

Review of bigeye tuna catch by Korean longline fleet in the Indian Ocean

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Introduction

Longline is the only type of gears for Korean tuna fisheries in the Indian Ocean. It was started with a small experimental longline fishing in the Indian Ocean in 1957, which was the first instance of Korean distant-water fisheries. After that, Korean longline fishery was expanded to the other oceans and became one of forces for the early period of Korean economic development by the 1960-70s. Catch statistics have been available since the mid-1960s. The main species were yellowfin tuna, bigeye tuna and albacore tunas from the beginning, to which southern bluefin tuna was included from 1991. At the outset, fishing grounds were around the central tropical area between 20°N and 20°S and then extended southward to 45°S.

The total annual catches of tuna and tuna-like species by Korean longline fisheries in the Indian Ocean steeply increased from the beginning of the mid-1960s and peaked at 71,100 mt in 1978 and then largely decreased with fluctuation thereafter (Table 1, Fig. 1). The catch trend closely coincided with the changes in the number of vessels active throughout the periods, in which the number were 185 vessels in 1975 and then decreased to 7 vessels in 2010 (Fig. 2). The bigeye tuna was the top component of the Korean longline catches along with yellowfin tuna, which considerably increased from the beginning and peaked at 34,309 mt in 1978 but had decreased with fluctuation to a few hundreds tons in recent years (Fig. 1).

In this document, we described the historical Korean longline catch and effort of bigeye tuna.

Data source

The catch in the number of fish and the effort in the number of hook were the data aggregated by month and 5°x5°block which the National Fisheries Research and Development Institute (NFRDI) have compiled from the logbook submitted by the fishermen of the longline vessels. These data are

available for 1975-2010. Size data were obtained from the Korean national scientific observer program. These data are only available for a few years of 2003-2010.

Trend of catch and effort

The fishing efforts in the number of hooks were the highest at 64,797 thousands in 1978 but significantly decreased with fluctuation to 7,786 thousand hooks until 1999 and stable around 5000-12000 thousands since then until recent years and likewise were its corresponding catches in the number of fishes that peaked at 737 thousand fishes in 1978 but decreased below 10s thousand fishes in recent years (Table 2, Fig. 3). The proportion of bigeye tuna in the species composition were 49.8% in 1977, 21-53% from 1979 to 1997 and 21-62% from 1979 to the recent years (Fig. 4). The CPUEs peaked at 17 fishes/1000hooks in 1977 but were 37% of its peak from 1979 to 1997 and then gradually declined below 10% in recent years (Fig. 5).

The decadal and spatial distribution of fishing efforts, catches and CPUEs of bigeye tuna caught by Korean longline fishery are shown in Fig. 6 and the those information of the recent 5 years are shown in Fig. 7.

In terms of overall feature of Korean longline fishery in the Indian ocean, it was apparent that efforts and catches had been sharply increasing at the beginning and calminated in the late 1970 and, since then, largely decreasing, especially showing prominent decreases in 1984, 1992 and 1999 (Fig. 4). These were known as a deliberate withdrawl of fishing efforts due to some fishing operational reasons..

When the catch were increasing from the late 60s to the late 1970s and recorded the its peak in 1978, the efforts were deployed between 15°N and 15°S of the eastern Indian Ocean and 15°N and 40°S of the wesrwen Indian Ocean, with higher density in the tropical western area between 40°E and 60°E and, to lesser extent, in the south-western area around 30°S and in the area off north-western Australia, while the catches of bigeye tuna (No. of fish) were higher in the western Indian Ocean between 15°N and 15°S, with the higher CPUEs throughout tropical Indian Ocean than in other periods (Fig. 6).

In 1980s, the efforts were deployed with slightly decreasing by 70% in average of the previous period but concentration on the western tropical area and the resultant catches of bigeye tuna were decreased except in the tropical area, which seemed resulted from a decreased nominal CPUEs that were somewhat stable at 37% in average of its peak in 1977 (Fig. 6, 4 and 5). In 1990s, The efforts expanded further southward but reduced by 30% from its peak in 1978 and the resultant bigeye catches were mainly occurred in the western tropical area, the CPUEs of which were 36% of its

peak in 1977. In 2000s, The efforts that were about 14% in average of its peak in 1978, were deployed in the same areas as in the previous decade, the catches were mainly occurred in the tropical areas, the CPUEs of which around 13 % of its peak in 1977.

The efforts, catches and CPUEs of bigeye tuna for the recent years from 2006 to 2010 were shown in Fig. 7. Most of the fishing efforts were deployed off the eastern African continent in 2006 and 2007. Since then, the effort deployment were getting reduced from the tropical areas off eastern Africa, especially from Somalian waters, while it moved southward to the south of Madagascar and to the west-south off Australia, which resulted both in the severe reduction of bigeye tuna catch and CPUEs year by year (Fig. 4 and 5). On the other hand, the dislocation of Korean longline fleet from the tropical fishing grounds of bigeye tuna to the subtropical areas, had led southern bluefin tuna to place at the top component of its catches in recent years (Fig. 4, and 7).

Size data

The length frequency data of bigeye tuna were solely available for 2003-2010, which were compiled from Korean scientific observation (Fig. 8, 9). In length distribution by year, the number of samples were, in general, too small except for 2003-2005. The range of fish size in fork length were roughly from 80 to 200 cm for 2003-2005 but narrowed for 2006-2010 when the sample were small. It was observed that a small size slightly dominate in 2003, 2008 and 2009 but a bit larger size in 2004, 2005 and 2006 even though the difference in length was small. In length distribution by year and area (eastern and western), there were no difference in length by area except for sample size.

Table 1. Bigeye tuna catch (mt) caught by Korean longline fishery. Western: FAO area No. 51 (mostly west of 80°E), eastern: FAO area No. 57 (mostly east of 80°E). Data source: IOTC database.

Year	Eastern	Western	Total
1965		168	168
1966		161	161
1967		562	562
1968		6,809	6,809
1969		7,672	7,672
1970		3,591	3,591
1971		4,925	4,925
1972		4,967	4,967
1973		7,390	7,390
1974		14,772	14,772
1975	8,045	18,405	26,449
1976	9,106	12,914	22,021
1977	6,221	20,138	26,359
1978	9,527	24,783	34,309
1979	10,330	11,184	21,515
1980	8,261	11,192	19,453
1981	3,880	15,621	19,500
1982	975	18,620	19,595
1983	859	16,584	17,442
1984	1,371	10,405	11,777
1985	1,368	11,512	12,880
1986	916	10,985	11,901
1987	1,394	13,040	14,435
1988	2,039	15,132	17,172
1989	1,189	11,038	12,226
1990	1,164	9,576	10,740
1991	212	2,077	2,289
1992	181	4,636	4,816
1993	669	4,629	5,298
1994	62	8,820	8,882
1995	48	6,522	6,570
1996	103	11,751	11,854
1997	81	10,975	11,057
1998	49	3,553	3,602
1999	678	797	1,476
2000	302	3,334	3,636
2001	277	1,278	1,555
2002	8	184	192
2003	267	888	1,155
2004	691	1,840	2,531
2005	694	1,957	2,651
2006		3,105	3,105
2007		1,323	1,323
2008	27	501	527
2009	361	305	667
2010	152	145	297

Table 2 : Annual fishing effort (number of hooks) for the Korean longline fishery and its catch in number by species.

Year	No. of Hook (X1,000)	Catch in number (X1,000)						
		ALB	YFT	BET	SBT	SWO	STM	BUM
1971	79	0	0	1	0	0	0	0
1972	1,661	21	45	14	0	0	3	0
1973	1,627	39	6	5	0	0	0	0
1974	5,293	23	29	27	0	0	1	1
1975	18,477	45	89	133	0	5	5	3
1976	132	0	0	2	0	0	0	0
1977	10,561	7	201	178	0	4	8	6
1978	65,334	158	559	743	1	14	28	21
1979	29,422	19	182	239	3	7	14	11
1980	58,883	45	268	459	2	12	31	14
1981	46,420	31	277	314	0	10	15	10
1982	52,142	19	398	348	1	12	14	9
1983	62,686	32	403	378	0	15	16	12
1984	23,255	9	137	132	0	6	8	4
1985	34,090	17	239	204	0	11	12	7
1986	43,007	32	375	262	0	17	20	8
1987	44,001	21	348	315	0	19	17	7
1988	51,054	21	337	327	0	23	15	8
1989	52,985	12	216	234	0	20	11	7
1990	39,112	9	151	188	0	17	5	5
1991	11,731	2	83	54	0	6	8	2
1992	17,644	8	104	104	0	13	8	5
1993	24,837	6	114	129	0	24	9	6
1994	25,739	8	71	152	0	25	8	6
1995	18,554	7	56	123	0	18	11	5
1996	30,397	8	77	227	15	22	13	7
1997	35,644	12	90	193	24	19	6	7
1998	14,150	7	42	47	8	8	3	4
1999	7,786	1	10	18	16	1	0	1
2000	9,694	4	21	41	5	4	2	3
2001	9,736	3	37	21	11	5	1	2
2002	5,245	2	5	2	15	0	0	0
2003	7,510	6	48	30	3	3	0	1
2004	12,202	11	107	43	2	7	1	2
2005	6,522	10	56	24	1	6	0	1
2006	11,053	13	55	30	4	4	1	1
2007	9,500	16	58	16	7	3	0	1
2008	7,279	10	16	7	17	1	0	0
2009	11,718	31	25	13	23	1	0	1
2010	5,079	27	17	5	10	1	0	0

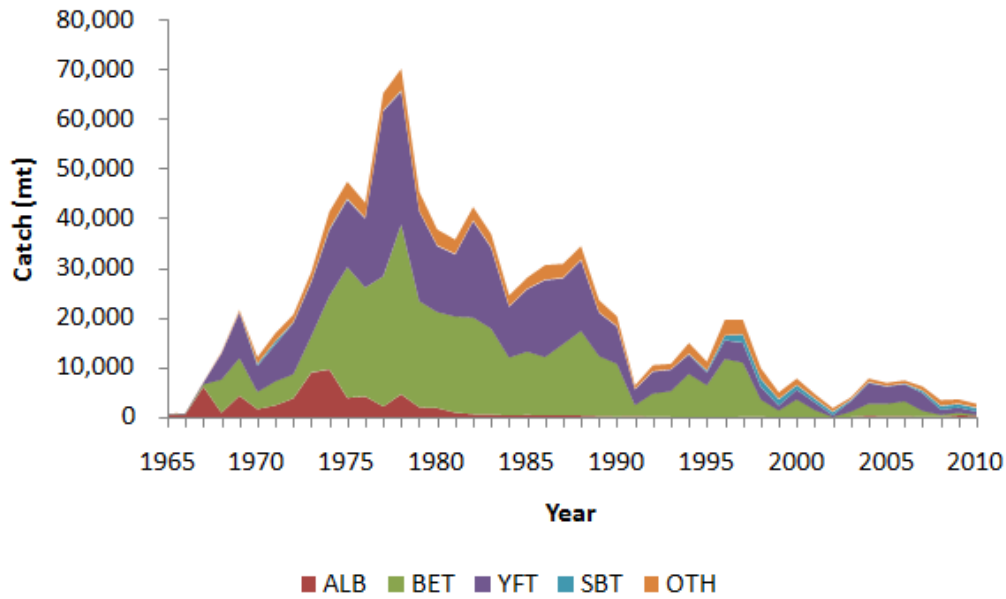


Fig.1. Historical catches of target species by Korean longline fishery in the areas of the IOTC competence.

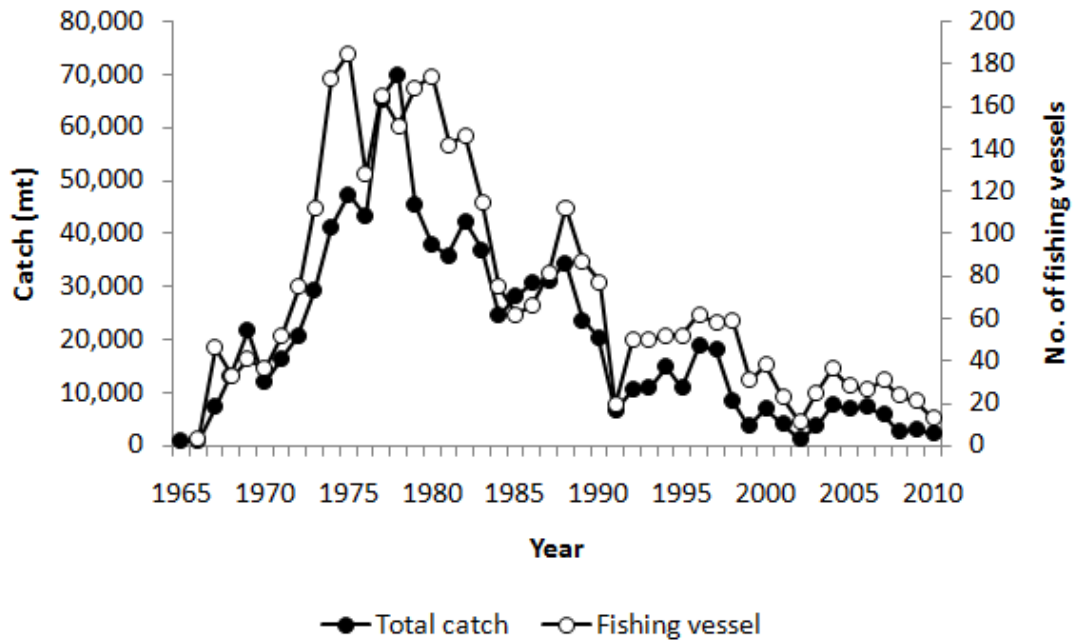


Fig.2. Historical total Korean longline catch and the number of longline vessels active in the areas of the IOTC competence.

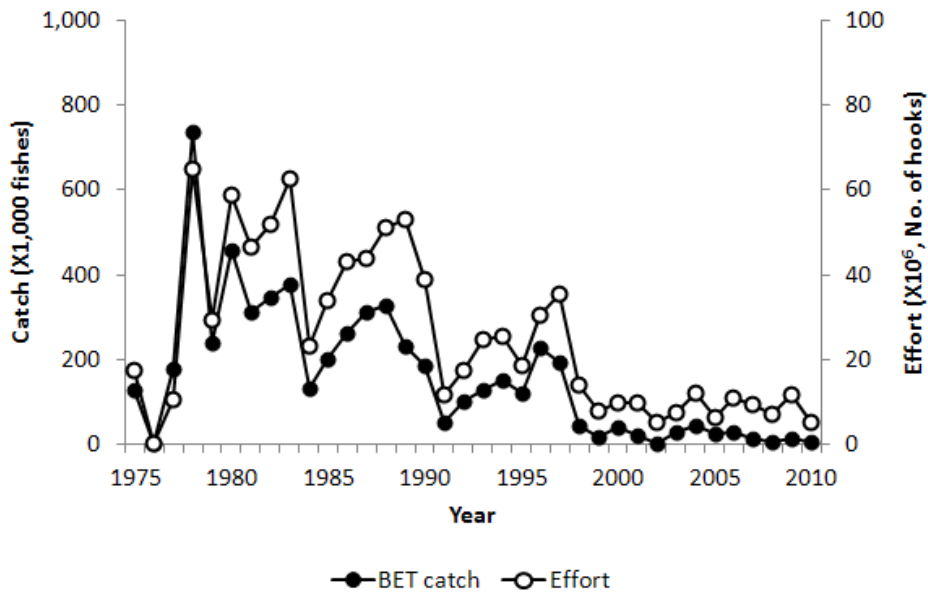


Fig. 3. The number of hooks employed and bigeye catch by Korean longline vessels.

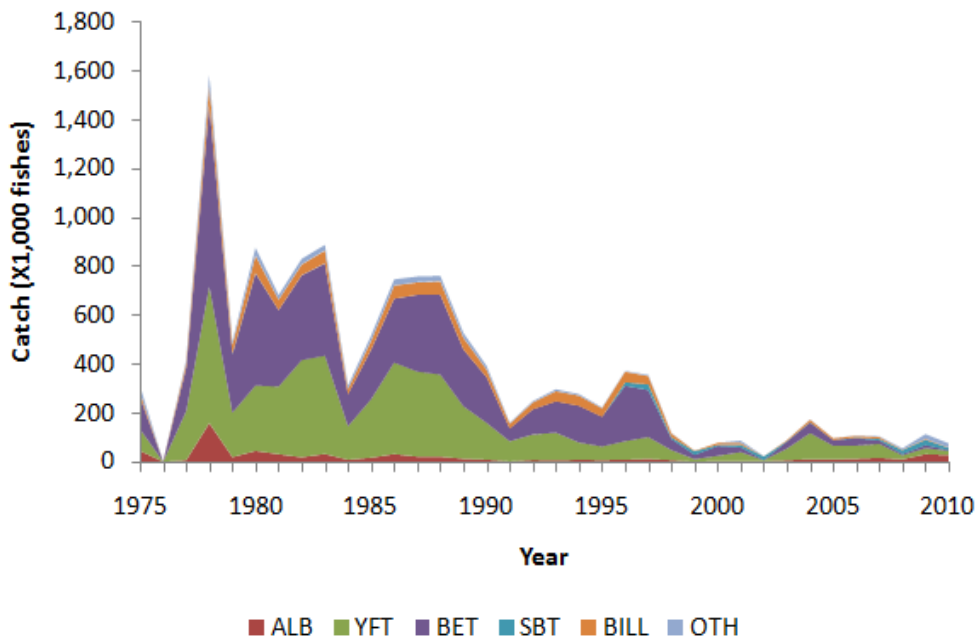


Fig.4. The species composition in the number of fishes derived from the logbook submitted by by Korean longline vessels.

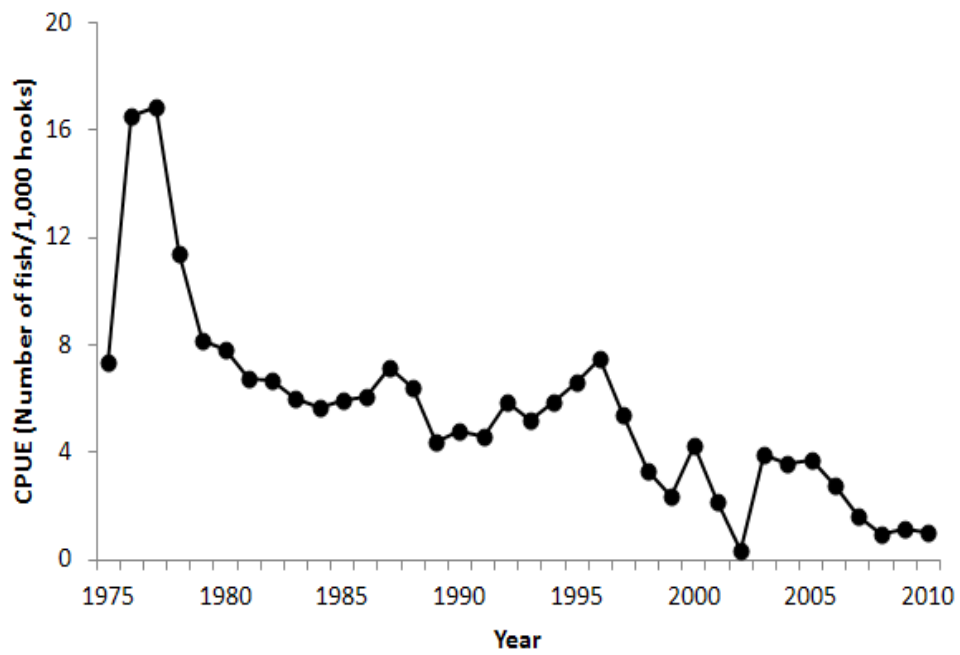


Fig. 5. The nominal CPUE of bigeye caught by Korean longline vessels.

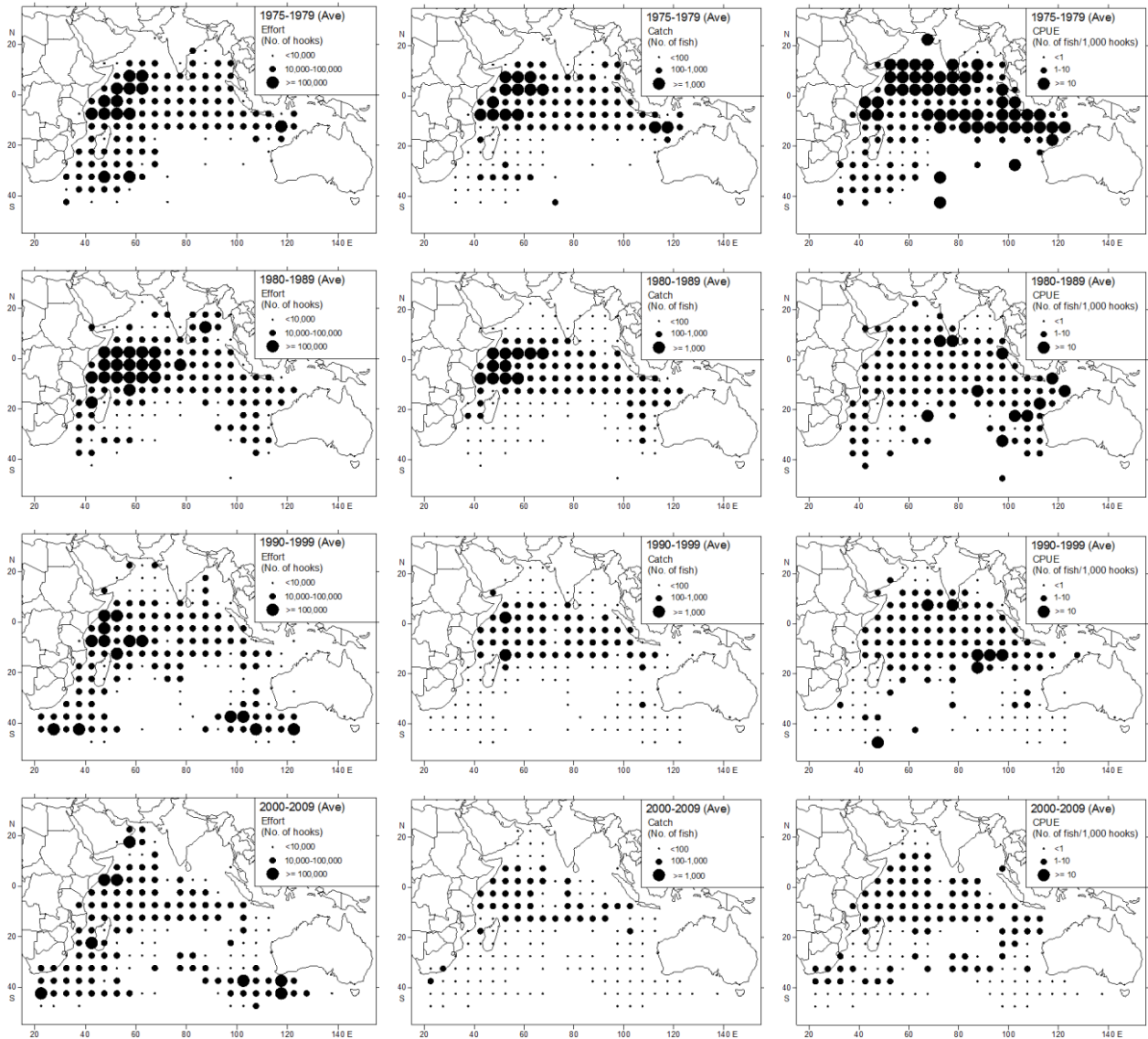


Fig. 6. The geographical distribution of Korean longline effort (number of hooks), bigeye catch and CPUE by each decade.

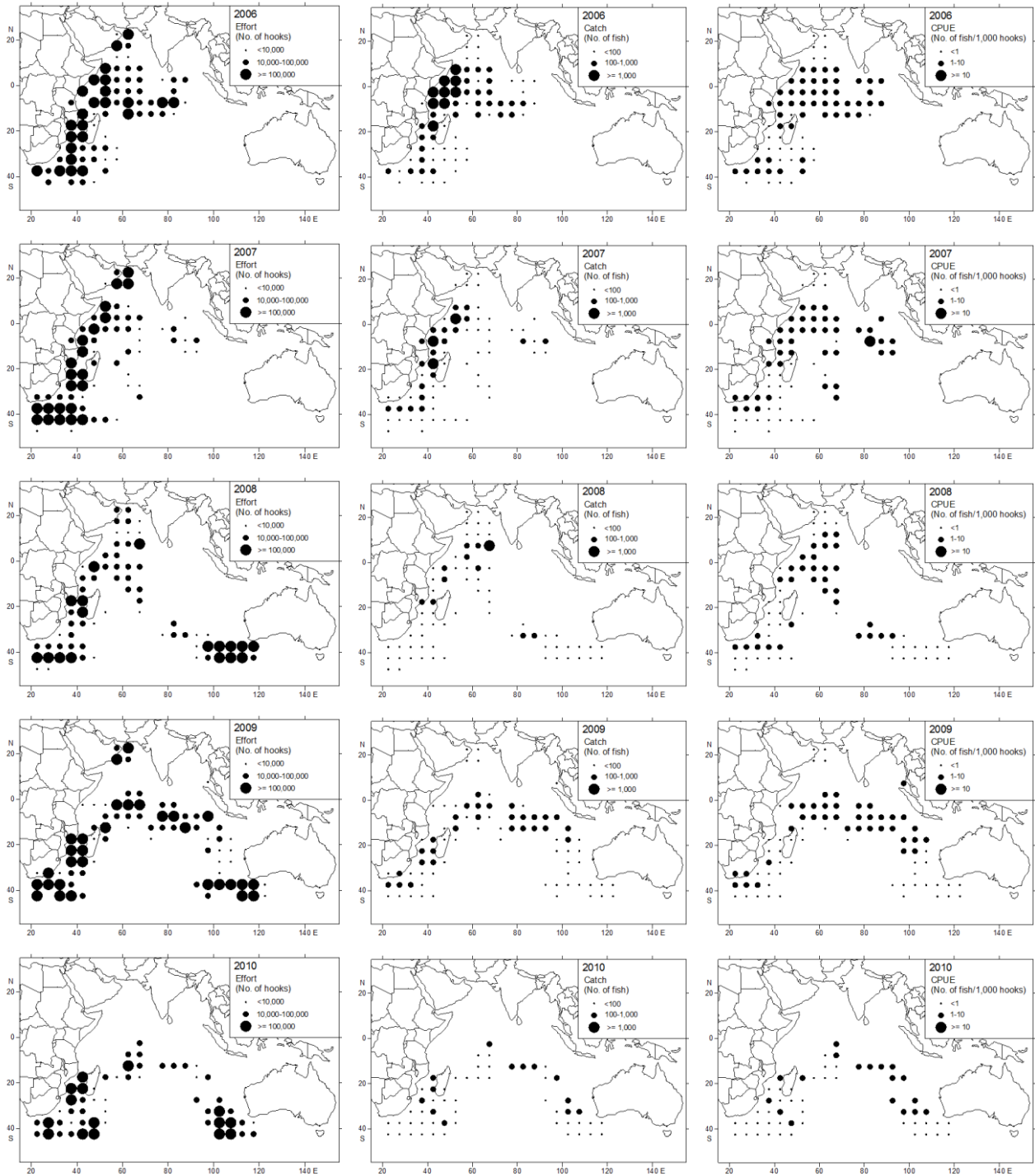


Fig. 7. The geographical distribution of Korean longline effort (number of hooks), bigeye catch (number of fish) and CPUE (number of fish/1,000 hooks) in recent years

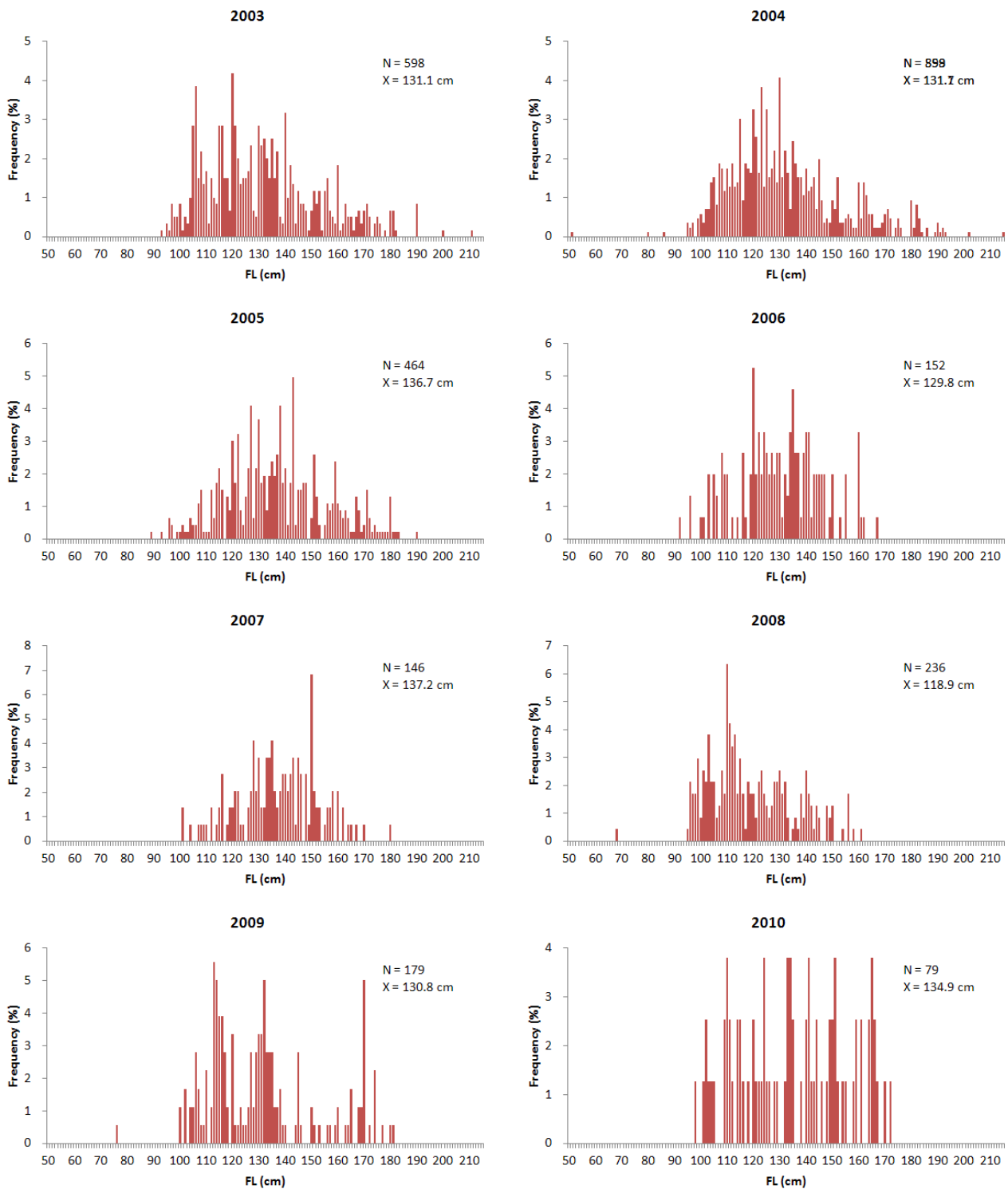


Fig. 8. Length frequency distribution of bigeye obtained from scientific observation by year in the Indian Ocean.

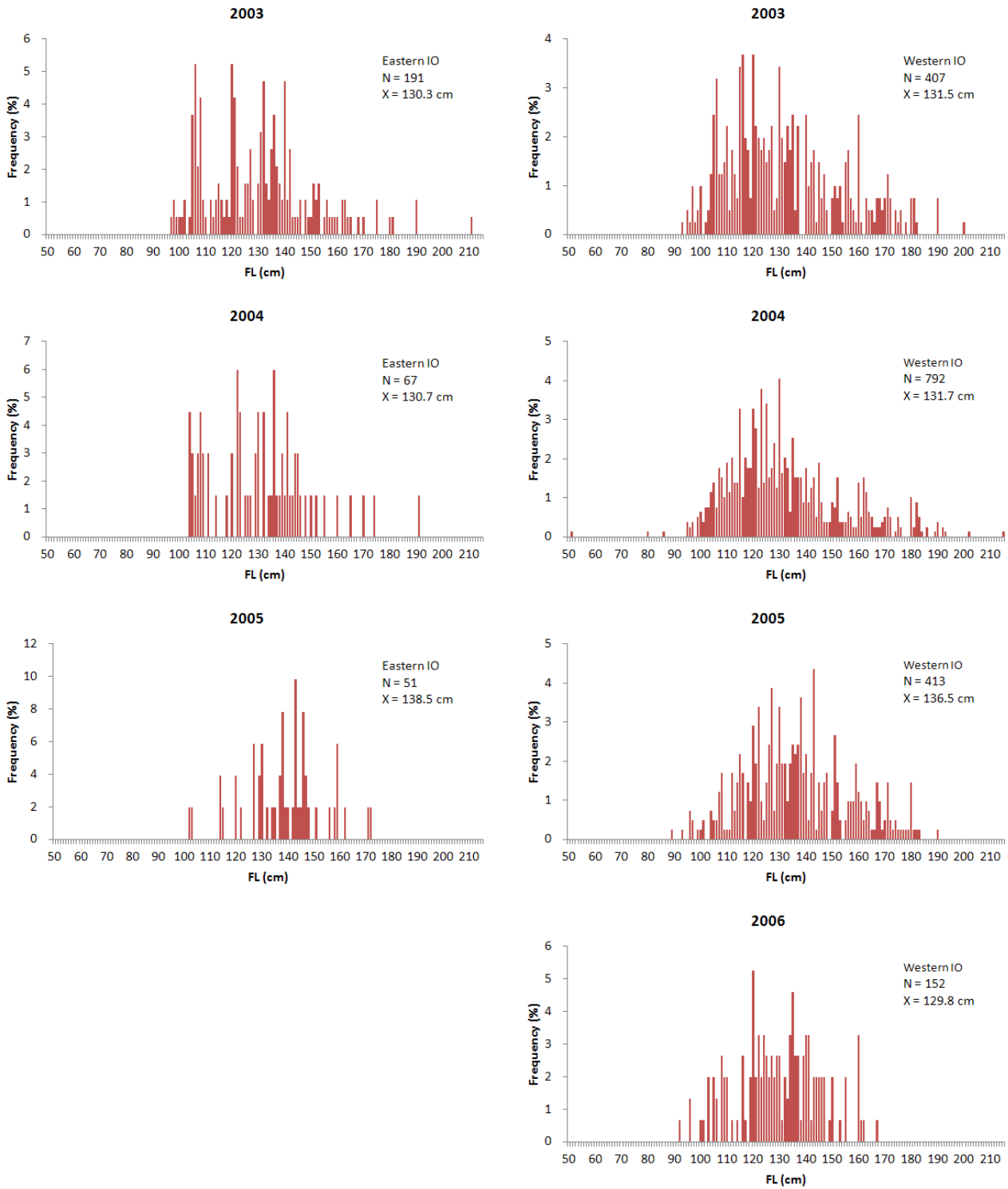


Fig. 9. Length frequency distribution obtained from scientific observation by area in the Indian Ocean.

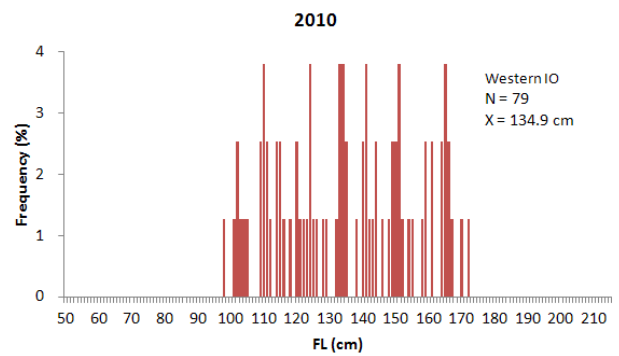
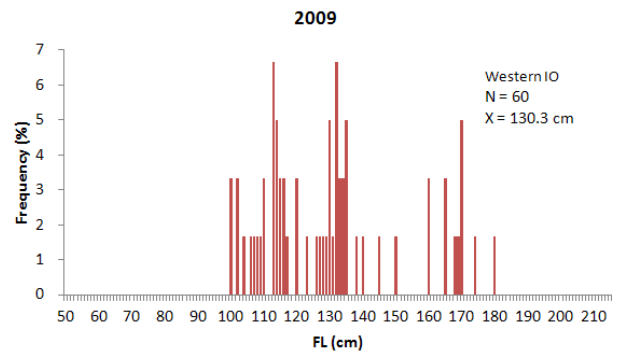
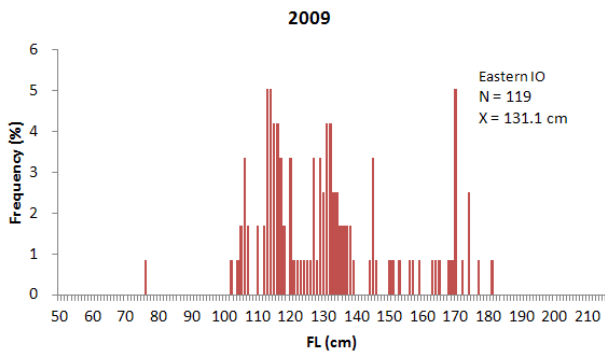
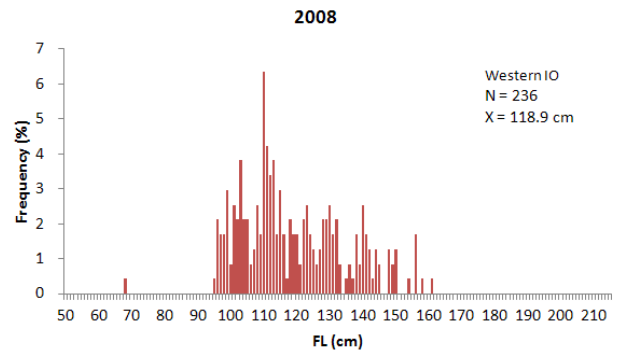
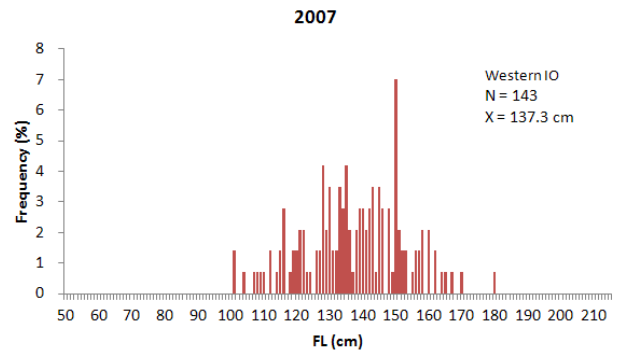
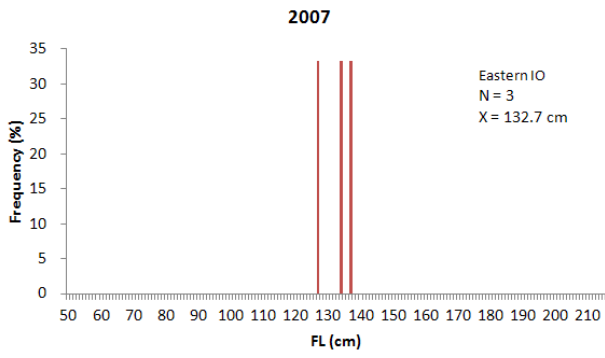


Fig. 11. Continued.