

STATUS REPORT OF TAIWAN DEEP SEA TUNA FISHERY IN THE INDIAN OCEAN

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1. FISHERY INFORMATION

Taiwan's deep-sea longline fishery commenced in the mid-1950s, firstly in the North and East Indian Ocean and expanded extensively to the three Oceans, while the Indian Ocean was the major fishing ground through its development. The main catch was yellowfin tuna in the Indian Ocean during late 1960s to the early 1970s, and later albacore become the target species in temperate waters. Since 1980s, some of the longliners, together with newly built larger vessels with super cold freezers (below -60°C), started to shift the target to bigeye and yellowfin tunas in tropical waters. In recent years, swordfish and southern bluefin tuna have also become seasonal target species to some of the vessels.

In 2001, there has been 335 deep-sea longliners operating in the Indian Ocean (excluding the small fresh tuna longliners), following the decreasing trend since 1998 (Table 1) due to a gradually shift of fishing ground to the Pacific Ocean. Most of them (295 boats) were larger than 200 GRT. Their catch was all sold in frozen form and was thus referred as frozen tuna longline fishery. The total catch of tunas and billfishes made by these longliners, except for 1993 when high yellowfin catch was observed, was fluctuated between 93,000-110,000 MT and in average maintained at the level of 100,000 MT over the past ten years (1992-2001). Figure 1 shows their effort distributions of the recent four years.

Major species of the frozen tuna fishery was the albacore, bigeye and yellowfin tunas, and the swordfish (Table 2). The albacore catch of 2001 was estimated as 26,000 MT, increased by about 4,000 MT from years 1999 and 2000. The bigeye tuna catch was estimated as 37,000 MT, the same level of 1999. The yellowfin tuna catch was slightly increased about 1,000 MT from previous years and was estimated as about 19,000 MT. For swordfish, however, the 2001 catch was decreased to 12,000 MT, which is the lowest catch since swordfish has become a seasonal target species during early 1990s. The decrease of fishing effort for the species was also noted concurrently.

Except for the frozen tuna longline fishery, there were about 1,700 small longliners operating in the surrounding waters of Taiwan and the distant fishing grounds in the Pacific and the Indian Oceans in recent decades. They mainly target on bigeye and yellowfin tunas for fresh sashimi market and therefore were referred as fresh tuna longliners. The current rough estimation of their bigeye and yellowfin tuna catch in the

Indian Ocean was in the magnitude of 25,000 MT, with 40% of it being bigeye catch.

Besides longline fishery, gillnet fishery was also operated in the Indian Ocean during the mid-1980s, targeting on albacore on a seasonal basis. The fishery was banned in 1992 in accordance with the UN moratorium.

2. STATISTICAL SYSTEMS

Statistical systems of Taiwan tuna fisheries were started in 1960s. Statistics were all collected by the Taiwan Fisheries Bureau up to 1991 and since then by the Fisheries Administration. Processing of the data has been carried out by the Institute of Oceanography, National Taiwan University up to 1995 and was then transferred to the OFDC. OFDC is commissioned to be in charge of the data compilation and processing system and has proposed changes in the data system in late 1996.

There are four types of frozen tuna fishery data currently collected and compiled in OFDC:

- (1) Annual catches: The annual catch data was estimated based on multiple sources including: traders' sales record, verification of fishing vessels' sales settlement, certified weight reports from a Japan association, and verification records of Taiwan Tuna Association. The last two sources were available since 1994.
- (2) Catch and effort data: The catch and effort data was compiled based on logbooks which were submitted to the authorities by fishers. The information recorded in the logbook includes daily position, number of hooks used, catches in number and weight by species (14 tuna and tuna-like species). Information on the number of hooks per basket used has been requested since 1994.

All the logbooks were verified first for the accuracy and the validity on the fishing location, catches, average weight, trip courses, etc, through scientists' review. The data were then digitalized and processed through real-time error trapping and batch checking process for its completeness and integrity. From year of 1995 when detail input in the data base was initiated, the catch in weight of the logbook was adjusted so that the sum of the trip would be as close to its commercial landing records as possible.

The data that provided to IOTC has been monthly aggregated

and raised to the annual catches by a specific process: A raising factor was firstly obtained by dividing the sum of annual total catches of the four main species (albacore, bigeye, yellowfin tunas and swordfish) by the sum of the catches of the same four species reported on logbooks. Then all the logbook data (including efforts and catches of the 14 species) was raised by multiplying the same raising factor to keep the consistency of CPUE and catch composition between raised data and original logbook data.

However, because of the complexity of our longline data which conjoined with different targeting fisheries and hard to be raised separately, the add-up catch of a species in the raised and aggregated data may be incomparable to its annual total catch.

- (3) Size data: Length measurements were recorded on the logbook by fishers for the first 30 fish landed everyday, regardless of species. As a result, there have been more records on the measurement of the major species (e.g., albacore) but less on the non-target species (e.g., bigeye, yellowfin and/or swordfish in earlier years). Same as the logbook data, it has been verified first for the accuracy and the validity by scientists before it was incorporated into the database.
- (4) Fishing craft information: Information on fishing vessels operating in the Ocean was compiled by major tonnage (GRT) each year to provide the annual estimate of total number of fishing vessels requested by IOTC.

All the data had been routinely provided to IPTP in the past. However, since the Indian Ocean is the most important and largest fishing ground for Taiwanese deep sea longliners, the data of this Ocean was much more complicate and sensitive comparing to other Oceans. Therefore, due to the re-organization of statistical group and the consequent necessity of revising historical data for consistency, although the catch/effort data from 1996 to the present have been continuously provided to IOTC on schedule, the data before that year are still subject to revision.

As to the size data, since the very low coverage (less than

10%) for logbook data and hence the even lower coverage for size data, was noted in 1990-1993, and also due to the revision process on historical data, the provision of size data to IPTP or IOTC was temporarily broken off since 1990.

Although the revision on both catch/effort and size data was finished at this stage, the data quality still needs to be confirmed. Nevertheless, for the urgent stock assessment necessity, we will open to collaborative studies on the concerned species using the whole series of newly revised catch/effort and size data next year, and will provide to IOTC if no significant error or drawback has shown up during the collaborative works.

Regarding to the fresh tuna fishery, since its high mobility and complexity in fishing activities, it is difficult to make the statistical data collection satisfactorily. Collections of annual catch and logbook information for foreign-based longliners have been initiated recently. The coverage is still low and expects to be increasing in the future.

3. MANAGEMENT

To be in line with the IOTC regulation on bigeye tuna (IOTC Resolution 01/06), a statistical document program on bigeye tuna catch has been implemented since July 1 of 2002. Any bigeye catch was required to obtain official statistical document before they can be exported to market. Provision of logbook data was also required for fishers to obtain the document, and thus the coverage of logbook for this fishery is expected to be increased substantially in the next few years.

For better monitoring the fishing activities of deep sea longliners, the experimental vessel monitoring system (VMS) was conducted continuously. All vessels fishing in the deep seas are encouraged to install the system.

For the purpose of better understanding the target fishing activities and collecting bycatch information, an experimental scientific observer program has been lunched in 2001 and expanded in 2002. There has been one observing trip for each year conducted in the Indian Ocean since 2001. The recent trip was just finished in November of 2002.

Table 1. Total number of Taiwanese frozen tuna longliners having been operating in the Indian Ocean, by tonnage, during 1996-2001. Data of 2001 is preliminary.

TONNAGE	1996	1997	1998	1999	2000	2001
- 200 GRT	22	25	36	42	40	40
201-500 GRT	149	183	181	170	173	170
501- 1000 GRT	121	121	126	129	126	125
TOTAL	292	329	343	341	339	335

Table 2. Total catches (round weight, MT) of the four major species (albacore, bigeye and yellowfin tunas and swordfish), by Taiwanese frozen tuna longline and gillnet fisheries in the Indian Ocean, 1981-2001. Data of 2001 is preliminary.

Year	Longline				Gillnet				Longline+Gillnet			
	ALB	BET	YFT	SWO	ALB	BET	YFT	SWO	ALB	BET	YFT	SWO
1981	12,326	6,840	4,101	1,092					12,326	6,840	4,101	1,092
1982	21,930	11,313	4,715	1,452					21,930	11,313	4,715	1,452
1983	16,958	11,322	5,580	1,910					16,958	11,322	5,580	1,910
1984	13,932	10,862	5,812	1,725					13,932	10,862	5,812	1,725
1985	6,155	12,185	7,321	1,988	721	16	-	-	6,876	12,201	7,321	1,988
1986	11,052	16,836	16,216	3,049	15,176	275	33	182	26,228	17,111	16,249	3,231
1987	13,137	17,637	22,313	3,768	12,179	103	52	63	25,316	17,740	22,365	3,831
1988	11,048	19,365	22,730	5,127	14,441	1,919	35	274	25,489	21,284	22,765	5,401
1989	7,097	19,934	22,388	3,949	14,357	465	37	121	21,454	20,399	22,425	4,070
1990	5,756	20,747	31,550	3,739	21,142	168	88	105	26,898	20,915	31,638	3,844
1991	13,102	28,958	30,707	4,672	9,001	117	6	43	22,103	29,075	30,713	4,715
1992	11,103	24,007	55,987	8,987	1,322	17	1	6	12,425	24,024	55,988	8,993
1993	11,890	39,542	88,026	15,345					11,890	39,542	88,026	15,345
1994	14,407	27,732	33,984	12,454					14,407	27,732	33,984	12,454
1995	14,209	32,645	23,069	18,261					14,209	32,645	23,069	18,261
1996	16,930	29,820	27,850	17,620					16,930	29,820	27,850	17,620
1997	15,204	34,145	18,374	17,163					15,204	34,145	18,374	17,163
1998	21,572	39,698	23,416	16,829					21,572	39,698	23,416	16,829
1999	22,514	37,093	17,686	14,727					22,514	37,093	17,686	14,727
2000	21,650	36,411	17,367	15,170					21,650	36,411	17,367	15,170
2001	26,141	37,015	18,860	12,284					26,141	37,015	18,860	12,284

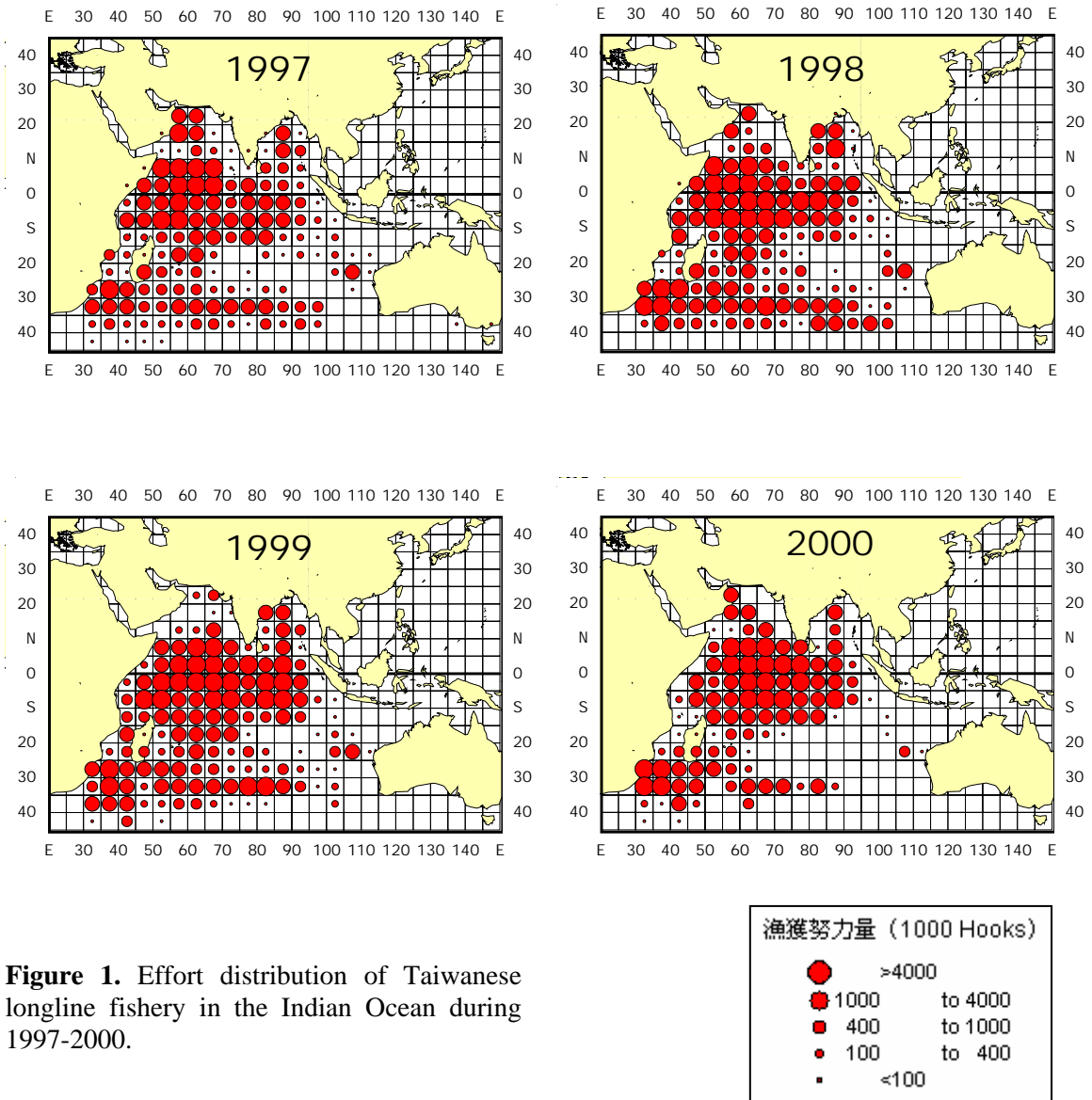


Figure 1. Effort distribution of Taiwanese longline fishery in the Indian Ocean during 1997-2000.