

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

New Zealand

23 August 2006

1 Introduction

During the 1960s and 1970s catches of southern bluefin tuna (SBT) were limited to occasional small catches off the west coast of the South Island. However, from the late 1970s and early 1980s, a concerted effort to develop a domestic fishery to service the Japanese market was undertaken. By 1982 the handline fishery was established with the catch frozen onboard a former Japanese -50° longline vessel. The handline fishery continued, albeit at a reduced level, following the record 1982 season (305 t 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 t per year based on the New Zealand fishing year (1 October to 30 September) since 1989. During this time New Zealand has exceeded its quota on a few occasions and when the catch limit has been exceeded, the subsequent year's catch limit has been reduced to adjust for the over-catch (Figure 1; Table 1).

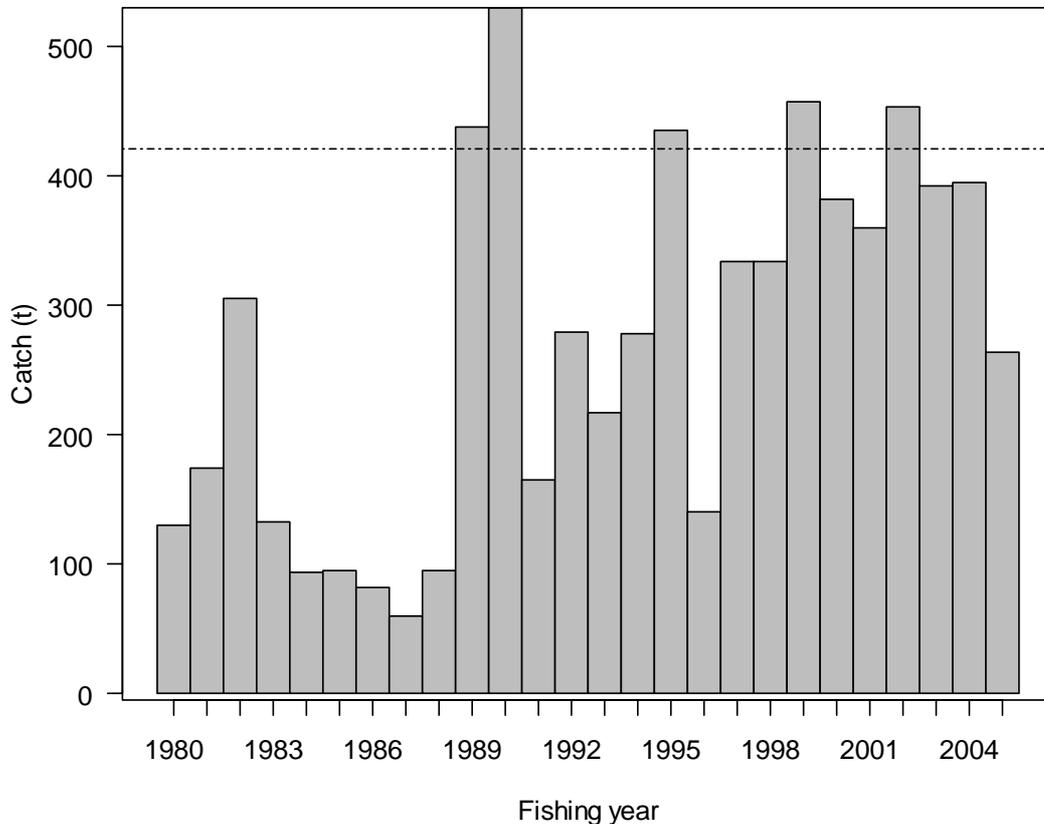


Figure 1: Catches of southern bluefin tuna (tonnes whole weight) by New Zealand fishing year (1 October to 30 September). Annual total catch is from Licensed Fish Receiver returns for 1998/99 to 2000/01, and from Monthly Harvest Returns from permit holders since 2001/02. The dashed horizontal line refers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

All but a few tonnes of the domestic SBT catch is now taken by longline, and SBT catches are chiefly off the southwest coast of the South Island (WCSI) and off the east coast of the North Island (ECNI) from April to June. Longlining off the WCSI is almost entirely targeted at SBT, yielding higher catch rates of SBT than off the ECNI. 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 few of the smaller domestic owned and operated vessels operate in this area.

The longline fishery off the ECNI is dominated by smaller domestically owned and operated “ice boats” that are typically at sea for only a few days, and includes landings of SBT both as a target and as a bycatch of bigeye target sets.

SBT was introduced into the Quota Management System (QMS) effective 1 October 2004 with a Total Allowable Commercial Catch (TACC) of 413 t, the remainder of New Zealand’s TAC of 420 t being allocated to recreational and customary fishers, and other sources of mortality. The introduction to the QMS has seen a change from the “Olympic” race for fish seen in previous years. This introduction has been associated with a consolidation of the fleet.

The most recent fishing season (2004/05) resulted in the lowest NZ catch in 10 years (264 t). This is attributed to two main factors: the absence of new recruitment into the NZ 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.

2 Catch and Effort

Catches for the charter fleet by calendar year and CCSBT region are provided in Table 2 and effort is provided in Figure 2 and Table 4. Most catch and effort occurs in region 6 which covers the west coast of the South Island (WCSI) fishing grounds. Over the period 2001-2004 there has been no targeting of SBT (and no catches of SBT) in region 5 which covers the east coast North Island (ECNI) fishing grounds. In 2005, the two charter vessels did fish the later part of the season in region 5 and experienced higher catch rates that they had in region 6 (see Section 3).

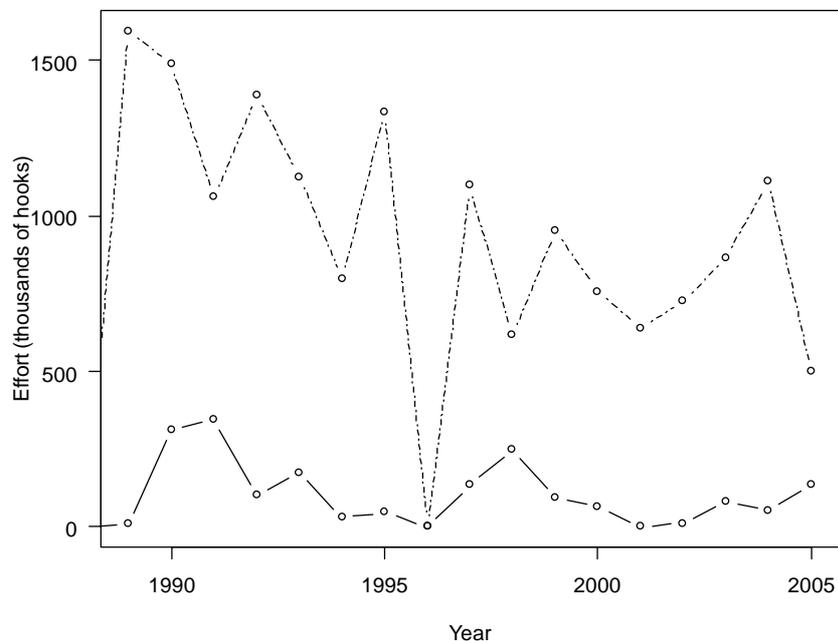


Figure 2: Effort (thousands of hooks) for the charter fleet in Region 5 (solid line – east coast North Island) and Region 6 (dashed line – west coast South Island). Note that this includes some non-SBT target effort in region 5.

Catches for the domestic fleet by calendar year and CCSBT region are provided in Table 3 and total longline effort is provided in Table 5. Because there is also a significant longline fishery that operates outside the SBT fishing season it is useful to separate these and therefore target SBT effort is also provided in Figure 3 and Table 6. For catches, the importance of the two regions has switched, almost annually, since 1995. While target effort increased dramatically in both regions from 1995 to 2003, it has decreased since then, particularly in region 6.

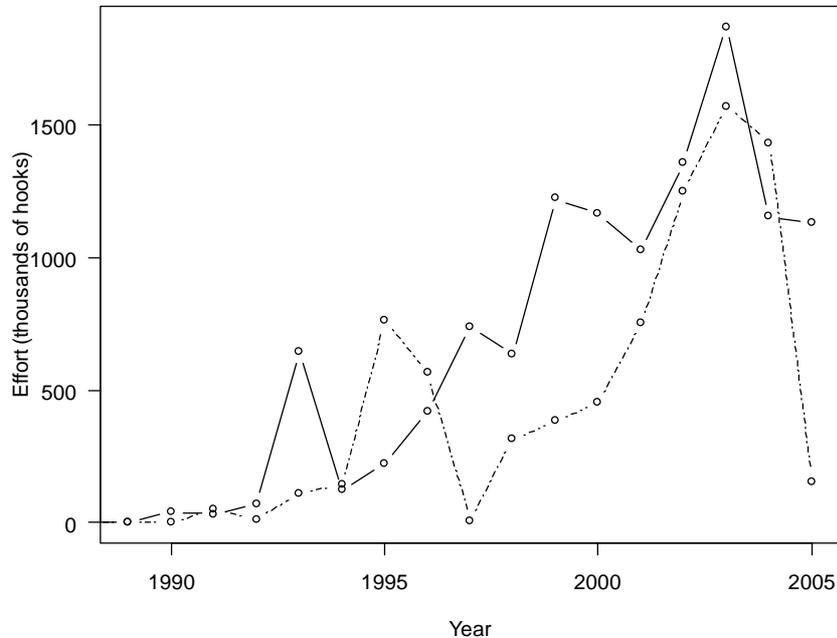


Figure 3: Target effort (thousands of hooks) by the domestic fleet for Region 5 (solid line – east coast North Island) and Region 6 (dashed line – west coast South Island). Target effort represent hooks from sets that either targeted or caught SBT.

3 Nominal CPUE

Nominal CPUE was calculated by fleet, year, and CCSBT region. For the domestic fleet, CPUE was calculated separately for all effort and for effort from sets that either caught or targeted SBT (referred to as target effort). It is noted that due to the large changes in the structure of the domestic fleet and the nature of the “Olympic system” which the NZ fishery operated under, the trends in the CPUE for the domestic fishery are not thought to provide reliable information on trends in vulnerable biomass.

Nominal CPUE by fleet across all regions based on all longline effort is provided in Figure 4, and Figure 5 contains the same plot, but only for target effort. Charter CPUE averaged around 3 SBT per 1000 hooks over 1997-2002. Associated with the lack of new recruitment (Section 4), CPUE declined dramatically in 2003 and has stayed at these historically low levels in 2004 and 2005. Figure 5 indicates a small increase in CPUE in 2005, this is attributed to the increased effort in region 5. When the analysis is restricted to the core area of the charter fishery (e.g. region 6), the trends are slightly different (Figure 6). In region 6, CPUE increased from 1997 – 2001 before declining rapidly. Also, the small increase in CPUE in 2005, appears to have been driven by catch rates in region 5, as CPUE in region 6 actually declined further in 2005. It appears to be important to consider region in any analysis of CPUE data from the charter fleet.

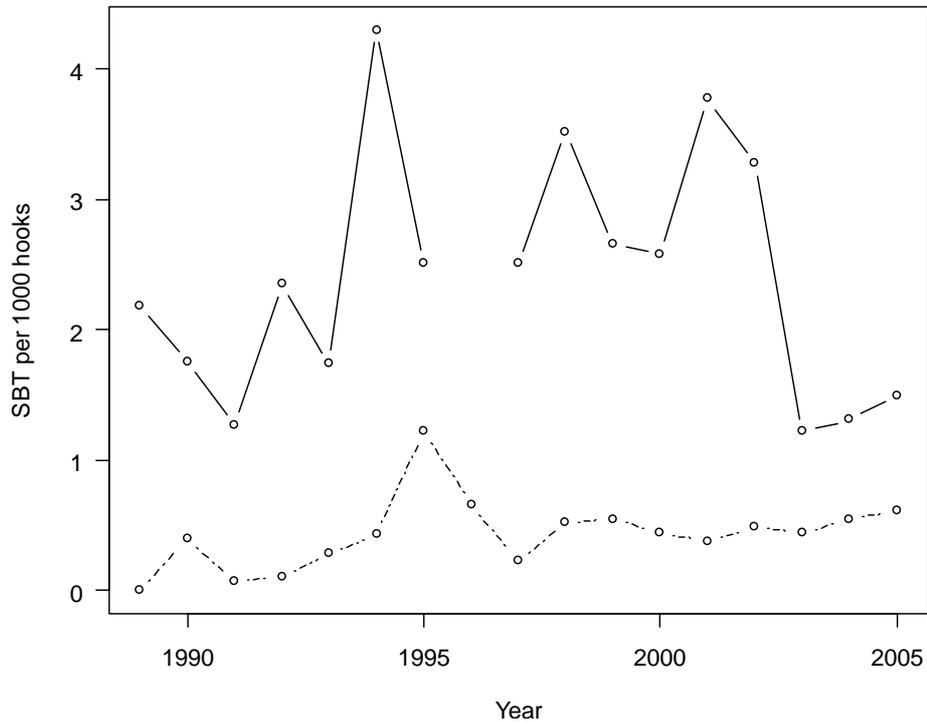


Figure 4: Catch per unit effort (number of SBT per thousand hooks) by calendar year for the charter (solid line) and domestic (dashed line) longline fleets based on all longline effort.

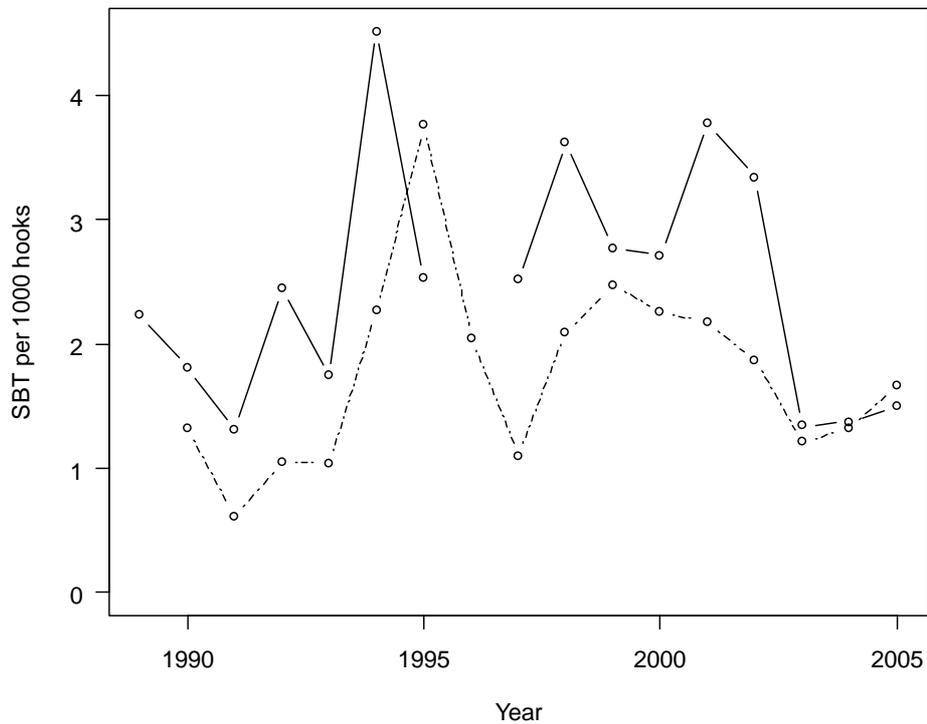


Figure 5: Catch per unit effort (number of SBT per thousand hooks) by calendar year for the charter (solid line) and domestic (dashed line) longline fleets based only on effort from sets that either targeted or caught southern bluefin tuna.

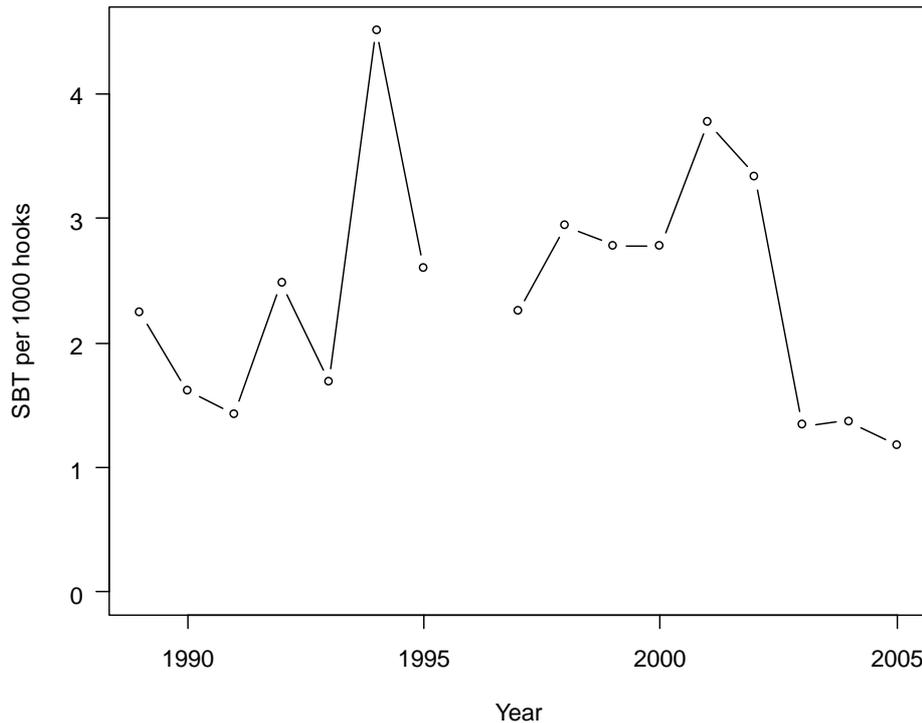


Figure 6: Catch per unit effort (number of SBT per thousand hooks) from the charter fleet in Region 6 (west coast South Island).

4 Size composition

For length and proportional ageing, we consider data collected from 1989 to 2006. The data collected in 2006 is preliminary, but does represent all catches by the charter fleet. No further direct ageing has been undertaken in addition to the data for 2001 to 2004 that was presented at SC10.

4.1.1 Size composition data

As noted at SC10, there has been a very clear reduction in the range of sizes of SBT taken in the New Zealand fishery since 2001 and new data suggest that this has continued in 2006 (Figure 7). There is evidence of the growth (progression of modes) over this period, but there is no evidence of recruitment of smaller fish to the New Zealand fishery. Data for 2006 do show a scattering of small numbers of smaller fish across all the size ranges (in fact many of these were tagged and released), but there is still no evidence of new cohorts entering the fishery.

Due to inadequate observer coverage prior to 2004, size composition data are not well estimated for the domestic tuna fleet in a way that makes them useful for examining patterns or trends. Nevertheless, size composition data for the domestic fleet (based on observer reports) are provided in Figure 8 and show similar patterns to that observed in the charter fishery.

An examination of the proportion of the charter fleet catch under a given size since 1989 (Table 7; Figure 9) indicates that fish under 140 cm generally represent over 25% of the catch from the charter fleet, but have been 5% or less since 2004. Overall, the proportions do fluctuate in a way consistent with periods of above and below average recruitment (e.g. two to three year cycles).

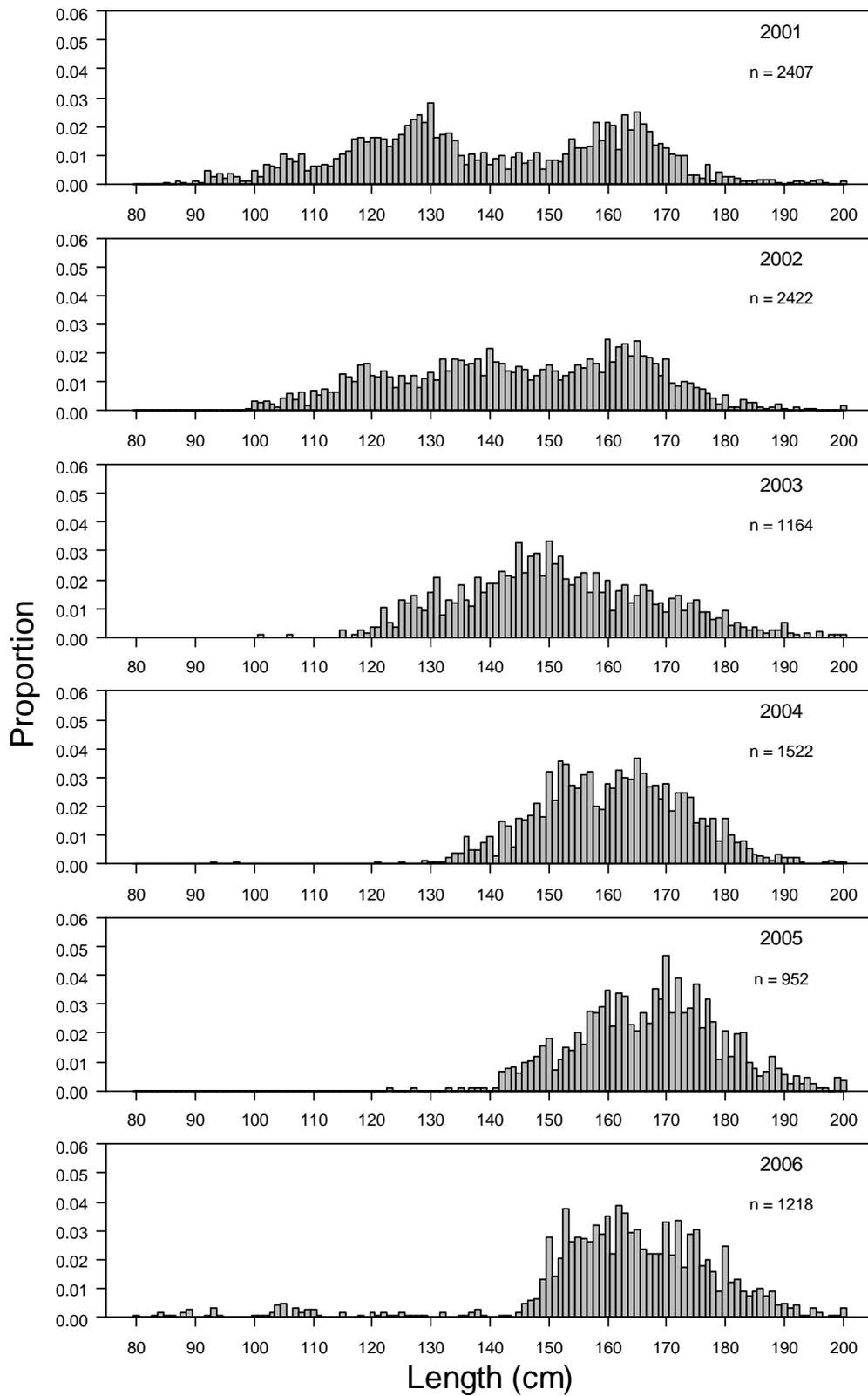


Figure 7: Proportion at length for the charter fleet for 2001 to 2006. Data for 2006 is preliminary.

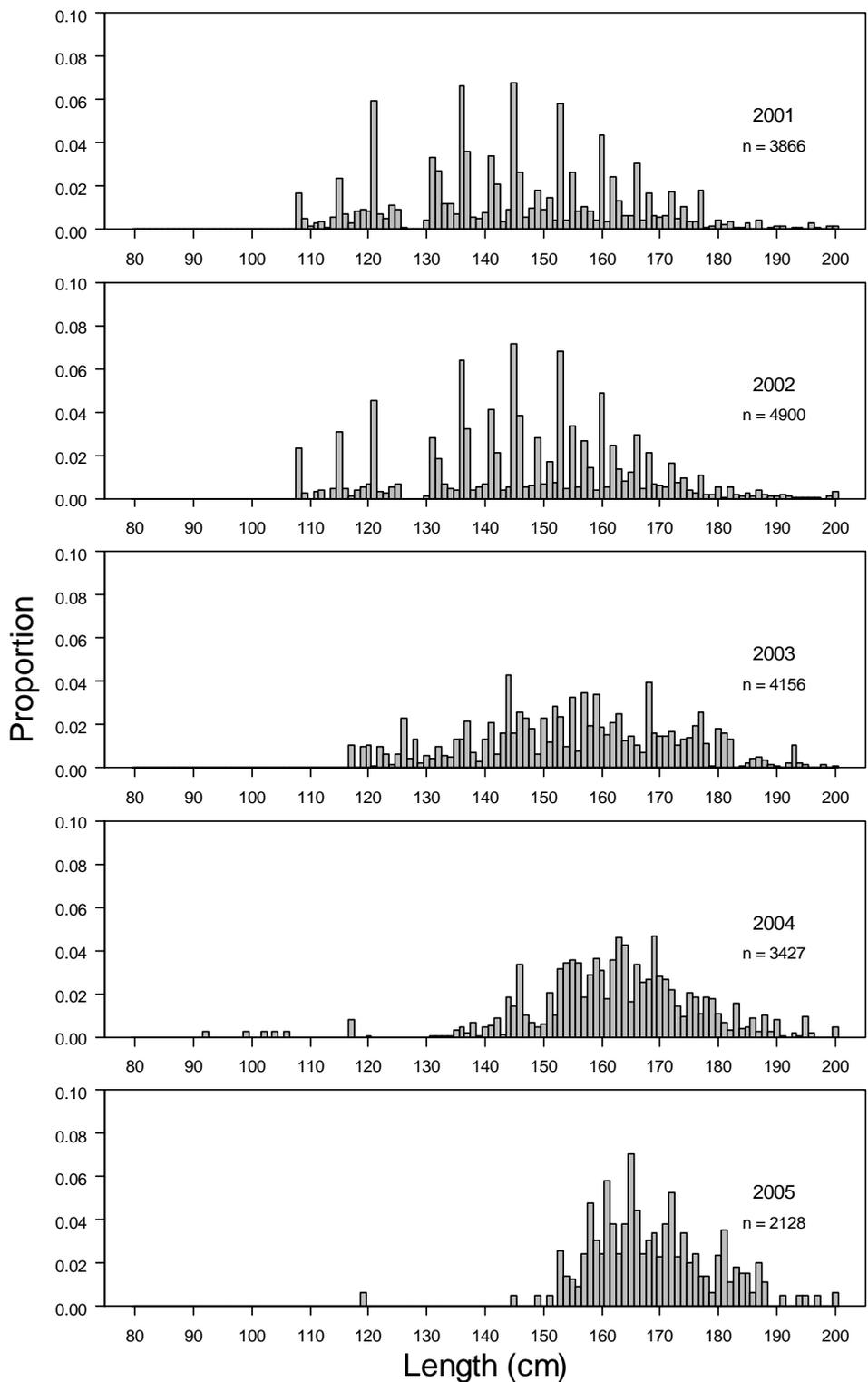


Figure 8: Proportion at length for the domestic fleet for 2001 to 2005. Data prior to 2004 is less reliable due to low levels of observer coverage. Samples sizes are the number of fish caught rather than number sampled.

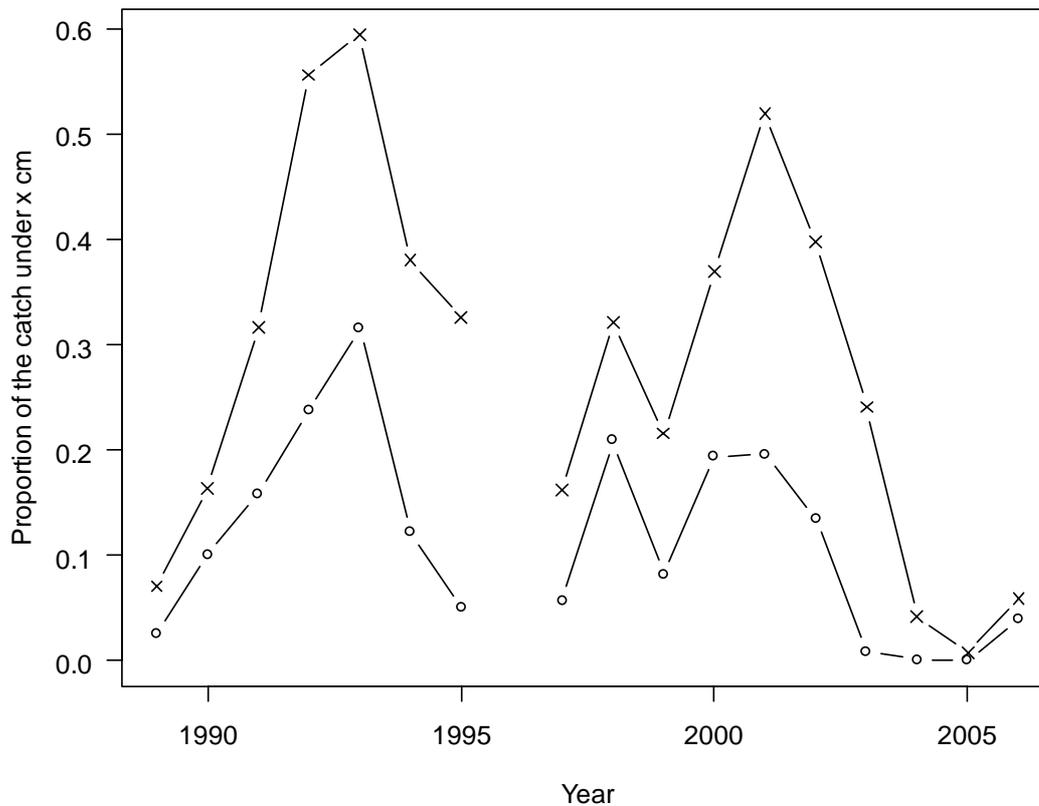


Figure 9: Proportion of the catch from the charter fleet under 120 cm (o) and 140 cm (x) for 1989 to 2006. Data for 2006 is preliminary.

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 10). The data suggests at least three consecutive extremely weak year classes during 1999 to 2001. In addition no fish from the 2002 cohorts were taken in 2005, though the vulnerability of three year old fish to the New Zealand longline fishery is likely low and variable.

4.1.3 Direct ageing data

At SC10 New Zealand provided proportions at age determined from direct ageing of fish caught by the Charter fleet for the years 2001 to 2004. It was noted that there were technical difficulties associated with assigning ages to fish taken in the middle of the year. These difficulties were particularly important for the younger fish in the samples and did not have a great impact on older fish (e.g. over 10 years). It was noted that the direct ageing showed considerably fewer 'plus group' fish that were estimated from proportional ageing.

It has not been possible to resolve these issues over the past year. In ageing future samples, efforts will be made to collect detailed measurements for otoliths to allow statistical modelling of these data to refine age estimates. This work should be available for discussion at SC12.

5 Fleet size and distribution

The number of vessels catching southern bluefin tuna peaked in 2002 and has since declined drastically to only 57 vessels in 2005. We expect that it will have declined even further in 2006 (Table 8). In 2005 only two charter vessels fished for SBT in New Zealand fisheries waters, which is less than recent years.

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, though there was some effort off the ECNI in 2005 due to the low catch rates experienced off the WCSI.

The spatial distribution of fishing effort (target and non-target effort separately) and SBT catches from the domestic fleet are provided in Figures 13-15. While most target effort occurs off the ECNI, a substantial domestic fishery operated off the WCSI – mostly due to one large domestic vessel. Historically most of the ECNI effort has been south of East Cape, but after the introduction of SBT to the QMS in 2004, the effort was more distributed around the East Cape region and occurred slightly later (a month or so). Figure 14 shows the substantial domestic fishery that operates outside the SBT season. The effort in this fishery is more northern in its distribution and has low SBT bycatch. The distribution of catches is similar to that of target effort, though proportionally more catch (compared to effort) was taken in the WCSI fishery compared to the ECNI fishery prior to 2005.

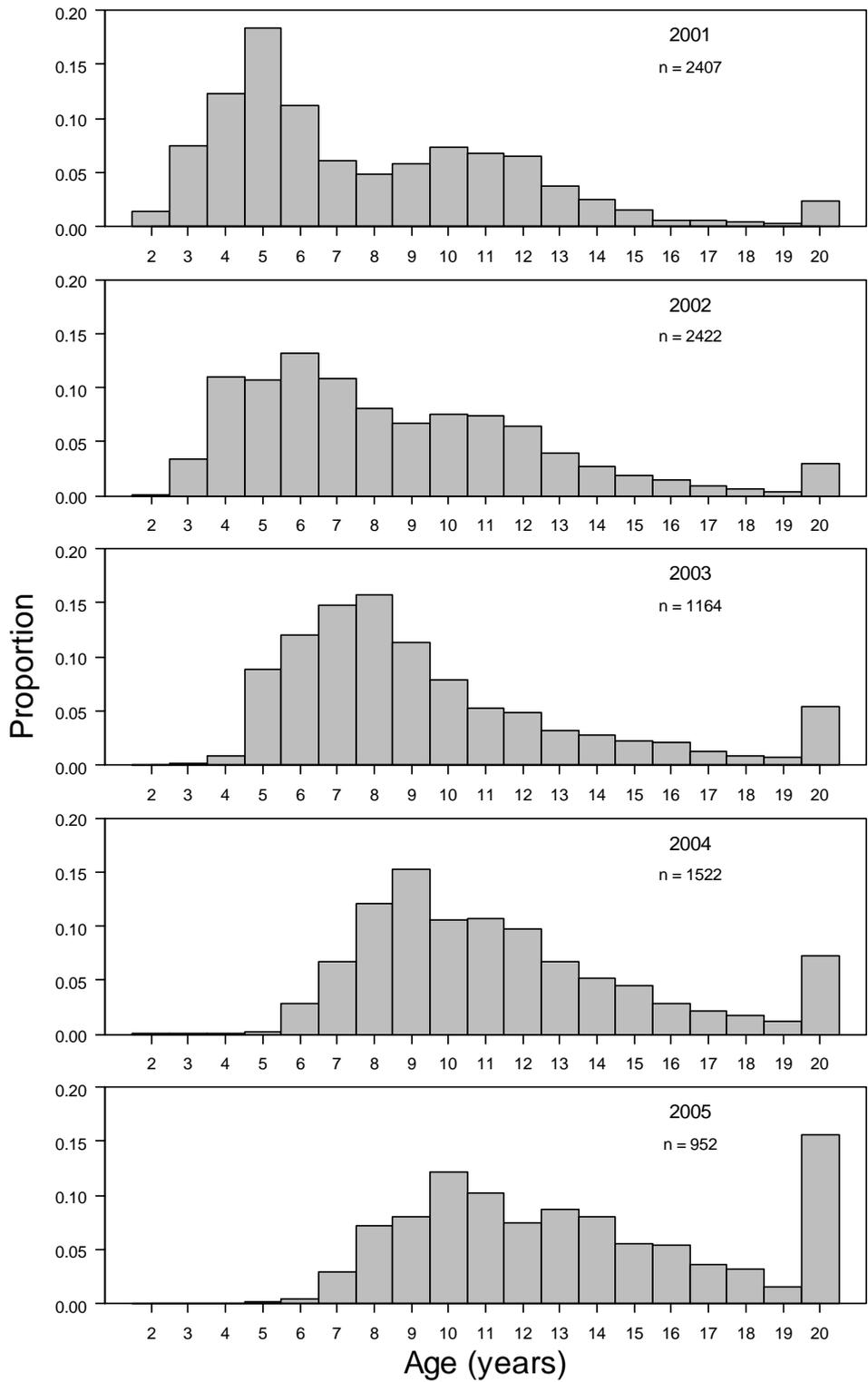


Figure 10: Proportion at age for the charter fleet for 2001 to 2005 based on cohort slicing using the SC(2001) growth curve.

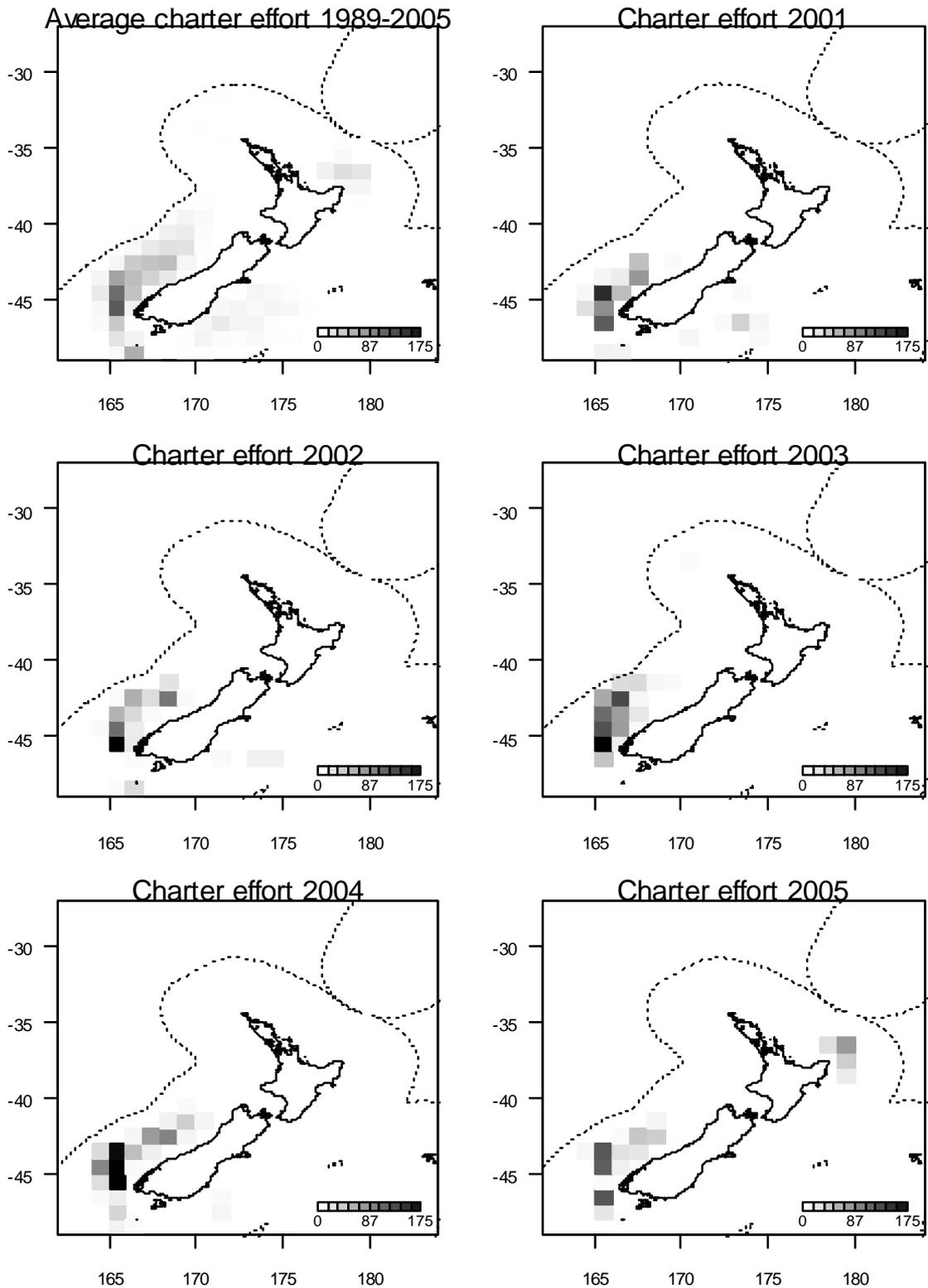


Figure 11: Distribution of longline effort (thousands of hooks per 1 degree square) for the charter fleet: average for the time series (1989-2005), and annually for 2001 to 2005. The darkest grey scale is the 90th percentile in 2001.

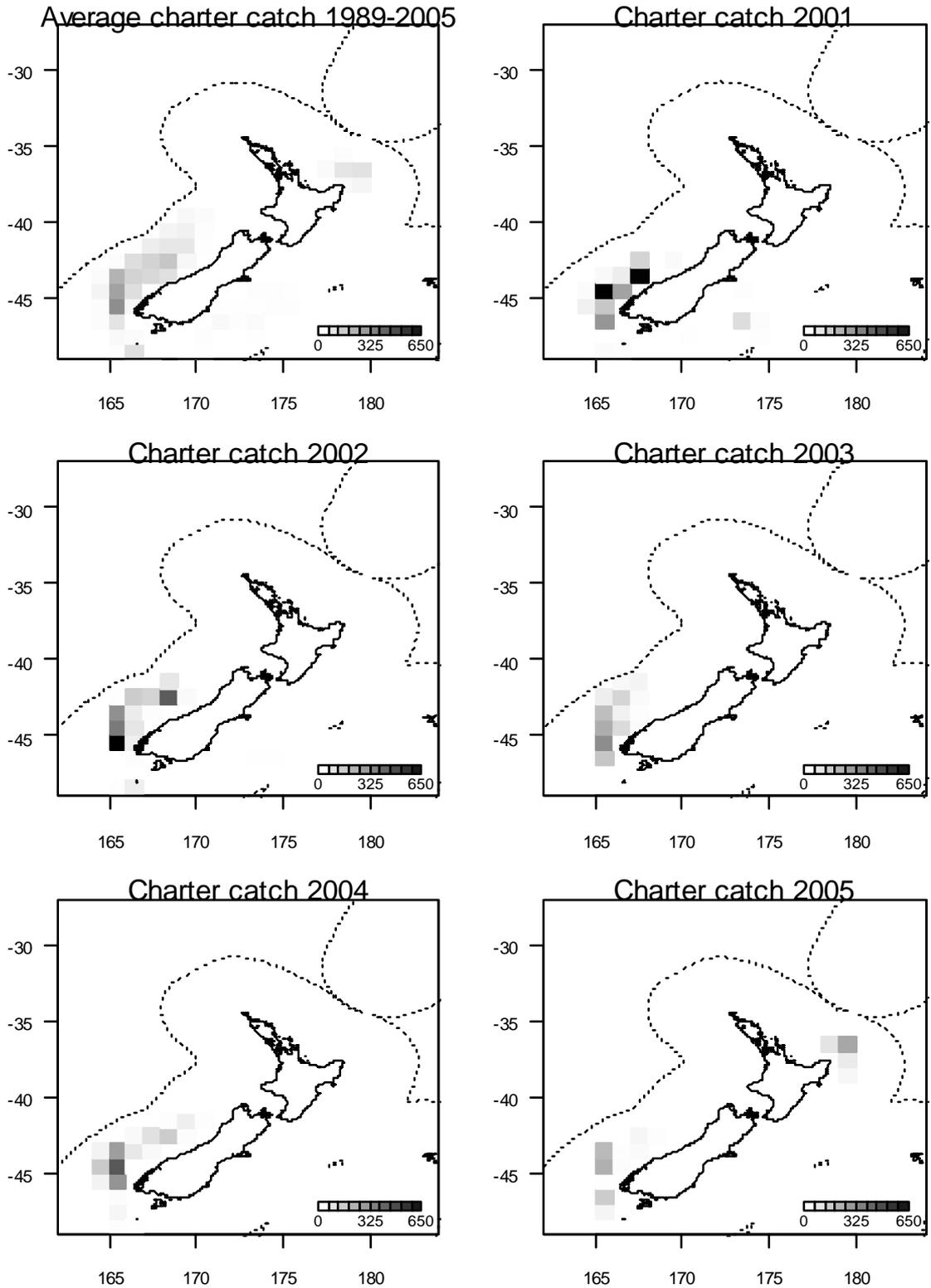


Figure 12: Distribution of longline catches (number of fish per 1 degree square) for the charter fleet: average for the time series (1989-2005), and annually for 2001 to 2005. The darkest grey scale is the 90th percentile in 2001.

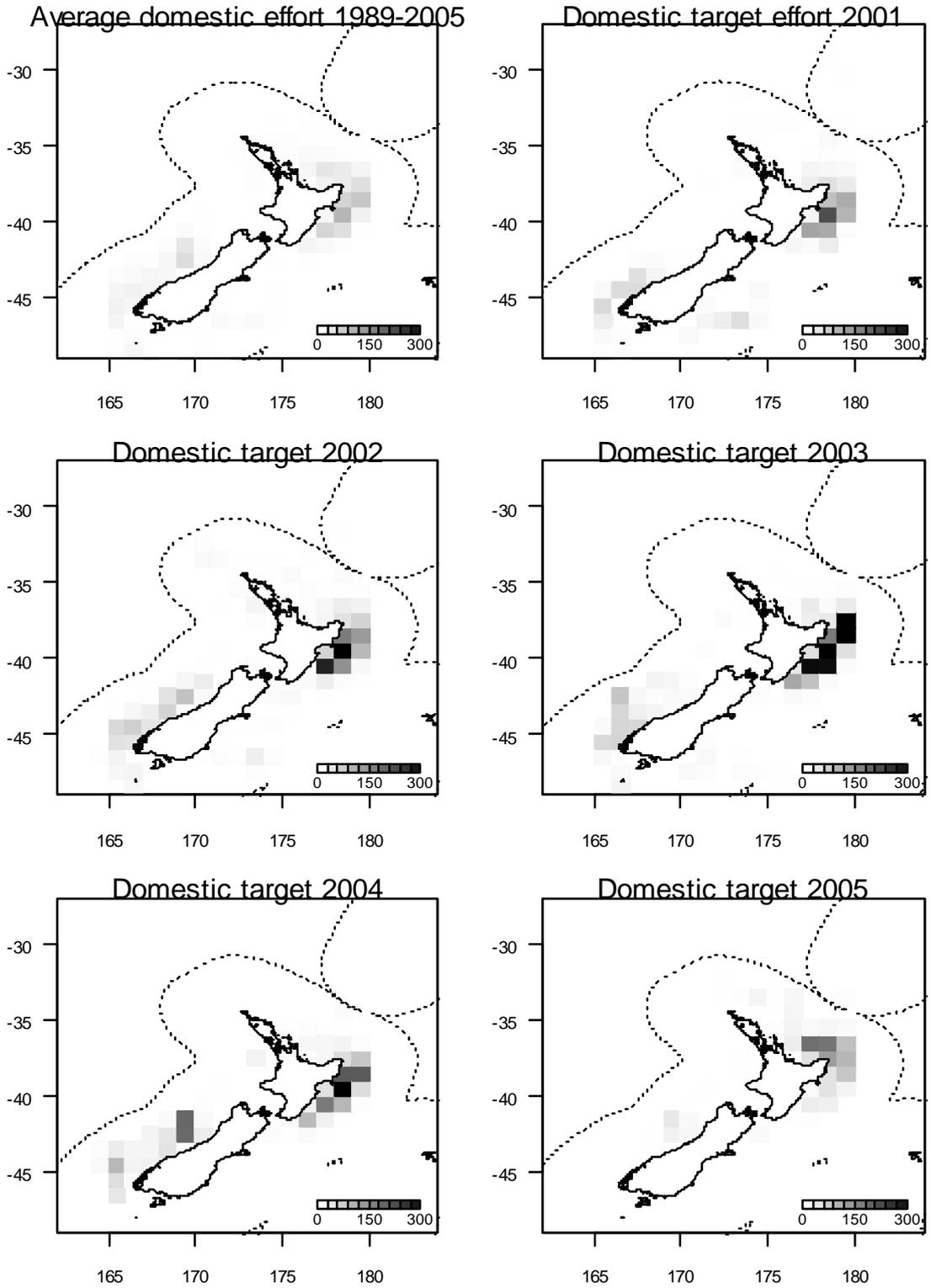


Figure 13: Distribution of longline effort (thousands of hooks per 1 degree square) for the domestic fleet that was targeted at southern bluefin tuna: average for the time series (1989-2005), and annually for 2001 to 2005. The darkest grey scale is the 90th percentile in 2001.

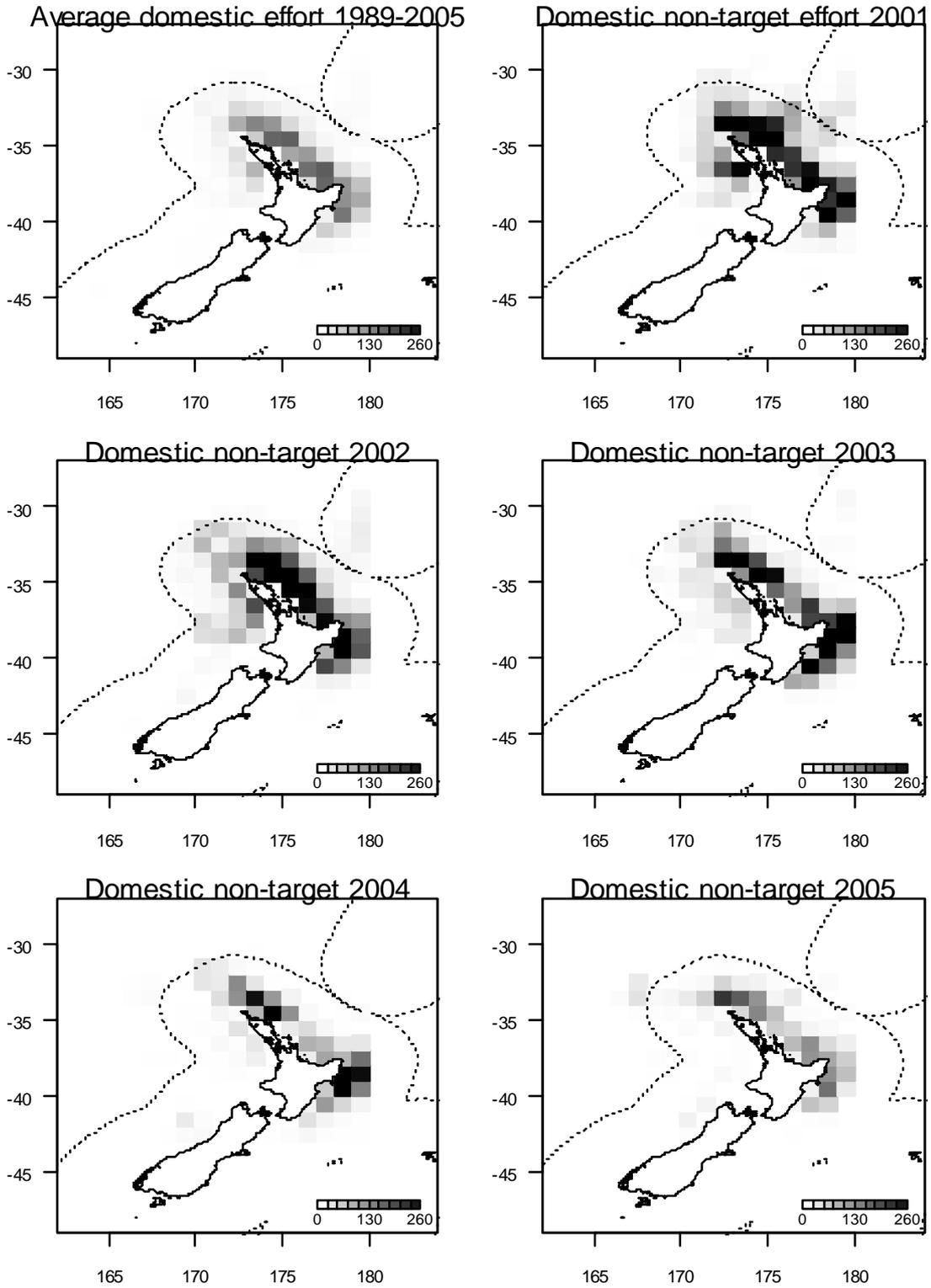


Figure 14: Distribution of longline effort (thousands of hooks per 1 degree square) for the domestic fleet that was not targeted at southern bluefin tuna: average for the time series (1989-2005), and annually for 2001 to 2005. The darkest grey scale is the 90th percentile in 2001.

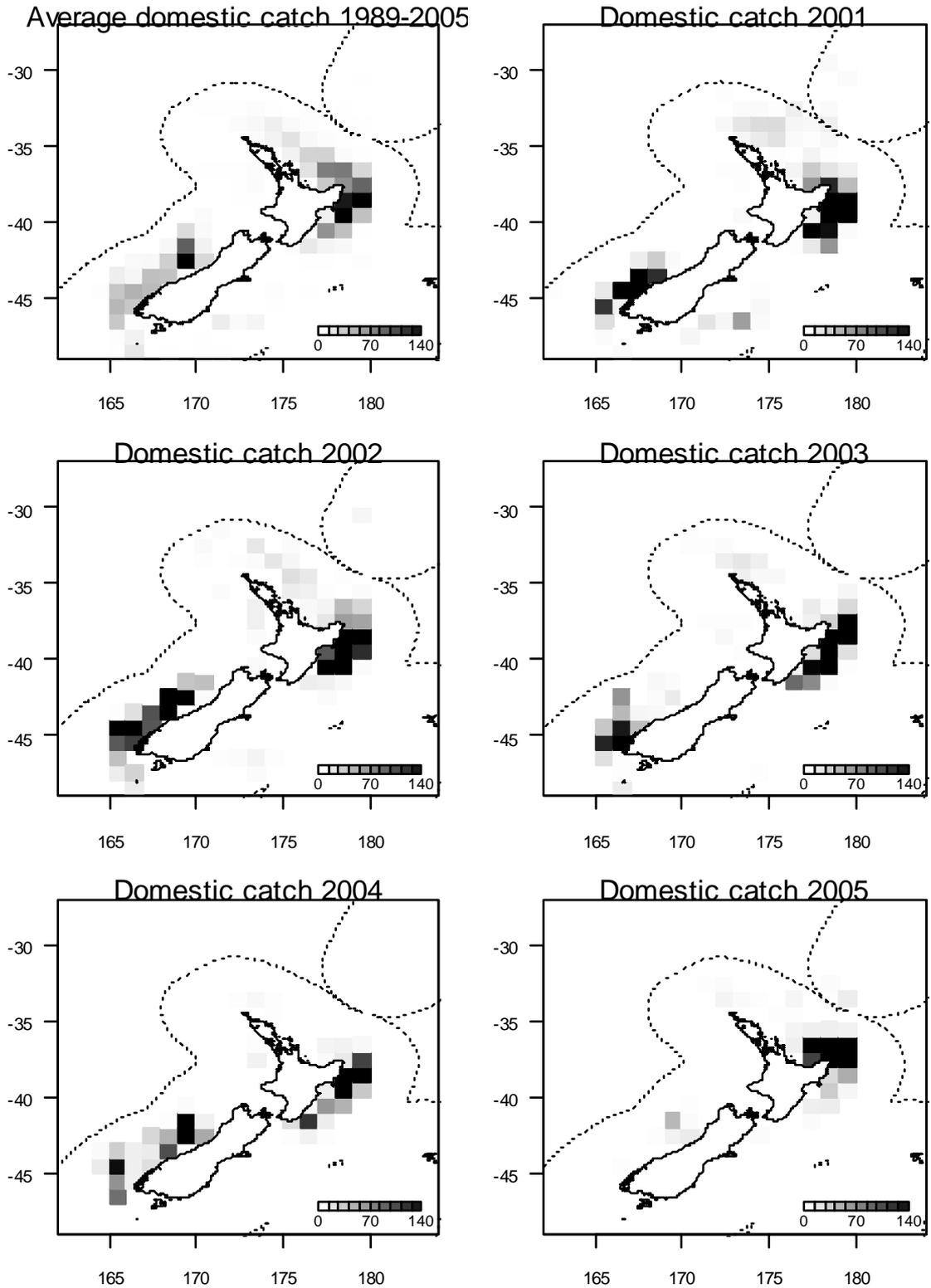


Figure 15: Distribution of longline catches (number of fish per 1 degree square) for the domestic fleet: average for the time series (1989-2005), and annually for 2001 to 2005. The darkest grey scale is the 90th percentile in 2001.

6 Other relevant information

6.1.1 Scientific observer programme

New Zealand has a Scientific Observer Programme (SOP) that covers both domestic and charter longline vessels. All trips on charter vessels are covered by at least one observer, while the target coverage level for the domestic fleet is 10% of the effort to reflect 10% of the catch.

In 2004, 12 observers were briefed and deployed (4 charter vessel and 10 domestic vessel deployments); in 2005, 10 observers were deployed (2 charter vessel and 9 domestic vessel deployments).

Coverage is measured in two ways, proportion of catch (in numbers of fish) observed (Table 9) and proportion of hooks observed (Table 10). In terms of catches, over 98% of the catch was observed (and measured) in the charter fleet in 2004 and 2005. For the domestic fleet, 15% of the catch was observed in 2004, but only 9% in 2005. In terms of effort, over 90% of hooks were observed on the Charter vessels. For the domestic fleet 15% of the effort was observed in 2004 and 12% in 2005.

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

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 at this time.

In 2004, 1153 otoliths were collected from SBT, but only 429 were collected in 2005. The lower number is because only two charter vessels fished in 2005 compared to 2004. A subsample of the otoliths from 2004 have already been aged while those collected in 2005 are currently archived at NIWA and will be aged later in the year.

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 fleet for the years 1989-2005 were provided to the Commission (Table 11). The totals are based on observer estimates of discards scaled to total effort. The discards were not split by month and 5x5 square at this stage, but we intend to do this in the future. 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 categories alive and dead based on the annual proportions of alive/dead discards reported by observers.

Estimates for the domestic fleet were also provided for the years 1992-2005 based on observer records (Table 12). These are preliminary, but are not expected to vary greatly. There is still some minor work required to ensure that most appropriate estimates of total effort are used in the scaling.

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). The estimate are

higher for 2004, reflecting discards of live SBT after the fishery was closed, but lower for 2005.

6.1.4 Tagging of southern bluefin tuna

New Zealand has participated in the Global Spatial Dynamics Programme to electronically tag juvenile SBT. In 2005, the near complete absence of juvenile SBT made it impossible to reach the target of tagging 50 juvenile SBT. In fact only two SBT were tagged during 2005, one with an archival tag and another with a conventional (spaghetti) tag.

The scattering of small fish in the fishery in 2006 has allowed for more success in tagging during the final year of this three year programme. To date almost 30 SBT have been tagged and a full report will be provided at SC12.

In 2004 five tagged SBT were recaptured by NZ fishers while in 2005 only four were recaptured. These tags were returned to the tagging agency.

7 Acknowledgements

The authors acknowledge Lynda Griggs and the data entry staff at NIWA for ensuring that length data for the 2006 season was available for inclusion in this report, and Bob Kennedy for his continued assistance to New Zealand and the preparation of their 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	263.8	263.8

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

Calendar Year	Region 5	Region 6	Other*
1989	0	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	0	234.1	
1995	1.6	228.7	0.2
1996	0.0	0.0	
1997	52.3	186.2	
1998	83.9	117.3	
1999	9.8	190.7	
2000	2.5	132.5	
2001	0.0	139.3	
2002	0.0	148.4	
2003	0.0	82.1	
2004	0.0	126.4	
2005	34.4	52.9	

*Most often erroneous position data

Table 3: Catches of the domestic fleet by year and CCSBT region.

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	0.0
1990	6.9	278.7	2.0
1991	0.9	37.8	0.1
1992	6.2	53.2	0.0
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	0.0
2005	164.8	11.5	0.1

* Includes erroneous position data and data without positions

Table 4: Effort (thousands of hooks) for the charter fleet by year and CCSBT region.

Calendar Year	Region 5	Region 6	Other*
1989	9.7	1596.0	32.3
1990	310.8	1490.6	0.0
1991	344.6	1062.6	0.0
1992	103.8	1386.8	3.0
1993	174.1	1125.7	101.4
1994	30.4	799.1	8.5
1995	46.0	1335.7	15.0
1996	0.0	0.0	0.0
1997	135.2	1098.7	0.0
1998	247.2	616.0	0.0
1999	93.7	955.1	2.5
2000	64.1	757.9	6.0
2001	0.0	639.4	0.0
2002	12.0	726.4	0.0
2003	80.2	866.6	6.4
2004	51.5	1113.5	0.0
2005	137.0	498.7	0.0

*Most often erroneous position data

Table 5: Effort (thousands of hooks) for the domestic fleet by year and CCSBT region.

Calendar Year	Region 5	Region 6	Other*
1989	11.2	0.0	0.0
1990	138.5	0.0	0.0
1991	597.5	50.5	5.9
1992	775.2	18.6	1.9
1993	2606.4	112.0	25.2
1994	1250.7	153.3	24.5
1995	2296.4	771.1	39.9
1996	2484.7	572.4	24.8
1997	3621.1	13.5	37.8
1998	3486.9	316.3	20.0
1999	6694.9	408.7	55.1
2000	7650.4	621.4	33.0
2001	9213.4	949.6	18.4
2002	8145.5	1738.6	70.1
2003	6823.7	2542.6	125.4
1989	4349.4	1835.8	18.8
1990	3080.0	349.3	85.1

* Includes erroneous position data and data without position data

Table 6: Effort (thousands of target[#] hooks) for the domestic fleet by year and CCSBT region.

Calendar Year	Region 5	Region 6	Other*
1989	0.0	0.0	0.0
1990	41.7	0.0	0.0
1991	31.5	49.2	0.0
1992	71.7	12.1	0.0
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	1130.8	153.4	0.1

* Includes erroneous position data and data without position data

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

Table 7: Proportion of the catch from the charter fleet under 110, 120, 130, and 140 cm for 1989 to 2006. Data for 2006 is preliminary.

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	0.034	0.040	0.051	0.059

Table 8: Number of vessels catching 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 vessel numbers	Fishing year vessel numbers
2001	132	132
2002	151	155
2003	132	132
2004	99	101
2005	57	58

Table 9: Observer coverage in terms of catch (proportion of numbers observed) for the charter (NZC) and domestic (NZD) fleets for 2004 and 2005.

Calendar year	NZC	NZD
2004	0.99	0.15
2005	0.98	0.09

Table 10: Observer coverage in terms of effort (proportion of hooks observed) for the charter (NZC) and domestic (NZD) fleets for 2004 and 2005.

Calendar year	NZC	NZD
2004	0.96	0.15
2005	0.89	0.12

Table 11: Estimated number of non-retained SBT (separated by life status - alive and dead) for the charter fleet based on observer records.

Year	Alive	Dead	Total
1989	0	0	0
1990	0	0	0
1991	0	0	0
1992	0	0	
1993	55	13	68
1994	40	13	53
1995	4	9	13
1996	NA	NA	NA
1997	0	38	38
1998	0	20	20
1999	18	15	33
2000	0	4	4
2001	3	4	6
2002	2	3	5
2003	0	2	2
2004	0	2	2
2005	0	0	0

Table 12: Estimated number of non-retained SBT (separated by life status - alive and dead) for the domestic fleet based on observer records.

Year	Alive	Dead	Total
1989			
1990			
1991			
1992	0	0	0
1993			
1994	0	0	0
1995	10	20	30
1996	25	6	31
1997	0	4	4
1998	0	0	0
1999	0	0	0
2000	0	0	0
2001	8	10	18
2002	24	30	53
2003	0	0	0
2004	0	7	7
2005	33	8	42

Table 13: 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
2004	99	19	118
2005	19	5	24