

Incidental- and By-Catches in the Indian Ocean from Taiwanese Observer Data of 2002-2005

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Introduction

Noting the increasing global attentions on the conservation of the ecosystem, the issue of incidental catches of ecological related species (ERS) in fishing operations has been of great concerns by States and conservation groups. The interaction between longline fishery and ERS such as seabirds, sea turtle and sharks, has become a new focal point in this regard since recent decades. One of the major concerns relating to studies on the interaction is that information on ERS has usually been sparse or indefinite in the regular catch logbooks. Observer data is therefore important to be supplementary information to the study.

Longline fishery is one of the most important Taiwanese deep seas fisheries and operates all over the three oceans. To collect scientific data on major target species and ERS, a pilot short-term observer program was launched in 2001 and more formal program was started since 2002. There were 13 vessels with one or two trips each vessel, have been observed in the Indian Ocean during 2002-2005. This report presents summary information on the incidental- and by-catch of the ERS from these observing trips. The information, however, needs to be regarded as premature due to low observer coverage.

Data Collected by the Observer Program

The data collected by observers include the following categories: (1) vessel's information such as size and equipments; (2) environmental information; (3) operation and effort information such as buoyline length, branch line length, number of baskets, setting time, setting direction, number of hooks, number of hooks per basket, etc; (4) catch information such as catch in number, in weight and discards in number for all species (tuna and tuna-like species, sharks by major species); (5) length measurements for the first 60 fish per set regardless of species (only the first 30 fish for 2002-03); and (6) incidental catch information, etc.

The observer logbook format has been changed in 2004 to require more information from the observing trip especially on the incidental catch species. Sea birds information was recorded by species since the new observer logbook was adopted.

The observers also collected biological samples from tuna and tuna-like species, and ERS for various research projects. Only data from observers' logbooks during 2002-05 are covered in this report. The 2005 data is not complete since one observer's data has not yet been recovered and included, and the verification on 2005 data has not yet finished. Discard information on fishes was not considered in the report. Information on biological samples or research results will be reported in other circumstances.

Results and Discussions

Location and efforts

The number of observers, vessels, fishing days and total efforts (numbers of hooks) of the observed trips in the Indian Ocean during 2002-2005 was summarized in Table 1. The observations were carried out in 14 longline vessels during these years. They were albacore- or bigeye-targeting vessels, but most of them have a period fishing for southern bluefin tuna. In general, each observer conducted his observation in one vessel each year for the Indian Ocean, but in some cases they had to change to the second vessel at sea or luckily in foreign ports if the vessel happened to have plan for entering port.

Each vessel may have up to 2 observing trips targeting on different species. A rough estimation, each trip was about 2-4 months and each observer collected 3-8 months of fishing operations. However, if taking into account the voyage time to the designated observing vessel, the time for changing fishing ground and the time waiting for another observing vessel (happened often in other Oceans), each observer may have up to 8-11 months on duty between his leave and back to Taiwan.

The fishing efforts of observed vessels were mostly in the range of 3,300-4,500 hooks per day, with an average of 3,400 hooks per day. Most of the efforts were in the temperate area of the Central Indian Ocean (Figure 1) before 2004. In 2004 there was one trip in the tropical area of the eastern Indian Ocean and 4 trips in the western Indian Ocean; and, in 2005, there were 2 trips in the tropical area and 7 trips in the temperate area, by 6 vessels.

Catch composition

Table 2 shows the annual catches and catch compositions (in terms of number) by major categories, and Figure 2 shows the catch compositions of tuna/billfishes and sharks by species. Tuna is the major catch category in the observed longline vessels in 2002-03 which composed more than 90% of the total catches. Among them, albacore and southern bluefin tuna composed most (Figure 2) because most of the observation was done in ALB/SBT fishing ground. In 2005 there was unexpected high catch of 'other fish' category which is mainly the oilfish (*Ruvettus pretiosus*) in the waters off South Africa.

There was no incidental take of sea turtle during the 2002-05 observations, nor whales and dolphins. The most incidental- or by-catch species were seabirds and sharks.

Seabirds

The catch composition of seabird is in the range of 0.08-0.26% (Table 2), depending on the location. Most seabirds were incidentally caught in the central Indian Ocean between 25°S-35°S (Figure 3), and therefore when more data from that area (for example the 2004 observation) the seabird composition was noted higher. Beside of the central Indian Ocean, in 2005, high seabird incidental catch was also noted in the waters off South Africa, between 30°S-40°S.

Figure 4 shows the distribution of number of seabirds spotted. Seabirds were mainly spotted in the temperate area. As to tropical area, it seems western part has more seabirds than the eastern part (very few instance happened in the eastern tropical area).

Table 3 listed the numbers of incidental catches of seabirds during the

observation period of 2002-2005. In general, the catch rates were around 0.009-0.023 individual per 1000 hooks, depending on the fishing location and year. While in the south region (south of 25°S) where more seabirds were observed, the catch rates were around 0.015-0.031. A preliminary study shows that the catch rate is not only associated with the setting of tori line, but also with the type of bait used. Operations using saury bait seem to have higher incidental catch rate.

The main species of seabirds caught in longline fisheries was albatrosses which composed more than 70% of total catch of seabirds. Overall, about 40-55% seabirds were alive and released (Appendix) when they were caught (Table 4), with exception of the case in 2005 when only 3 of the 29 incidental caught seabirds were alive and released (about 10%). The reason of this situation has not been investigated yet. The rest were dead and discarded with beaks of some individual sampled for species identification.

Sharks

The catch composition of sharks was low in the south region (south of 25°S); it is in the range of 0.3-1.7%. While in the area north of 25°S, the composition was much higher and was 3.5% in 2005 (Table 2). Blue shark bycatch was noted most and then the shortfin mako (Figure 2).

Table 3 shows the number of sharks caught by observed vessels and the catch rate. In general, except the first observing year of 2002, the catch rates are in the range of 0.13-0.27 fish/1000 hooks during 2003-05. In the area north of 25°S the catch rates are higher (up to 0.39 fish/1000 hooks), except in the western Indian Ocean (0.04 fish/1000 hooks in 2004).

Figure 5 the distributions of sharks caught by observed vessels during 2002-2005. The distributions of the catches of sharks approximately consisted with the distribution of efforts. However, as noted from Table3 that catch rate in the area of 25°S are higher.

Table 1. Number of observers, vessels, fishing days and total efforts (1000 hooks) of the observing trips in the India Ocean during 2002-2005. (Data of 2005 is preliminary.)

Year	No. Obs	No. Vessel	Total effort (x1000 hooks)	Fishing days ^b
2002	1 ^a	1	425	126
2003	2	2	450	133
2004	3	5	1,219	349
2005	6	6	1,932 ^c	574 ^c

^a Two observers were hired but one failed and returned before the mission started.

^b Excluded the time for changing fishing ground.

^c The 2005 effort and fishing day data included only 5 vessels data because one observer's data have not yet recovered.

Table 2. Catch in number and catch composition by main catch category during the observation trips in the Indian Ocean of 2002-2005. (Data of 2005 is preliminary.)

Year	Tunas		Billfishes		Sharks		Other fishes		Sea birds	
	Num	%	Num	%	Num	%	Num	%	Num	%
2002	6,088	92.4	61	0.93	12	0.18	418	6.35	7	0.11
2003	4,777	91.5	77	1.47	120	2.30	244	4.67	4	0.08
2004	8,662	80.6	267	2.49	164	1.53	1,623	15.11	28	0.26
2005 ^a	23,072	30.6	576	0.76	457	0.61	51,298	68.01	29	0.04
2005 ^b	22,860	85.7	541	2.03	388	1.46	2,857	10.72	15	0.06
2005 ^c	5,919	76.8	404	5.24	268	3.48	1,119	14.51	0	0.00

^a All the 2005 observer data

^b 2005 observer data excluded the two trips with high oilfish catch

^c 2005 observer data in the tropical area (bigeye fishing ground)

Table 3. Incidental catch in number and catch rate (numbers per 1000 hooks) of sea birds and by-catches of sharks caught during the 2002-05 observations in the Indian Ocean. (Data of 2005 is preliminary.)

Year	Sea bird					Shark			
	Overall		Catch rate over 25°S			Overall		Catch rate over 25°S	
	No.	Catch rate	North	South	No.	Catch rate	North	South	
2002	7	0.0165	0.000	0.0196	12	0.0282	0.0440	0.0252	
2003	4	0.0089	0.000	0.0145	120	0.2667	0.3502	0.2139	
2004	28	0.0230	0.000	0.0309	164	0.1345	0.0415	0.1667	
2005	29	0.0150	0.001	0.0226	457	0.2365	0.3932	0.1486	

Table 4. The life status of caught sea birds during the observed trips in the Indian Ocean during 2002-2005. (Data of 2005 is preliminary.)

Year	Number	Alive and released %	Dead %
2002	7	42.86	57.14
2003	4	50.00	50.00
2004	28	53.57	46.43
2005	29	10.34	89.66
Total	68		

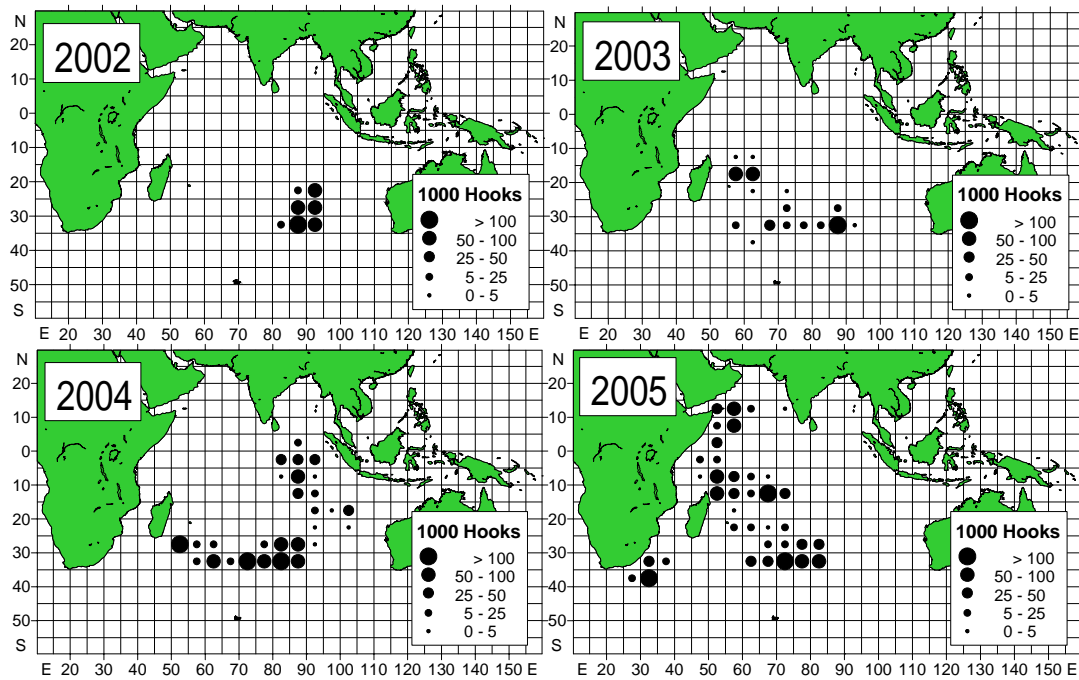


Figure 1. Effort distribution of the 13 observed vessels in the Indian Ocean during 2002-05. (Data of one observed vessel has not yet recovered.) Data of 2005 is preliminary.

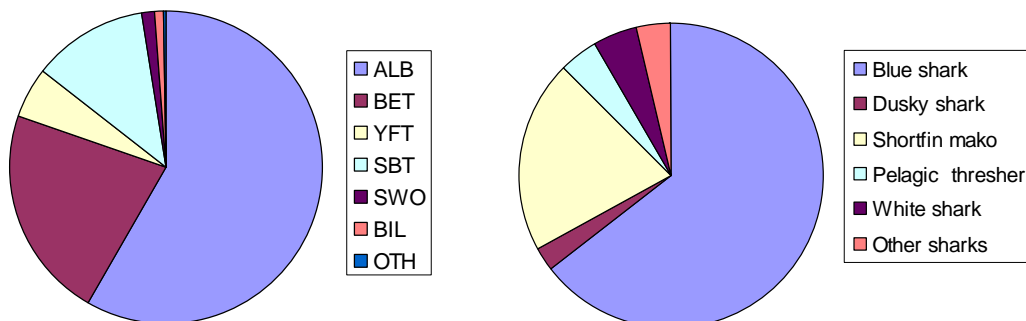


Figure 2. Catches compositions of tunas and billfishes (left) and sharks (right) from the Indian Ocean observation trips during 2002-2005. (Data of 2005 is preliminary.)

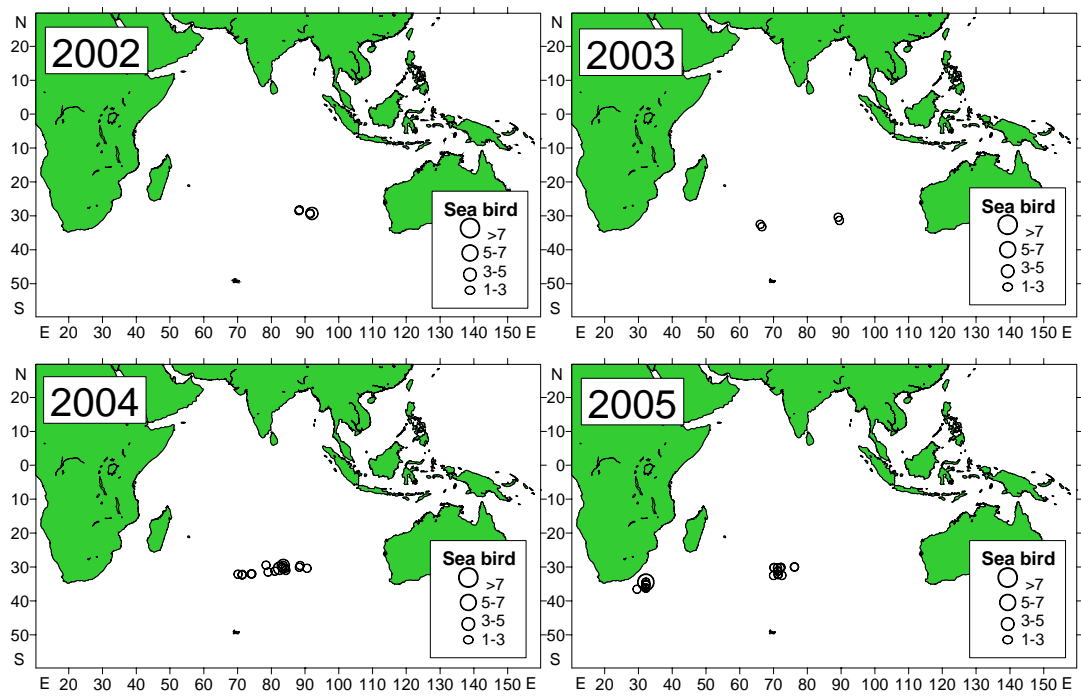


Figure 3. Distribution of incidental catches of seabirds in the 2002-05 observation trips. Each circle indicates one observing day. The larger the circle is, the higher the number of seabirds taken. (Data of 2005 is preliminary.)

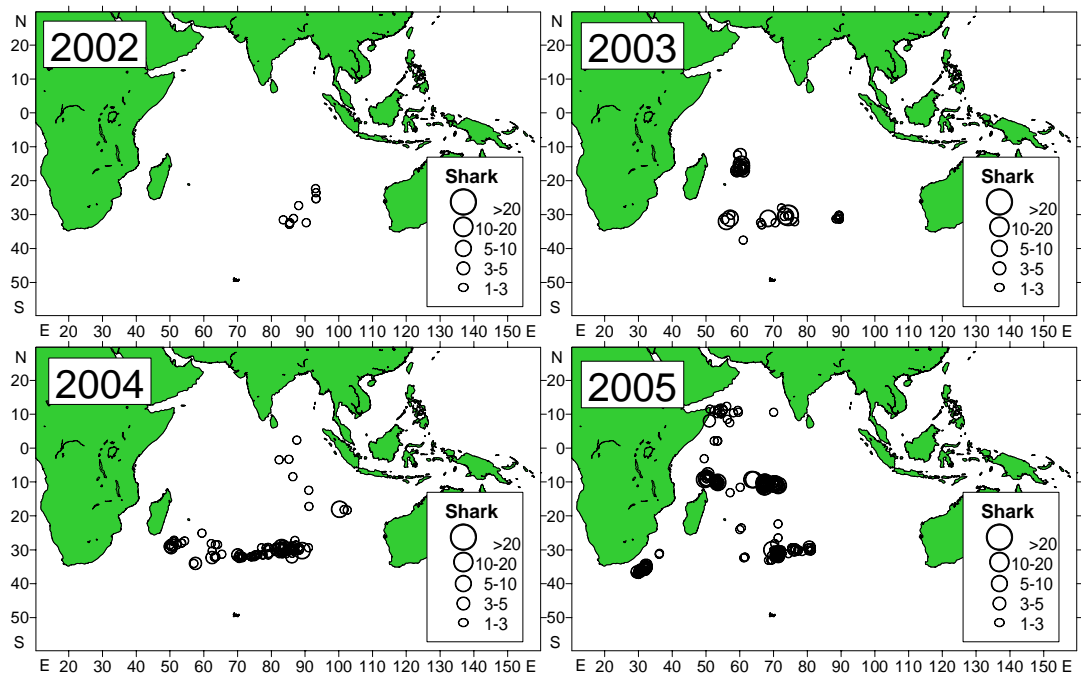


Figure 5. Distribution of bycatch of sharks in the 2002-05 observation trips. Each circle indicates one observing day. The larger the circle is, the higher the number of sharks caught. (Data of 2005 is preliminary.)

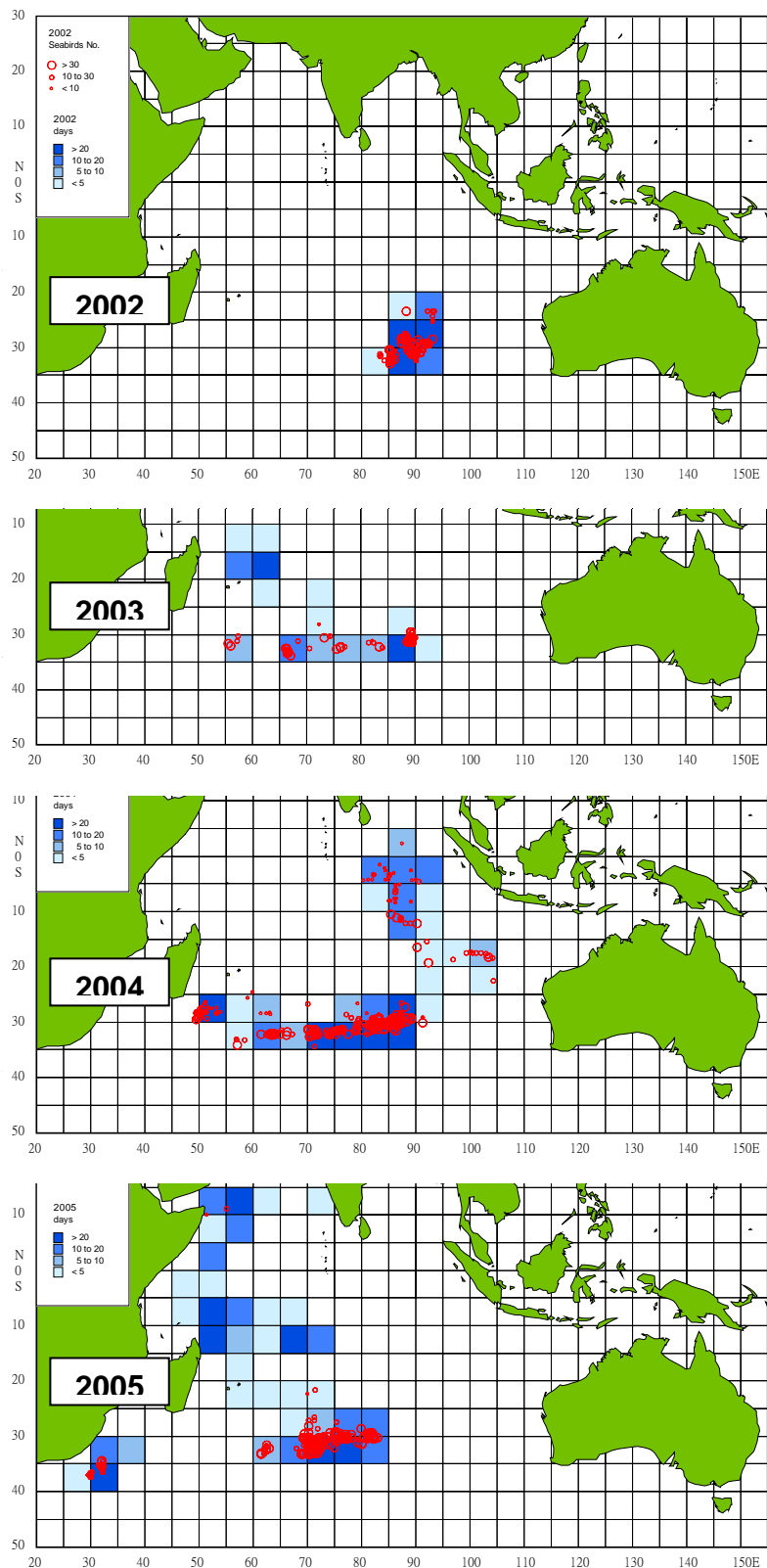


Figure 4. Number of seabirds spotted during the observation trips of 2002-05. The base blue shade indicates the number of observing days (effort), the darker the higher. The red circle indicates number of seabirds spotted each day, the larger the higher. Effort position is the position when line setting started and will be a little different from the seabird spotted position during the operation. (Data of 2005 is preliminary.)

Appendix. Unloose rope and release of incidentally caught seabirds from the observed vessel.

