

Review of catch and effort for albacore tuna by Korean tuna longline fishery in the Indian Ocean (1965-2015)

Sung Il Lee, Doo Nam Kim, Youjung Kwon, Jeong Eun Ku, Mi Kyung Lee and Du Hae An

National Institute of Fisheries Science

216 Gijang-Haeanro, Gijang-eup, Gijang-gun, Busan 46083, Korea

Abstract

This paper describes the fishing characteristics of Korean tuna longline fishery and its catch and CPUE trend for albacore tuna in the Indian Ocean from 1965 to 2015. The number of active fishing vessels showed the highest in the mid-1970s, since then it has sharply decreased and reduced to 7 vessels in 2011 and 2012. In recent years, it is showing a slight increasing, which was 14 vessels in 2015. The albacore tuna catch peaked at about 10 thousand mt in 1974 and decreased sharply thereafter. Since 2009 it has started to increase and showed over 600 mt in 2013 and 2014. The CPUE of albacore tuna showed a decreasing trend from the beginning of 1970s to 1980, and after that it showed a steady trend to 2002. Since then it has increased and showed a dramatic increasing during 2011-2014. In the 1970s and 1980s, the fishing ground of albacore tuna by Korean longline fishery was formed between 10°N and 40°S of the western and eastern Indian Oceans but it moved gradually to the southern of the Indian Ocean thereafter, and was formed mainly between 20°S and 40°S of the western and eastern Indian Oceans in recent years.

Introduction

Korean tuna longline fishery begun with a small experimental fishing in the Indian Ocean in 1957, which was the first instance of Korean distant-water fisheries, but its catch statistics have 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 of 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 10°N and 15°S and have been changed to the area of 20°S and 40°S since 2000s due to fishing for southern bluefin tuna. In recent years, its fishing ground has been formed at the western area and the eastern area around 15°S-45°S.

The aim of this study is to provide information on fishing characteristics of Korean tuna longline fishery and to review historical catch and effort for albacore tuna by Korean tuna longline fishery.

Data and Methods

The catches of tuna and tuna-like species caught by Korean tuna longline fishery in the Indian Ocean were referred to the Indian Ocean Tuna Commission (IOTC) database. The data of catch (number of fishes) and efforts (number of hooks) were aggregated by month and 5°x5° area which the National Institute of Fisheries Science (NIFS) has compiled from the logbook submitted by captain onboard.

The historical catch trend of Korean tuna longline fishery in the Indian Ocean was investigated using the IOTC database from 1965 to 2015 and the fishing characteristics by period (5 years) and area (5°x5° block) was investigated using logbook data from 1971 to 2015.

Results and Discussion

The total catch of tuna and tuna-like species by Korean longline fishery in the Indian Ocean steeply increased from the mid-1960s to 1978 when it peaked at about 70 thousand 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 of 185 vessels in the 1975, since then it has sharply decreased with fisheries operational conditions and reduced to 7 vessels in 2011 and 2012. In recent years, it is showing a slight increasing,

which was 14 vessels in 2015 (Fig. 1). The catch trend generally followed that of the number of vessels engaged in fishing from the beginning to the recent years.

As for the annual catch proportion by species, albacore tuna, along with bigeye tuna and yellowfin tuna, was a target species which accounted for average of 37% until 1974, and after that it decreased dramatically while bigeye tuna and yellowfin tuna were main target species which accounted for average of 80% until 2007. Since 2008 the catch of southern bluefin tuna has increased with a proportion of 20-40% and that of albacore increased as well (Fig. 2).

In case of albacore tuna, its catch had increased from the mid-1960s to 1974 when showed the highest of about 10 thousand mt, after then it sharply decreased. During the 1990s, it had remained in the lowest level below 200 mt, and since 2009 it has increased and showed over 600 mt in 2013 and 2014 (Table 1).

The fishing effort for albacore tuna of Korean tuna longline fishery had shown a high level of over 10 million hooks from 1978 to 1990, but since then it has decreased and showed a level of about 3 million hooks in recent years (Fig. 3). The CPUE of albacore tuna showed a decreasing trend from the beginning of 1970s to 1980, and after that it showed a steady trend to 2002. Since then it has increased and showed a dramatic increasing during 2011-2014 which was a level of over 10 fishes/10³ hooks (Fig. 4). However, it decreased in 2015.

From the 1970s to the first half of 1990s, the fishing efforts were concentrated relatively higher in tropical area between 10°N-10°S of the western Indian Ocean, which targeted bigeye tuna and yellowfin tuna. And in 1970s the vessels fishing for albacore tuna operated in the western area around 20°S-40°S. Since the second half of 1990s some of fishing vessels started to move southward and fished southern bluefin tuna in the western and eastern Indian Oceans around 35°S-45°S. In the recent years, a large part of fishing vessel has operated at the south of 20°S in the western and eastern Indian Oceans to fish for southern bluefin tuna (Figs. 5 and 6).

The temporal and spatial distributions of albacore tuna catch and CPUE by Korean longline fishery are shown that, the catch in 1970s was higher in the south-western area than any other areas of the Indian Ocean, and CPUE was also higher in the south-western area where was between 25°S-40°S around 30°E-70°E. In the 1980s, the catch was relatively higher in the area between 0°-20°S of the eastern and western areas. The CPUE in the first half of 1980s was relatively higher in the south-western area same as the 1970s, and that in the second half of 1980s was lower in the whole area. Its catch and CPUE had dramatically

decreased thereafter. Since the second half of 2000s the catch has increased in the south of 20°S area at between 20°E-50°E and the area of south-western off Australia (Fig. 6).

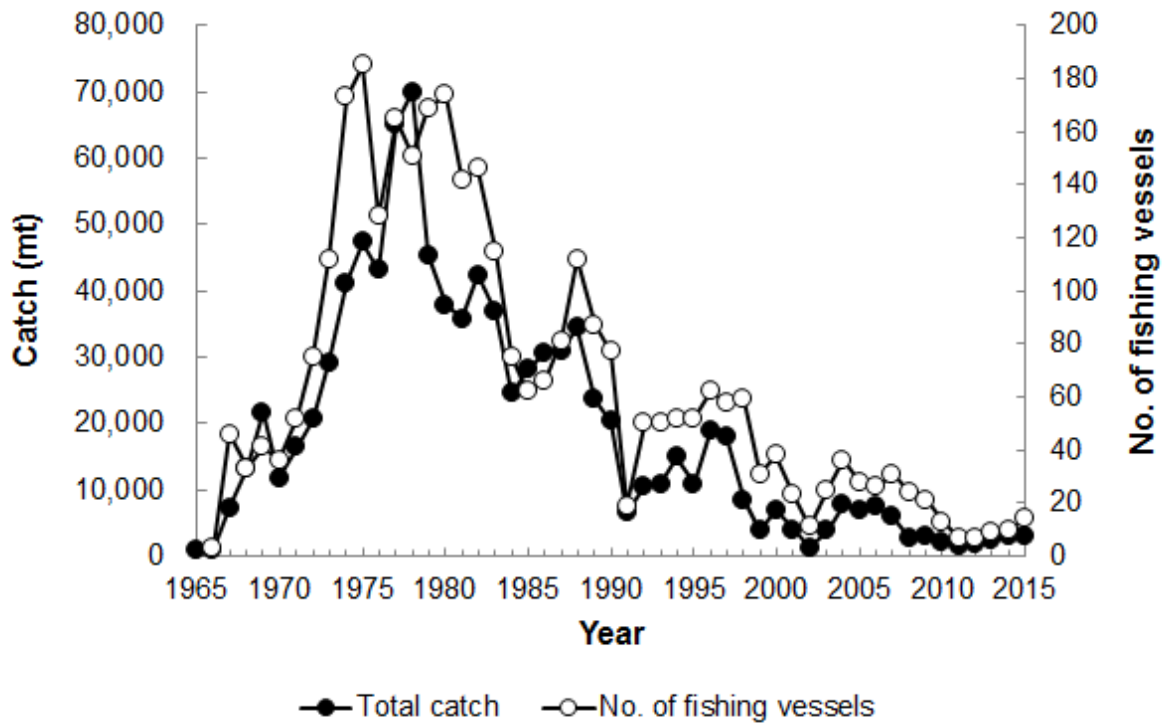


Fig. 1. Annual catch by Korean tuna longline fishery and the number of its active vessel in the Indian Ocean, 1965-2015.

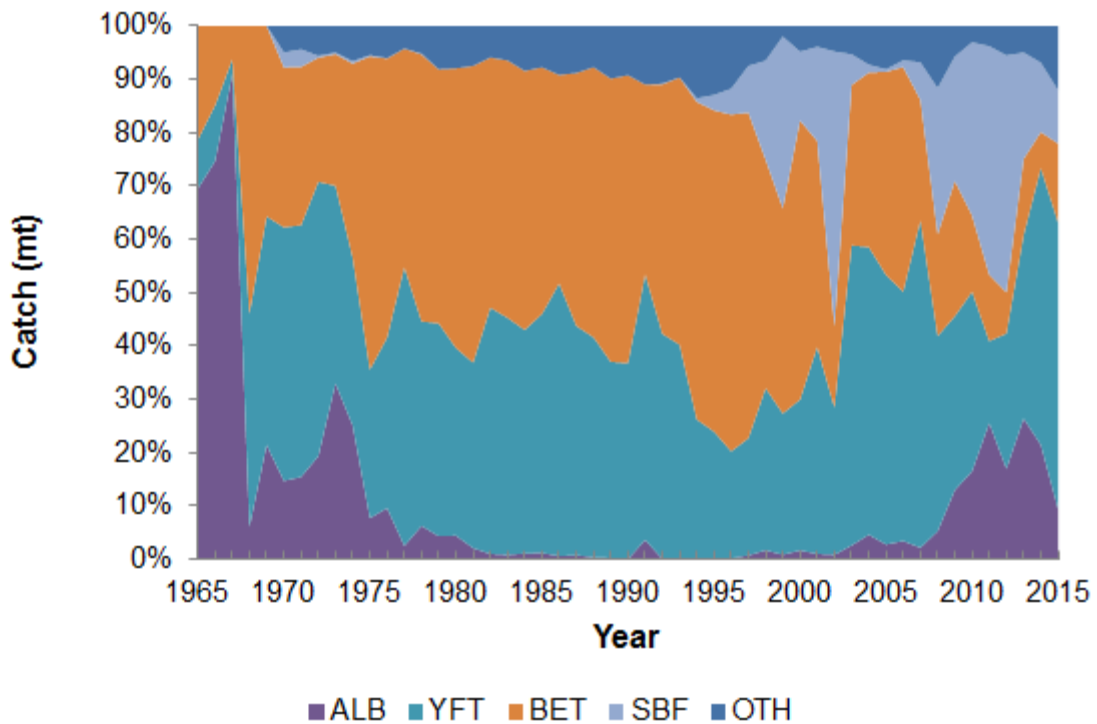


Fig. 2. Annual catch proportion by species of Korean tuna longline fishery in the Indian Ocean, 1965-2015. Data for 2015 is preliminary (Data source: IOTC database).

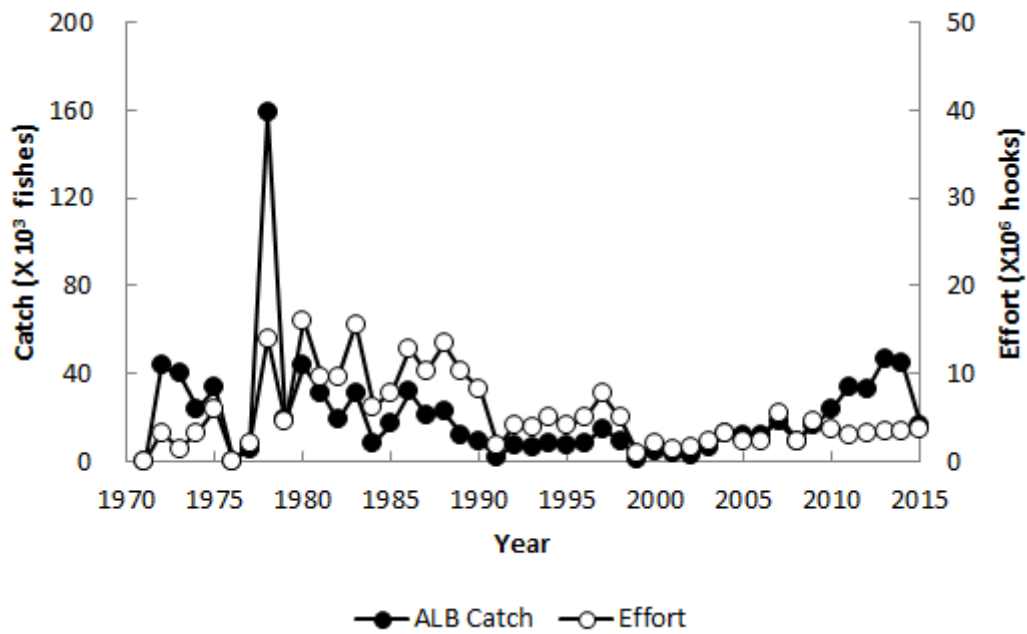


Fig. 3. Annual albacore tuna catch (in number) and fishing effort (number of hooks) by Korean tuna longline fishery in the Indian Ocean, 1971-2015 (Data source: logbook compiled from captain onboard).

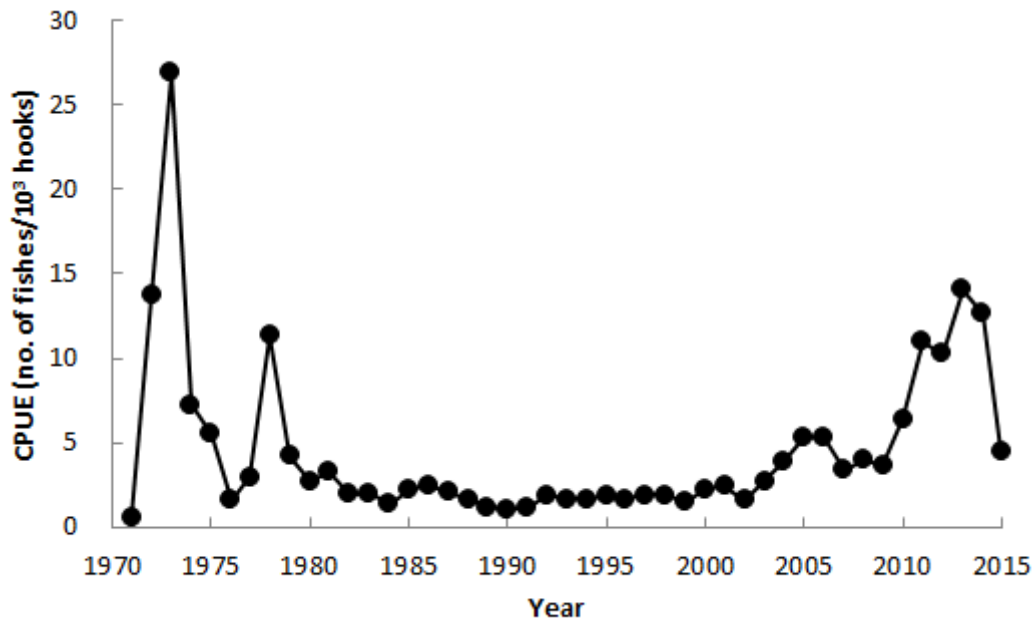
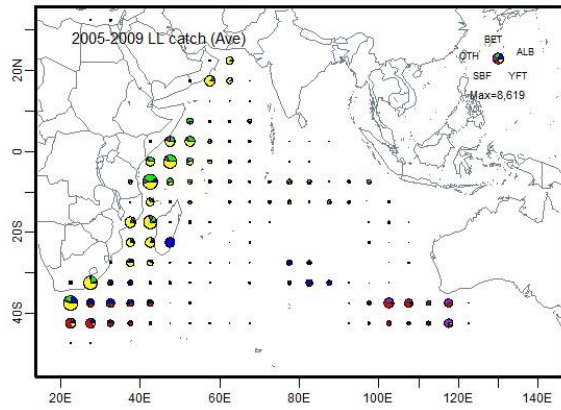
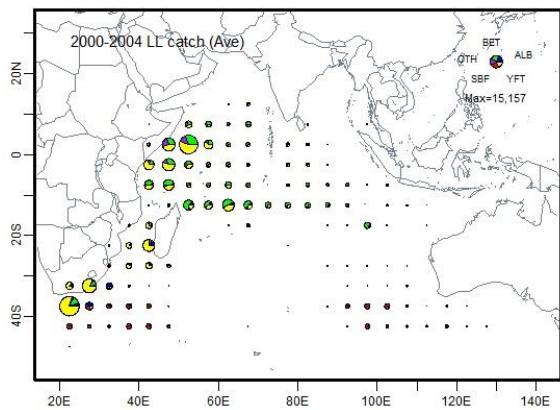
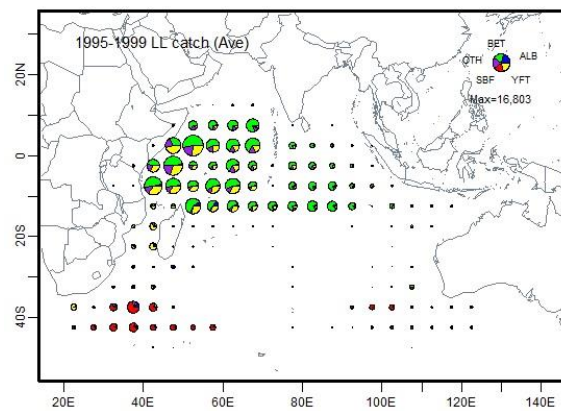
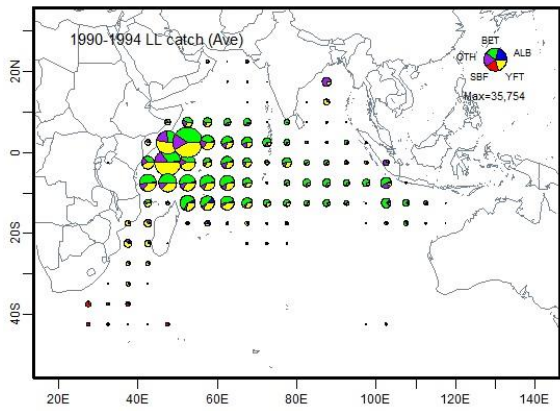
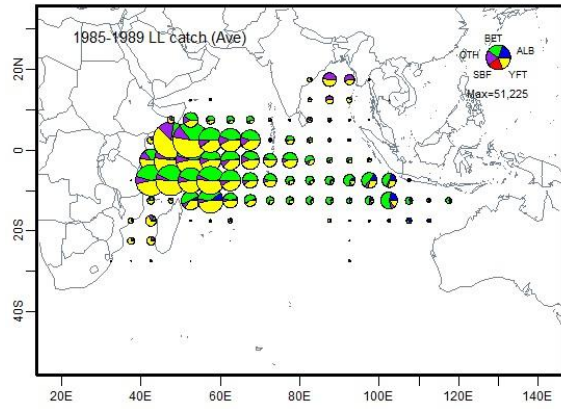
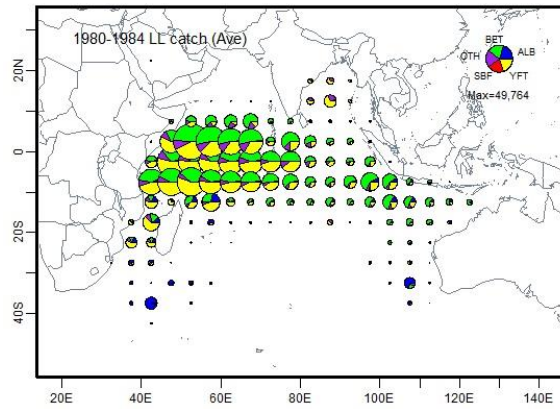
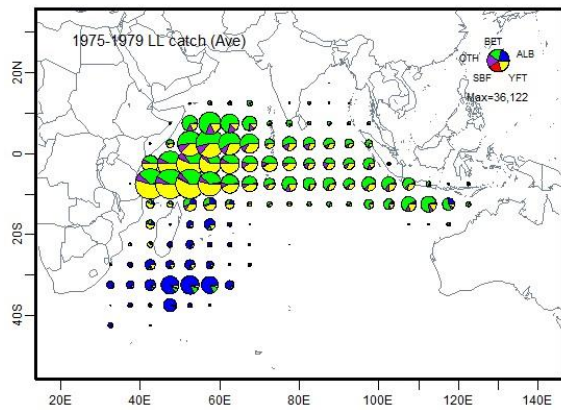
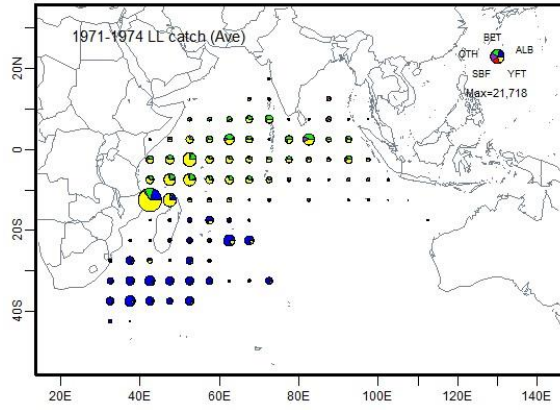


Fig. 4. Changes in the nominal CPUE of albacore tuna caught by Korean tuna longline fishery in the Indian Ocean, 1971-2015.



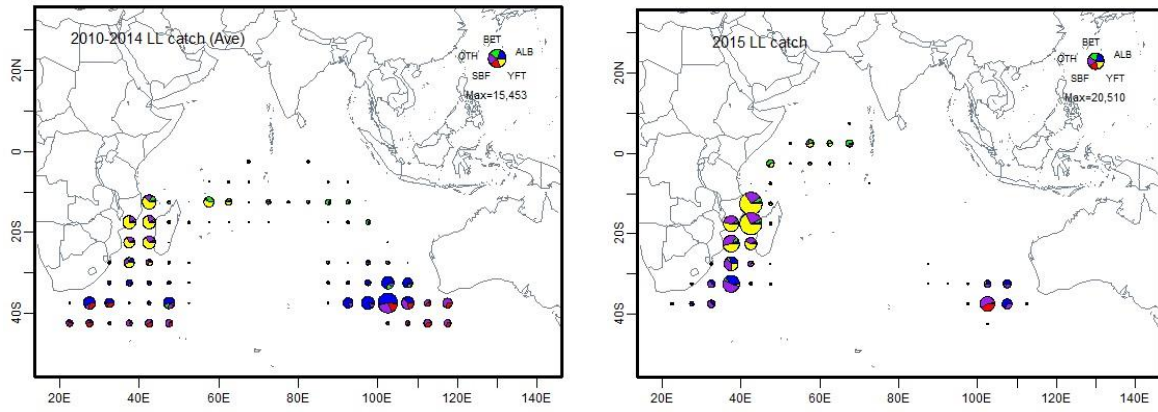


Fig. 5. The geographical distributions of catch by species caught by Korean tuna longline fishery in the Indian Ocean, 1970s-2010s.

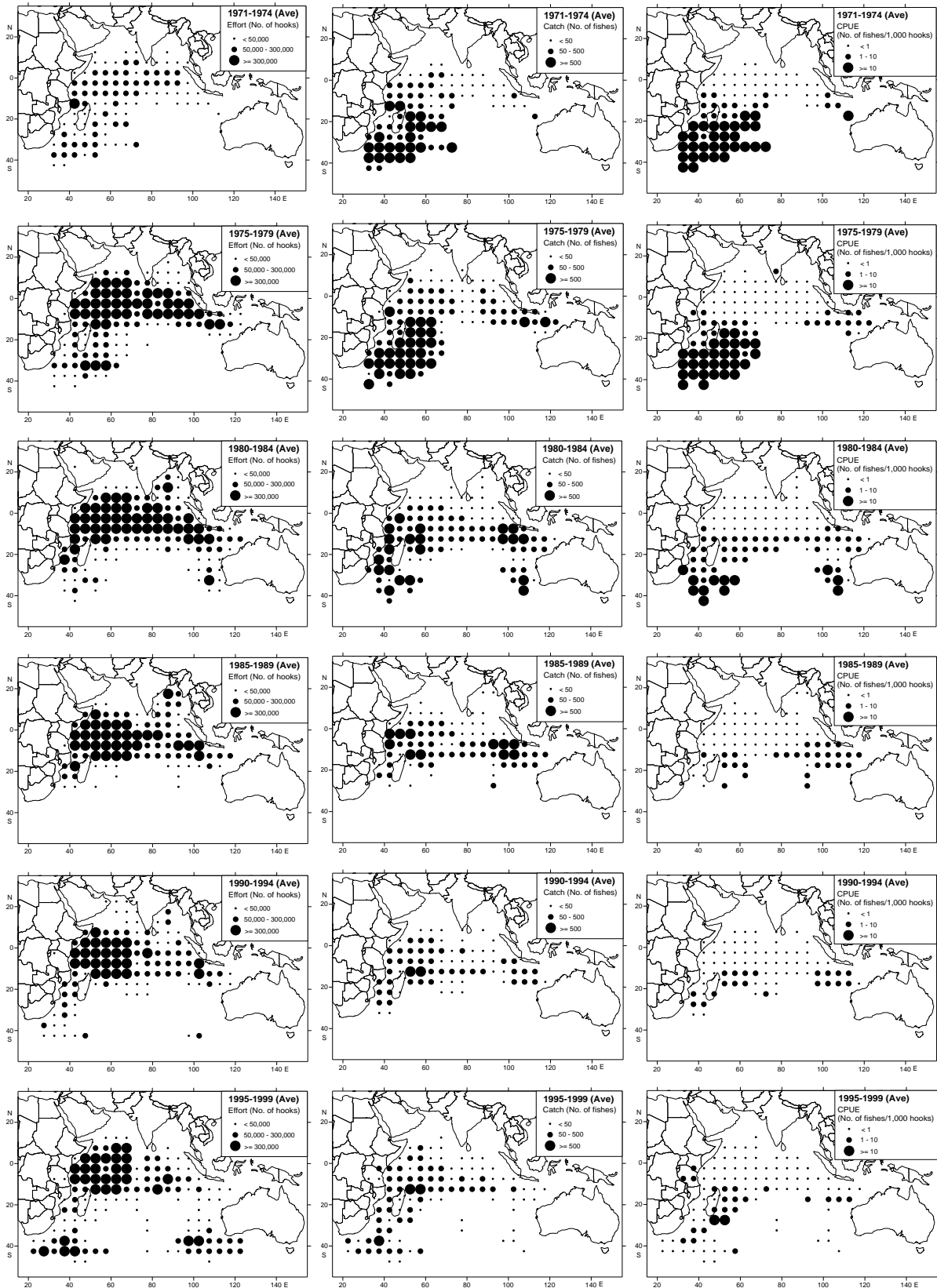


Fig. 6. The geographical distributions of effort (number of hooks), albacore catch (number of fishes), albacore CPUE (number of fishes/10³ hooks) of Korean tuna longline fishery in the Indian Ocean, 1970s-2010s.

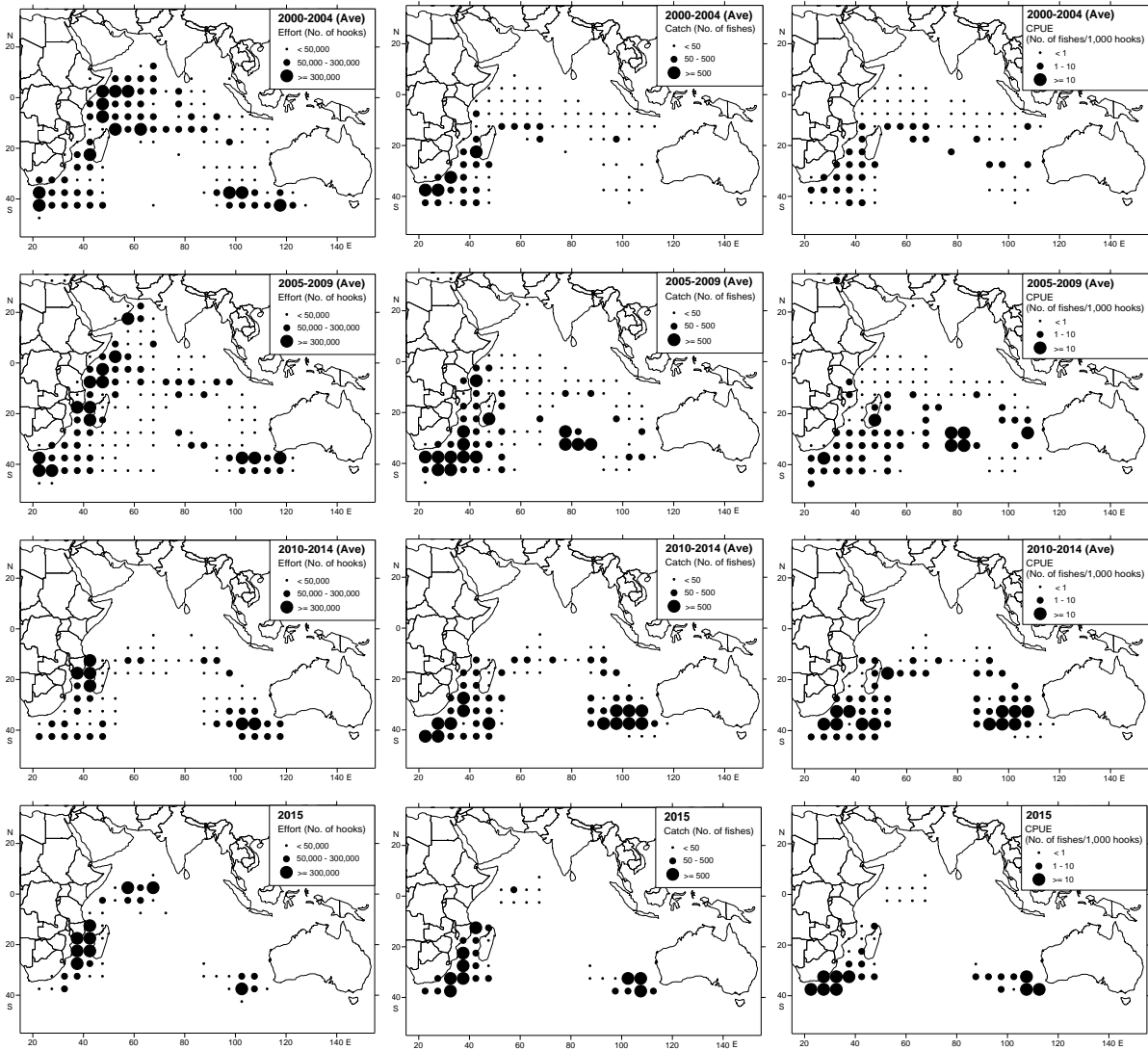


Fig. 6. Continued.

Table 1. Annual albacore tuna catch (mt) caught by Korean longline fishery in the Indian Ocean, 1965-2015

Year	Total	Western Indian Ocean	Eastern Indian Ocean
1965	556	556	
1966	717	717	
1967	6,543	6,543	
1968	792	792	
1969	4,631	4,631	
1970	1,735	1,735	
1971	2,531	2,531	
1972	3,980	3,980	
1973	9,615	9,615	
1974	10,322	10,322	
1975	3,649	3,303	346
1976	4,131	3,302	829
1977	1,633	1,311	323
1978	4,374	3,844	530
1979	1,959	1,512	447
1980	1,678	1,305	373
1981	748	690	58
1982	419	368	50
1983	293	236	56
1984	263	181	82
1985	331	105	226
1986	176	25	150
1987	229	86	144
1988	119	12	108
1989	58	29	29
1990	0		
1991	234		234
1992	6		6
1993	5	5	
1994	32	28	4
1995	19	16	3
1996	34	30	4
1997	128	127	0
1998	142	138	5
1999	32	31	1
2000	115	102	14
2001	40	39	0
2002	10	7	3
2003	100	61	39
2004	356	132	224
2005	192	144	48
2006	252	252	
2007	126	126	
2008	145	113	32
2009	385	301	84
2010	344	152	192
2011	392	341	51
2012	313	260	53
2013	612	121	492
2014	644	107	536
2015	266	197	69

* Data source: IOTC database. Data for 2015 is preliminary.