet is as bycatch when targeting other species (including bigeye tuna and swordfish), whereas SBT is the target species for the charter vessels.

As in previous years, 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 blue sharks, porbeagle sharks, and mako sharks.

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.

Of the small number of discards of SBT (4%), almost all were released alive or lost from the hook alive before being brought onboard. Approximately 1% of discards were reported as being dead at time of discard/loss. Dealfish and lancetfish are usually discarded, rather than retained, with most other fish being primarily retained. The majority of the other fish bycatch species that were commonly discarded were reported to be alive, except for lancetfish and dealfish that were more likely to be reported as dead or unknown.

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 at sea). The prohibition of shark finning was accompanied by regulatory changes in order to allow both live and dead discards of blue sharks, mako sharks, and porbeagle sharks. More information on the shark finning ban can be found in Section 11.2.

In 2014, 15% of blue sharks were retained. However, in 2015, likely influenced by the shark finning ban, only 0.2% of blue sharks were retained. In 2014, effectively 100% of blue sharks that were retained were caught in the charter fleet. In both years, a majority of discarded sharks were reported to be alive, although there was an increase in discarded blue sharks reported as dead in 2015, also likely the result of the shark finning ban and associated changes to discard rules.

In 2014, 28% of mako sharks were retained, whereas 16% were retained in 2015. In each year, of mako sharks that were discarded, a majority were discarded alive. In 2014, 28% of porbeagle sharks were retained, compared to only 5% in 2015. In 2014, 64% of discarded porbeagle sharks were alive, compared to 14% in 2015.

There were some differences between the domestic and charter fleet, with the domestic fleet more likely to discard sharks in 2014, before the shark finning ban. Discarded mako and porbeagle sharks were more likely to be reported as dead on domestic vessels.

Observers record life status on landing but they do not record if live fish are still alive at time of discard. In 2015, observer reporting forms were amended to include more information about life state at time of discard (for instance, information about whether fish reported as alive were injured or not) and reason for discarding. 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

Data describing all protected species captures in New Zealand fisheries is available on a public website (http://data.dragonfly.co.nz/psc/). The website provides a summary of all protected species captures in trawl and longline fisheries, from the 2002–03 to 2013–14 fishing year (fishing years run from October 1 to September 30). At ERSWG11 New Zealand presented data for marine mammals and marine reptiles up to 2012-13. In this report we present data by calendar year[14] through 2015.

6.1 MARINE MAMMALS

In 2014, there were 57 observed captures of New Zealand fur seals (*Arctocephalus forsteri*) in southern bluefin longline fisheries, with all but one released alive. In the 2015 fishing year, there were 37 observed captures of New Zealand fur seals in southern bluefin longline fisheries, resulting in four mortalities. Fur seals are caught across virtually all areas in which the fishery occurs (**Figure 12**).

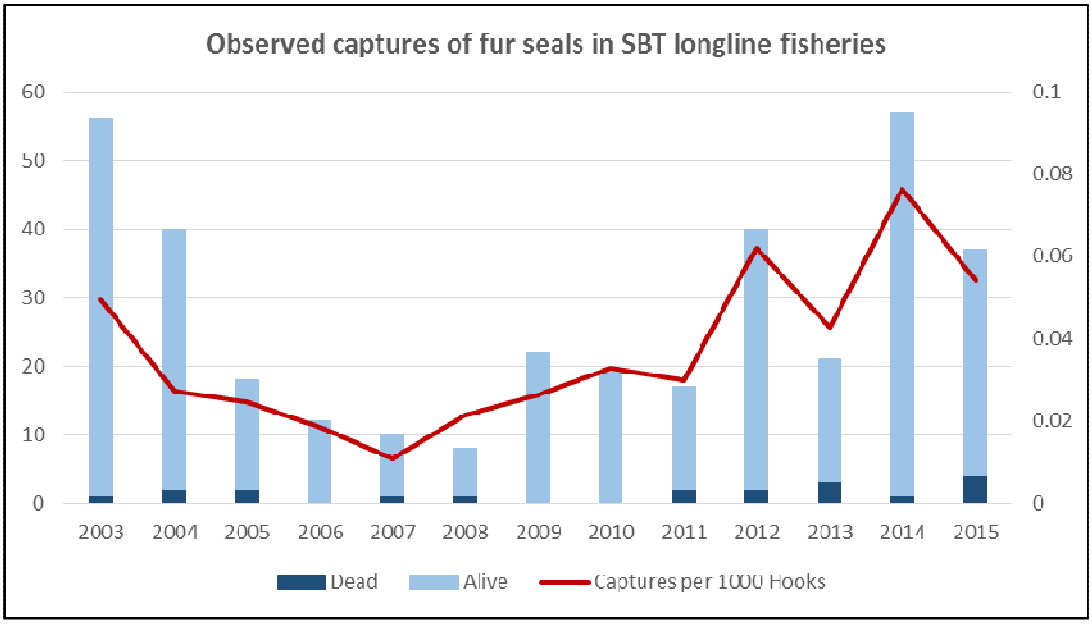

Figure 12: Observed captures of fur seals in southern bluefin longline fisheries 2003 to 2015.

[14] Data is presented in calendar year to correspond with other CCSBT reporting.

In the 2015 fishing year, there was one observed capture of a bottlenose dolphin (released alive) in southern bluefin longline fisheries. (**Figure 13**).

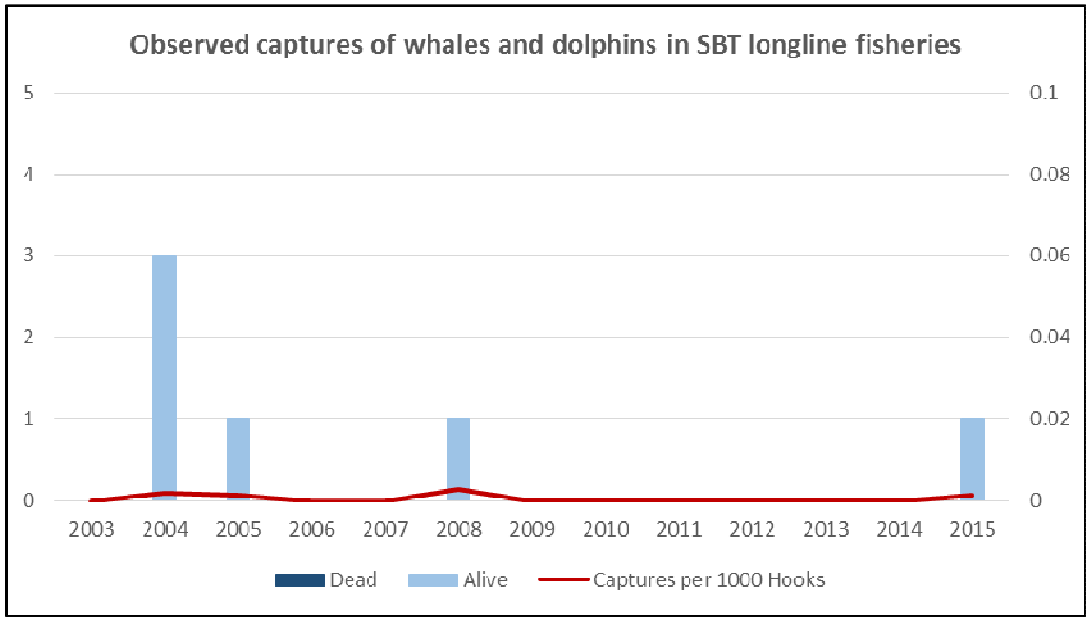

Figure 13: Observed captures of whales and dolphins in southern bluefin longline fisheries 2003 to 2015.

6.2 MARINE REPTILES

Marine reptiles are rarely encountered in New Zealand waters (**Figure 14**). None were observed caught in 2014 or 2015 while fishing for SBT. Most recently, in the 2011 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.

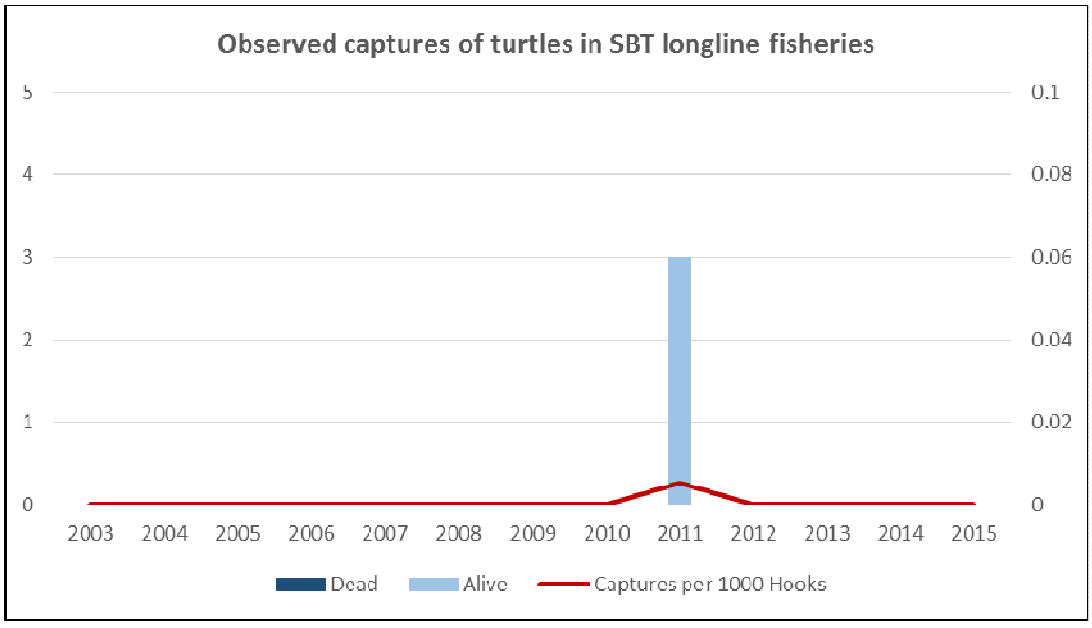

Figure 14: Observed captures of turtles in southern bluefin longline fisheries 2003 to 2015.

7 Mitigation Measures to Minimise Seabird and Other Species Bycatch

7.1 CURRENT MEASURES

7.1.1 Mandatory Measures

Current measures require commercial fishers to use two of three prescribed mitigation measures when setting surface longline fishing gear:

1. Use a tori line, *and*
2. *Either:*
    a. Use line weighting, *or*
    b. Set lines at night

These requirements were based on early advice from the Agreement for the Conservation of Albatrosses and Petrels (**ACAP**) and are incorporated into **WCPFC**'s *Conservation and Management Measure for Mitigating Impacts of Fishing on Seabirds* in 2012. As a Member of the WCPFC, New Zealand has implemented this conservation and management measure by way of the *Fisheries (Seabird Mitigation Measures – Surface Longline) Circular 2014* (see Appendix 1).

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

Compliance with these regulations is monitored by at-sea and in-port inspections via Fisheries Officers and observers placed on vessels. The observer coverage target is 10% effort and catch, as per CCSBT requirements.

In the 2015 calendar year, the inspections undertaken found four incidents where breaches of seabird mitigation regulations may have occurred across the New Zealand surface longline fleet. Each of these breaches resulted in an official warning.

7.1.2 Voluntary Measures

A wide range of effort has gone into improving the conservation status of New Zealand's seabirds. This includes workshops and Working Groups for fishers on 'seabird-smart' fishing; research; and industry-led initiatives (that include mandatory tori line use and other additional voluntary measures, for example, dying bait and careful release of offal).

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 maximize the coverage of tori lines over the baited hooks
- 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
- Hook shielding devices

Compliance with voluntary measures is not recorded.

Surface longline vessels also carry turtle mitigation equipment (line cutters, de- hookers, and nets).

7.2 MEASURES UNDER DEVELOPMENT/TESTING

Vessels are encouraged to try out mitigation methods they believe may be effective. Currently, a new prototype hook shielding device is being trialled.

Currently, New Zealand is considering whether to strengthen seabird mitigation measures by requiring fishers to use tori lines *and* weighted lines, while night setting would remain an additional voluntary measure. Should this change go ahead, New Zealand is also considering whether the specifications prescribed for line weighting should be updated to ACAP's updated recommendations, in which the weight is closer to the hook due to improved crew safety.

New Zealand contributed to work on improving tori lines on small surface longline vessels (see information paper (CCSBT- ERS/1603/Info/8). These improvements, including materials, were shared with fishers through the Liaison Officer Programme, which is visiting vessel visits in the longline fleet (see section 8 for more information on the Liaison Officer Programme).

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.

Longline Workshops

The primary means of engagement with surface longline fishers is through semi-annual workshops, where mitigation of captures of seabirds and other ERS are routinely discussed. New Zealand 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.

Codes of Practice

The New Zealand government, in conjunction with industry groups, has also produced a Code of Best Practice for longline fishers. The code of practice is distributed to quota holders and vessel masters, as well as licensed receivers of fish. The code of practice includes information regarding seabird capture mitigation practices. An upcoming review of this code of practice will include the drafting of "safe handling and release" guidelines for sharks and rays caught in surface longline fisheries.

Seabird Smart Training Programme

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.
- Presentation of 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.

Liaison Officer Programme

The Liaison Officer Programme covers several New Zealand fisheries. This year, the Liaison Officer Programme is focusing on seabird mitigation in the surface longline fishery. The project aims to:

- Visit every vessel in the surface longline fleet;
- Provide detailed advice on, and assistance with, the use and construction of tori lines (including providing vessels with necessary materials);
- Supply each vessel with standard documentation on regulations;
- Put in place specific vessel management plans for bycatch mitigation;
- Run port workshops to discuss mitigation measures;
- Return to vessels to check up on progress since first visit; and
- Improve communications by encouraging incident reporting to a central email address.

At the time of this meeting, liaison officers have visited 30 out of 39 vessels in the surface longline fleet, and put individual vessel management plans in place.

9 Information on other ERS (non-bycatch), such as Prey and Predator Species

New Zealand has no information to report on other ERS (non-bycatch).

10 Others

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

11 Implementation of the International Plans of Action for Seabirds and Sharks

11.1 NATIONAL PLAN OF ACTION FOR SEABIRDS

As a member of the United Nations Food and Agriculture Organisation (**FAO**), New Zealand is supportive of the International Plans of Action developed by the FAO. In line with the International Plans of Action, New Zealand has developed National Plans of Action for seabirds and sharks.

The National Plan of Action to Reduce the Incidental Catch of Seabirds in New Zealand Fisheries (**NPOA-Seabirds**) was published in 2004 and it was revised in 2013. NPOA-Seabirds sets out a long term objective that:

> *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.*

NPOA-Seabirds is the driver for all New Zealand actions to reduce the incidental mortality of seabirds from fishing. The objectives of the five-year plans for all New Zealand fisheries are aligned with NPOA-Seabirds, and annual plans prioritise these objectives as well as strategies to achieve them.

Seabird Risk Assessment

The NPOA-Seabirds is based on a risk assessment approach to identifying and managing seabird interactions. This focus on limiting captures of high-risk seabird species (those for which populations may not be able to sustain current incidental captures) is complemented by other objectives aimed at reducing captures overall.

Research and information underpin management of seabird interactions with fisheries. A quantitative risk assessment approach is updated annually and used to determine management priorities. 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.

The risk assessment compares 'annual potential fatalities' (**APF)** (estimated on the basis of the degree of spatial overlap between known seabird distributions with the distribution of fishing effort, observed capture rates, and multipliers for other factors such as unobservable mortalities) to a 'population sustainability threshold,' (**PST**) an analogue of the Potential Biological Removals, PBR, approach. The PST defines a threshold level, below which the population can sustain mortalities while allowing it to meet a pre-defined management objective, while mortalities above this level are unsustainable over the long term.

Best Practice

Current seabird mitigation requirements for surface longline vessels are included in a 2014 Circular (see Section 7), which states that surface longline vessels must use tori lines in addition to either night-setting or line weighting.

New Zealand has also made an ongoing effort to assess new/emerging mitigation measures for their suitability in surface longline fisheries. These measures have included several underwater bait and line setting systems, as well as various hook-shielding devices.

In addition, best practice, including mandatory and voluntary measures, is encouraged through the public relations and education activities detailed in Section 8.

Capture Rate Reduction

One of the five-year objectives of the NPOA-Seabirds is that capture rates reduce in all New Zealand fisheries. Capture rate reduction targets are to be quantitative when possible but the plan allows for alternative proxies to be developed in cases where current conditions did not allow for a meaningful numeric target.

In the three SBT groupings, only the large surface longline fishery (charter fleet) has had sufficient observer coverage and data for capture rates to be used as a measure of successful management over time. Capture rate reduction targets will be set for this fleet as necessary.

In 2016, the following proxy targets were developed for the small surface longline and swordfish surface longline fisheries:

- Tori line, line weighing, and night-setting use rates on observed sets;
- Number of vessels with Liaison Officer Programme Operational Plans in place;
- Levels of self-reporting of seabird bycatch (observed as compared to total observed and unobserved).

Many of the proxies listed above are aimed at assessing behaviour in the fleet as an alternative to a numerically based capture rate. Improved behaviour and buy-in from operators should translate into improved practices and therefore fewer incidents of avoidable bycatch, and these indicators should allow us to track progress towards this goal.

Species Specific Action Plans

In addition to the above, the NPOA-Seabirds necessitates the creation of species-specific action plans for high-risk species. In the SBT fisheries, Gibson's and Antipodean albatrosses have been identified as high risk species, and so the Wandering Albatross Action Plan was drafted in early 2016, outlining a plan to achieve the NPOA-Seabirds objectives of moving high-risk species into a less-threatened risk category by 2018.

International Fisheries and Engagement

Many seabird species found in New Zealand waters also travel widely across the Pacific and beyond, and international advocacy is an important component to successful management of seabird interactions. Out-of-zone impacts can include both fisheries impacts and wider changes, such as availability of prey species. In particular, the range of wandering albatrosses, which are caught in domestic longline fisheries, overlaps with a wide range of fisheries outside the New Zealand zone. New Zealand works bilaterally, through international bodies including ACAP, and through regional fisheries management organisations like WCPFC and CCSBT to contribute to international management of seabird interactions with fisheries.

11.2 NATIONAL PLAN OF ACTION SHARKS

As a member nation of the FAO, New Zealand is expected to establish an NPOA-Sharks, and to regularly review this plan. New Zealand adopted its first NPOA-Sharks in 2008, and reviewed its implementation in 2012. New Zealand will again review the NPOA-Sharks in 2017.

The long-term objective of the NPOA-Sharks is:

> *To maintain the biodiversity and the long-term viability of all New Zealand shark populations by recognizing their role in marine ecosystems, ensuring that any utilization of sharks is sustainable, and that New Zealand receives positive recognition internationally for its efforts in shark conservation and management.*

The 2012 review of the NPOA-Sharks 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 QMS 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.

Shark Finning Ban

In accordance with the goals of the NPOA-Sharks 2013, a ban on shark finning was implemented in New Zealand on 1 October 2014 meaning that it is illegal to remove the fins from a shark and discard the body of the shark at sea. Domestic regulations require that any shark fins landed must be naturally attached to the body of the shark. The regulations provide exceptions to the "fins naturally attached" requirements for eight species of shark, including the three main sharks caught in SBT fisheries: blue shark, mako shark, and porbeagle shark. Blue shark fins may be removed from the body, but must be attached to the trunk after processing but before landing. For several other QMS sharks, including mako sharks and porbeagle sharks, fins may be landed separately but in accordance with a gazetted ratio of fins to total greenweight.

The shark finning ban was accompanied by a change to domestic legislation which allows for the returning of certain QMS fish to sea, under specific conditions. Specifically, the Fisheries Act 1996 now states that blue sharks, mako sharks, and porbeagle sharks may be returned to the sea dead or alive. Reporting of these returns must note whether the fish was alive (and likely to survive) or dead, and catches are accounted for in the QMS.

In 2017, New Zealand will undertake a review of the shark fin ban, specifically looking at compliance with landing, discarding, and reporting requirements, and the effects of the ban on catch levels. The review will incorporate data and feedback from Fisheries Officers, Fisheries Observers, and fishers. The review will contribute to the upcoming update of the NPOA-Sharks.

Best Practice

Internationally, research into shark mitigation in surface longline fisheries has not resulted in the establishment of official "best practice" when it comes to avoiding shark captures. New Zealand-funded research into shark bycatch mitigation in 2015 found that, the most promising shark bycatch mitigation practices (nylon leaders, large hooks, and squid bait) are already

used extensively in New Zealand longline fisheries.[15] Further efforts to decrease impact of SBT fisheries on sharks tends to focus on increasing the likelihood of survival among sharks that are caught, as well as on improving crew safety when handling sharks.

New Zealand's NPOA-Sharks states that fisheries managers should seek to "minimise waste by promoting the live release of bycaught shark species, and develop and implement best practice guidelines for handling and release of live sharks."

In 2017, New Zealand will seek to make progress on this matter by working with industry to draft "safe handling and release" guidelines for sharks and rays caught in surface longline and purse seine SBT fisheries.

International Fisheries and Engagement

Highly migratory shark species spend only part of their time in New Zealand waters and may migrate over considerable distances. New Zealand cooperates with other countries to manage these species, notably via RFMOs including WCPFC and CCSBT. This collaboration is important to ensure New Zealand's conservation and management efforts are aligned with wider regional initiatives. Comprehensive management arrangements are required for the high seas and other national jurisdictions that take into account the individual characteristics of highly migratory sharks.

In mid-2015, New Zealand became a signatory to the Memorandum of Understanding on the Conservation on Migratory Sharks (CMS Sharks MOU). New Zealand participated in a meeting of the Signatories in February 2016, where 22 new species were added to the MOU and the Conservation Plan was updated by the signatories. New Zealand will continue to advocate for the adoption of effective, risk-based shark management measures at WCPFC and CCSBT.

12 Acknowledgements

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

[15] See Howard 2015.

13 References

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14 Appendix 1

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.

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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—

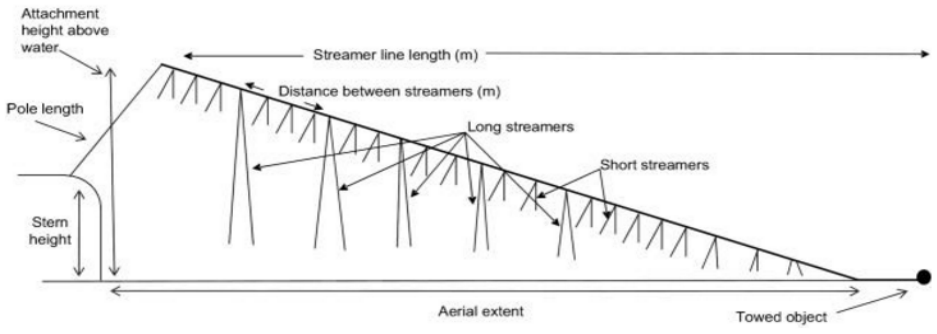
(a) the configuration and use of streamer lines; and

(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.

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 for surface 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.

Explanatory Note

This note is not part of the circular, but is intended to indicate its general effect.

This circular, which comes into force on 1 July 2014, is made under regulation 58A of the Fisheries (Commercial Fishing) Regulations 2001. It is made by the Deputy Director-General, Regulation and Assurance, of the Ministry for Primary Industries pursuant to an authority delegated under section 41 of the State Sector Act 1988.

This circular sets out mandatory mitigation measures that apply to commercial fishers using the method of surface longlining. The measures are designed to mitigate the effect of fishing-related seabird mortality. The circular requires that, when setting surface longlines, commercial fishers—

- use and configure streamer lines in accordance with the specifications prescribed in the circular; and
- either set lines at night or weight lines in accordance with the specifications prescribed in the circular.

Streamer lines meeting the requirements of this circular are approved seabird-scaring devices for the purposes of regulation 58(1).

The *Schedule* sets out best practice guidelines for—

- the configuration and use of streamer lines; and
- the weighting of surface longlines.

The guidelines do not form part of the specifications set under regulation 58A and do not have the force of law. In the event of any inconsistency with the specifications set out in *clauses 7 to 9*, the specifications prevail.

15 Annex 1

Summary of papers submitted to ERSWG

#	CCSBT-ERS/1703/Info8
Title	Tori line designs for small longline vessels
Authors	Johanna Pierre (JPEC Ltd), Dave Goad (Vita Maris), Igor Debski (Department of Conservation)
Abstract	Tori lines, or bird-scaring lines, are one of the key seabird bycatch mitigation measures for pelagic longline fisheries. A tori line suitable for use by small vessels operating in the New Zealand pelagic longline fishery was designed and is currently being tested under operational conditions at sea on several vessels. Testing is still underway but initial results indicate that the design is largely workable from a fishing perspective and represents an improvement over current tori lines in use. The tori line incorporated two sections: a lightweight aerial section with tubing streamers every 5 m and shorter tape streamers in between, and an in-water section of rope or monofilament nylon to generate drag whilst minimising the possibility of tangling with the longline. Composite poles were installed on several vessels to achieve higher attachment points, and to allow tori lines to be moved across the vessel. A breakaway system was used to reduce problems associated with tori lines tangling with the longline.

#	CCSBT-ERS/1703/12
Title	Assessing the risk to seabirds from surface longline fishing: a New Zealand update and initial application to tuna RFMO data
Authors	Edward Abraham, Yvan Richard, Nathan Walker Marie-Julie Roux
Abstract	As noted at CCSBT ERSWG 10 and 11, New Zealand has been intending to extend the risk assessment framework applied to main fishing methods within the New Zealand Exclusive Economic Zone (EEZ) to a broader set of fisheries as seabirds migrate widely and interact with a wide range of fisheries across multiple EEZ and RFMO. This paper presents the progress on this to date, where the methodology has been applied to public tuna RFMO fishing data throughout the southern hemisphere for the 26 ACAP listed seabird species that breed in the southern hemisphere (Table 1). The intention for this risk assessment is to undertake a second iteration later in 2017 including additional data for tuna RFMOs and including other fishing methods operating within the southern hemisphere.

#	CCSBT-ERS/1703/13
Title	Discussion document on ‘high risk areas’ definition
Authors	Nathan Walker, Dominic Vallieres, Yvan Richard
Abstract	This paper provides a list of potential methods to apply in defining high risk areas using the waters around New Zealand as an example. While these options are shown at a finer spatial scale (0.2 degrees cells), the authors consider that, for CCSBT, 5 degree cells would be more appropriate given data availability and complexity in managing at a finer resolution.

#	CCSBT-ERS/1703/14
Title	Update to Indicator-Based Analysis for Sharks
Authors	Malcolm Francis
Abstract	This study updates several abundance indicators for blue, porbeagle and mako sharks, the main shark species caught in New Zealand's tuna longline fishery. Distribution indicators for all three species were extended by two years, and standardised catch per unit effort (CPUE) indices for porbeagle sharks were extended by two years. The distribution indicators were consistent for all three species in showing either increasing trends throughout the period 2005–2015, or an increasing trend followed by stabilisation at a constant level. CPUE indices for porbeagle shark from the Japanese charter tuna longline fishery in southern New Zealand (the Japan South fishery) showed a strong increase in the last two years, whereas in northern New Zealand the indices for domestic and Japanese vessels combined (the North fishery) were relatively flat. The longer time series of the Japan South observer indices showed little change since the early 2000s apart from a small increase since 2013. A large peak in 1998–2000 was anomalous and cannot currently be explained, but it is independently corroborated by a peak in reported commercial landings during 1998–2000. The North fishery observer data suggest that porbeagle abundance declined to low levels during the early 2000s but has since increased substantially, although since 2008, the indices have been variable without any clear trend. Thus, there is some inconsistency among trends identified for porbeagle shark by the distribution and CPUE indicators, and by the standardised CPUE indices for the North and South fisheries. Some year-to-year CPUE variations were too large to represent changes in population biomass, and may instead reflect changes in availability to the fishery. Furthermore, some CPUE models fitted the data poorly and may be unreliable. Nevertheless, when taken as a group, the indicators suggest that the porbeagle population around New Zealand has been stable or increasing during the last decade.