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Review of catch and effort for albacore tuna by Korean longline fishery in the Indian Ocean

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Abstract

To provide the information for assessing albacore stock status, the catch and effort for albacore tuna by Korean longline fishery in the Indian Ocean, 1965-2011, was reviewed using fisheries statistics from the IOTC data base and logbook data compiled from fishing vessels. The number of active fishing vessels showed the highest in the mid-1970s, and then have sharply decreased and reduced up to 7 vessels in 2011. The total catch trend by Korean tuna longline fishery generally followed that of the number of vessels engaged in fishing. The albacore tuna catch peaked at 9,206 mt in 1974 and decreased sharply thereafter, and it has started to increase since the mid-2000s. The CPUE of albacore tuna showed a steady trend from 1977 to 2002, and an increasing trend in recent years. The fishing ground of albacore tuna by Korean longline fishery distributed between 20°N and 20°S of the EIO and 20°N and 40°S of the WIO. It has moved gradually to the southern of the Indian Ocean and, in recent years, distributed mainly between 20°S and 40°S of the eastern and western Indian Ocean. This transition is supposed due to the pirate activities off the coast of Somalia and Korean southern bluefin tuna fishery.

Introduction

Korean tuna longline fishery begun with a small experimental fishing in the Indian Ocean from the mid-1950s but its catch statistics has appeared since the mid-1960s. Its target species have been yellowfin tuna, bigeye tuna and albacore tuna. Southern bluefin tuna has been included in the target species for Korean tuna longline fishery since 1991 as it became of the highest value in Japanese sashimi market. The traditional fishing grounds of Korean tuna longline fishery were around the central tropical area between 20^{o}N and 40^{o}S and concentrated in the area of 20^{o}S and 40^{o}S since 1991, where it found a fishing possibility of southern bluefin tuna, yellowfin tuna, bigeye tuna and albacore tuna. In recent years, its fishing ground ranged over 20^{o}N-45^{o}S and 20^{o}-120^{o}E.

Data source

The total catch and the catches by tuna and tuna-like species caught by Korean longline fishery in the area of the IOTC competence were referred to the IOTC data base. The catch in the number of fishes, efforts in the number of hooks were the data aggregated by month and 5°x5° area which the National Fisheries Research and Development Institute (NFRDI) have compiled from the logbook submitted by the fishermen of the longline vessels.

Trend of catch and effort

The total catch of tuna and tuna-like species by Korean longline fisheries in the Indian Ocean steeply increased from the beginning of the mid-1960s to 1978 when it peaked at 71,000 mt and showed a sharp-stepwise decreasing with a fluctuation thereafter (Fig. 1).

The number of active fishing vessels of Korean longline tuna fishery also recorded the highest in the mid-1970's, and then it has sharply decreased with fisheries operational conditions and reduced by 7 vessels in 2011. The catch trend generally followed that of the number of vessels engaged in fishing from the beginning to the recent years (Fig. 2).

In case of albacore tuna, its catch had maintained a high level of over 1,000 mt until 1980, after then it sharply decreased. During the 1990s, it had remained in the lowest level below 200 mt, and started to increase up to about 400 mt in recent years (Table 1).

The fishing effort (×1,000 hooks) for albacore tuna by Korean longline fishery had shown a high level until the mid-1990s, and it showed decreasing and stable trend after 1999 (Fig. 3). The CPUE of albacore tuna generally showed a steady trend from 1977 to 2002 except a

jump in 1978, and has been increasing thereafter. In particular, it was dramatically increased in 2011 which was about 4 times higher than the average of recent years (Fig. 4).

Fig. 5 shows the changes in the number of hooks between float (HBF) used in Korean tuna longline fishery. The main HBF was 6-7 hooks in 1970s and 1980s, and 11-13 hooks in 1990s, and since 1990s it was largely increased more than 10 hooks. The HPF of 16-17 hooks as well as 10-11 hooks were used in 2000s, and over 20 hooks were often used in recent years. This indicates the change of fishing operational pattern in a decadal interval.

The decadal and spatial distribution of fishing efforts, catches and CPUEs of albacore tuna caught by Korean longline fishery are shown that, when the fishing effort increased in the 1970s, it was deployed throughout the areas between 20^{o}N and 20^{o}S of the eastern Indian Ocean and the areas between 20^{o}N and 40^{o}S of the western Indian Ocean. But the catch was higher in the south-western part than any other parts of the Indian Ocean, and CPUE was also higher in the south-western part where was area of 20^{o}S-40^{o}S and 30^{o}-70^{o}E (Figs. 6 and 7). In the 1980s, the overall effort was slightly decreased and concentrated in the area between 10^{o}N and 10^{o}S, and the catch was largely decreased across the Indian Ocean. Although CPUE was spread higher in the south-western part same as 1970 years, the density was lower than those of 1970 years (Figs. 6 and 7). In the 1990s, the effort and catch generally showed a stable trend which was evenly distributed over the Indian Ocean as previous years, in particular the fishing ground extended to the area of 20^{o}E. But CPUE showed generally lower than those of 1970s and 1980s (Figs. 6 and 7). In the 2000s, the effort and catch were increasing to the level as were in the 1980s, and concentrated in the area between 20^{o}S and 40^{o}S. Also CPUE showed a high level in the area of south-western off Australia as well as in the area of south-western part (Figs. 6 and 7).

In the recent years, the main fishing ground of Korean tuna longline fishery has shown gradually moving to the south of 20^{o}S in the Indian Ocean (Figs. 8 and 9). It seems that there are two reasons as follows. One is that most of fishing vessels have been apart from off the coast of Somalia due to the pirate activities since the mid-2000s. And the other is related to the Korean tuna southern bluefin tuna fishery in the area between 20^{o}S and 40^{o}S of the Indian Ocean.

Table 1. Albacore tuna catch in weight (mt) caught by Korean longline fishery from 1965 to 2011. Western: FAO area No. 51 (mostly west of 80°E), eastern: FAO area No. 57 (mostly east of 80°E)

Year	Eastern	Western	Total
1965		500	500
1966		634	634
1967		6169	6169
1968		696	696
1969		3988	3988
1970		1257	1257
1971		2108	2108
1972		3601	3601
1973		8816	8816
1974		9206	9206
1975	307	2936	3243
1976	771	3076	3847
1977	297	1208	1505
1978	497	3606	4103
1979	438	1484	1922
1980	351	1231	1582
1981	55	654	709
1982	47	352	399
1983	53	221	274
1984	80	174	254
1985	224	100	324
1986	147	24	171
1987	140	81	221
1988	104	11	115
1989	28	27	55
1990			
1991	231		231
1992	5		5
1993		5	5
1994	4	28	32
1995	3	16	19
1996	4	30	34
1997	0	127	128
1998	5	138	142
1999	1	31	32
2000	14	102	115
2001	0	39	40
2002	3	7	10
2003	39	61	100
2004	224	132	356
2005	48	144	192
2006		252	252
2007		126	126
2008	6	113	119
2009	40	285	325
2010	192	152	344
2011	294	152	446

* Data source: IOTC database.

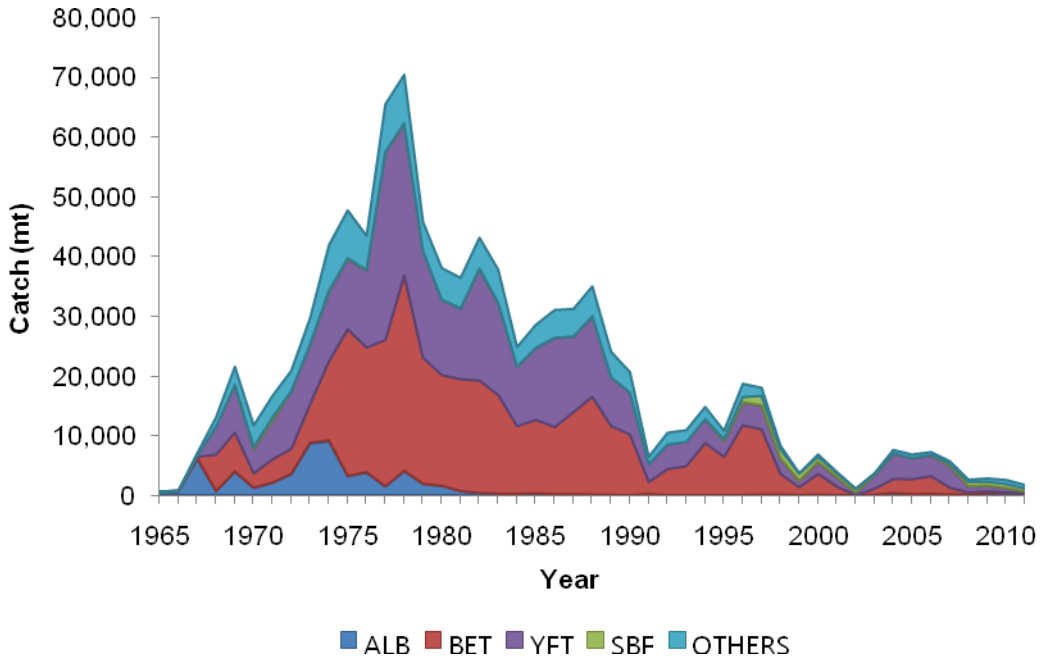

Fig. 1. Historical catches of Korean tuna longline fishery in the areas of the IOTC competence from 1965 to 2011.

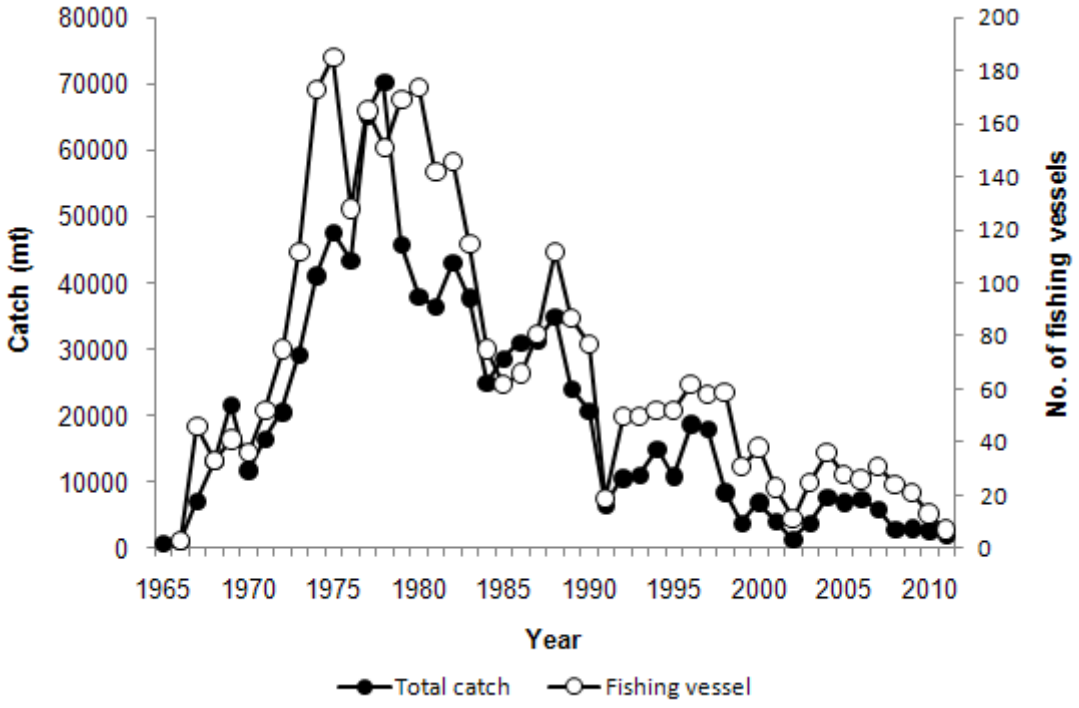

Fig. 2. Historical total Korean tuna longline catch and the number of active longline vessels in the area of the IOTC competence from 1965 to 2011.

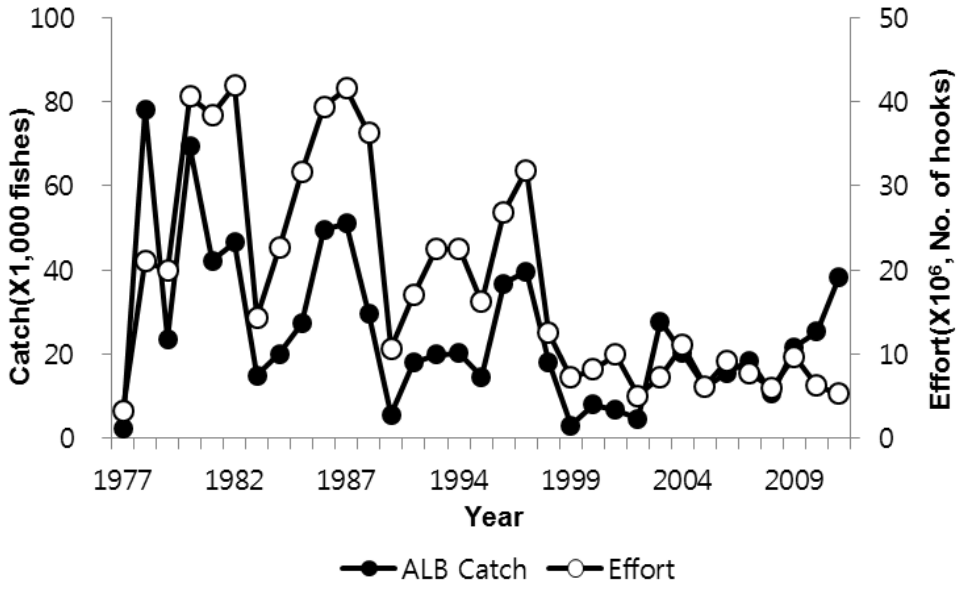

Fig. 3. Annual catch (in number) and fishing effort (number of hooks) for albacore tuna caught by Korean longline fishery in the Indian Ocean from 1977 to 2011. These are compiled from logbook, and the data were not raised.

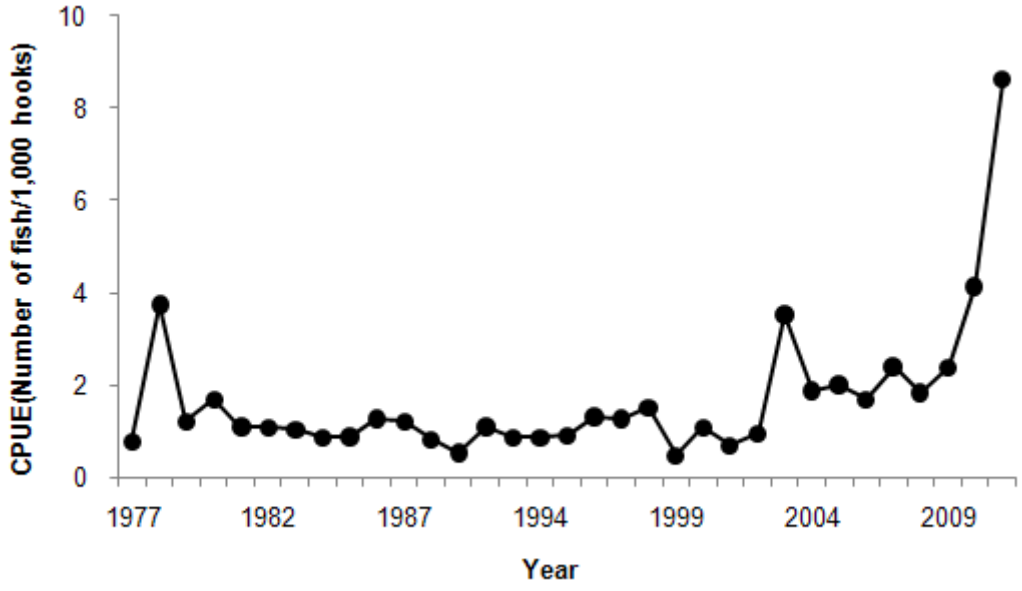

Fig. 4. Changes in the nominal CPUE of albacore tuna caught by Korean longline vessels from 1977 to 2011.

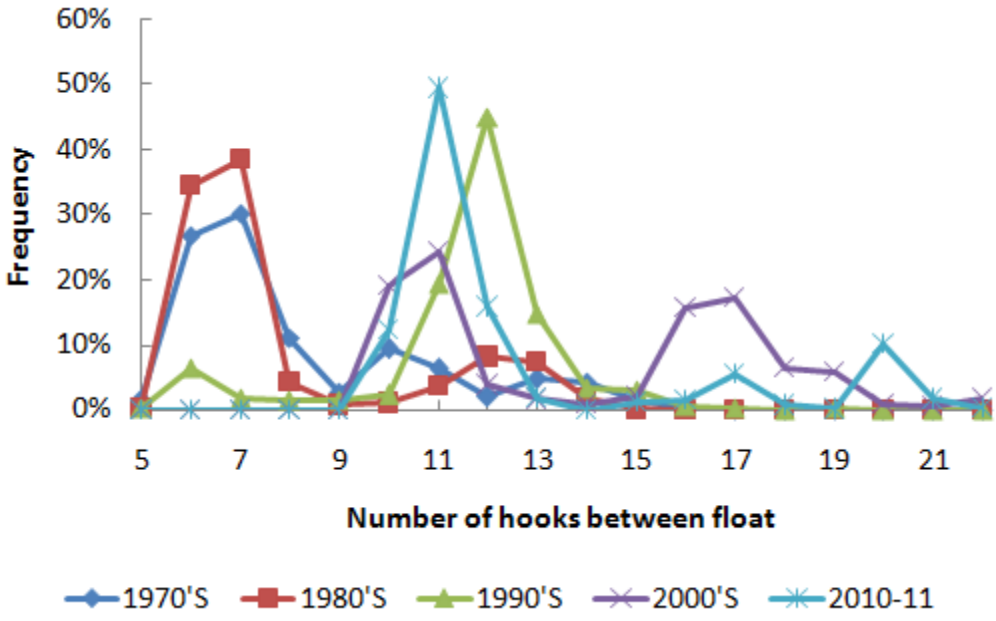

Fig. 5. Changes in the number of hooks between float (HBF) used in Korean tuna longline fishery by decade.

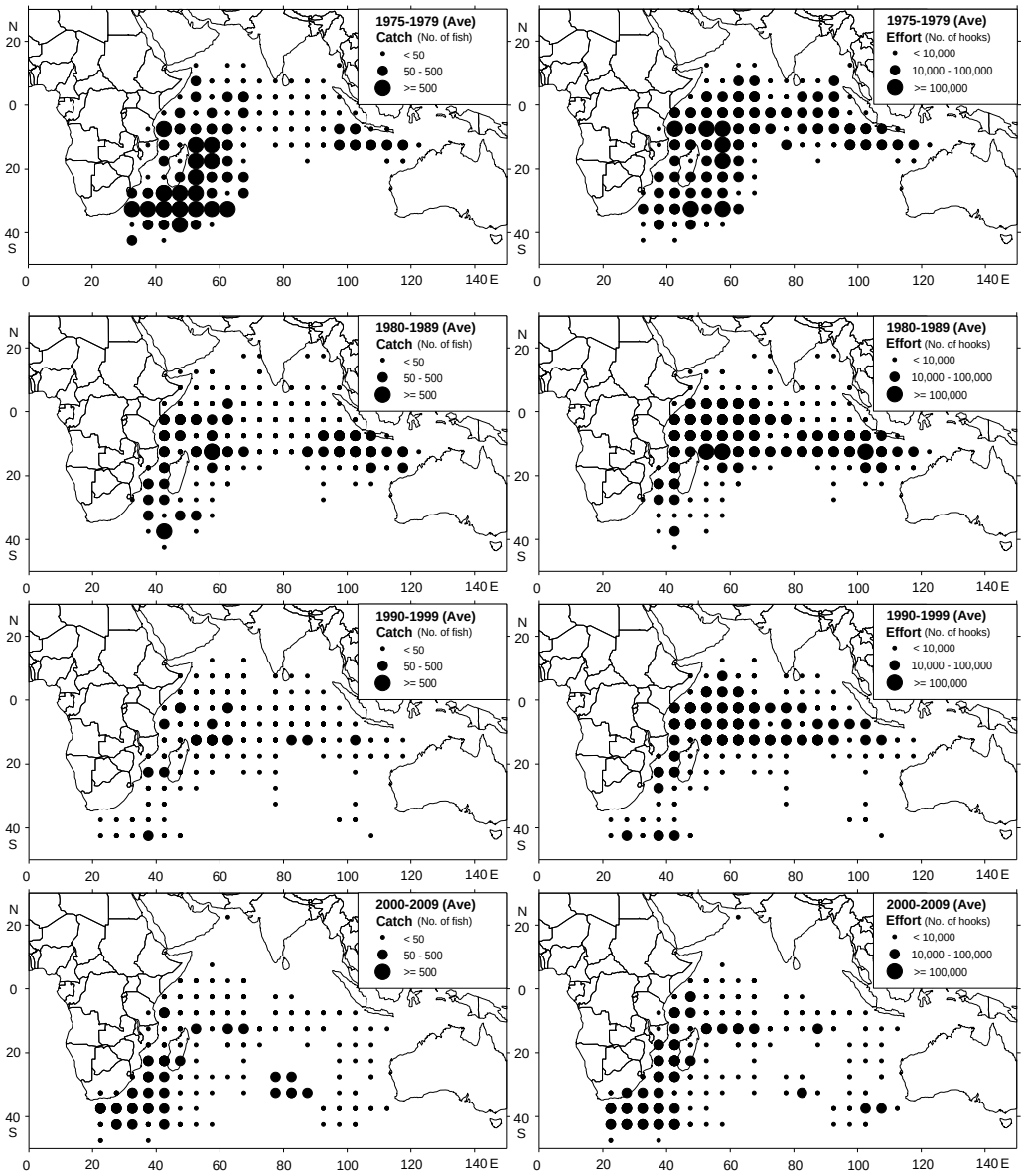

Fig. 6. The geographical distributions of catch (number of fishes) and effort (number of hooks) for albacore tuna caught by Korean longline fishery by decade, 1970s-2010s.

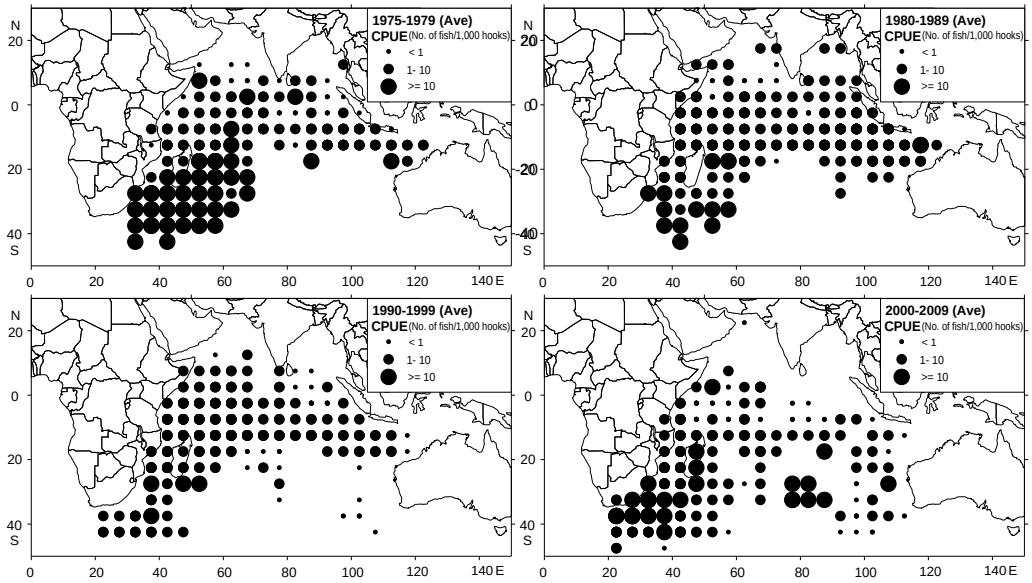

Fig. 7. The geographical distributions of CPUE (number of fishes/1,000 hooks) for albacore tuna caught by Korean longline fishery by decade, 1970s-2000s

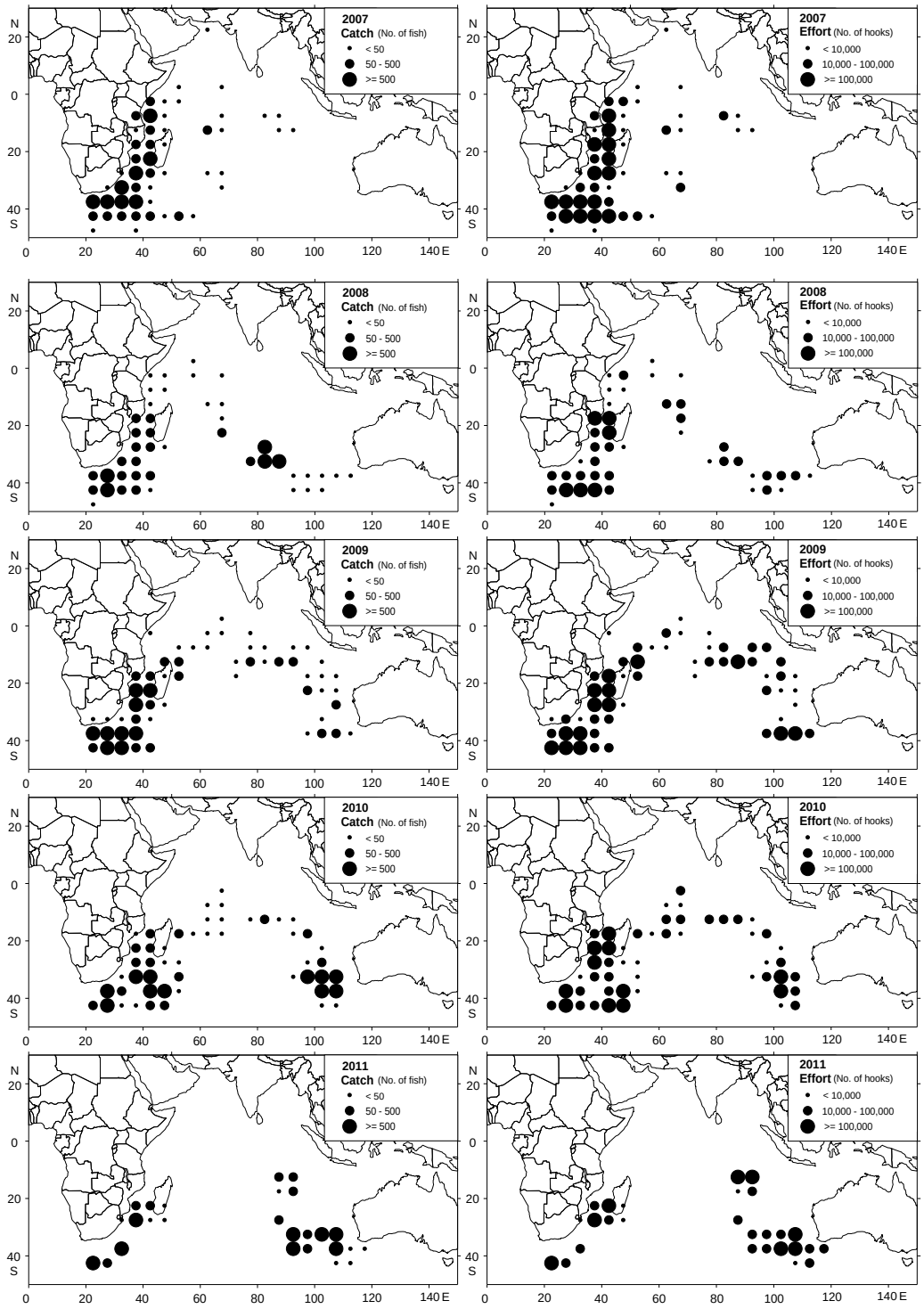

Fig. 8. The geographical distributions of catch (number of fishes) and effort (number of hooks) for albacore tuna caught by Korean longline fishery, 2007-2011.

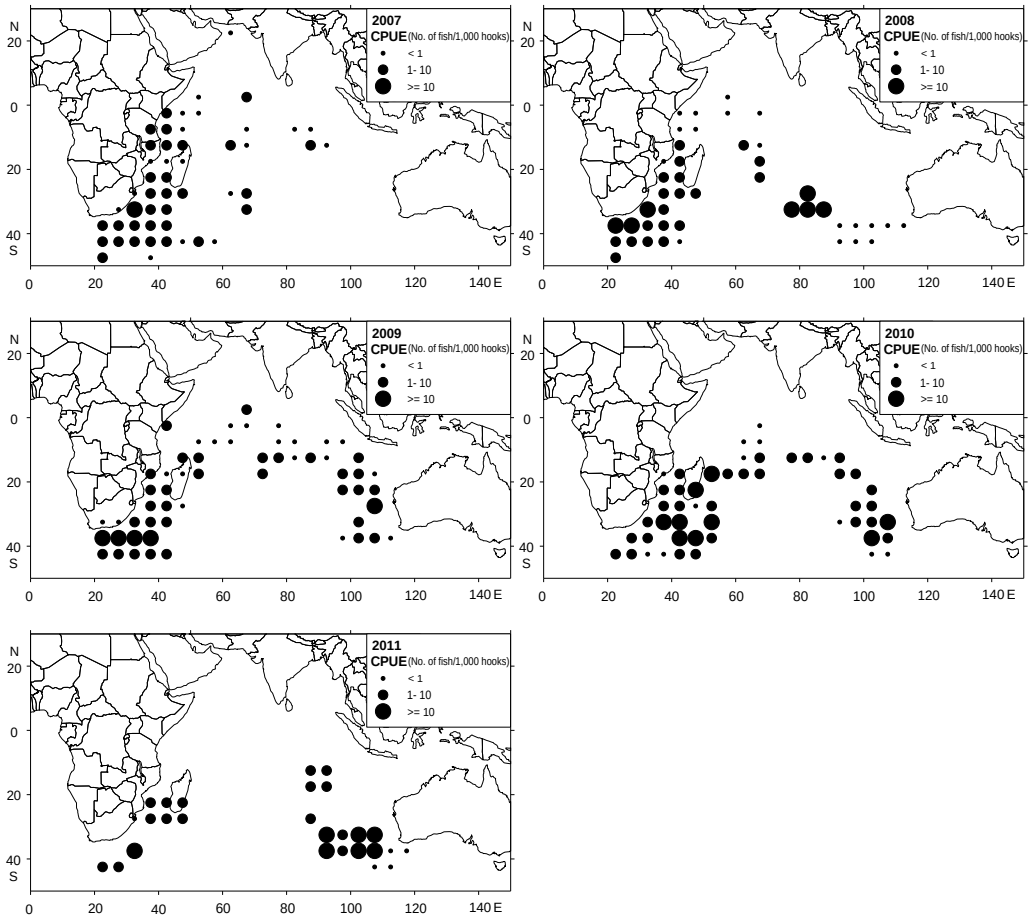

Fig. 9. The geographical distributions of CPUE (number of fishes/1,000 hooks) for albacore tuna caught by Korean longline fishery, 2007-2011.