

**National Report of Taiwan: Ecologically Related Species in the Taiwanese
Southern Bluefin Tuna Fishery 2009-2010**

Fisheries Agency of Taiwan

1. Introduction

Southern Bluefin Tuna (*Thunnus maccoyii*, SBT) was bycatch of Taiwanese 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 have started targeting SBT seasonally since 1990s. There are no whole year round vessels fishing for SBT. For Taiwanese fishing vessels, only longliner caught SBT and except by-catch vessels, seasonal target SBT vessels all operate in the Indian Ocean. Due to vessel structure, most Taiwanese vessels are unable to operate in the areas of very high latitude with very cold temperature and strong waves. There are two main fishing grounds in general: one is in the southern central Indian Ocean around 55°E – 95°E, 30°S – 40°S, and the other locates off the southeast coast of Africa around 30°E – 55°E, 35°S – 45°S. Two fishing seasons for Taiwanese seasonal target SBT fishing vessels have been in the southern central Indian Ocean from April to September, and in the southern and western Indian Ocean extending to the eastern limit of the Atlantic Ocean from November to February of the following year.

This report includes information and data on Ecologically Related Species (ERS) of Taiwanese SBT fishery sampled by scientific observers updated to 2010.

2. Review of SBT fisheries

Fleet size and distribution

More than 100 vessels had SBT catch records during 1998-2001. Since 2002, Taiwan has become a member of the Extended Commission of CCSBT and agreed on its national quota of 1,140 tons. Taiwan has imposed strict regulation and started to allocate individual quota to each vessel authorized to fish for SBT since 2002. Besides, those vessels are separated to either seasonal target ones or by-catch ones. The

number of active vessels to fish for SBT is 30-100 from 2002 to 2010 shown as table 1.

Distribution of Catch and Effort

Historically, annual catches of SBT were less than 250 tons in early 1980s. Thereafter, with the improvement of vessel facilities, the fishing grounds and target species have also been changed. Apart from capturing albacore, Taiwanese vessels also capture SBT in the specific seasons. Since 1989 onwards, annual catch of SBT has surpassed 1,000 tons. After then, the SBT catches fluctuated between 800 and 1,600 tons. Since CCSBT has been established, Taiwan, in line with the CCSBT conservation and management measures, voluntarily set up its SBT catch limit at 1996 level of 1,450 tons since 1997. During 1996-2001 the average annual catch of SBT maintain around 1,450 tons. When Taiwan joined CCSBT in 2002, it compromised by reducing 310 tons from our original self restraint catch limit, and set up annual catch quota to 1,140 tons. In 2006, Taiwan had agreed CCSBT adopt TAC arrangement based on binding allocated catch limits for 2007 – 2009, and catch quota has being fixed in 1,140 tons. On the other hand, Taiwan undertook to maintain actual catch at the level below 1,000 tons for 3 years to contribute to the recovery of SBT stock.

The total annual catches were 921 tons in 2009 calendar year, and 1,208 tons in 2010. The annual catch of SBT by gear from 1972 to 2010 is shown in table 2.

The fishing locations of SBT fishing vessels are mainly concentrated in the waters of 30°S – 40°S in the Indian Ocean and the waters adjacent to the Atlantic Ocean (Fig. 1). There are two fishing grounds in general: one is in the southern central Indian Ocean around 55°E – 95°E, 30°S – 40°S, and the other locates off the southeast coast of Africa around 30°E – 55°E, 35°S – 45°S. Two fishing seasons for Taiwanese SBT fishing vessels have been in the southern and central Indian Ocean from April to September, and in the southern and western Indian Ocean extending to the eastern limit of the Atlantic Ocean from November to February of the following year.

3. Fisheries Monitoring for Each Fleet

Intensive efforts have been continuously exerted for monitoring the SBT fishery

through the following measures:

- (1) Since April 2002, vessels authorized to fish for SBT have been required to install VMS equipments in order to monitor the positions of the vessels.
- (2) Weekly report for SBT catch is required for submission to Fisheries Agency through Taiwan Tuna Association. From 2002, provision of such information as daily catch, daily fishing location and daily discards is required in the weekly report when applying for SBT statistical document. Since 1 January 2010, the CCSBT SBT statistical document has been replaced by CCSBT CDS. When fishers apply for validation on CDS, the officials authorized by Fisheries Agency of Taiwan shall check all of the above information consistent with the real catch.
- (3) Taiwan has designated two foreign ports (Port Louis and Cape Town) for SBT transshipment of its flagged vessels since March 2010 and has prohibited transshipment at other foreign ports. Government officials stationed at Port Louis and Cape Town are responsible for inspecting all SBT catch. Any catch without inspection by its officials shall not obtain validated catch document.
- (4) Besides, Taiwan has designated fishing port of Cianjhen in Kaohsiung for domestic SBT unloading port by carrier vessels or fishing vessels. Since September 2009, Fisheries Agency of Taiwan has dispatched officials to inspect all of SBT catch. Only for those catch are verified, the officials of Fisheries Agency of Taiwan shall validate catch documents.
- (5) In case of transshipment at sea, regional observer of IOTC, ICCAT boarding on carrier vessel shall observe if all of SBT transshipped quantities consistent with the reported catch in the transshipment declaration since 1 April 2009.
- (6) Besides, catch data were also verified by scientific observers on board. With exception of 2008, the observer coverage rate was all above 10% in terms of effort since 2005. In 2008, due to high fuel price, fishing vessels reduced visiting ports and meeting with carrier vessels, it is difficult to dispatch observer onboard, so that the observer coverage rate by effort was 6.65%. In 2010 quota year, 7 scientific observers were deployed on 11 fishing vessels. The observer coverage rate by efforts was about 11.95% shown as table3.

- (7) In addition to catch data, observers also collected and recorded ecologically related species (ERS) data, such as sea birds, sea turtles, marine mammals, and sharks data. Besides, mitigation measures adopted by fishing vessels shall be recorded.
- (8) Besides, patrol boats were also dispatched to inspect Taiwanese fishing vessels operating in three oceans. In 2008, 2 SBT fishing vessels were boarded and inspected by patrol boat. It accounts for 4.9% of Taiwanese SBT fishing vessels. In 2009, 5 SBT fishing vessels were boarded and inspected. It accounts for 7.5% of Taiwanese SBT fishing vessels. In 2010, due to the threat of Somalia piracy and for safety consideration, no patrol boat was dispatched in the Indian Ocean.
- (9) There are penalties for over catch, transshipment or unloading catch at any other non-designated foreign ports or any violation of regulation.

4. Seabirds

Two fishing seasons for Taiwanese SBT vessels are from April to September and from November to February of the following year. The major fishing grounds is around 30° S-40°S in the Indian Ocean. The lower latitude the vessels operate at, the less frequency and fewer seabirds are sighted.

According to the record of scientific observers deployed on SBT vessels, in 2010, 75 seabirds were caught among which 23 were still alive and released, and 52 were dead and discard. Table 4 shows the number of seabirds caught, total hooks, and by-catch per unit effort (BPUE) recorded by observers in 2009-2010. Table 5 shows the composition of species.

5. Other Non-target Fish

For Taiwanese SBT vessels, the main catch is albacore and SBT. Other non-target fish include bigeye tuna, yellowfin tuna, sharks, and billfish. For shark species, blue shark was the most dominant species accounting for 71.5% in 2009, and 87.34% in 2010. Table 6 shows the composition of shark species caught during observation trips from 2009-2010.

6. Marine Mammal and Marine Reptile

According to observer record in 2009-2010, there were not any cetaceans sighted during observation trips.

Sea turtles in general live in the waters near the equator and the depth of habitat is above 150m, but all of Taiwanese SBT vessels operated in the area southern than 25°S and fishing depth is about 300-400m, so sea turtle was sighted rarely by observers. In 2009 there was no sea turtle by-catch. In 2010 one green turtle was by-catch alive and released.

7. Mitigation Measures to Minimise Seabird and Other Species Bycatch

Current Measures

Mandatory Measures for Each Fleet

➤ *Sea bird*

The government of Taiwan has introduced a regulation which requires vessels fishing at the areas of southern than 30°S to deploy a tori line to reduce seabird incidental catch since 2004. Besides, in line with the resolution 08/03 on reducing the incidental bycatch of seabirds in longline fisheries adopted by IOTC, all Taiwanese longline vessels fishing south of 30°S shall use at least two of mitigation measures in consistence with the resolution since 2009.

In 2011, according to IOTC resolution 10/06 on reducing the incidental bycatch of seabirds in longline fisheries, Taiwan imposed regulation requiring all Taiwanese longline vessels fishing south of 25°S in Indian Ocean shall use at least two different mitigation measures including tori line and one other measure, such as night setting, weighted branch lines, offal discharge control or line shooting device in consistence with the resolution. Fishers shall fill out the specified form regarding the measures adopted by its vessels with photos of tori line and inform the Fisheries Agency of Taiwan in advance one month the vessel fishing south of 25°S in the Indian Ocean. Government officials stationed at Port Louis and Cape Town will examine the tori line by random.

➤ ***Sea turtle***

To conserve sea turtles, Taiwan has publicized domestic management regulations since 2006, requiring fishing vessels to carry necessary devices on board, such as dig nets, de-hookers and line cutters, during voyage or operation periods, for appropriate release of incidentally caught sea turtles. The incidental catch individuals shall be released alive, and the operators shall record in their logbooks all incidents involving marine turtles during fishing operations.

In addition to the above mentioned regulations, Taiwan government has imposed “Wild Life Protection Act”, forbidding fishers to capture or possess the following kinds of sea turtles, which include green turtle, loggerhead turtle, olive ridley turtle, leatherback turtle and hawksbill turtle. The incidentally caught sea turtles must be released and the fishers are required to record this event in the logbook.

➤ ***Shark***

According to the Resolution adopted by ICCAT and IOTC, Taiwan has applied mandatory regulations to require its authorized vessels fishing in the Atlantic Ocean and the Indian Ocean not to have onboard fins that total more than 5% of the weight of sharks onboard, up to the first point of landing since 2005. The regulation has subsequently applied to the fleets operating in Pacific Ocean since 2006. Besides, Taiwan has imposed regulation to prohibit *Rhincodon typus* (whale shark) to be captured, possessed and sold since 2008.

In line with IOTC resolution 10/12 on the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in IOTC area of competence, Taiwan has required that fishers operating in the Indian Ocean are prohibited from retaining on board, transshipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae since 2011.

To further ensure the sustainable use of shark resources, Taiwan has imposed the regulation of “fins naturally attached” on January 19, 2012 on a step by step basis. According to the regulation, the measure applies to Taiwanese fishing vessels

operating within in its coastal and inshore waters at the first stage and then gradually expands its application to the rest of fishing vessels operating outside its EEZ.

Voluntary Measures for Each Fleet

No information

Measures under Development/Testing

For mitigation of sea turtle by-catch for tuna longliner, Taiwan is collaborating with the United States of America for circle hook experiment in the Atlantic Ocean.

8. Public Relations and Education Activities

Public Relations Activities

- (1) Distribution of posters, sheets and booklets for guidance of mitigation measures of reducing seabird by-catch, shark full utilization, and species identification for seabirds, sharks and sea turtles to fishers. (CCSBT/0402/Info28)
- (2) For sea turtles, we encouraged fishers to carry dip net and line clipper on board to safely release sea turtles. Meanwhile, we also distributed 3000 copies of posters entitled “Release the sea turtle incidentally caught” to our fishers in 2003.
- (3) In order to avoid incidental catch of sea bird, sea mammal and sea turtle by deep-sea fisheries, Taiwan government sponsored the World Wildlife Fund (WWF) international and Chinese Wild Bird Federation to hold the International Smart Gear Competition Judges Workshop in Taiwan in September 2007. After the workshop, Fisheries Agency hosted a forum inviting the international experts and the related industries to discuss how to mitigate by-catch species during fishing operation.
- (4) Taiwan published seabird identification guideline in 2009 and shark identification pamphlet for observer training and for the related staffs training

in 2011. Besides, Taiwan also published shark identification pads 2000 copies for fishers in 2011.

- (5) For disseminating shark fins naturally attached policy, Taiwan distributed posters, brochures and CD for fishers, the related fisheries associations and managers further understanding the regulation and the practical process for how to naturally attach fins in January 2012.
- (6) Fisheries journal (two times per month) and magazines are published and distributed domestically and overseas to fishers, the related fisheries associations/organizations, and managers.
- (7) All local governments and related fisheries associations/organizations have been required to strengthen the knowledge to fishers. Besides, broadcasting for educating fishers through the professional fisheries radio station has been conducted regularly. The related information has been passed on to ship masters and crews during observer trips and while in port.

Education

- (1) Fisheries Agency of Taiwan had authorized Wild Bird Federation Taiwan (WBFT) to implement a fishers' education program for mitigating seabird by-catch in 2005. Wild Bird Federation Taiwan (WBFT) conducted an educational program for Taiwanese fishers in the Port Louis, Mauritius in the fall of 2005. The program was the first trial to discuss the by-catch problems and the efficiency of mitigation measures with fishers in their cabins.
- (2) 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 on board 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 tuna and tuna-like species at local fish market.

- (3) In addition to the above mentioned posters, brochures, and CD, Taiwan has held a series of education training for fishers, the related association and managers for promoting shark fins naturally attached since January 2012.

Information Exchange

In line with the resolution/recommendation adopted by IOTC, ICCAT, WCPFC and IATTC aimed at the protection of ecologically related species (ERS), Taiwan has reported on its compliance with all current binding and recommendatory measures and on exchanging ERS information to these regional fisheries management organizations annually.

9. Information on Other ERS (Non-bycatch) Such as Prey and Predator Species

For investigating the prey species of southern bluefin tuna (SBT), Fisheries Agency of Taiwan commissioned scientists to conduct analysis on the stomach content of SBT in 2006 and 2009. The results were as follows.

- (1) The stomach contents of 131 southern bluefin tunas captured by Taiwanese longliners in southern central Indian Ocean in August 2004 and in June-July 2005 were examined. The size of tunas ranged from 84-187 cm FL (12-115 kg GG). The length and weight frequency distributions indicated that most specimens were in the range of 100-120 cm FL with a body weight between 10 and 20 kg. For the stomachs with prey items, almost all the preys are Pisces and the proportion of each prey groups are fishes (56.02%), cephalopods (5.39%), and crustaceans (38.59%). In total, 7 prey taxa were identified – 4 species of fish, 1 unidentified Pisces, 1 unidentified crustacean, and 1 unidentified cephalopod. The 4 fish species fall in the family of Carangidae, Clupeidae, Emmelichthyidae, and Hemiramphidae.

(2) In total 53 stomach samples were collected by observers at mid-western South Indian Ocean from Nov. 2007 to Jan. 2008 and Jun. – Sep. 2008. The mean fork length (FL) were 118.9 ± 1.84 (90-175) cm and 27.2 ± 12.9 (9-74) kg. 95% of the fish samples were within 91-150 cm FL. Among the 18 good stomach samples, the rate of empty stomach was 38.9%, having 11 non-empty stomachs for further analysis. The prey items can be distinguished into four major groups, i.e. fish, cephalopod, crustacean and marine pollution, and subdivided into 12 items. Paralepididae (Pisces) and Euphausiidae (Crustacean) were the only two families can be identified. The descending orders of the prey-importance were fish > cephalopod > crustacean = marine pollution by occurrence%.

10. Others

No other information.

11. Implementation of the IPOA-Seabirds and IPOA-Sharks

In line with “International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries” of FAO, Taiwan has adopted “National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-Seabirds)” which came into force in October 2006 to act as a basis for establishing seabird conservation policy.

Similarly, in respect of sharks, we have also adopted NPOA-sharks which entered into force in May 2006, not only for the guidance to encourage full usage of shark caught, but also for avoidance of waste. For consistent with global trend for the conservation and management of sharks, Taiwan is updating its NPOA-sharks.

Table1 . The number of active vessels fishing for SBT during 2002-2010

Year	No. of seasonal target vessels	No. of by-catch vessels	Total vessels
2002	21	50	71
2003	76	24	100
2004	79	18	97
2005	49	8	57
2006	33	3	36
2007	27	3	30
2008	35	6	41
2009	34	33	67
2010	65	17	82

Table 2. Annual SBT catches by gear for Taiwanese fishing vessels during 1972-2010
calendar year

Year	Longliner	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	913		913
2009 ¹	921		921
2010 ²	1208*		1208*

¹ Catch by quota year in 2009 (from 2009/4/1 to 2010/3/31): 949 MT

² Catch by quota year in 2010 (from 2010/4/1 to 2011/3/31): 1,140* MT

*landed weight

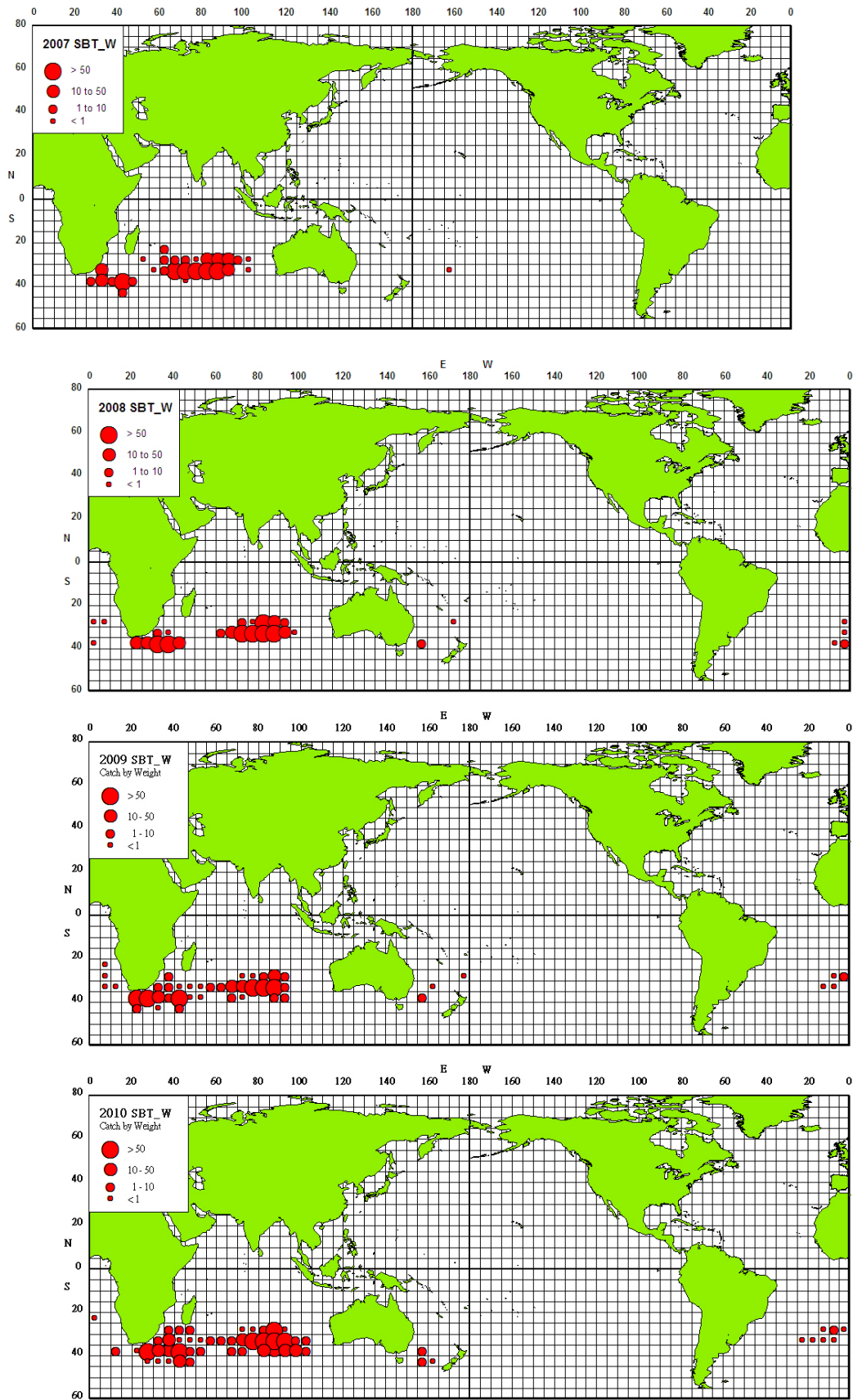


Fig. 2 Distribution of SBT catch by Taiwan longline fishery from 2007 to 2010. (Data in 2010 is preliminary.)

Table 3. Summary of results for scientific observer programs during 2002-2010.

Year	Observers Deployed	Observed Trips	Sea Days	Set Observed	Observer Vessels (%)	Observed Effort (%)	Observed Catch (%)
2002	1	1	202	126	4.76	6.57	1.44
2003	2	2	177	133	2.63	2.43	0.86
2004	3	5	263	165	3.8	4.17	3.10
2005	4	4	681	444	8.16	11.57	9.62
2006	3	3	296	253	9.09	10.46	6.08
2007	4	4	441	394	14.81	14.84	13.72
2008	2	2	252	227	5.71	6.65	3.63
2009*	5	6	531	457	18.18	15.01	12.75
2010*	7	11	964	927	16.67	11.95	8.35

*Data from 2009 was for quota year.

Table 4. Incidental catch of seabirds recorded by observers deployed on SBT vessels in 2009 - 2010 calendar year

Year	Caught seabird number	Observed hooks	BPUE (number/ thousand hooks)	Life Status	
				Alive and Release	Dead
2009	31	1,310,452	0.0237	2	29
2010	75	2,646,979	0.0283	23	52

Table 5. Seabird species recorded by observers deployed on SBT vessels in 2009 - 2010 calendar year

Species	Observed number	
	Year	
	2009	2010
yellow-nosed albatross	6	16
black browed albatross	5	1
wandering albatross	4	2
sooty albatross	2	3
light-mantled sooty albatross		4
grey-headed albatross		2
Salvin's albatross		1
shy typed albatross		1
other albatross	2	30
white-chinned petrel	11	9
giant petrel		1
grey petrel	1	1
other Seabirds		3
Total	31	75

Table 6. By-catch of shark species recorded by observers deployed on SBT vessels in 2009 – 2010 calendar year

Year	species	Number	%	CPUE
				(number/ thousand hooks)
2009				
	Blue shark	459	71.50%	0.350261
	Shortfin mako	134	20.87%	0.102255
	Bigeye thresher	4	0.62%	0.003052
	Pelagic thresher	1	0.16%	0.000763
	Smooth hammerhead	2	0.31%	0.001526
	Great white shark	26	4.05%	0.01984
	Longfin mako	15	2.34%	0.011446
	Other shark	1	0.16%	0.000763
	Total	642		0.489907
	Total hooks	1,310,452		
2010				
	Blue shark	490	87.34%	0.185117
	Shortfin mako	66	11.76%	0.024934
	Longfin mako	1	0.18%	0.000378
	Bigeye thresher	1	0.18%	0.000378
	Great white shark	3	0.53%	0.001133
	Total	561		0.21194
	Total hooks	2,646,979		