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Fleet overlap in the IOTC area

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Summary

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) has requested that the Extended Scientific Committee (ESC) conduct sensitivity analyses around all sources of unaccounted mortality of southern bluefin tuna (SBT) as part of the planned 2014 stock assessment. One potential source of unaccounted mortality not currently considered in the operating model is unreported catch of SBT by countries that are not Members of CCSBT.

This paper is a first attempt at a method designed to examine the overlap of non-Member fleets in areas identified as peak SBT areas within the area of competence of the Indian Ocean Tuna Commission (IOTC) during peak SBT seasons. This analysis identified an increasing amount of effort in these peak areas and times that may indicate catch of SBT. In the future, this method may be refined to provide estimates of SBT catch by non-Member fleets. A similar approach could also be applied to the Convention Area of the Western and Central Pacific Fisheries Commission.

1 Introduction and Approach

The 2013 meeting of the CCSBT Extended Commission requested the ESC to conduct sensitivity analyses around all sources of unaccounted catch mortality and provide preliminary advice on the impact of any unaccounted catch mortalities on the stock assessment projections and the possible Management Procedure recommendation beyond the 2015–17 quota block. The Extended Commission noted that the sources of mortality should include:

- Unreported or uncertainty in retained catch by Members, for example surface fisheries, artisanal catch, non-compliance with existing measures (e.g. catch over-run)
- Mortality from releases and/or discards
- Recreational fisheries
- Catches by non-Members
- Research Mortality Allowance
- Any other sources of mortality that the ESC is able to provide advice on (including depredation)

The fifth meeting of the Operating Model and Management Procedure Working Group (OMMP5) discussed the request from the Extended Commission and noted that the working group was not necessarily in possession of the information required to construct the full range of plausible scenarios for unaccounted mortalities. The working group discussed the required types and potential sources of information that could better inform unaccounted mortality scenarios and encouraged the ESC, Compliance Committee and Extended Commission to work towards filling the gaps in the information base.

This paper focuses on the catches by non-Members to further develop scenarios at the ESC. The OMMP5 working group noted that as the SBT stock increases, bycatch of SBT in non-target fisheries is likely to increase and that lack of information on SBT bycatch is of concern (CCSBT 2014). The working group proposed that scenarios could be developed by applying SBT bycatch rates in longline fleets to the effort by non-Members in the same areas and months. The meeting agreed that Members should evaluate the bycatch rate of their own longline fleets to inform this analysis (CCSBT 2014).

In line with these discussions, this paper provides an initial exploration of the potential for unreported longline catch in the Indian Ocean by fleets that are not members of the CCSBT but are fishing in areas and at times when there is a reasonable expectation that SBT would be caught. The paper considers the reported fishing effort for the years 2000 to 2012 in the area of competence for the Indian Ocean Tuna Commission (IOTC) which was the primary source of data. Accounting for all sources of mortality has been identified as a priority in the CCSBT operating model so that the stock status can be determined. Catches by non-Members of CCSBT have been identified as a likely source of unaccounted mortality that need to be examined further.

The approach taken was as follows:

1) Map the catches of SBT reported to CCSBT at 5 degree grids to identify the main SBT grounds.

2) Determine the primary SBT catching months within the different regions.

3) Calculate the amount of longline fishing effort reported to the IOTC within the peak catch periods and main SBT grounds that is not accounted for members to CCSBT. (Appendix 1: Global southern bluefin tuna catch by flag).

Data sources

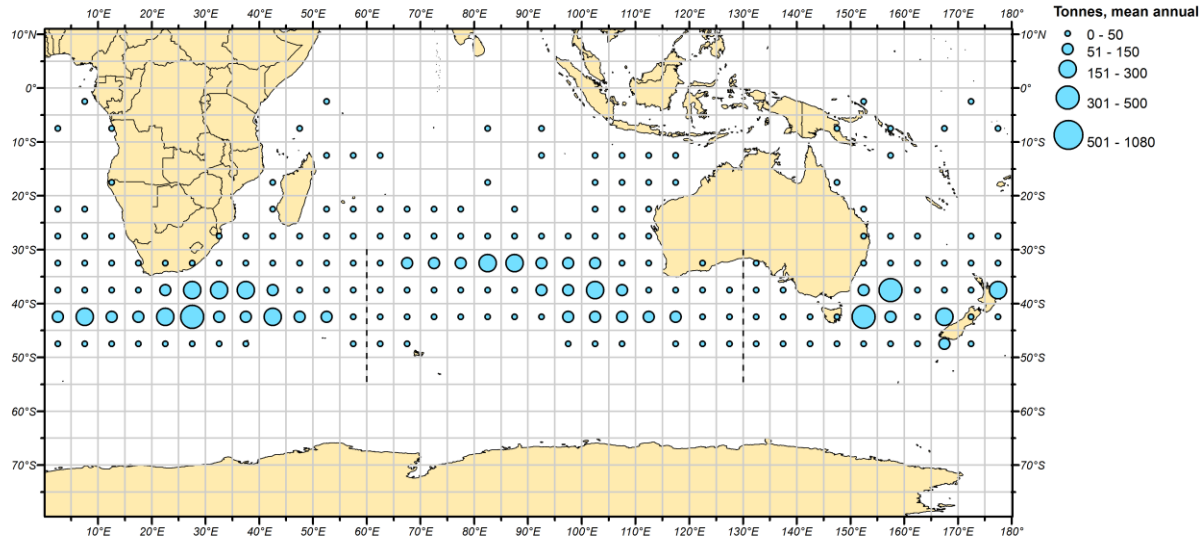
Data	File	Source
CCSBT—Catch by year, month, gear, ocean and 5 degree grid from 1965 to 2012 inclusive [Longline]	CatchByYMGOLoLa.XLS	http://www.ccsbt.org/site/sbt_data.php
IOTC— CE longline: IOTC-2014-DATASETS-CELongline	IOTC-2014-WPTmT-DATA-CELongline.xlsx	http://www.iotc.org/documents/ce-longline

2 Results

Peak season by region

Figure 1 maps the distribution of SBT longline catch (by weight) over the period 2000–2012. The centres of catch are broken into three bands of longitude: 0°–60° East, 65°–130° East and 135°–180° East (see broken lines Figure 1).

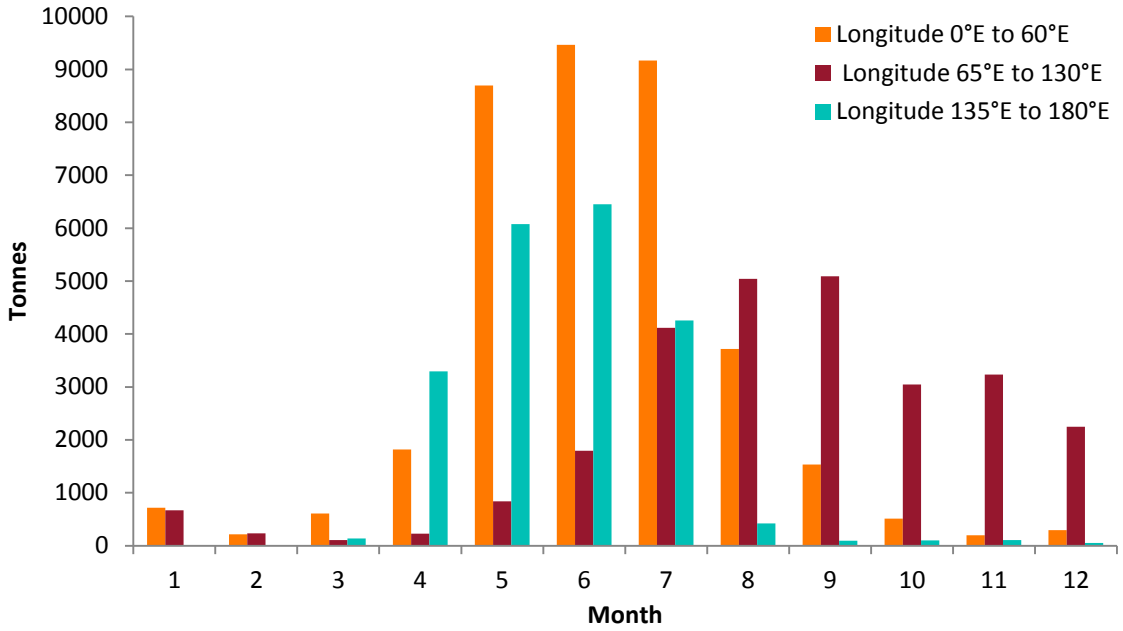
Figure 1 Mean annual SBT catch by five degree grid during the study period (2000–2012) and all months. Dashed lines delineate the three longitude band regions.



Source: CCCSBT CatchByYMGOLoLa.XLS

Peak longline catching months within each of the longitude band regions are illustrated in Figure 2. Peak months were defined as follows: latitudes 0°–60° East = May to July; latitudes 65°–130° East = July to December; latitudes 135°–180° = April–July. Subsequent analysis was constrained for each area to only these "peak months". This peak season filtering retains 71 624 t of the 86 674 t (82.6 per cent) of the catch for 2000–2012 within longitude 0°–180° East.

Figure 2 Total longline SBT catch by month during the period 2000–2012, south of 30°S within the longitude bands 0°–60° East, 65°–130° East and 135°–180° East.

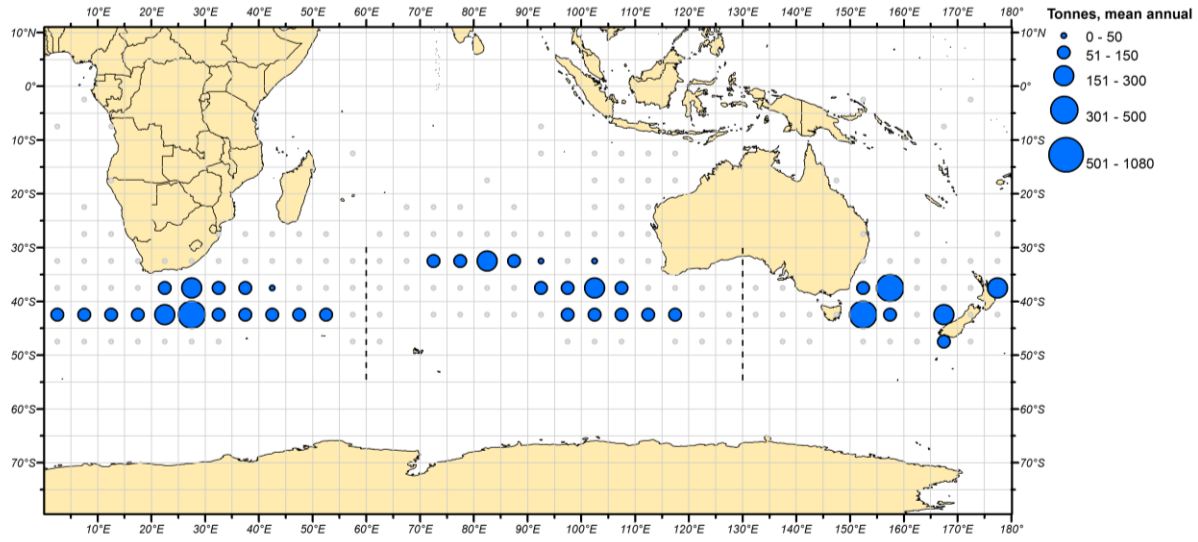


Source: CCCSBT CatchByYMGOLoLa.XLS

Main Grounds

Figure 3 maps the distribution of SBT catch during the peak months within each longitude band region over the period 2000–2012. For the purpose of identifying the main SBT grounds, the five degree grids were ordered by decreasing SBT catch. The grids which represented 90 per cent of the total catch were retained to represent the grounds (noting this is for the peak months and area, during 2000–2012).

Figure 3: Mean annual SBT catch by five degree grid during peak months within each longitude band region within the study period (2000–2012). The main SBT grounds are identified by the blue circles which represent 90 per cent of the SBT catch (90th percentile) while grey circles represent the remaining 10 per cent.



Source: CCCSBT CatchByYMGOLoLa.XLS

The main SBT fishing grounds during the peak months within each longitude band region over the period 2000–2012 where identified as the 38 five degree grids in Table 1.

Table 1: Five degree grids identified as main SBT grounds during peak seasons (data from Figure 3).

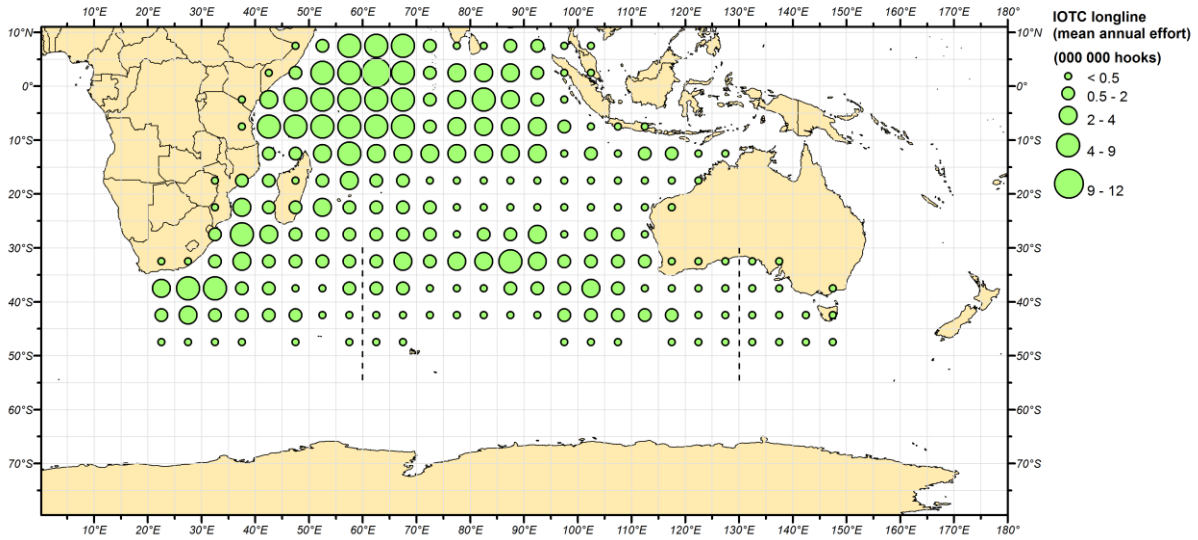
Longitude (centre) ° East	Latitude (centre) ° South	Mean annual catch (tonnes)
152.5	-42.5	423
157.5	-37.5	400
27.5	-42.5	324
22.5	-42.5	279
102.5	-37.5	221
27.5	-37.5	190
167.5	-42.5	170
82.5	-32.5	162
177.5	-37.5	153
7.5	-42.5	146
12.5	-42.5	141
97.5	-37.5	140
152.5	-37.5	135
107.5	-42.5	129
87.5	-32.5	123
102.5	-42.5	121
107.5	-37.5	118
17.5	-42.5	118
77.5	-32.5	112
157.5	-42.5	111
42.5	-42.5	98
47.5	-42.5	97
32.5	-37.5	91
32.5	-42.5	88
112.5	-42.5	86
2.5	-42.5	85
72.5	-32.5	75
37.5	-37.5	72
97.5	-42.5	68
92.5	-37.5	66
37.5	-42.5	63
22.5	-37.5	61
117.5	-42.5	59
167.5	-47.5	58
52.5	-42.5	55
102.5	-32.5	48
42.5	-37.5	46
92.5	-32.5	42

“Other” longline effort in main grounds and peak months

Having identified the areas and times when there is a reasonable expectation that SBT could be caught, we examined the reported longline effort data from the IOTC to determine activity of non-Members within these grounds and peak months.

The IOTC reported mean annual longline effort (number of hooks) by five degree grid is mapped in Figure 4.

Figure 4: Mean annual longline effort (number of hooks) by five degree grid within the study period (2000–2012) and all months.



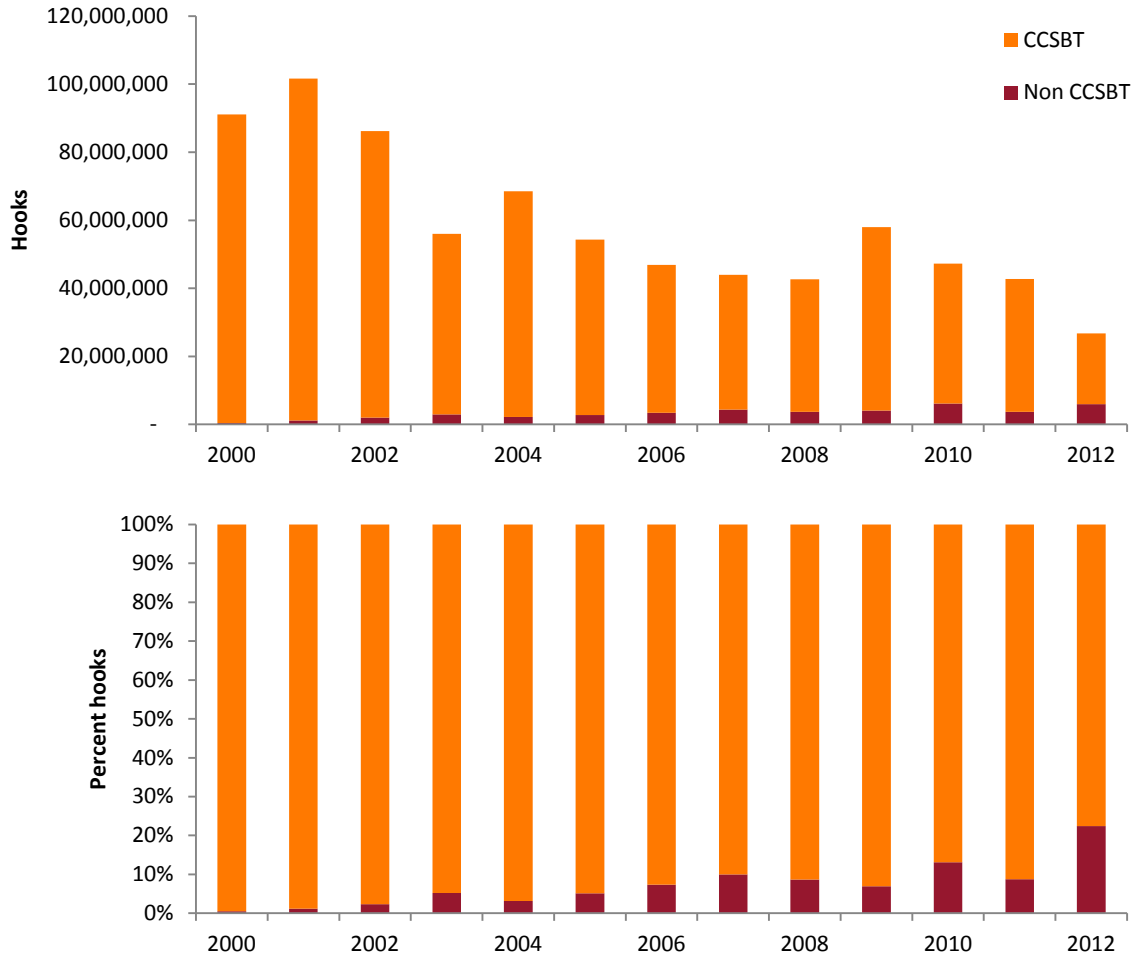
Source: IOTC IOTC-2014-WPTmT-DATA-CELongline.xlsx

Figure 5 shows the annual effort within the main SBT grounds and peak months from CCSBT Members and non-Members during 2000–2012. Overall effort (number of hooks) has decreased during this period. However, the effort by non-Members has increased in absolute terms and as a percentage of the total effort. In 2012, the effort of non-Members was ~20 per cent of the total effort in the main SBT grounds and peak months.

A further breakdown of the non-Members effort by flag in the main SBT grounds and peak months is provided in Figure 6. The effort by the EU-Spanish fleet in the main SBT grounds increased between 2000 and 2002 and has been relatively constant since (with a peak in effort in 2007). The EU-Spanish fleet represents the largest part of the non-Member effort. The EU-Portuguese fleet’s effort was substantial in 2012, at a similar level to the effort from the EU-Spanish feet in that year.

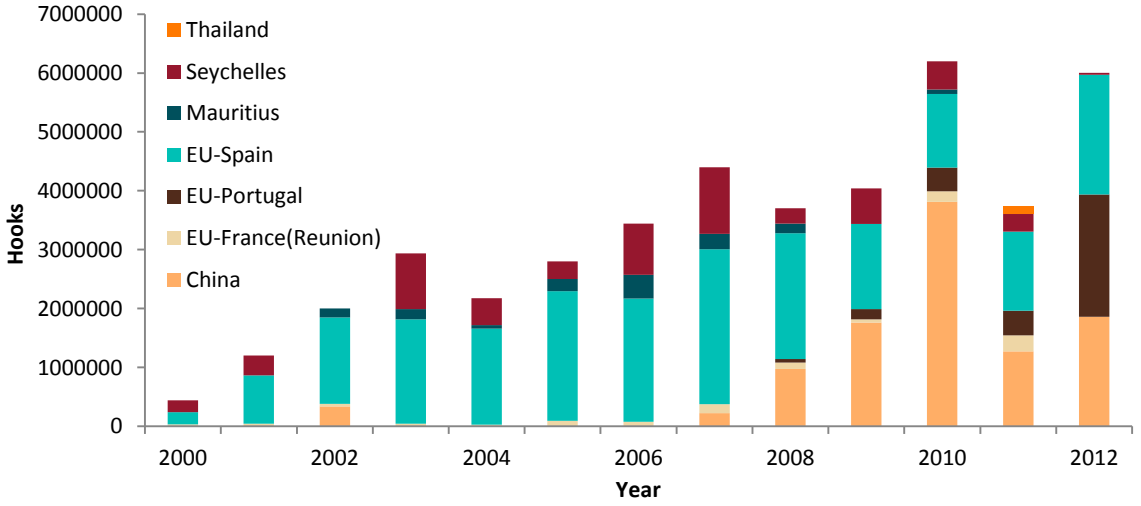
The Chinese fleet’s effort in the main SBT grounds and peak months commenced in 2007 and has become significant in recent years. The effort from the Chinese fleet peaked in 2010.

Figure 5: Annual effort (number of hooks and percentage of total number of hooks) within the main SBT grounds (peak months in peak grids) from CCSBT Members and non-members.



Source: IOTC effort data IOTC-2014-WPTmT-DATA-CELongline.xlsx

Figure 6: Annual effort (hooks) by CCSBT non-Members within the main SBT grounds (peak months in peak grids).



Source: IOTC effort data IOTC-2014-WPTmT-DATA-CELongline.xlsx

3 Discussion

This paper provides an initial step in examining the potential catch of SBT by non-Members. This has demonstrated that there is overlap of fleets in the IOTC area of competence that may lead to catch of SBT. It is worth noting that the location of longline fishing effort in the Indian Ocean has been influenced by piracy in recent years (IOTC 2013). Some of the equatorial longline effort has been displaced southwards resulting in higher effort in the temperate latitudes where SBT may be caught. This may change as piracy dissipates in the Indian Ocean.

The results of the spatial analysis indicate that there are non-Members of CCSBT fishing in the identified peak SBT areas during the peak months and this has increased over time. In addition, the countries have changed slightly over time, although a few are consistently in these areas. In 2012, for example, the countries fishing in these areas during the peak months were China, Spain and Portugal. The European Community is a cooperating non-member of CCSBT, with an allocation of 10 t for the incidental catch of SBT.

The level of SBT catch that may be associated with this fishing effort is likely to depend on the operational nature of the fishing (such as the species targeted and the setting depths of longlines). Almost all the longline effort by EU-Spanish and EU-Portuguese fleets is flagged as 'Longline (targeting swordfish)' in the IOTC data. Thus, this effort was likely shallow set and it is unclear how likely this effort would be in catching SBT. As the European Community is a cooperating non-member of CCSBT, there is an expectation that any catch by EU vessels would be reported to CCSBT.

This paper will enable the ESC to further discuss the issue of non-Member catches as a potential source of unaccounted mortality. As discussed at the OMMP5 working group, consideration of Member's SBT bycatch rates could inform this analysis. A similar analysis of fleet overlap in the Convention Area of the Western and Central Pacific Fisheries Commission could also inform further discussions.

References

CCSBT (Commission for the Conservation of Southern Bluefin Tuna) 2014, *Report of the Fifth Operating Model and Management Procedure Technical Meeting*, 24–27 June 2014, Seattle, Washington, US.

IOTC (Indian Ocean Tuna Commission) 2013, *Report of the sixteenth session of the Scientific Committee*, IOTC-2013-SC-R[E], 2–6 December 2013, Busan, Korea.

Attachment 1

Global Southern Bluefin Tuna Catch By Flag.

Catches are presented as whole weights in tonnes. All figures, particularly for the last reported year of catch (2012) are subject to change as improved data or estimates become available. Note: reviews of SBT data in 2006 indicated that southern bluefin tuna catches may have been substantially under-reported over the previous 10–20 years and the data presented here do not yet include estimates for this unreported catch.

Calendar Year	Australia	Japan	New Zealand	Korea*	Taiwan	Philippines	Indonesia	South Africa	European Community	Miscellaneous	Research & Other
2000	5,257	6,000	380	1,135	1,448	17	1,203	4	0	31	0
2001	4,853	6,674	358	845	1,580	43	1,632	1	0	41	4
2002	4,711	6,192	450	746	1,137	82	1,701	18	0	203	17
2003	5,827	5,770	390	254	1,128	68	565	15	3	40	17
2004	5,062	5,846	393	131	1,298	80	633	19	23	2	17
2005	5,244	7,855	264	38	941	53	1,726	24	0	0	5
2006	5,635	4,207	238	150	846	50	598	9	3	0	5
2007	4,813	2,840	379	521	841	46	1,077	41	18	0	3
2008	5,033	2,952	319	1,134	913	45	926	45	14	4	10
2009	5,108	2,659	419	1,117	921	47	641	32	2	0	0
2010	4,200	2,223	501	867	1,208	43	636	34	11	0	0
2011	4,200	2,518	547	705	533	45	842	49	3	0	1
2012	4,503	2,528	776	922	497	46	910	77	4	0	0

Source: CCSBT "GlobalCatch_Flag_Gear.xls"