# KOREAN TUNA LONGLINE FISHERY IN THE INDIAN OCEAN

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**ABSTRACT**

*The commercial Korean tuna longline fishery has operated in the Indian Ocean since mid 1960s. Korean tuna longline fishery was mainly targeted for yellowfin, bigeye and albacore tunas. Southern bluefin tuna was enlisted on the main target species of Korean longliners in recent years. The traditional fishing ground of Korean tuna longline fishery were mainly formed in the central tropical Indian Ocean but Korean longliners were mainly operated in the western Indian Ocean from 2000.*

*Number of Korean tuna longline fishing vessel in the Indian Ocean showed a decreasing trend from a peak in 185 longliners in 1975 but 1995 onward about 50 to 60 longliners have operated. The size of Korean tuna longliners ranges from 298 to 525 gross tonnage class. Catches of Korean tuna longline fishery has shown a decreasing trend from a peak at 71,000 tons in 1978 and in 2001, 23 out of 54 registered longliners caught 4,000 tons, showing a decrease by about 42% from 2000 figure. CPUE of Korean longline fishery has also shown a decreasing trend from a peak at 2.48 fish/100 hooks in 1977 and it has maintained less than 1.00 fish/100 hooks in recent years.*

*Korean government initiated fisheries observer program in 2002 to monitor its distant water fisheries including those for tunas and to meet the requirements of regional fisheries bodies. Two systems have been maintained for the collection of Korean tuna fisheries data. The first system has been operated by the Korean Deep-Sea Fisheries Association to collect total catch by species and the second data collection system which has been the National Fisheries Research and Development Institute (NFRDI) is to sample catch and effort data based on the logbooks.*

## INTRODUCTION

The experimental fishing of the Korean tuna longline fishery was commenced in the eastern Indian Ocean in 1957 and commercial fishing has started since mid 1960s, targeting for yellowfin, bigeye and albacore tunas. The fishing ground were gradually extended to the whole fishing grounds of the Indian Ocean. Bigeye tuna have been the dominant species of Korean tuna longline fishery since 1974 and this was due to the introduction of deep longline fishing gear. Southern bluefin tuna fishery is the most recently developed tuna fishery by Korean distant-water fishing industry in the early 1990s and has highlighted since mid 1990s in the Indian Ocean.

National Fisheries Research and Development Institute (NFRDI) have continuously collected catch and effort data for the Indian tunas and tuna-like species from Korean tuna longliners.

This report is to review fishing vessels, catch and effort, catch per unit effort (CPUE), fishing ground and size composition of major species for the Korean tuna longline fishery on the bases of Korean commercial fishing data in the Indian Ocean.

## FISHING VESSELS

Number of Korean tuna longline fishing vessels in the Indian Ocean showed a decreasing trend from a peak in 185 longliners in 1975, followed by decrease continuously to 19 in 1991. From 1992 onward about 50 to 60 longliners have operated annually in the ocean (table 1). The size of Korean tuna longliners ranges from 298 to 525 gross tonnage (GRT) class and most of vessels are included in the 380-420 GRT class.

## GEOGRAPHICAL DISTRIBUTION OF FISHING GROUND AND CPUE

Annual geographical distribution of CPUE for all species, yellowfin tuna(YFT) and bigeye tuna(BET) for 1999-2001 are shown in Figure 1. The traditional fishing grounds of Korean tuna longline fishery were mainly formed in the central tropical area between $20^{o}$N and $20^{o}$S and no significant change in fishing area was observed.

From 2000 Korean longliners were mainly operated in the western Indian Ocean and The fishing ground of high CPUE

revealed off east coast of Africa between Somalia and Madagascar in 2001.

Korean SBT fishery commenced in 1991 with a few longliners shifted from tropical waters where they targeted bigeye and yellowfin and fishing grounds were formed in the high seas of the western Indian Ocean off South Africa and the eastern Indian Ocean off the western Australia.. Thus, in the early years of this fishery, SBT did not attract Korean fishing industry, but because of higher market price, from 1995 onward number of longliners rapidly increased to reach a maximum fleet size of 19 longliners in 1998. However, by the voluntary regulation of fleet size among fishing industries, annual fleet size for SBT fishery never exceeded 16 registered number since then which resulted in less catch than allocated quota of 1,140 mt in 2001.

**CATCH AND EFFORT**

Korean longline fisheries in the Indian Ocean usually have operated in all year round since the fishery started. Thus, fisheries statistics are collected and reported for a calendar year. Coverage rate in catch of all species and catch per unit effort (no. of fish per 100 hooks) was 52 to 69 percent during the 1981-1985 period, but it was increased to the highest level of 91 percent in 1987. In recent years the coverage rates maintained about 50% and it was 70.8 and 65.4 percent in 2000 and 2001, respectively.

Korean tuna longline fishery was mainly targeted for BET and YFT in the Indian Ocean but recent years southern bluefin tuna (SBT) was enlisted on the main target species (Table 2). Until 1974 yellowfin tuna was dominant species in total catch, but bigeye tuna since 1974, which is attributed to the introduction of the deep longline fishing gear in 1973, has replaced it.

Catches of Korean tuna longline fishery has shown a decreasing trend from a peak at 71,000 tons in 1978 and it was recorded below 10,000 tons from 1998. In 2001, 23 out of 54 registered longliners caught 4,000 tons, showing a decrease by about 42% from 2000 figure (Table 1).

**NOMINAL CPUE**

CPUE of Korean longline fishery in the Indian Ocean for all species has shown a decreasing trend from a peak at 2.48 fish/100 hooks in 1977 and then CPUE appeared to be more or less stable between 1.00 and 1.78 fish/100 hooks. In recent years CPUEs were less than 1.00 fish/100 hooks (Table 1).

**SIZE COMPOSITION**

Fishermen on board have routinely collected size of main targeted species, BET and YFT and sometimes included bycatch also. But the data should be used with caution due to relatively small sample size and no validation procedure.

Fig. 2 showed the size distribution of YFT and BET caught by Korean longliners during the past 3 years. Size composition ranges from 97 to 212cm FL for YFT and from 95 to 190 cm FL for BET, respectively.

**OTHER RELEVANT INFORMATION**

**Observer program**

Korean government initiated fisheries observer program in 2002 to monitor its distant water fisheries including those for tunas and to meet the requirements of regional fisheries bodies. At the initial stage, the size of observer program will be fairly small to cover only for the fisheries to be urgently implemented such as SBT longline fishery in CCSBT Convention Area but will be gradually developed to a bigger scale to cover all required areas of fisheries.

**Data Collection System**

Two systems have been maintained for the collection of Korean tuna fisheries data. The first system has been operated by the Korean Deep-Sea Fisheries Association to collect total catch by species. All Korean distant water fishing vessels report their catch records in terms of weight by species to their companies once a week or at 10-day intervals. The Association compiles the data by month and by FAO fishing area to submit to the Ministry of Maritime Affairs and Fisheries for the final review and publication. Both the Association and the Ministry of Maritime Affairs and Fisheries have published the catch statistics for official use annually.

The second data collection system is to sample catch and effort data based on the logbooks. This system was lawful in 1977 by the Ministry of Agriculture and Fisheries. According to this domestic regulation, distant-water fishing vessels have to submit the reports of their fishing operations within 30 days (home-based) or 60 days (foreign-based) after completion of their operations to the National Fisheries Research and Development Institute (NFRDI).

*Table 1. Number of vessel, catch (ton) and CPUE (no. of fish/100 hooks) by Korean longline fishery in the Indian Ocean, 1966~ 2001*

| Year | No. of vessel | *Catch (ton) | ** CPUE | Year | No. of vessel | Catch (ton) | CPUE |
|---|---|---|---|---|---|---|---|
| 1966 | 3 | 761 | | 1991 | 19 | 6,317 | 1.38 |
| 1967 | 46 | 6,594 | | 1992 | 50 | 10,311 | 1.42 |
| 1968 | 33 | 11,596 | | 1993 | 50 | 14,198 | 1.20 |
| 1969 | 41 | 18,612 | | 1994 | 52 | 14,581 | 1.08 |
| 1970 | 36 | 8,808 | | 1995 | 52 | 10,905 | 1.15 |
| 1971 | 52 | 16,786 | | 1996 | 62 | 18,432 | 1.34 |
| 1972 | 75 | 20,967 | | 1997 | 58 | 18,100 | 1.30 |
| 1973 | 112 | 29,799 | | 1998 | 59 | 8,411 | 0.88 |
| 1974 | 173 | 41,958 | | 1999 | 54(31) | 3,836 | 0.82 |
| 1975 | 185 | 47,908 | 1.64 | 2000 | 54(38) | 6,888 | 0.83 |
| 1976 | 128 | 43,497 | 1.86 | 2001 | 54(23) | 4,033 | 0.92 |
| 1977 | 165 | 66,015 | 2.48 | | | | |
| 1978 | 151 | 71,123 | 2.37 | | | | |
| 1979 | 169 | 46,176 | 1.66 | | | | |
| 1980 | 174 | 38,085 | 1.28 | | | | |
| 1981 | 142 | 36,138 | 1.47 | | | | |
| 1982 | 146 | 42,531 | 1.60 | | | | |
| 1983 | 115 | 36,975 | 1.38 | | | | |
| 1984 | 75 | 24,613 | 1.32 | | | | |
| 1985 | 62 | 28,185 | 1.49 | | | | |
| 1986 | 66 | 30,639 | 1.73 | | | | |
| 1987 | 81 | 30,904 | 1.78 | | | | |
| 1988 | 112 | 34,469 | 1.49 | | | | |
| 1989 | 87 | 23,610 | 1.00 | | | | |
| 1990 | 77 | 20,335 | 1.00 | | | | |

* Catch included FAO 58 area (FAO areas 51, 57 and 58)

** CPUE : Number/100 hooks

( ) : number of vessel fished

Data source : Ministry of Maritime Affairs and Fisheries (MOMAF)

Table 2. Annual catch by species and FAO statistical area for Korean longline fishery in the Indian Ocean, 1991-2001

| | FAO area | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Southern Bluefin tuna | 51 | | 15 | | 98 | 216 | 314 | 1,402 | 1,415 | 463 | 328 | 363 |
| | 57 | | | | | 99 | 597 | 181 | 147 | 210 | 112 | 347 |
| | 58 | | | | | | | | | 563 | 456 | |
| | sub-tot | | | | | | | 1,583 | 1,562 | 1,236 | 896 | 710 |
| Yellowfin tuna | 51 | 2,891 | 3,861 | 4,681 | 3,608 | 2,426 | 3,426 | 3,607 | 2,218 | 718 | 991 | 1,240 |
| | 57 | 113 | 224 | | 14 | 18 | 17 | 35 | 47 | 85 | 73 | 161 |
| | 58 | | | | | | | | | 105 | 747 | |
| | sub-tot | 3,004 | 4,085 | 4,681 | 3,622 | 2,444 | 3,443 | 3,642 | 2,265 | 908 | 1,811 | 1,401 |
| Albacore | 51 | | 5 | 4 | 9 | 3 | 14 | 102 | 118 | 26 | 85 | 31 |
| | 57 | 231 | | | 4 | 3 | | | 4 | 1 | | |
| | 58 | | | | | | | | | | 10 | |
| | sub-tot | 231 | 5 | 4 | 13 | 6 | 14 | 102 | 122 | 27 | 95 | 31 |
| Bigeye tuna | 51 | 1,946 | 4,382 | 7,146 | 8,179 | 6,106 | 10,737 | 10,129 | 3,154 | 608 | 1,677 | 1,145 |
| | 57 | 209 | 154 | | 60 | 48 | 48 | 77 | 33 | 479 | 129 | 256 |
| | 58 | | | | | | | | | 258 | 1,414 | |
| | sub-tot | 2,155 | 4,536 | 7,146 | 8,239 | 6,154 | 10,785 | 10,206 | 3,187 | 1,345 | 3,220 | 1,401 |
| Other tunas | 51 | 222 | 464 | 796 | 584 | 577 | 1,036 | 1,199 | 705 | 182 | 171 | 294 |
| | 57 | | 58 | | | | 46 | 5 | 19 | 18 | | 29 |
| | 58 | | | | | | | | | 44 | 358 | |
| | sub-tot | 222 | 522 | 796 | 584 | 577 | 1,082 | 1,204 | 724 | 244 | 529 | 323 |
| Swordfish | 51 | 17 | 60 | 20 | 17 | 74 | 51 | 196 | 147 | 8 | 42 | 18 |
| | 57 | 15 | | | | 2 | | 8 | 2 | 14 | | 19 |
| | 58 | | | | | | | | | 7 | 21 | |
| | sub-tot | 32 | 60 | 20 | 17 | 76 | 51 | 204 | 149 | 29 | 63 | 37 |
| Blue marine | 51 | 11 | 32 | | 3 | 7 | 1 | 75 | 101 | 10 | 79 | 16 |
| | 57 | | | | | | | | 2 | 6 | | |
| | 58 | | | | | | | | | | | |
| | sub-tot | 11 | 32 | | 3 | 7 | 1 | 75 | 103 | 16 | 79 | 16 |
| Striped marine | 51 | 9 | | 3 | 2 | 38 | | 65 | 43 | | 12 | 2 |
| | 57 | | | | | | | | | 1 | 8 | 1 |
| | 58 | | | | | | | | | | | |
| | sub-tot | 9 | | 3 | 2 | 38 | | 65 | 43 | 1 | 20 | 3 |
| Sailfish | 51 | | 6 | | | | 3 | 5 | | | | |
| | 57 | | | | | | | | | | | |
| | 58 | | | | | | | | | | | |
| | sub-tot | | 6 | | | | 3 | 5 | | | | |
| Black marine | 51 | | 2 | | | 21 | 8 | 40 | 20 | 2 | 12 | 10 |
| | 57 | | | | | | | | | 7 | | 13 |
| | 58 | | | | | | | | | 4 | 13 | |
| | sub-tot | | 2 | | | 21 | 8 | 40 | 20 | 13 | 25 | 23 |
| Other billfishes | 51 | 623 | 978 | 1,548 | 2,003 | 1,242 | 2,125 | 939 | 217 | 4 | 124 | 74 |
| | 57 | 30 | 58 | | | 25 | 9 | 22 | 15 | 8 | 1 | 4 |
| | 58 | | | | | | | | | 5 | 23 | |
| | sub-tot | 653 | 1,036 | 1,548 | 2,003 | 1,267 | 2,134 | 961 | 232 | 17 | 148 | 78 |
| Sharks | 51 | | | | | | | 13 | 4 | | | 10 |
| | 57 | | 12 | | | | | | | | | |
| | 58 | | | | | | | | | | 2 | |
| | sub-tot | | 12 | | | | | 13 | 4 | | 2 | 10 |
| Total | 51 | 5,719 | 9,805 | 14,198 | 14,503 | 10,710 | 17,715 | 17,772 | 8,142 | 2,021 | 3,521 | 3,203 |
| | 57 | 598 | 506 | 0 | 78 | 195 | 717 | 328 | 269 | 829 | 323 | 830 |
| | 58 | | | | | | | | | 986 | 3,044 | |
| | total | 6,317 | 10,311 | 14,198 | 14,581 | 10,905 | 18,432 | 18,100 | 8,411 | 3,836 | 6,888 | 4,033 |

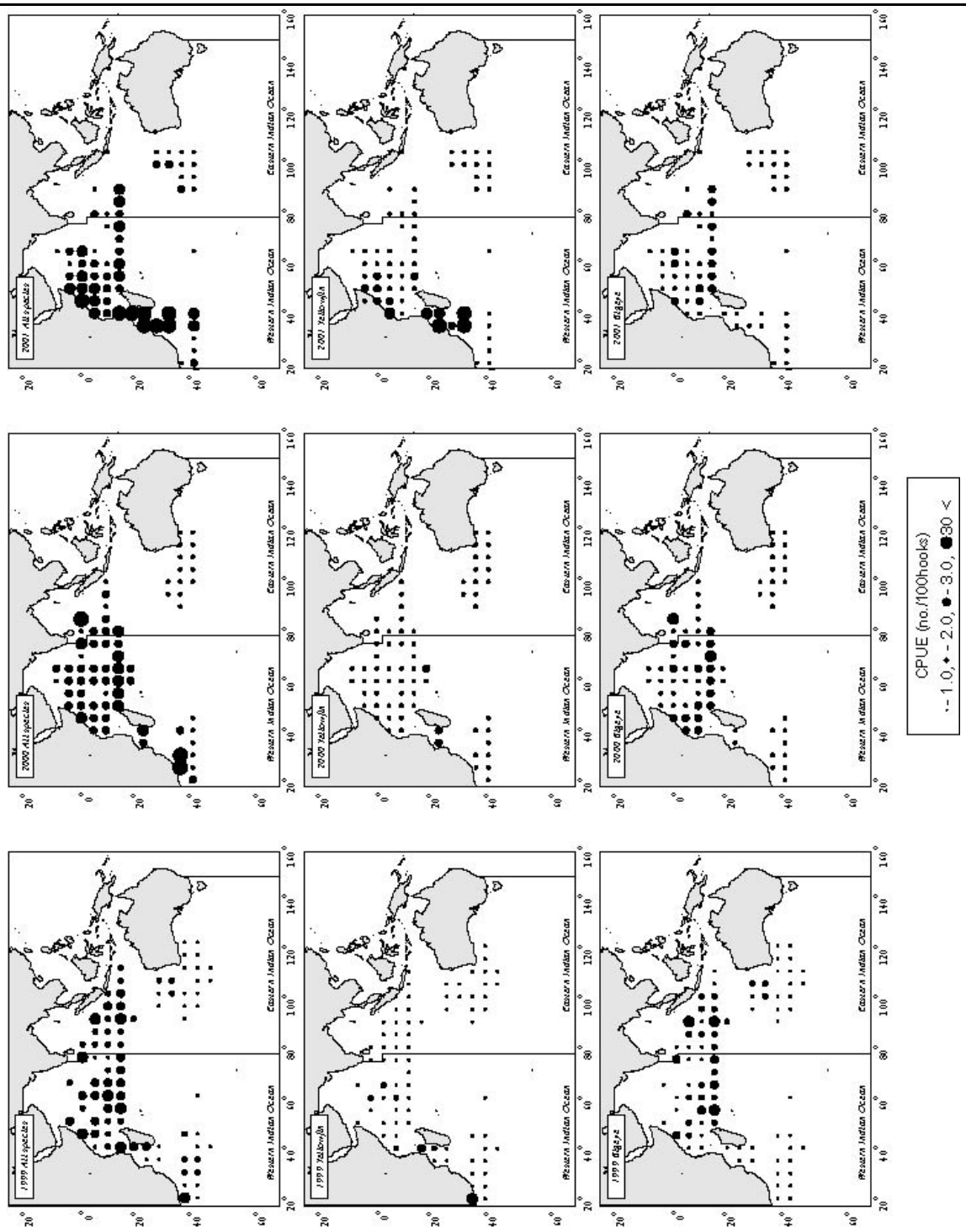


*Fig. 1. Korean tuna longline fishery operation area and CPUE (no. of fish/1,000 hooks) distribution from 1999 to 2001.*

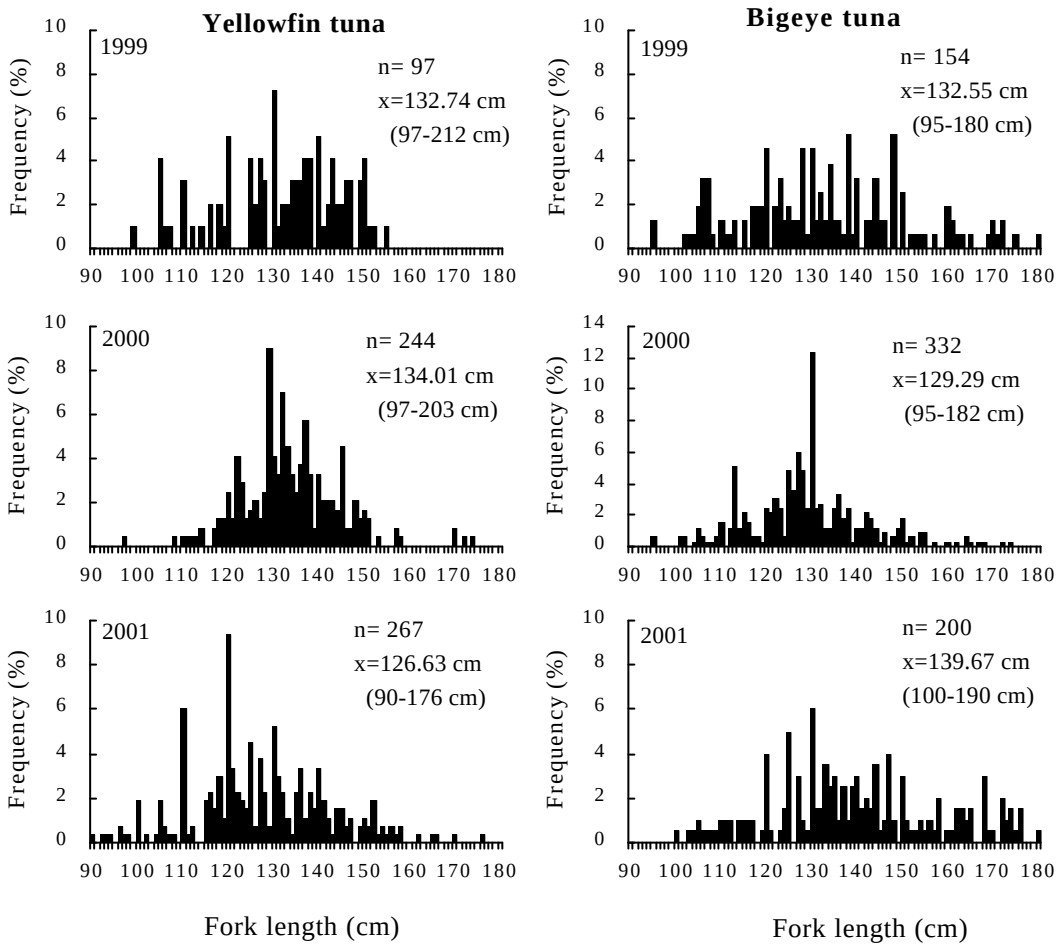


*Fig. 2. Length distribution of YFT and BET caught by Korean longliners from 1999 to 2001 in the Indian Ocean*