Review of Taiwan SBT Fishery of 2007/2008

1. INTRODUCTION

Southern Bluefin Tuna (*Thunnus maccoyii*,SBT) was bycatch of Taiwan tuna longline fishery targeting albacore in the past, but after the fishing vessels equipped with deep-frozen freezers, some fishing vessels operating in the Indian Ocean started targeting SBT seasonally since 1990s. The annual catches of SBT were less than 250 MT in early 1980s (Table 1); after then with the increase of fishing fleet size and the expansion of fishing grounds, the catches of SBT increased thereafter. From 1989 onwards, the annual catches of SBT were over 1,000 MT, of which the catches of drift net accounted for about 25% of the total catches in 1989 and 1990. The catches of SBT kept stable between 800 and 1,600 MT from 1991 to 2001. In 2002 Taiwan became the member of the Extend Commission of CCSBT and commenced to restrain its annual catch of SBT to a maximum of 1140 tons. The annual catches of SBT fluctuated between 876 tons and 1,298 tons from 2002 to 2008. Table 1 shows the annual catches of SBT from 1972 to 2008.

2. CATCH AND EFFORT

There are 3 types of data collected to compile the catch and effort data for SBT, namely, (1) weekly reports (SB data), (2) logbooks (LG data) and (3) commercial trading information including statistical documents of trade information scheme and certified weight reports provided by the Organization for the Promotion of Responsible Tuna Fisheries (OPRT) (OT data).

In addition to the requirement of logbook, the masters of fishing vessels authorized to fish for SBT are required to send their weekly catch reports of SBT with individual weight, length and location, to Fisheries Agency of Taiwan since 2002. However, the weekly report has only the catch information of SBT without other tuna and tuna-like information. The trading information on SBT product has also been

collected through the subscription of certified weight reports of Shin Nippon Kentai Kaisha from 1994 to 2003, and through OPRT since 2004. The weekly reports of fishing vessels have been crosschecked with the logbook and trading information.

The annual catch of SBT by gear from 1972 to 2008 is shown in Table 1. The catch distribution of 2005-2008 is mapped in Figure 1. The data for 2008 is still preliminary and may be revised in the coming year.

3. NOMINAL CPUE

The catch of SBT was relatively low compared with the catches of other tuna and tuna-like species for Taiwanese deep-sea tuna longline fishery and there was no separate 'SBT' item on logsheet issued to fishermen before 1994. Because the catch information on SBT collected through logbook system is insufficient to reflect the fishing pattern, the weekly report data system has become the major source of catch and effort information since 1996. However, since the weekly report system was designed for monitoring the SBT catch so as to manage the quota allocation rather than to replace the logbook system on catch and effort data collection, the fishing effort information was collected incompletely, and this could lead to the over-estimation of CPUE of Taiwanese SBT longline fishery. After crosschecking with other available information from fishing companies and logbook later recovered, the CPUE over-estimation has been improved.

For estimating the CPUE of Taiwanese SBT longline fishery from 1996 to 2008, the nominal CPUE series were derived from the LG data excluding the daily set operating during off-season (February to May) and in the northern area of 20°S. The catch and effort data for 2008 is preliminary and may be revised after more information is collected.

Figure 2 shows the nominal CPUE trend of Taiwanese longline fishery for SBT from 2002-2008. The CPUE (number of fish caught per 1000 hooks) appeared to be varied from 0.9 to 1.87 during 2002-2007. The CPUE of 2008 is preliminary estimated as 1.89 and may be revised in the coming year.

4. SIZE COMPOSITION

The measurement scheme of catch length has been applied to Taiwanese deep-sea longline fishery statistical system. Fishermen are requested to measure the FL-length of the first 30 specimens from daily catch, and fill the length data in logbook. Besides, the fishermen have been to report SBT catch positions and weights on weekly basis to Fisheries Agency since 1996, and they have also requested to report the individual length of SBT caught since 2002. Figure 3 shows the distributions of length frequency of SBT during 2003-2008 and the predominate range is from 110 cm to 140 cm.

5. FLEET SIZE AND DISTRIBUTION

According to the weekly report and trading information, there were more than 100 vessels fishing for SBT during 1998-2001. The number of active vessels to fish SBT is 30-100 from 2002 to 2008 shown as Table 2. Since 2002, Taiwan has imposed individual quota system to allocate SBT quota to each vessel which was authorized to fish for SBT shown as Table 2. The major reason for the number of vessels significant decreased in 2005-2008 is that partial vessels have shifted to target oilfish in the waters off South Africa.

The SBT fishing vessels mainly operated in the waters of 20°S - 40°S in the Indian Ocean and the areas adjacent to the Atlantic Ocean. There were two major fishing grounds in general: one is the central Indian Ocean around 55°E-95°E, 30°S-40°S, and the other one locates in off the southeast coast of Africa around 30°E-55°E, 35°S-45°S. Seasonally, SBT was caught in the southern and central Indian Ocean from June to September, and in the southern and western Indian Ocean extending to the eastern boundary of the Atlantic Ocean from October to February of the following year.

6. SCIENTIFIC OBSERVATION PROGRAM

Appendix 1 provides the summary report on the implementation of CCSBT scientific observer program.

7. OTHER RELEVANT INFORMATION

The collaboration between Taiwan and Australia on SBT archival tagging program was initiated in 2004. The observers deployed on SBT fishing vessels carried out the SBT tagging program for 4 years (2004-2007). There were 37, 48, 25 and 75 archival tags successfully settled in 2004, 2005, 2006, and 2007 respectively. The program ended in 2007.

Table 1. Annual SBT catches by Taiwanese deep-sea longline and drift net fisheries during 1972-2008.

Unit: MT

Year	Deep-sea Longline	Drift Net	Total
1972	70		70
1973	90		90
1974	100		100
1975	15		15
1976	15		15
1977	5		5
1978	80		80
1979	53		53
1980	64		64
1981	92		92
1982	171	11	182
1983	149	12	161
1984	244	0	244
1985	174	67	241
1986	433	81	514
1987	623	87	710
1988	622	234	856
1989	1,076	319	1,395
1990	872	305	1,177
1991	1,353	107	1,460
1992	1,219	3	1,222
1993	958		958
1994	1,020		1,020
1995	1,431		1,431
1996	1,467		1,467
1997	872		872
1998	1,446		1,446
1999	1,513		1,513
2000	1,448		1,448
2001	1,580		1,580
2002	1,137		1,137
2003	1,128		1,128
2004	1,298		1,298
2005	941		941
2006	846		846
2007	841		841
2008*	876		876

*Preliminary estimation.

Table 2. The number of authorized vessel to fish SBT during 2002-2008.

Year	2002	2003	2004	2005	2006	2007	2008
N. Vessel	61	100	97	57	36	30	41

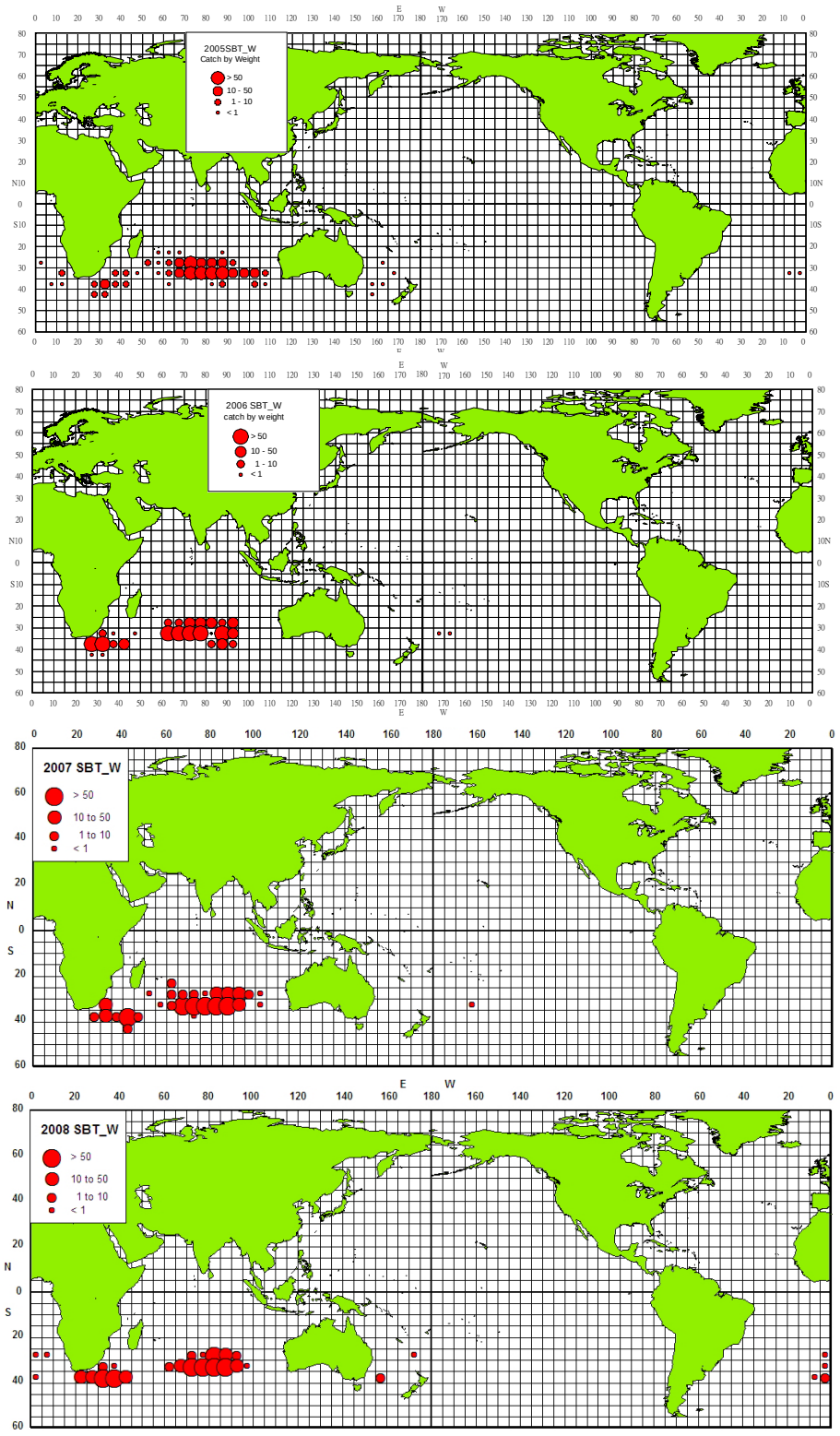

Fig 1. The SBT catch distribution of Taiwanese longline fishery during 2005-2008 (Data of year 2008 is preliminary and may be revised.)

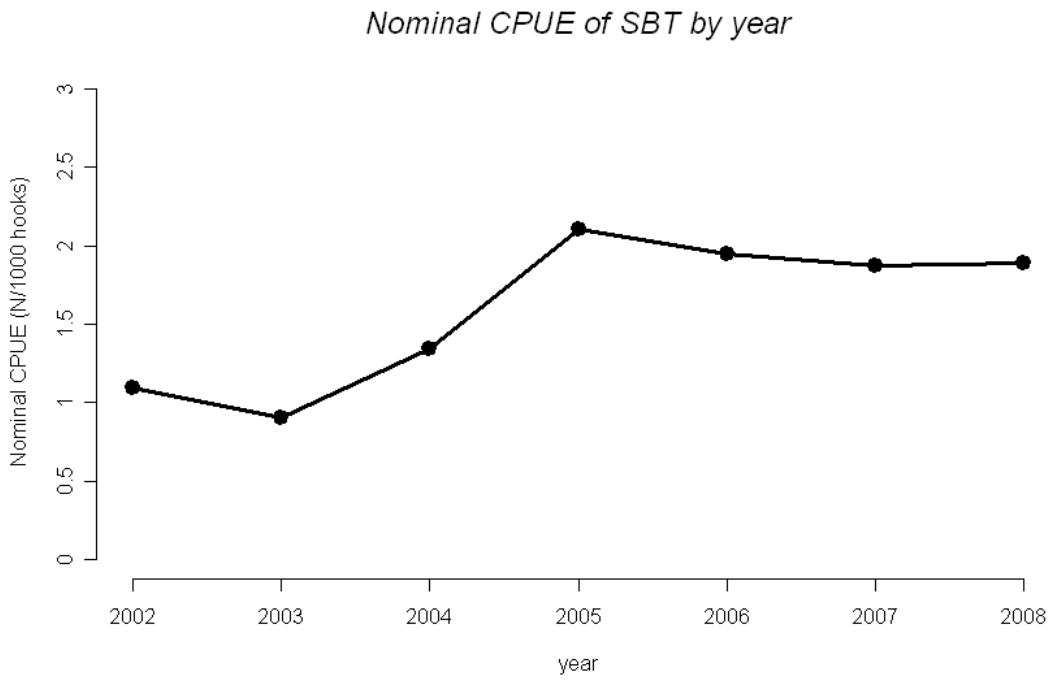

Fig 2. The nominal CPUE series of SBT during 2002-2008 (Data of2008 is preliminary.)

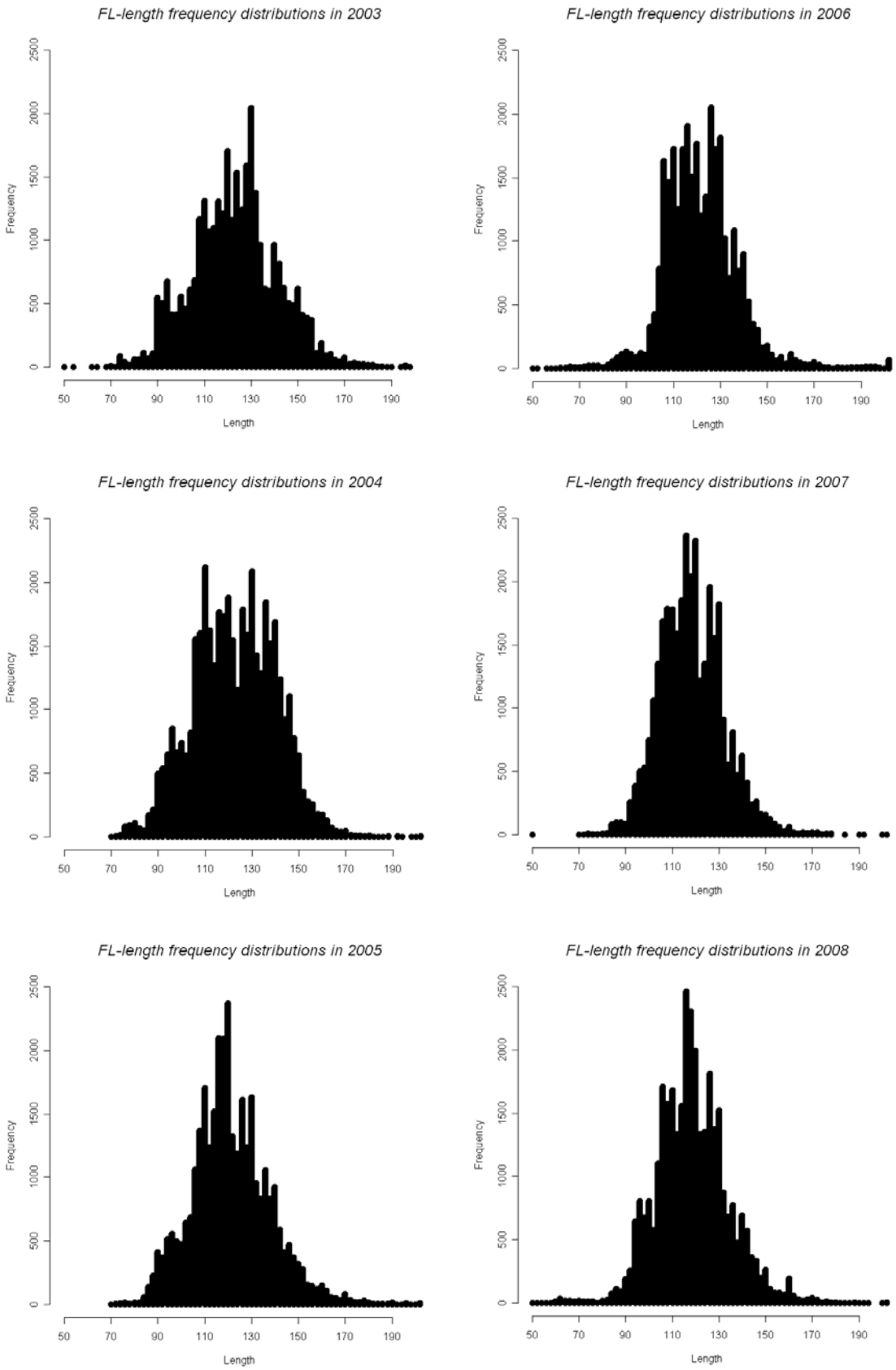

Figure 3. The FL-length frequency distributions of SBT caught by Taiwanese longline fishery during 2003-2008. (Data of 2008 is preliminary.)

Appendix 1

Scientific observer program

Observer Training

To collect the scientific information of tuna longliners, the scientific observer program of deep-sea tuna fisheries of Taiwan was launched in 2001. However, observers deployed on vessels seasonally targeting SBT commenced in 2002.

Fisheries Agency (FA) is responsible for implementing the program and recruiting scientific observers. FA also invited researchers on fishery sciences and senior observers (with 2-year's experience) to form a special panel for designing the observer training program, items of observation, biological and by-catch information to be collected for scientific researches and the format of data records.

The qualification for observers is college graduated or senior high school graduated with at least 5-year experience on-board, and they are required the competence to live and work at sea. Candidate observers who have passed the oral examination will have to take a 3-week training program, and only those who pass the training program and medical check will be qualified and deployed as scientific observers.

Observer training program includes basic safety training for seafaring, operations of navigation devices, mini-log thermometer and VMS system, identification of tunas, tuna-like species, sea turtles, seabirds, sharks and marine mammals, sampling skill for muscle tissue, otolith, stomach content and gonad, and data collection for fishing activities, catches and locations. After the training program, they are required to undergo at sea training on a training ship for one week and have a test in identifying the tuna and tuna-like species at local fish market.

Scientific Observer Program Design and Coverage

At the initial stage, for the purpose of encouraging industries to join the observer program, the observed vessels were offered reward catch quota after completing the observation cruise if they fully cooperated with the observer's duties. However, this measure has been put an end since 2007. It is regarded as the obligation of industries to accept observer on board. Since 2008, observers have been requested to accept a debriefing after completing the trip.

In 2008, due to high fuel price, for saving cost, fishing vessels reduced to enter ports and meet transshiping vessels, it was difficult to deploy observer on board, so that only 2 observers were placed on 2 seasonally targeting SBT vessels. There were 227 fishing days and 595,820 hooks observed by the observers. The observer coverage rate by vessels was about 5.71%, 6.65 % by hooks in 2008. Table 1 shows the summary results for scientific observer program from 2002-2008.

Observer Data Collected

The data recorded by observer on board includes 3 categories: vessel and gear attributes, set details and by-catch/incidental catch information (including sighting of marine mammals, sea turtles and sea birds).

The biological samplings include measuring length and weight, recording live condition of the first 60 fish, and collecting otoliths, muscle tissues, stomach content and gonads of SBT. Figure 1 shows SBT catch distributions of observed vessels during 2005-2008.

In 2008, 1,219 SBT catch data were recorded, 1,049 SBT lengths were measured, and 73 SBT otoliths and 45 SBT stomach were sampled. Table2 shows the results of SBT biological data collected by observers from 2002 to 2008.

Tag Return Monitoring

There was no tagged SBT recaptured during the presence of observer on board

in 2008. The tags returned by Taiwanese fishing vessels are 726 in total among which 640 were released by the CCSBT and 86 tagged by CSIRO during 2002-2008. The details of tag recaptures for each year are shown in Table 3. The returned tags and the related information have been sent to the CCSBT Secretariat.

Problems Experienced

Although the program was fully supported by boat owners and skippers of SBT observed vessels, there are still some difficulties that could not be resolved technically. Since the homeport is far from the fishing ground, it will take more than 1 month to transport the supplies and equipments needed for sampling from Taiwan to fishing ground, and sometimes the supplies could not reach to observers on board in time. Besides, samples collected by observers were sometimes missing transferred by transshipping vessels. In addition, it is also difficult to arrange interviews with skippers for collecting the information on fishing activities since these SBT fishing vessels seldom return to Taiwan after SBT fishing season.

Table 1. Summary of results for scientific observer programs during 2002-2008.

Year	Observers Deployed	Observed Trips	Sea Days	Set Observed	Observer Vessels (%)	Observed Effort (%)
2002	1	1	202	126	4.76	6.57
2003	2	2	177	133	2.63	2.43
2004	3	5	263	165	3.8	4.17
2005	4	4	681	444	8.16	11.57
2006	3	3	296	253	9.09	10.46
2007	4	4	441	394	14.81	14.84
2008	2	2	252	227	5.71	6.65

Table 2. Biological samples collected by observers during 2002-2008.

Year	SBT catch data recorded (No. of fish)	SBT length measured (No. of fish)	Number of otolith collection	Stomach content (No. of fish)
2002	498	338	-	-
2003	226	174	102	-
2004	1295	1290	316	93
2005	3200	2217	210	257
2006	1863	1484	56	57
2007	4632	4043	197	189
2008	1219	1049	73	45

Table 3. Number of SBT tag returned by Taiwan fishing vessels during 2002-2008.

Year	CCSBT	CSIRO	Total
2002	2	16	18
2003	24	18	42
2004	112	21	133
2005	204	25	229
2006	253	6	259
2007	40	0	40
2008	5	0	5
Sum	640	86	726

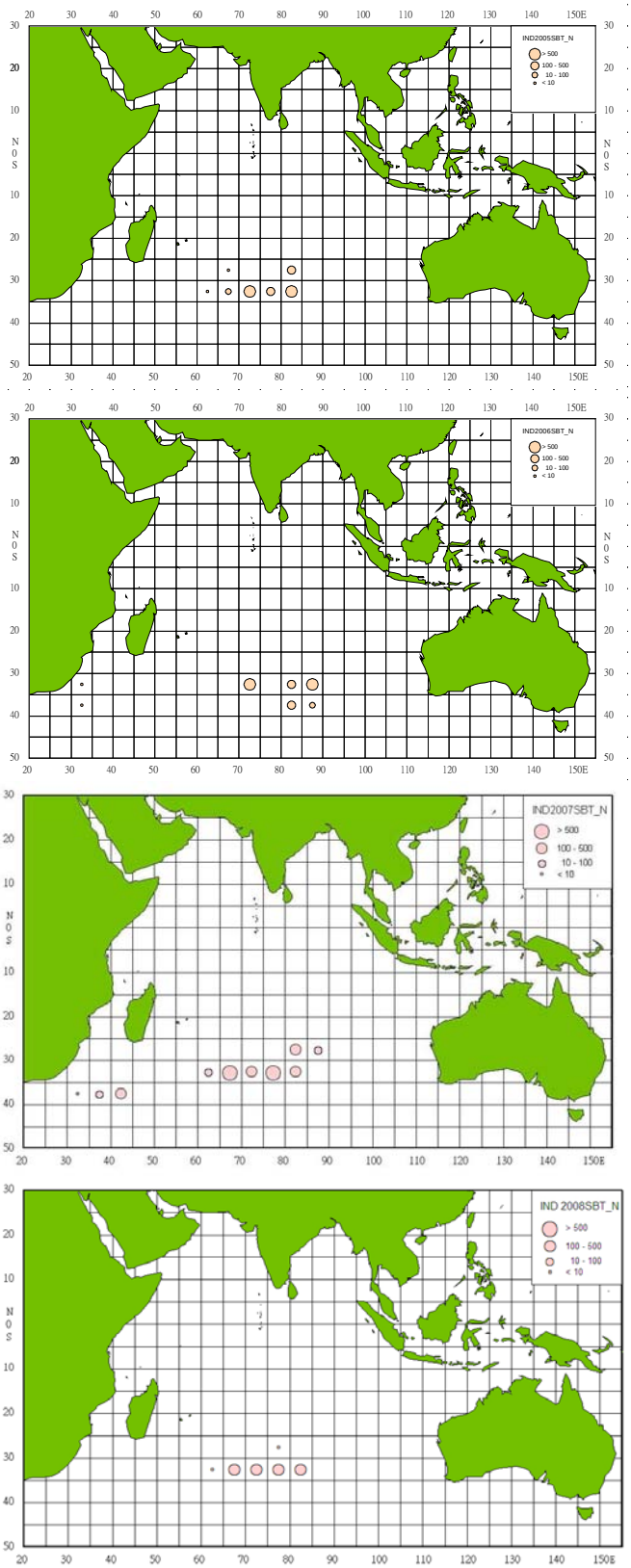

Figure 1. The SBT catch distributions of observed vessels during 2005-2008.