

CCSBT-ESC/1009/SBT Fisheries - New Zealand

**Annual Review of National SBT Fisheries for the
Scientific Committee**

New Zealand

2010

Executive Summary

This report describes the New Zealand southern bluefin tuna (SBT) fishery for the 2008/09 fishing year. New Zealand's allocation of 420 t for the 2008/09 fishing year was allocated between commercial (413 t) and non-commercial sectors (5 t), with an allowance also made for other fishing related mortality (2 t). After two years when commercial catches were well below 300 t, commercial landings of SBT were around 318 t for the 2007/08 season and 417 t for the 2008-09 season. This increase is attributed to both an increase in effort and increased abundance of small fish as indicated in the CPUE and size composition data.

The estimate of non-commercial SBT catch as bycatch from the recently developed Pacific bluefin tuna fishery was less than one tonne in 2009. From scaled observer data, it is estimated that eleven dead SBT were discarded during the 2008/09 season. Though no size data on the discards is available, the total weight was likely around one tonne. Overall New Zealand's catch against its allocation was about 418.4 t for the 2008/09 fishing season.

CPUE in 2008/09 was similar to that observed in 2007/08 for the charter fishery but increased markedly for the domestic fleet, which largely fishes the east coast of the North Island (CCSBT region 5). The catch rate data reflect the increased abundance of small fish.

All four charter vessels were covered by scientific observers in 2008/09. Coverage by the observers was 89% and 82% for catch (numbers) and effort (hooks) respectively. For the domestic fishery in 2008/09 coverage was 10% of both catch and effort.

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1 Introduction

Historically both adult and juvenile southern bluefin tuna (SBT) were distributed around New Zealand. During the 1960s and 1970s juvenile SBT were encountered on both the east and west coasts of the North Island and the west coast of the South Island during summer months – with several tonnes taken in pole and line and troll fisheries.

From the late 1970s and early 1980s, a concerted effort to develop a domestic fishery to service the Japanese market was undertaken. By 1982 a handline fishery was established, with the catch frozen onboard a former Japanese longline vessel. The handline fishery continued, albeit at a reduced level, following the record 1982 season (305 tonnes landed) into the early 1990s when longlining became the dominant fishing method for SBT.

The New Zealand SBT fishery has been constrained by a national catch limit of 420 tonnes per year between 1989 and 2008/09. During the few occasions when New Zealand exceeded its catch limit, the subsequent year's catch limit has been reduced to adjust for the over-catch (Figure 1; Table 1).

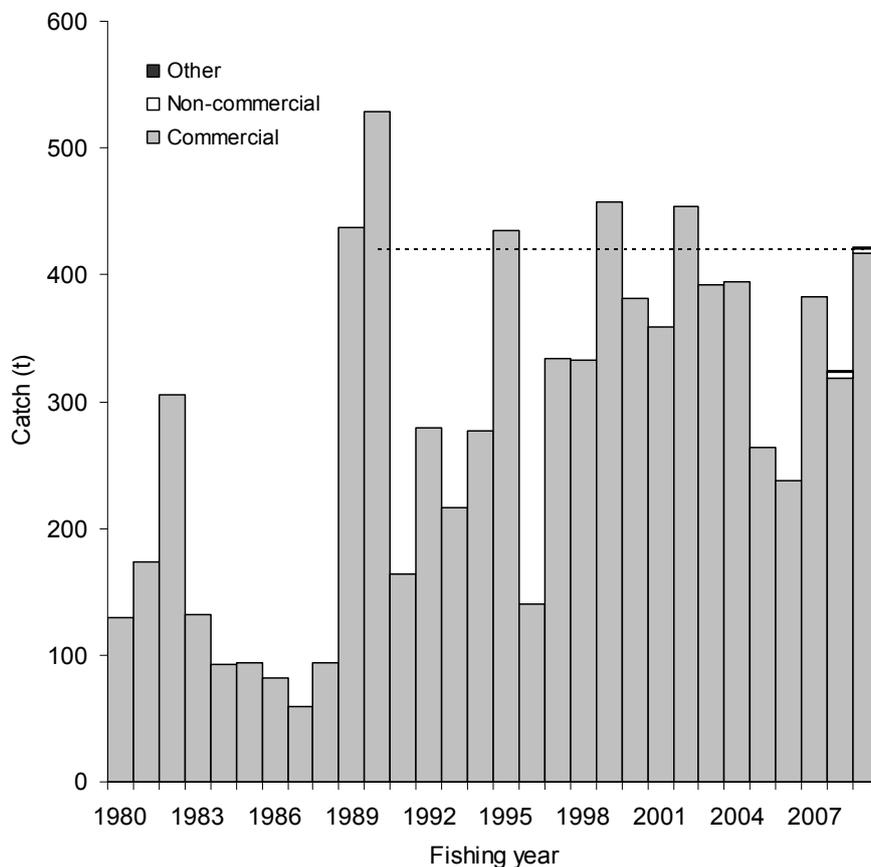


Figure 1: Commercial catches of southern bluefin tuna (tonnes whole weight) by New Zealand fishing year (1 October to 30 September). Annual total catch is from Licensed Fish Receiver returns for 1998/99 to 2000/01, and from Monthly Harvest Returns from permit holders since 2001/02. The dashed horizontal line refers to the limit of 420 t that has been in place since 1989. From the 2007/08 fishing year, estimates of non-commercial catch, and discard mortality are included.

All but a few tonnes of the domestic SBT catch is now taken by longline. SBT catches are taken chiefly off the southwest coast of the South Island (WCSI) and off the east coast of the North Island (ECNI) from April to July. Longlining off the WCSI is almost entirely targeted at SBT. The fleet operating off the southwest coast is primarily composed of the larger –60° freezer vessels of the charter fleet. The generally heavier weather conditions off the WCSI compared to the ECNI means that less of the smaller domestic owned and operated vessels operate in this area.

Smaller domestically owned and operated “ice boats” operate in the longline fishery off the 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.

SBT has been managed under a Quota Management System (QMS) since 1 October 2004. For the 2008/09 season, the fishery had a Total Allowable Commercial Catch (TACC) of 413 t, the remainder of New Zealand’s TAC of 420 t being allocated to recreational (four tonnes) and customary non-commercial fishers (one tonne), and other sources of fishing-related mortality (two tonnes). The introduction to the QMS saw a change from the “Olympic” race for fish and was associated with a consolidation of the fleet.

The 2005/06 fishing season resulted in the lowest NZ catch in 10 years (238 t). This was attributed to two main factors: the absence of new recruitment into the New Zealand longline fishery leading to decreased vulnerable biomass (as illustrated in the continued period of low CPUE in the charter fleet); and the decline in longline effort from the domestic fleet and charter fleets. Catches have increased since then as a consequence of a consolidation of the domestic fleet and small fish reappearing in the catch. In 2008-09 commercial removals were 417.3 tonnes.

2 Catch and Effort

Catches for the charter fleet by calendar year and CCSBT region are provided in Table 2. Effort information is provided in Figure 2 and Table 3. Most catch and effort occurs in Region 6, which covers the west coast of the South Island fishing grounds. Over the period 2001-2004 there was little targeting of SBT (and no catches of SBT) by the charter fleet in Region 5, which covers the east coast North Island fishing grounds. Since then there has been a small amount of effort from charter vessels operating in the later part of the season in Region 5 each year with the exception of 2008.

Catches for the domestic fleet by calendar year and CCSBT Region are provided in Table 4. SBT target effort for this sector is provided in Figure 3 and Table 5. A longline fishery targeting other highly migratory species also operates outside the SBT fishing season. It is important to separate these data out to better understand the New Zealand SBT fishery. For catches, the importance of the two regions has varied since 1995. While target effort increased dramatically in both regions from 1995 to 2003, it has decreased since then, particularly in Region 6. This decline is associated with a substantial decrease in the number of vessels in the surface longline fleet (see Table 7), and the removal of a domestically-owned freezer vessel that fished in region 6 from the fleet. Recent years have seen an increase in effort in region 6 by small domestic vessels as the operators of those vessels attempt to extend the season that they can fish for SBT.

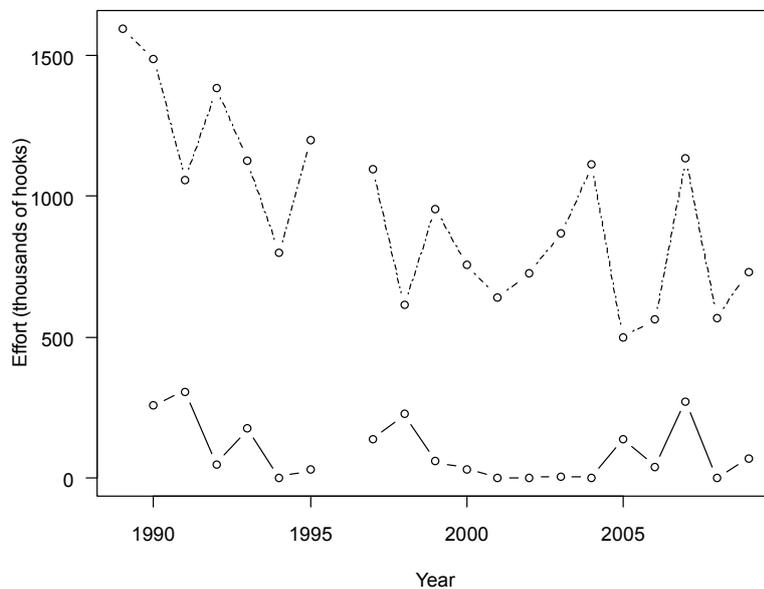


Figure 2: Effort (thousands of hooks) for the charter fleet in Region 5 (solid line – east coast North Island) and Region 6 (dashed line – west coast South Island). Note that this includes some non-SBT target effort in Region 5 and that no charter vessels fished in 1996.

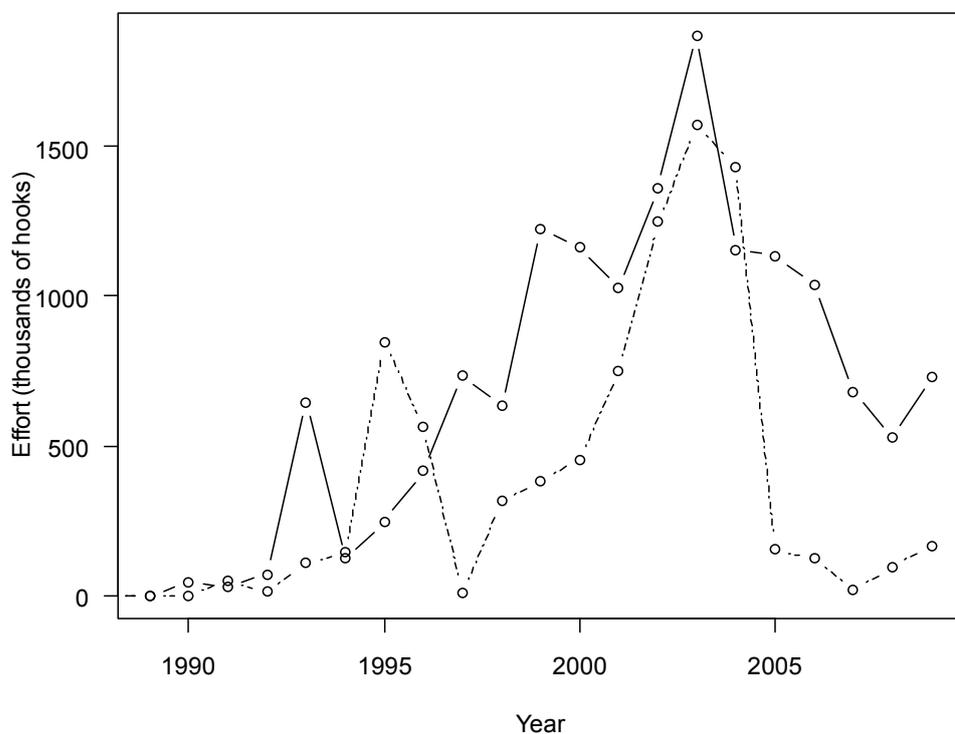


Figure 3: Target effort (hooks from sets that either targeted or caught SBT – thousands of hooks) by the domestic fleet for Region 5 (solid line – east coast North Island) and Region 6 (dashed line – west coast South Island).

3 Nominal CPUE

Nominal CPUE was calculated by fleet, year, and CCSBT Region. For the domestic fleet, CPUE was calculated for effort from sets that either caught or targeted SBT (referred to as target effort). Due to the large changes in the structure of the domestic fleet and the nature of the “Olympic system” under which the New Zealand fishery operated prior to 2004, the trends in the CPUE for the domestic fishery may not provide reliable information on trends in vulnerable biomass, although the CPUE does exhibit similar trends to that of the charter fleet.

Nominal CPUE by fleet across all regions based on targeted longline effort is provided in Figure 4. The domestic fleet operating in area 5 experienced an increase in 2007 with similar catch rates in 2008, and another increase in 2009. Charter CPUE averaged around three SBT per 1000 hooks over 1997-2002. Associated with the lack of new recruitment (Section 4), CPUE declined dramatically in 2003 and stayed at about these historically low levels for five consecutive years until a marked increase in 2008 for the charter fleet. Figure 5 indicates that this increase occurred in the core area of their fishery (e.g. Region 6) and may be due to the appearance of some small recruits.

Nominal CPUE was also calculated for the charter fleet in Region 6 for fish thought to be of spawning age (SBT greater than 10 years of age). This was done based on both the proportional ageing of observer lengths and on the smaller dataset of SBT that were directly aged. The series are compared in Figure 5 and agree closely with each other in describing no overall trend over the available time series; CPUE varies around one SBT per 1000 hooks with an historical low point in 2003 and the highest level for the series in 2008.

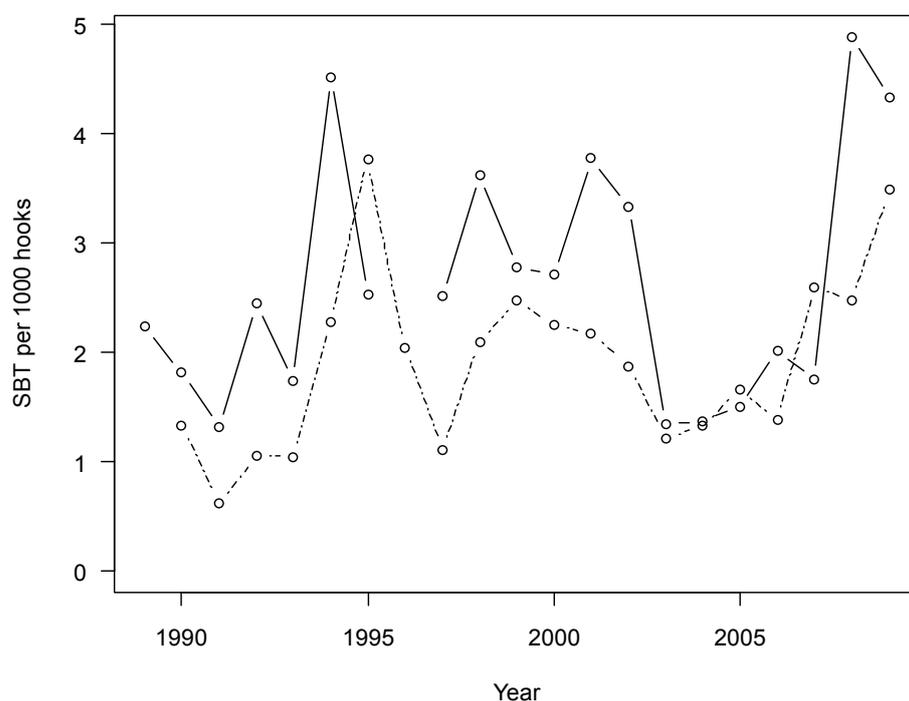


Figure 4: Catch per unit effort (number of SBT per thousand hooks) by calendar year for the charter (solid line) and domestic (dashed line) longline fleets based only on effort from sets that either targeted or caught southern bluefin tuna.

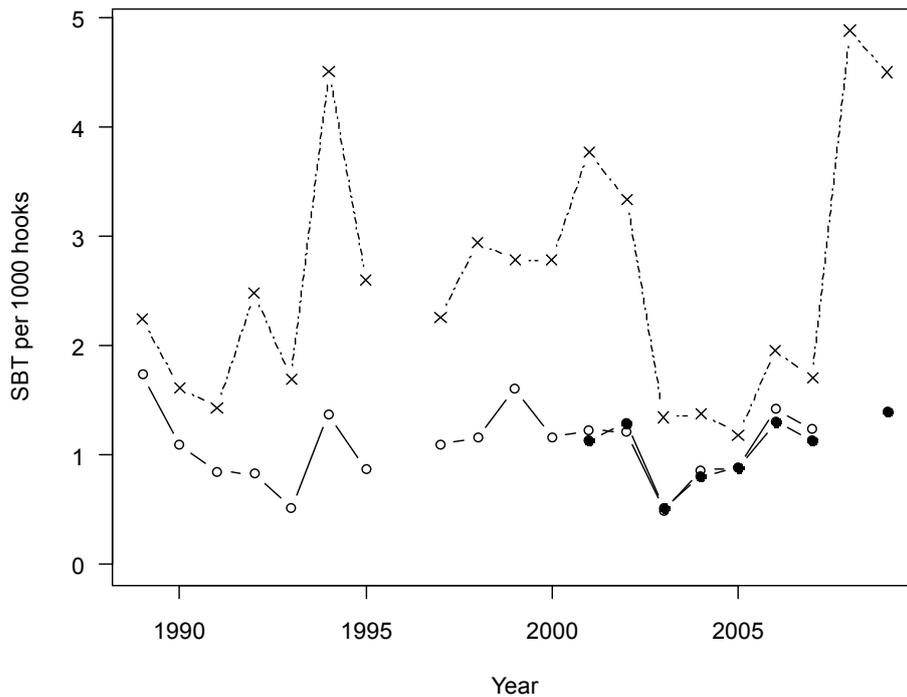


Figure 5: Catch per unit effort (number of SBT per thousand hooks) from the charter fleet in Region 6 (west coast South Island) for all southern bluefin tuna (dashed line) and for fish greater than 10 years of age based on proportional ageing data (solid line, open symbols) and based on direct ageing data (solid line, solid symbols).

4 Size composition

For fish length we consider data collected from 1989 to 2009 (Figures 6 and 7).

4.1.1 Size composition data

There was a very clear reduction in the range of sizes of SBT taken in the New Zealand fishery between 2001 and 2006. There is evidence of growth (progression of modes) over this period, but little evidence of recruitment of smaller fish to the New Zealand fishery. New data suggests a change in this trend, with fish from a wide range of smaller sizes starting to appear in 2006, and more pronounced in 2008 and 2009 (Figure 6).

Due to lower levels of observer coverage historically in the domestic fishery, size composition data are not as well estimated for that fleet. Nevertheless, size composition data for the domestic fleet (based on observer reports) are provided in Figure 7 and show similar patterns to that observed in the charter fleet.

An examination of the proportion of the charter fleet catch under a given size since 1989 (Table 6; Figure 8) indicates that fish under 140 cm generally represent over 25% of the catch from the charter fleet, but were 10% or less for the three years between 2004 and 2006. Overall, the proportions do fluctuate in a way consistent with periods of above and below average recruitment (e.g. two to three year cycles).

4.1.2 Proportional ageing data

The lack of small fish reflected in the length data corresponds to a series of weak (or absent) cohorts in the proportional ageing data (Figure 9). The data suggests at least four consecutive extremely weak year classes during 1999 to 2002. There is a scattering of 2 and 3 year old fish in 2006 and 2007 (Figure 9), suggesting better recruitment of more recent year classes.

4.1.3 Direct ageing data

Proportions at age determined from direct ageing of fish caught by the charter fleet are available for the years 2001 to 2009 (Figure 10).

It is noted that the direct ageing showed considerably fewer 'plus group' fish than were estimated from proportional ageing. Direct ageing data have also been used to calculate the annual catch rates for SBT that are greater than 10 years of age (spawning age fish), as shown in Figure 5 above.

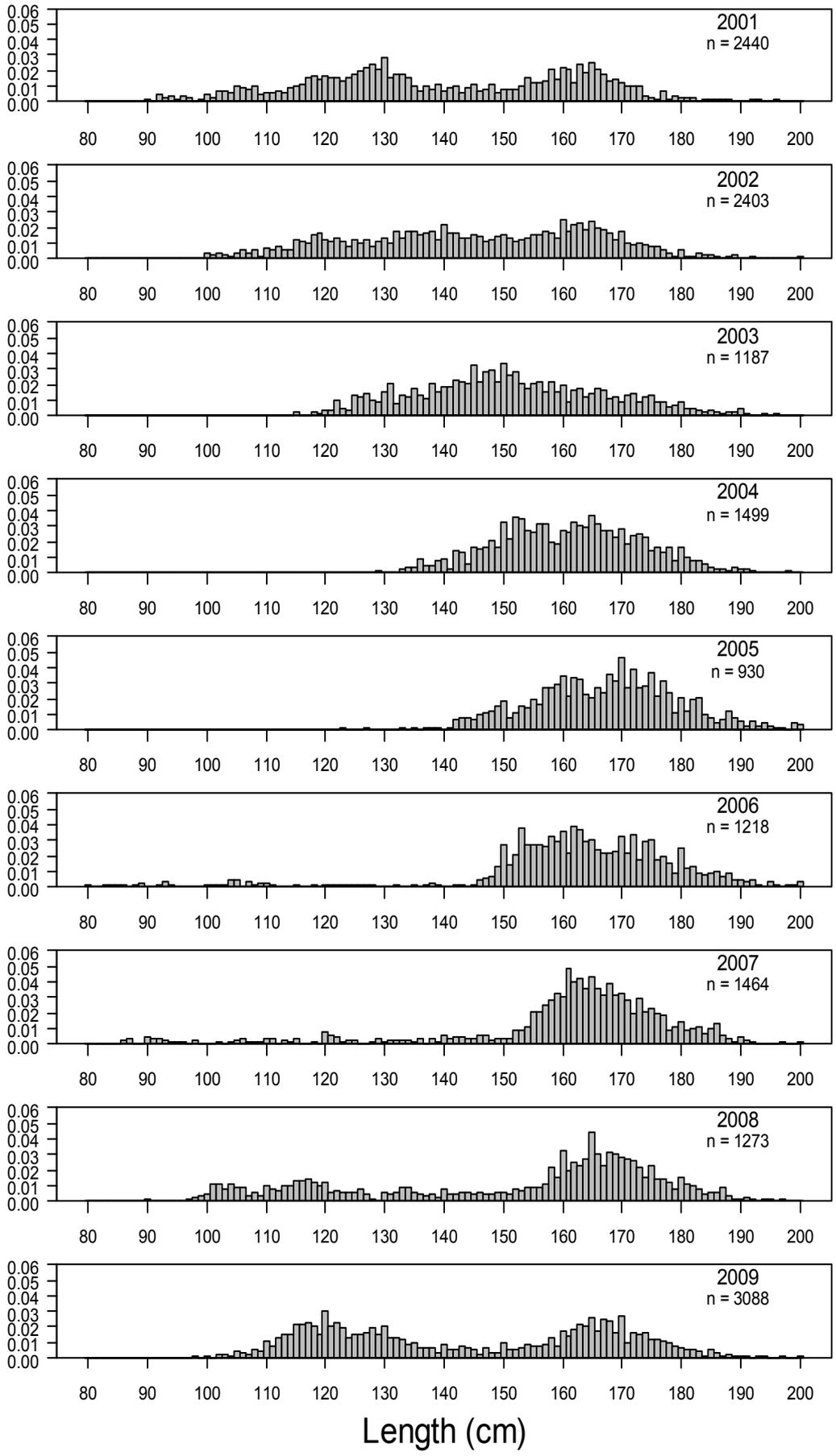


Figure 6: Proportion at length for the charter fleet for 2001 to 2009.

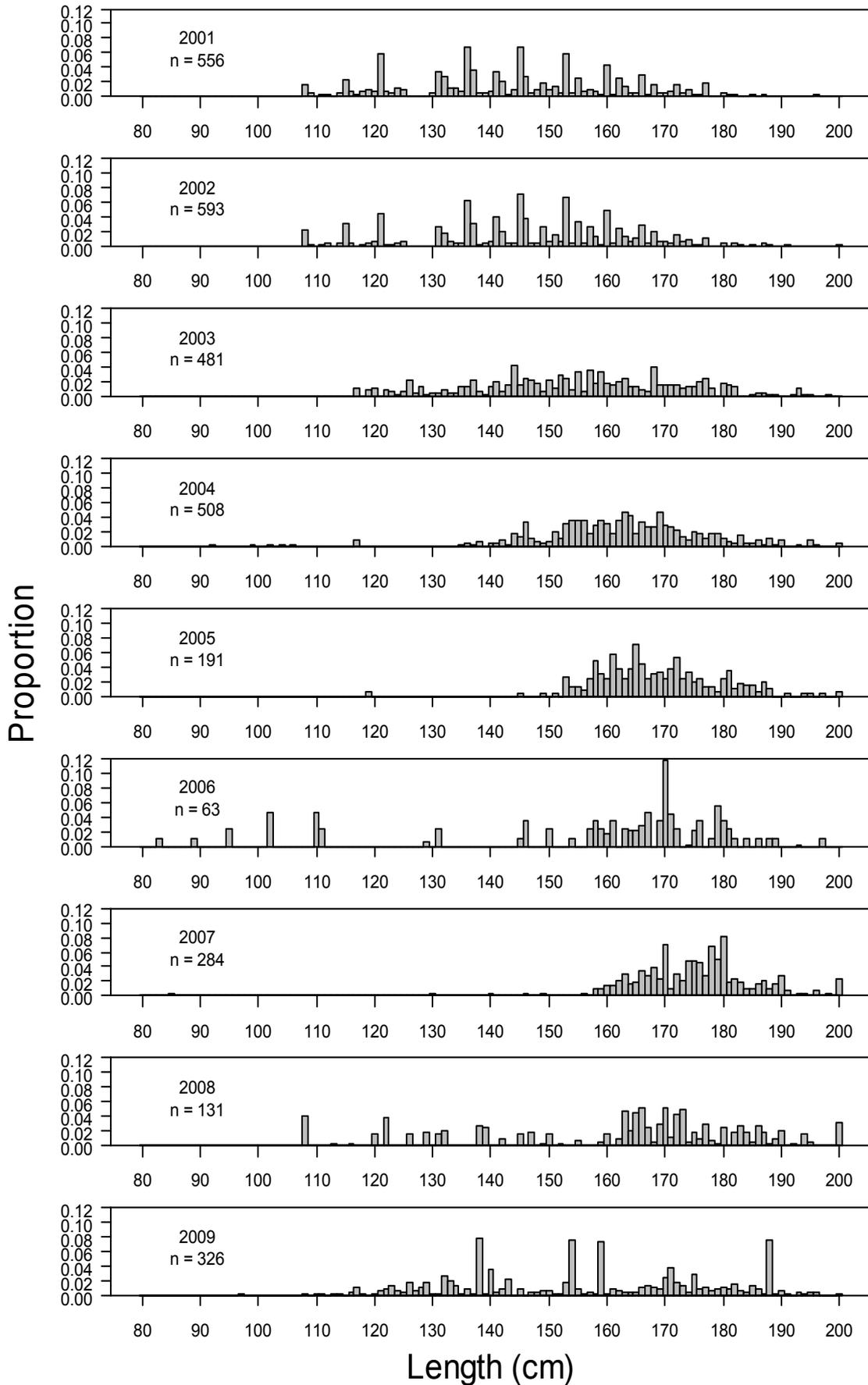


Figure 7: Proportion at length for the domestic fleet for 2001 to 2009.

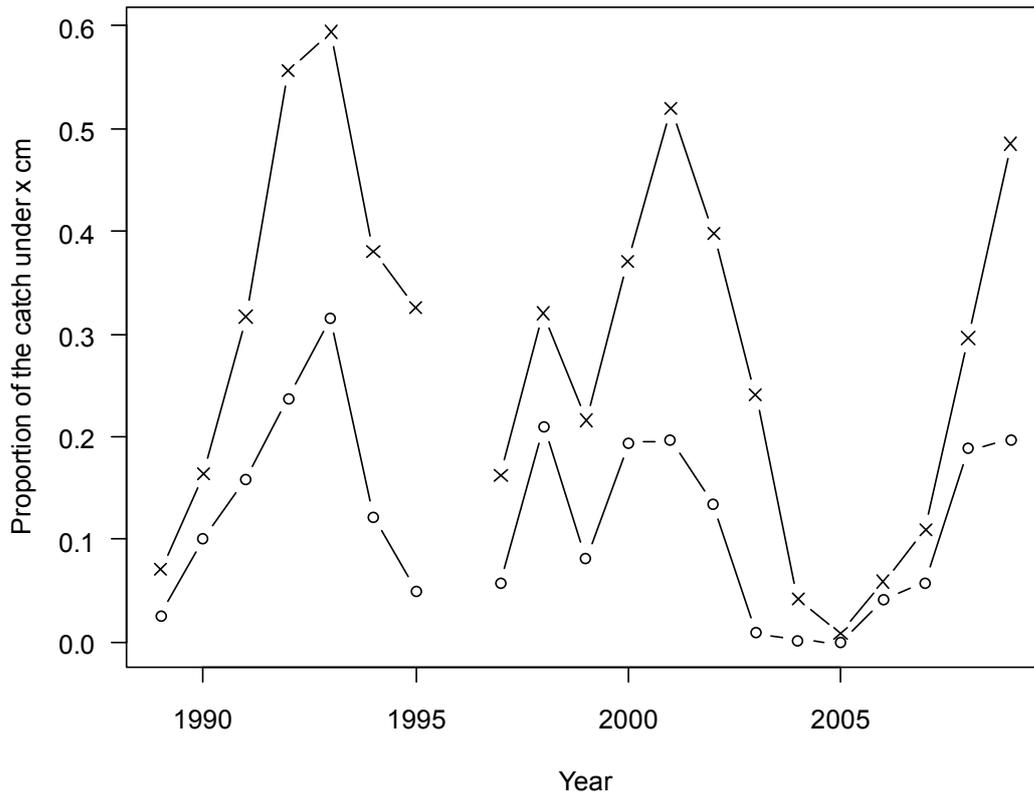


Figure 8: Proportion of the catch from the charter fleet under 120 cm (o) and 140 cm (x) for 1989 to 2009.

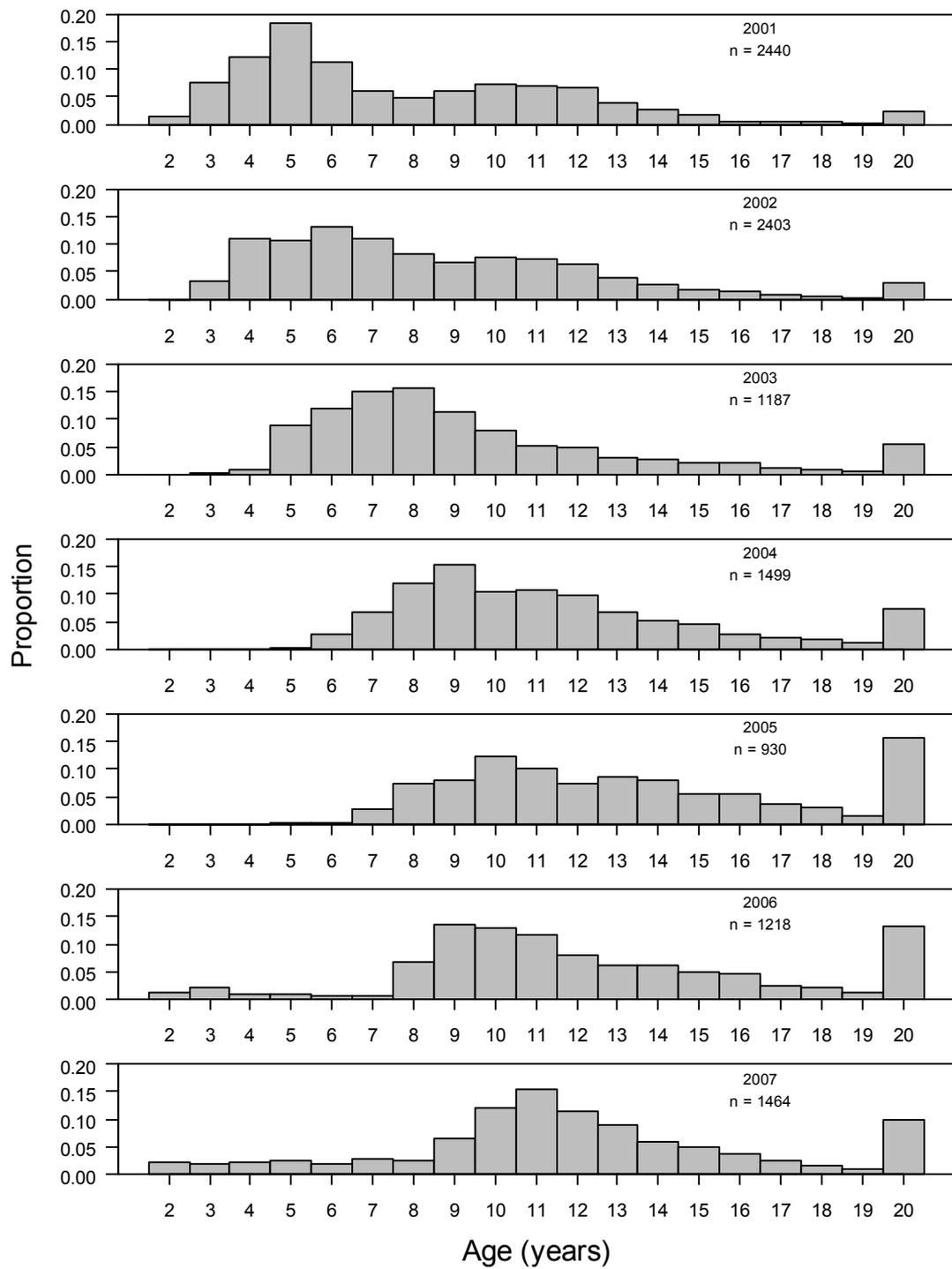


Figure 9: Proportion at age for the charter fleet for 2001 to 2007 based on cohort slicing using the SC (2001) growth curve. Age 20 is a plus group.

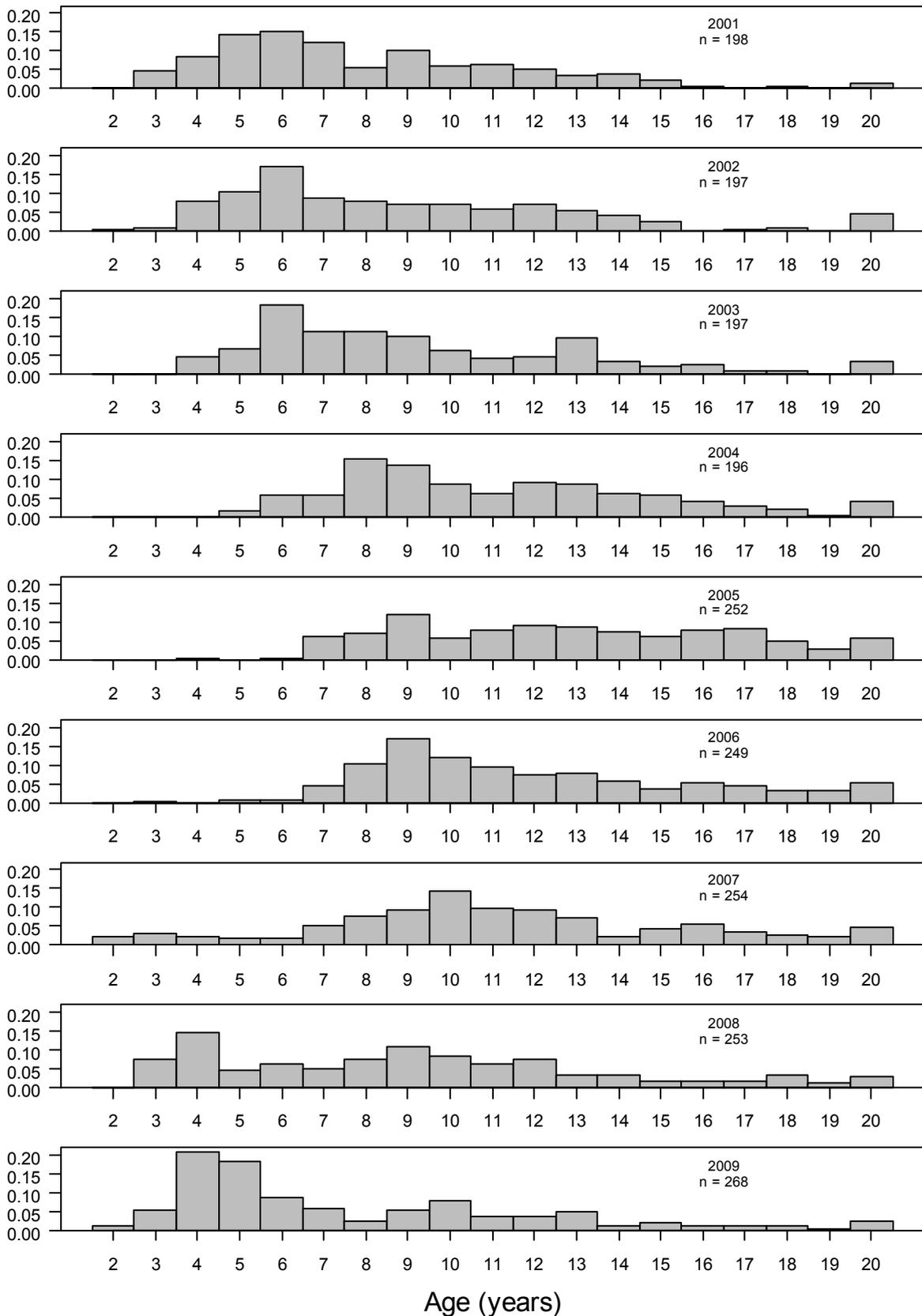


Figure 10: Proportion at age for the charter fleet for 2001 to 2009 based on direct ageing. Age 20 is a plus group.

5 Fleet size and distribution

The spatial distribution of fishing effort and SBT catches from the charter fleet are provided in Figures 11 and 12. Most of the charter catch and effort occurs off the WCSI. Although there has been some effort off the ECNI in most years since 2005, there was none in 2008.

The spatial distribution of target fishing effort and SBT catches from the domestic fleet are provided in Figures 13 and 14. While most target effort occurs off the ECNI, domestic vessels also operate off the WCSI. The distribution of catches is similar to that of target effort.

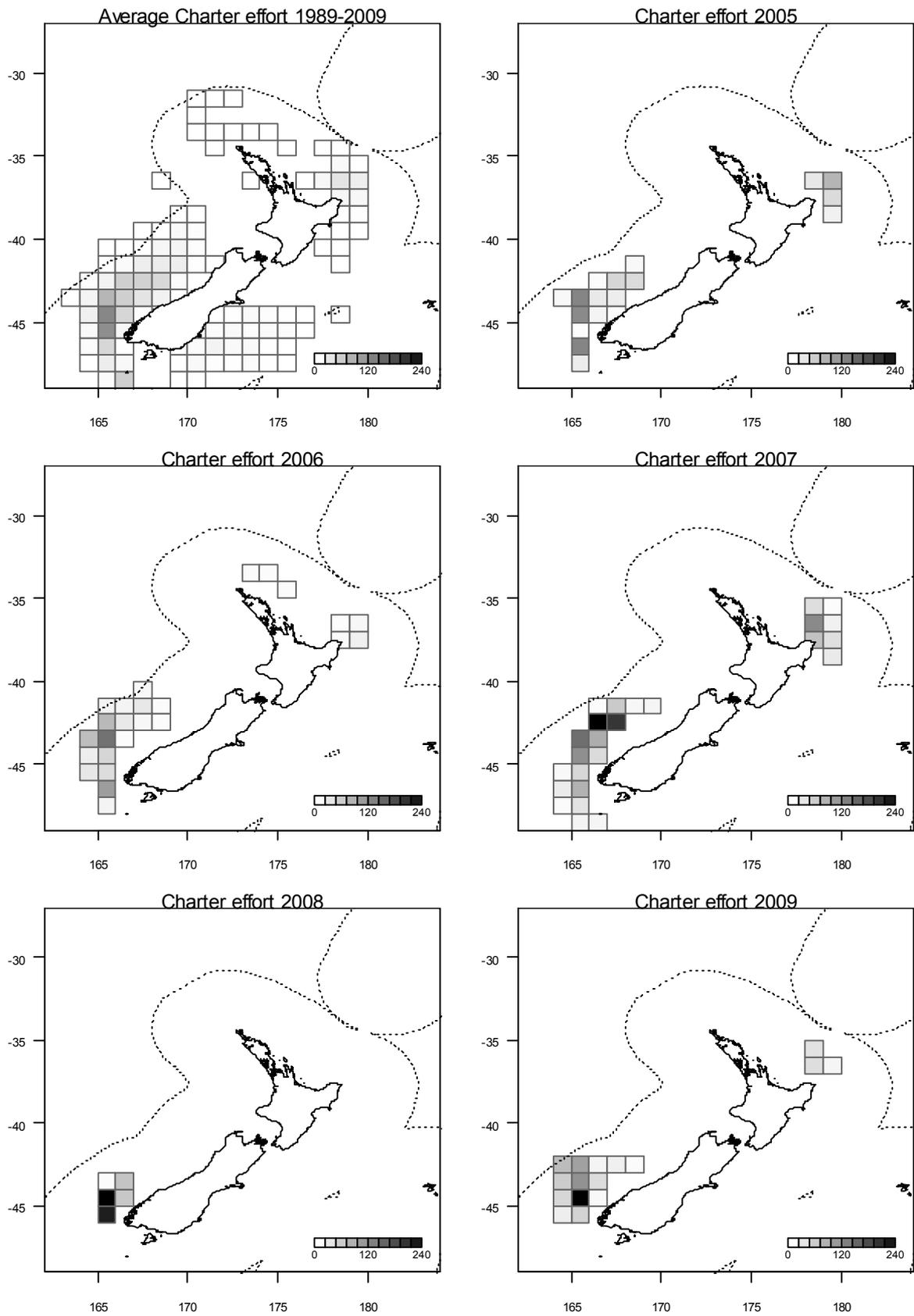


Figure 11: Distribution of longline effort (thousands of hooks per 1 degree square) for the charter fleet: average for the time series (1989-2009), and annually for 2005 to 2009.

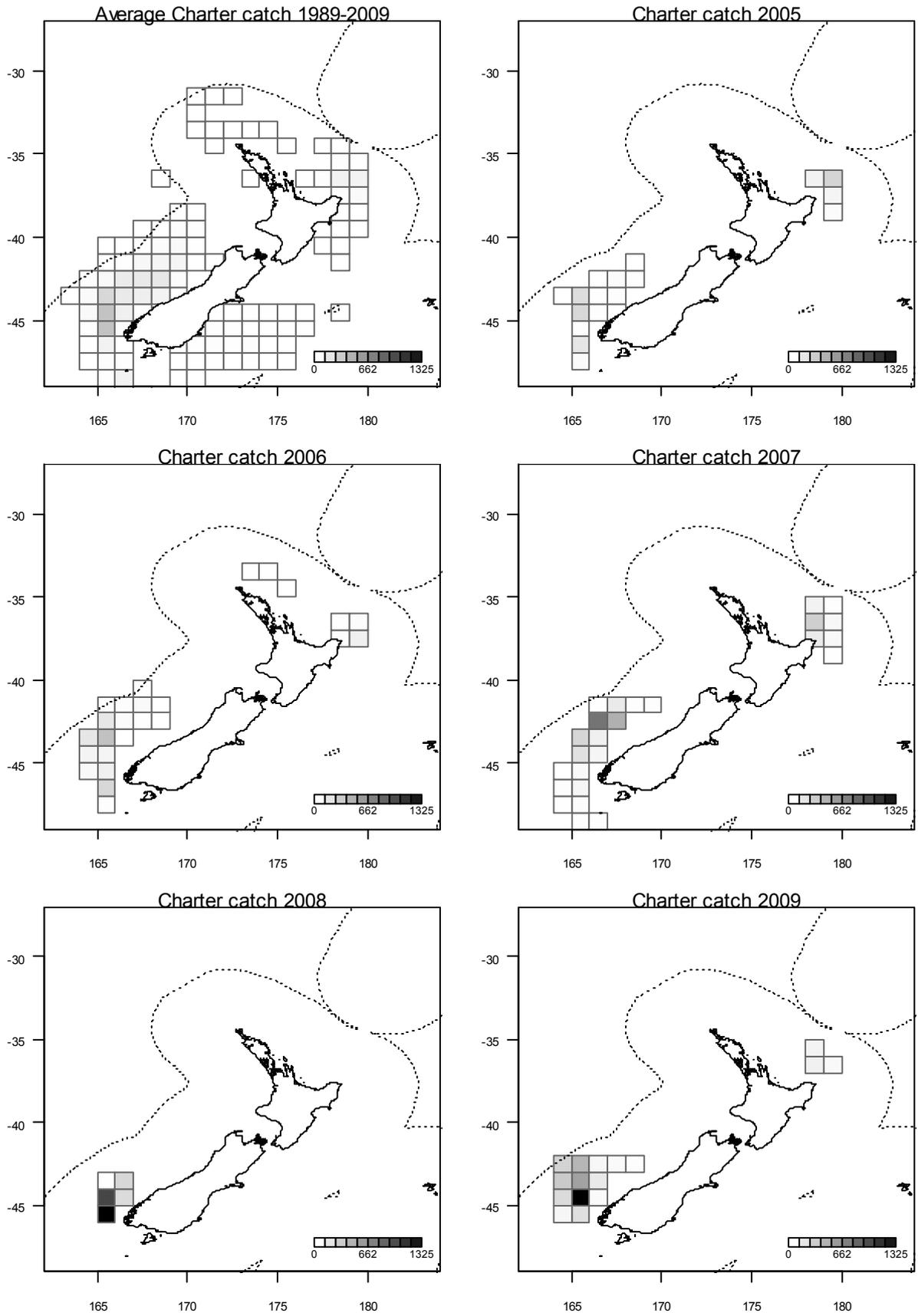


Figure 12: Distribution of longline catches (number of fish per 1 degree square) for the charter fleet: average for the time series (1989-2009), and annually for 2005 to 2009.

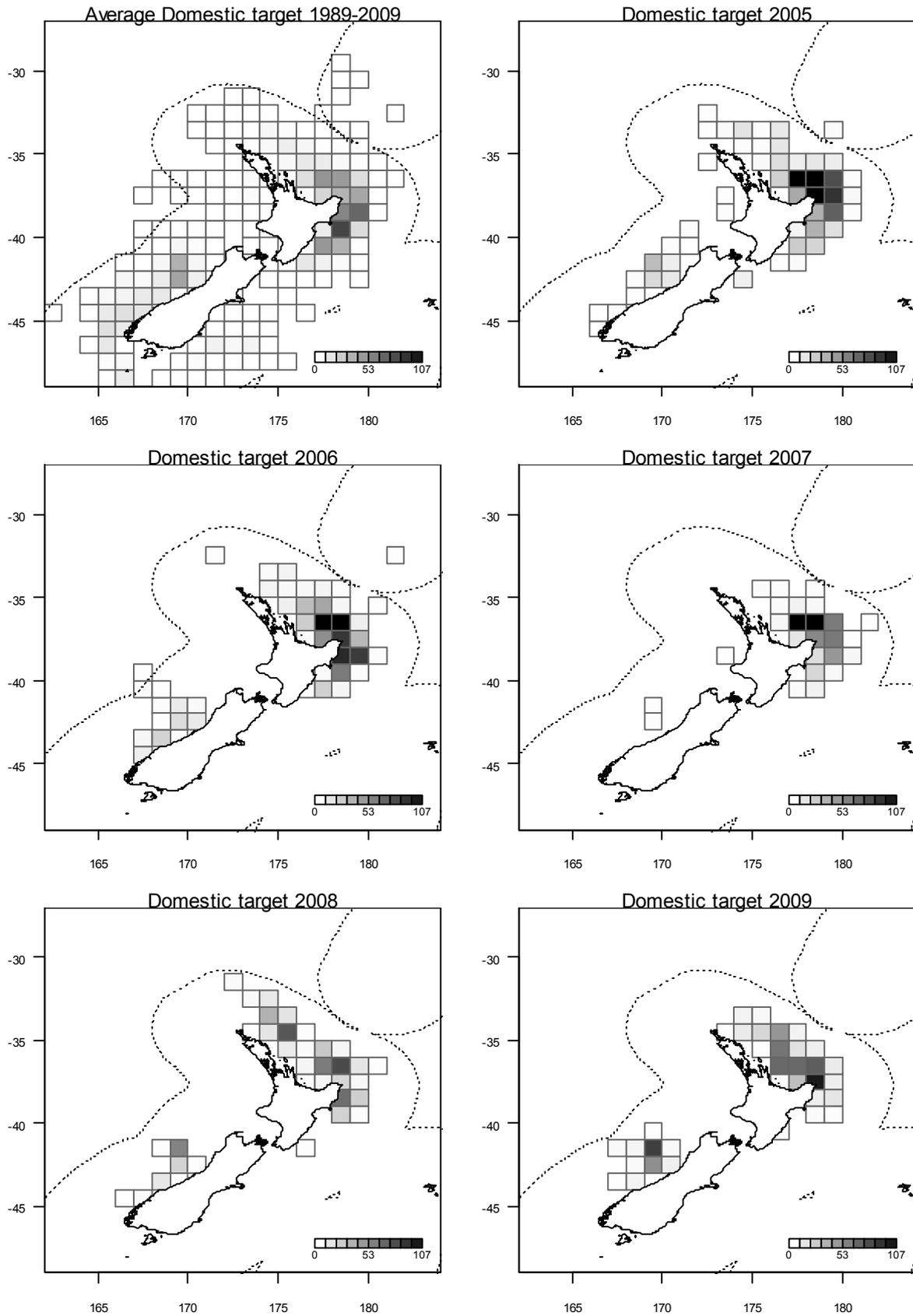


Figure 13: Distribution of longline effort (thousands of hooks per 1 degree square) for the domestic fleet that was targeted at southern bluefin tuna: average for the time series (1989-2009), and annually for 2005 to 2009.

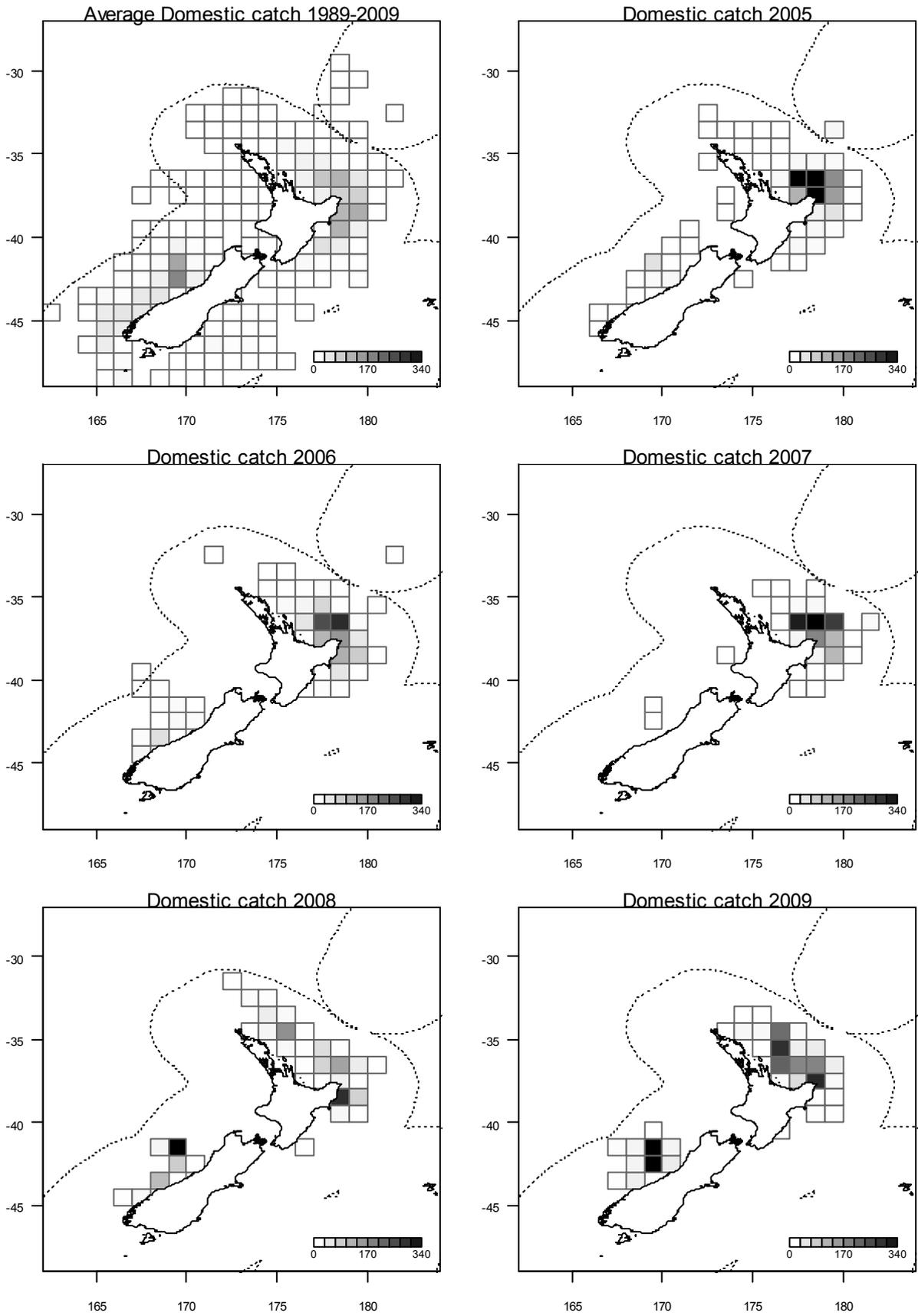


Figure 14: Distribution of longline catches (number of fish per 1 degree square) for the domestic fleet: average for the time series (1989-2009), and annually for 2005 to 2009.

6 Other relevant information

6.1.1 Scientific observer programme

New Zealand's Observer Programme covers both domestic and charter longline vessels. Before 2006, all trips on charter vessels were covered by at least one observer. In 2007 and 2008 only two of the four vessels were observed, but in 2009 this increased again to coverage of all four vessels. 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 8) and proportion of hooks observed (Table 9).

In terms of catches, around 89% of the catch was observed (and measured) in the charter fleet in 2009. This equated to 82% of hooks being observed on the charter vessels in 2009. For the domestic fleet, 10% of the effort and 10% of the hooks were observed in 2009.

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 generally 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.

6.1.2 Otolith collection

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

A sub-sample of the otoliths from 2001 to 2009 have been aged and the information is described in this report. The number of otoliths collected and aged per year is shown in Table 10.

6.1.3 Estimation of non-retained catches

As required for the CCSBT data exchange, estimates of non-retained catches of SBT from the New Zealand charter and domestic fleets for the years 1989-2009 were provided to the Commission (Tables 11 and 12). The totals are based on observer estimates of discards scaled to total effort. These figures are preliminary, but are not expected to vary greatly. There is still some minor work required to ensure that the most appropriate estimates of total effort are used in the scaling.

There was no auxiliary information on the size structure of the discards, so it is assumed that they are representative of the retained catch. Discards have been separated into the categories alive and dead based on the annual proportions of alive/dead discards reported by observers.

Since 2004, fishers have also been required to report discards on their catch effort returns, providing another method to estimate non-retained catches (Table 13 and 14). Also since 2004, specific provisions under the Fisheries Act have provided for the live releases of southern bluefin tuna where they are considered likely to survive. Such releases are also recorded and catch effort returns.

6.1.4 Non-commercial catches

Since 1 October 2004, New Zealand has allowed five tonnes for non-commercial catches under its national allocation. Due to the locations and seasons during which SBT are found in New Zealand waters (generally winter months and areas with little recreational fishing), it is unlikely that this allowance has been approached in the past.

There have been reports of bycatch of SBT in the recently developed sport fishery for Pacific bluefin (*Thunnus orientalis*) off the west coast of the South Island. Generally, the SBT are only taken early in the season (July) with the catch being almost entirely Pacific bluefin by August – September when most effort occurs.

A programme was initiated in 2007 to estimate the number and weight of fish kept or released. In 2007, about four tonnes was reported as being caught and retained while a further two tonnes of SBT were caught and released. In 2008 and 2009, provisional data suggests lower southern bluefin landings (around 0.4t and 0.1t respectively). No data is available on releases. It is not known why reported recreational landings of southern bluefin decreased in 2008 and 2009.

7 Acknowledgements

MFish acknowledges Terese Kendrick and John Holdsworth for assistance with various parts of this report. Also, we thank Simon Morgan for his assistance to New Zealand in the preparation of its data.

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

Year	Calendar year catches	Fishing year catches
1980	130.0	130.0
1981	173.0	173.0
1982	305.0	305.0
1983	132.0	132.0
1984	93.0	93.0
1985	94.0	94.0
1986	82.0	82.0
1987	59.0	59.0
1988	94.0	94.0
1989	437.2	437.1
1990	529.2	529.3
1991	164.5	164.5
1992	279.2	279.2
1993	216.6	216.3
1994	277.0	277.2
1995	436.4	434.7
1996	139.3	140.4
1997	333.7	333.4
1998	337.1	333.0
1999	460.6	457.5
2000	380.3	381.7
2001	358.5	359.2
2002	450.3	453.6
2003	389.6	391.7
2004	393.3	394.0
2005	264.4	264.0
2006	238.2	238.2
2007	382.6	383.1
2008	319.0	318.8
2009	418.5	417.3

Table 2: Catch (t) for the charter fleet by year and CCSBT Region.

***Most often erroneous position data**

Calendar Year	Region 5	Region 6	Other*
1989		296.3	0.3
1990	66.7	174.9	
1991	23.0	102.6	
1992	4.8	214.5	0.5
1993	20.2	120.5	9.5
1994		234.1	
1995	1.6	228.7	0.2
1996			
1997	52.3	186.2	
1998	83.9	117.3	
1999	9.8	190.7	
2000	2.5	132.5	
2001		139.3	
2002		148.4	
2003		82.1	
2004		126.4	
2005	34.4	53.0	
2006	9.9	95.3	
2007	53.0	161.0	
2008		200.0	
2009	17.0	201.2	

Table 3: Effort (thousands of hooks) for the charter fleet by year and CCSBT Region.

Calendar Year	Region 5	Region 6	Other*
1989		1596	3.5
1990	259	1490.6	
1991	306	1056.5	
1992	47.6	1386.8	3
1993	174.1	1125.7	101.4
1994		799.1	
1995	27.1	1198.7	13.5
1996			
1997	135.2	1098.7	
1998	225	616	
1999	57.2	955.1	
2000	30.3	757.9	
2001		639.4	
2002		726.4	
2003	3	866.6	
2004		1113.5	
2005	137	498.9	
2006	39.4	562.5	
2007	271.6	1136.1	
2008		568.3	
2009	66.8	731.0	

*Most often erroneous position data

Table 4: Catch (t) for the domestic fleet by year and CCSBT Region. * Includes erroneous position data and data without positions.

Calendar Year	Region 5	Region 6	Other*
1980			130.0
1981			173.0
1982			305.0
1983			132.0
1984			93.0
1985			94.0
1986			82.0
1987			59.0
1988			94.0
1989	0.1	140.5	
1990	6.9	278.7	2.0
1991	0.9	37.8	0.1
1992	6.2	53.2	
1993	49.4	16.3	0.8
1994	6.5	35.6	0.8
1995	15.0	184.9	6.1
1996	34.2	103.8	1.3
1997	57.9	36.2	1.1
1998	83.4	52.2	0.4
1999	194.7	64.8	0.6
2000	184.0	60.9	0.4
2001	113.1	105.7	0.4
2002	135.7	162.9	3.2
2003	216.7	89.7	0.1
2004	101.0	165.9	
2005	165.2	11.6	0.3
2006	122.8	10.2	
2007	162.5	2.1	
2008	80.5	38.1	
2009	132.4	67.7	0.2

Table 5: Effort (thousands of target[#] hooks) for the domestic fleet by year and CCSBT Region.

Calendar Year	Region 5	Region 6	Other*
1989			
1990	41.7		
1991	31.5	49.2	
1992	71.7	12.1	
1993	644.0	108.1	7.7
1994	122.6	143.3	5.8
1995	221.5	760.4	26.7
1996	417.9	564.3	11.5
1997	736.4	8.9	17.3
1998	633.6	314.5	1.2
1999	1221.4	382.9	5.5
2000	1164.0	454.4	8.5
2001	1027.6	751.5	1.9
2002	1358.6	1246.8	13.5
2003	1868.7	1569.1	4.3
2004	1154.1	1431.9	1.2
2005	1133.0	153.6	2.4
2006	1036.4	122.4	0.9
2007	681.2	19.0	
2008	527.8	94.0	
2009	731.1	167.5	1.3

* Includes erroneous position data and data without position data

[#] Effort for sets that either targeted or caught southern bluefin tuna

Table 6: Proportion of the catch from the charter fleet under 110, 120, 130, and 140 cm for 1989 to 2009.

Year	< 110 cm	< 120 cm	< 130 cm	< 140 cm
1989	0.006	0.026	0.045	0.071
1990	0.041	0.101	0.131	0.164
1991	0.114	0.158	0.274	0.317
1992	0.052	0.237	0.392	0.556
1993	0.217	0.316	0.472	0.594
1994	0.028	0.122	0.229	0.380
1995	0.019	0.05	0.161	0.326
1996	NA	NA	NA	NA
1997	0.038	0.057	0.098	0.162
1998	0.094	0.209	0.247	0.321
1999	0.033	0.082	0.157	0.216
2000	0.067	0.194	0.279	0.370
2001	0.093	0.196	0.378	0.519
2002	0.037	0.135	0.245	0.398
2003	0.002	0.009	0.094	0.241
2004	0.001	0.001	0.004	0.042
2005	0.000	0.000	0.002	0.008
2006	0.035	0.041	0.051	0.059
2007	0.042	0.058	0.087	0.109
2008	0.080	0.181	0.230	0.289
2009	0.033	0.196	0.384	0.485

Table 7: Number of vessels catching southern bluefin tuna in New Zealand fisheries waters by Calendar year and New Zealand fishing year (1 October to 30 September).

Year	Calendar year vessel numbers	Fishing year vessel numbers
2001	132	132
2002	151	155
2003	132	132
2004	99	101
2005	57	58
2006	56	57
2007	44	45
2008	35	36
2009	40	39

Table 8: Observer coverage in terms of catch (proportion of numbers observed) for the charter (NZC) and domestic (NZD) fleets for 2007 and 2008.

Calendar year	NZC	NZD
2007	0.60	0.16
2008	0.46	0.09
2009	0.89	0.10

Table 9: Observer coverage in terms of effort (proportion of hooks observed) for the charter (NZC) and domestic (NZD) fleets for 2007 and 2008.

Calendar year	NZC	NZD
2007	0.54	0.11
2008	0.45	0.13
2009	0.82	0.10

Table 10: Number of otoliths collected and aged by observers from the charter fleet catch for the years 2001 – 2008.

Year	Otoliths	Number aged
2000	149	0
2001	777	198
2002	1199	197
2003	838	197
2004	1141	196
2005	417	252
2006	443	249
2007	714	254
2008	745	253
2009	*	268

* Number not available for 2009

Table 11: Actual number of discards observed and the estimated total number of discards (separated by life status - alive and dead) based on observer coverage and the life status of the observed discards for the charter fleet. Note that numbers are rounded to the nearest whole fish.

Year	Observed	Scaled estimate		
	Numbers	Alive	Dead	Total
1989	0	0	0	0
1990	0	0	0	0
1991	0	0	0	0
1992	0	0	0	
1993	22	55	13	68
1994	36	40	13	53
1995	5	4	9	13
1996				
1997	23	0	38	38
1998	20	0	20	20
1999	33	18	15	33
2000	3	0	4	4
2001	6	3	4	7
2002	5	2	3	5
2003	2	0	2	2
2004	2	0	2	2
2005	0	0	0	0
2006	4	2	2	4
2007	3	4	2	6
2008	0	0	0	0
2009	5	6	0	6

Table 12: Actual number of discards observed and the estimated total number of discards (separated by life status - alive and dead) based on observer coverage and the life status of the observed discards for the Domestic fleet. Note that numbers are rounded to the nearest whole fish.

Year	Observed	Scaled estimate		
	Numbers	Alive	Dead	Total
1989				
1990				
1991				
1992	0	0	0	0
1993				
1994	0	0	0	0
1995	4	10	20	30
1996	5	25	6	31
1997	1	0	4	4
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0
2001	5	8	10	18
2002	4	24	30	54
2003	0	0	0	0
2004	1	0	7	7
2005	5	33	8	41
2006	1	16	0	16
2007	2	8	8	16
2008	2	13	0	13
2009	2	11	11	23

Table 13: Estimated number of non-retained SBT (separated by life status - alive and dead) for the charter fleet based on fisher reporting.

Year	Alive	Dead	Total
2004	0	0	0
2005	0	0	0
2006	0	0	0
2007 ^Y	5	0	5
2008 ^Y	21	0	21
2009 ^Y	24	0	24

^Y Released under 6th schedule provisions which require the fish to be alive

Table 14: Estimated number of non-retained SBT (separated by life status - alive and dead) for the domestic fleet based on fisher reporting.

Year	Alive	Dead	Total
2005	19	5	24
2006	48	0	48
2007 ^Y	23	0	23
2008 ^Y	26	0	26
2009 ^Y	81	0	81

^Y Released under 6th schedule provisions which require the fish to be alive