TRENDS IN ALBACORE CATCH BY JAPANESE LONGLINE FISHERY IN THE ATLANTIC OCEAN, 1956-1987

H. Nakano, Y. Watanabe, Y. Nishikawa
National Research Institute of Far Seas Fisheries, 7-1 Orido, 5-chome, Shimizu-shi, Shizuoka 424, Japan

SUMMARY

The Japanese albacore catches in the Atlantic Ocean consisted mainly of the longline fishery. Based on Japanese longline data during 1956 to 1987, trends in albacore catches were examined. The Japanese albacore catches declined from 1965 and after 1972 they were stable at a low level. This change was due to the change in target species from yellowfin, albacore and bigeye to southern bluefin, bluefin and bigeye. Therefore, the fishing grounds of the Japanese longline fleet were shifted from tropical and sub-tropical waters to temperate and tropical waters where albacore are thinly distributed. The decline is also due to the change in the longline gear from the normal type targeting yellowfin and albacore deep longline for bigeye in the tropical waters.

RESUME

Les prises japonaises de germon dans l'Atlantique ont surtout été effectuées à la palangre. La tendance des captures de germon a été étudiée à partir des données palangrières japonaises pour les années 1956 à 1987. Les prises japonaises de germon ont baissé à partir de 1965; depuis 1972 elles sont stables à un niveau faible. Cette modification est due au changement d'espèces cibles, de l'albacore, du germon et du thon obèse vers le thon rouge du sud, le thon rouge et le thon obèse. Les lieux de pêche de la flottille palangrière japonaise se sont donc déplacés des eaux tropicales et subtropicales vers les eaux tempérées et tropicales où le gerson est réparti en faibles quantités. Ceci est également dû au changement des engins palangriers, du type traditionnel qui vise l'albacore et le germon à la palangre de profondeur qui vise le thon obèse dans les eaux tropicales.

RESUMEN

Las capturas de atún blanco de Japón en el Océano Atlántico se produjeron principalmente por palangre. En base a los datos de palangre japoneses durante 1956 a 1987, se examinó la tendencia de las capturas de esta especie. Las capturas en Japón declinaron desde 1965, y después de 1972 se mantuvieron estables a un nivel bajo. Este cambio se debió al desplazamiento de especie-objetivo del rabil, atún blanco y patudo hacia el atún rojo del Sur, atún rojo y patudo. Por tanto, los caladeros de la flota de palangre de Japón se desplazaron de aguas tropicales y subtropicales a aguas templadas y tropicales donde hay una escasa distribución de atún blanco. Asimismo, se debe al cambio del arte de palangre de tipo normal, que perseguía rabil y atún blanco, al palangre de profundidad para patudo en aguas tropicales.

Introduction

To estimate stock abundance of fish using catch, effort and biological data taken from commercial fishery, it is desirable to be versed in the succession of that fishery. In historical progress of the Japanese longline fishery in the Atlantic, their condition have changed variously. Therefore, the fishery trends must be analyzed in detail to make the best available stock assessment.

This report has considered the trends of Japanese Atlantic longline fishery on catch of albacore during 1956 to 1987, and

ascertained available data to assess on albacore stock.

1. Trends of Albacore catch, 1956-1987

The Japanese albacore catch by longline in the Atlantic started from 1956. The catch in number of albacore increased year by year and reached to the peak of 2 million fish in 1964. Then the catch declined to the early 1970s, after that it has been in low level (Table 1). Catch trend during 1956 to 1987 was divided four categories, e.g. developing stage (1956-1961), ripe stage (1962-1966), declining stage (1967-1971) and low stable stage (1972-1987). As a whole, fishing effort ,in term of nominal hook numbers increased from the developing stage to the peak of 97 million in 1965 and then rapidly decreased one third of the peak in 1967 (Fig.1). The hook numbers fluctuated in 30 to 59 million during 1969 to 1977 and recovered in recent years about 45 to 76 million hooks. Trend of CPUE (number of fish / 100 hooks) showed remarkable two periods, high CPUE level in the during of 1956-1971 and low CPUE level after 1972 to recent years. For the former period, the CPUE trend was not fit to the catch trend but for the latter period it showed similar pattern to the catch.

2. Historical change of the Japanese longline fishery

The Japanese longline fishery in the Atlantic began as an experimental fishing in 1955, from next year the commercial fishing started at the western equatorial waters. Then, fishing ground expanded into the whole tropical waters in the mid-1960s. In this period many Japanese longliners based on the ports of the Atlantic and those were classified into mother boat type. They caught yellowfin and albacore tunas and unloaded their catch at Las Palmas, Freetown, Dakar, Recife, Santos, Port of Spain and Venice, etc. Then the fishes were exported mainly to Italy and other Mediterranean countries for canning (Shingu et al. 1979).

In the early stage, Japanese longliners aimed mainly at yellowfin tuna, and from around 1962 they changed target species from yellowfin to albacore due to the decline of yellowfin catch rate. After the Japanese longline fishery developed, Korean and Taiwanese started their longline fisheries in early 1960s,in the Atlantic. As a result, total amount of the export tunas by Asian fisheries to USA and Europe exceeded the demand and the profits of exportation went down. In addition, food poisoning happened in tuna canning at Detroit in 1963 gave a big damage to the export of tunas. Although total tuna catch in 1965 was good, some of Japanese longliners in the Atlantic shifted to the Pacific from 1966. Then, due to the mercury problem of 1970 in tuna canning and economic depression of USA in the mid-1970s, the tuna export virtually terminated.

In the early-1970s, super cold freezer (below -50oC) on board was spread. It made possible to circulate raw meat of Atlantic tuna and expanded consumption of tunas for the materials of "sashimi" and "sushi",typical Japanese food served raw fish meat, in domestic market. By the reasons we mentioned above, target species were shifted to bluefin, southern bluefin and bigeye tunas. From 1977 the Japanese vessel which aimed at bigeye in the equatorial water of the Atlantic introduced deep longline gear (Koido and Yonemori 1986). This type of gear is more effective to catch bigeye than other tunas including albacore (Suzuki et al. 1977). Since 1979, bigeye tuna catch increased gradually and occupied large portion of the total catch. Recent years catch has fluctuated between 26 and 48 thousands tons and bigeye tuna has occupied around 65 % of the total catch.

3. Comparison of albacore and other tunas catch

Table 2 and Figure 2 show Japanese annual catch of five tuna species, bluefin, albacore, bigeye, yellowfin and southern bluefin tuna during 1957 to 1987. Yellowfin tuna were caught in the largest amount in first decade and declined from the peak of 50 thousands tons in 1960 to several thousands tons recently. Albacore had a peak of 42 thousands tons in 1965, after that

catch declined quickly to the level of around one thousand tons. In contrast, bigeye tuna catch increased from the start of Japanese longline fishing till the mid-1960s and has been maintained in the high level of catch. Bluefin tuna catch peaked 13 thousands tons in 1964 and increased again during mid-1970s to early 1980s. The catch of southern bluefin tuna occurred from 1963 and stayed low level to the recent years.

4. Fishing grounds

In 1956, Japanese longline fishery started at the western equatorial water in the Atlantic, then expanded whole equatorial water. In 1960s, Japanese longline fishery ground have occupied wide area from equatorial to high latitudinal area in the north and south Atlantic and then fishing ground separated three major parts which were north and south temperate water fishing grounds and equatorial fishing ground in the 1970s. In the 1980s at the off southwestern Africa fishing ground, fishing efforts were concentrated. In Fig.3, typical pattern of fishing ground are shown. The distribution of nominal hook number in each 5 degree square of 1965 and 1985 indicate two phase of Japanese longline fishery in the Atlantic. The left figure of fishing ground in 1965 show Japanese longline boats operated the whole Atlantic in the developing stage. Whereas the right figure of fishing ground in 1985 were separated in three parts remarkably.

Discussion

Albacore catch by Japanese longline fishing increased rapidly in 1962 and peaked in 1965. In this period, Japanese longline fleet changed their target species from yellowfin to albacore, as catch rate of yellowfin was declined. High level of albacore catch in weight since 1962, however, dropped suddenly to around one third of the peak in 1967 and one tenth in 1972. The declining of albacore catch during 1967 to 1972 was due to the change of target species, following the industrial structure change, from the export fishery for foreign canning industry to the fishery supplying frozen tuna to domestic market.

Comparison of typical fishing ground of before and after target species shift shows remarkable difference in distribution of the fishing effort. Thus albacore catch trend shows remarkable difference before and after 1972. This is due to the increasing of domestic consumption of southern bluefin, bluefin and bigeye tuna for the materials of "sashimi" and "sushi". This increasing of consumption was made to be possible by the spread the super-cold freezer(below -50oC) equipped in vessels. These boats have been unloading their catches at the Japanese ports.

In addition, the introduction of deep longline gear since 1977, it has less fishing effect for albacore, slightly encouraged the decreasing of CPUE. Albacore and yellowfin tuna are not target species of the Japanese longline fishery at present and caught as by-catch of bluefin, southern bluefin and bigeye tuna. Therefore, the data sets of albacore from the Japanese longline fishery should be available using with interpretation based on historical change of that fishery.

References

FSFRL 1988: ICCAT national report of Japan. SCRS/88/24.

Koido, K. and T. Yonemori 1987: "Trend in hook rate of Atlantic swordfish", ICCAT CVSP 25(1), 396-401.

Kume, S. 1985: Stock assessment and management of the Atlantic tunas.,331-435. The review of the stock assessment and management of the world. 509 pp. Japan Fisheries Resources Conservation Association.

Shingu, C., K. Hisada and Z. Suzuki 1980: "Description of the Japanese longline fishery for bluefin tuna in the Atlantic", ICCAT CVSP 11,145-160.

Suzuki, Z., Y. Warashina and M. Kishida 1977: The comparison of catches by regular and deep tuna longline gears in the western and central equatorial Pacific. Bull. Far Seas Fish. Res. Lab., (15), 51-90.

Table 1. Catch in number of albacore caught by Japanese longline fishery in the Atlantic Ocean.

Year	No. of cruise	nominal Hooks (x1000)	Catch in Number (x1000)	CPUE fish/100 Hooks	Catch in weight (MT)
1956	4	130	1	0.769	
1957	60	3,370	32	0.950	
1958	131	7,980	99	1.241	
1959	189	15,230	355	2.331	
1960	243	20,900	456	2.182	9,804
1961	228	25,957	425	1.637	8,773
1962	182	54,104	1,087	2.009	22,086
1963	-	55,004	1,134	2.062	29,737
1964	258	84,998	2,134	2.511	39,473
1965	436	97,581	1,769	1.813	42,634
1966	242	53,814	1,586	2.947	26,883
1967	140	31,154	688	2.208	12,490
1968	140	30,247	917	3.032	14,701
1969	140	29,676	390	1.314	11,048
1970	199	41,580	811	1.950	11,773
1971	236	55,873	552	0.988	9,690
1972	190	44,139	211	0.478	3,407
1973	182	35,976	109	0.303	1,747
1974	185	38,495	133	0.345	2,168
1975	285	58,722	115	0.196	1,637
1976	149	32,837	93	0.283	1,419
1977	146	32,501	59	0.182	430
1978	189	44,747	44	0.098	666
1979	226	55,458	88	0.159	1,324
1980	240	58,102	94	0.162	1,369
1981	297	71,974	154	0.214	2,298
1982	305	76,388	91	0.119	1,350
1983	195	48,734	85	0.174	1,194
1984	255	65,344	53	0.081	800
1985	281	72,880	91	0.125	1,467
1986	255	65,344	53	0.081	1,209
1987			52		1,400

Table 2. Weight composition of Tunas (MT) caught by the Japanese fishery in the Atlantic Ocean.

Year	Bluefin	Albacore	Bigeye	Yellowfin	S.Bluefin
1957	63	860	454	13,198	
1958	34	1,992	453	27,159	
1959	256	3,614	1,478	44,071	
1960	820	9,804	2,904	50,822	
1961	577	9,273	11,044	42,609	
1962	3,703	22,138	15,746	43,137	
1963	7,809	29,737	14,505	38,594	723
1964	12,629	39,473	17,366	37,620	267
1965	9,551	42,634	28,663	39,331	61
1966	2,521	26,883	17,578	27,645	370
1967	794	12,490	9,012	19,351	100
1968	285	15,201	11,345	23,527	89
1969	118	11,048	11,783	15,672	718
1970	87	11,773	9,504	8,734	4,348
1971	1,532	9,690	21,299	14,544	2,120
1972	673	3,407	19,665	12,470	4,345
1973	1,387	1,747	22,014	11,561	2,687
1974	5,295	2,168	22,946	12,498	2,664
1975	5,673	1,637	17,548	5,777	637
1976	5,843	1,419	8,170	8,307	745
1977	5,772	932	10,144	4,055	3,168
1978	3,782	666	9,863	3,369	4,680
1979	4,350	1,324	12,150	2,948	6,203
1980	4,935	1,369	20,720	3,536	2,151
1981	4,386	2,298	21,228	6,709	1,673
1982	3,826	1,350	32,992	8,624	643
1983	3,997	1,194	15,141	3,300	505
1984	3,246	800	24,310	5,400	1,636
1985	2,523	1,467	31,500	5,308	1,468
1986	1,664	1,209	22,800	3,404	389
1987	2,180	1,400	19,300	4,000	1,110

Note: Figures in above table are referred from Kume(1985) for the period of 1957-1982 and FSFRL(1988) for the period of 1983-1987.

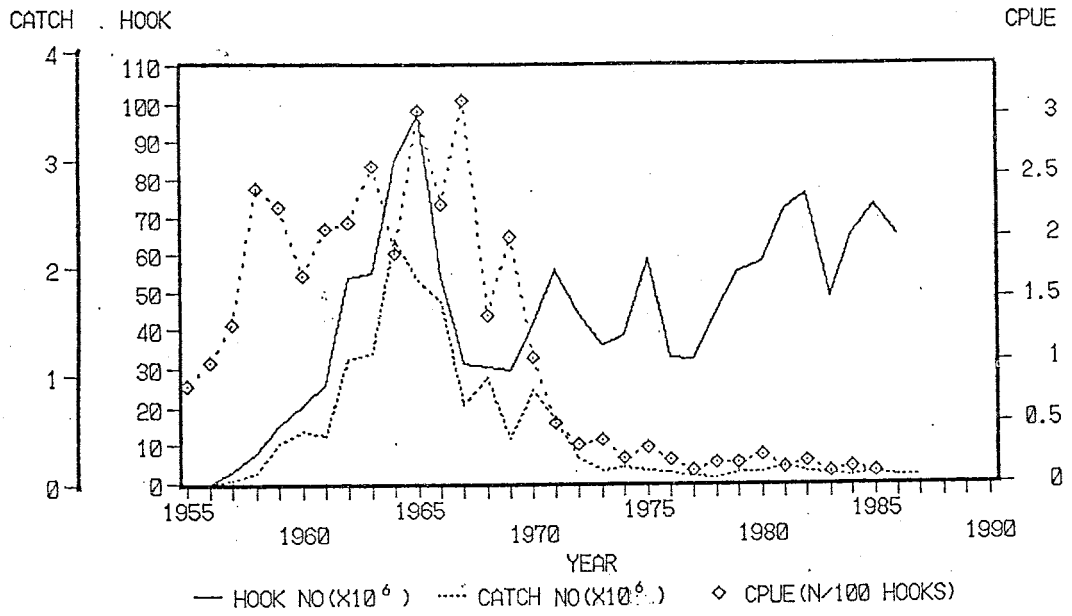

Fig.1 Albacore catch in number, nominal hook numbers and CPUE(catch No. of fish per 100 hooks) during 1956 to 1986.

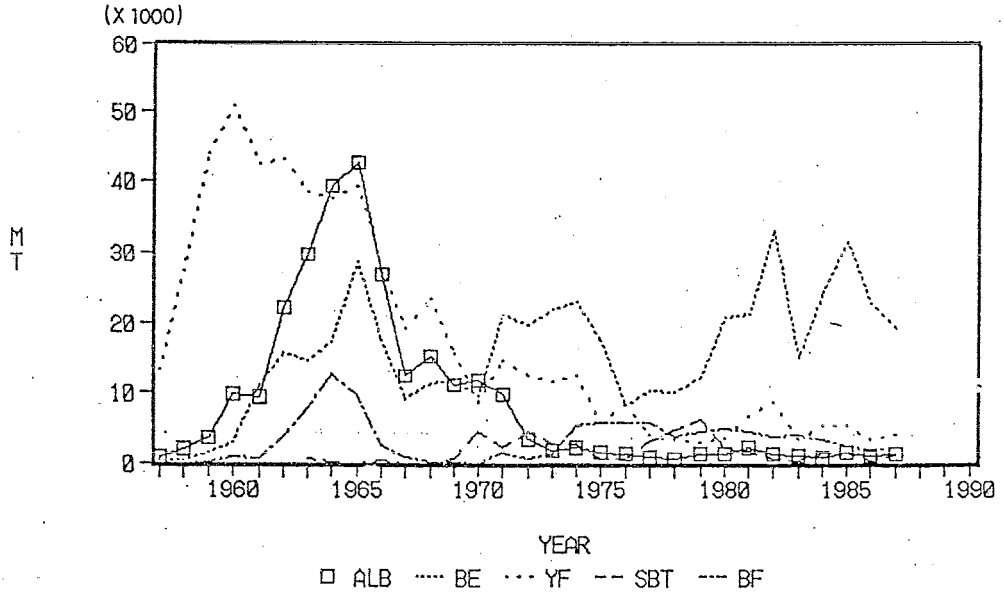

Fig.2 Comparison of Japanese catch tendency for five major species, bluefin, albacore, bigeye, yellowfin and southern bluefin tunas during 1956 to 1986.

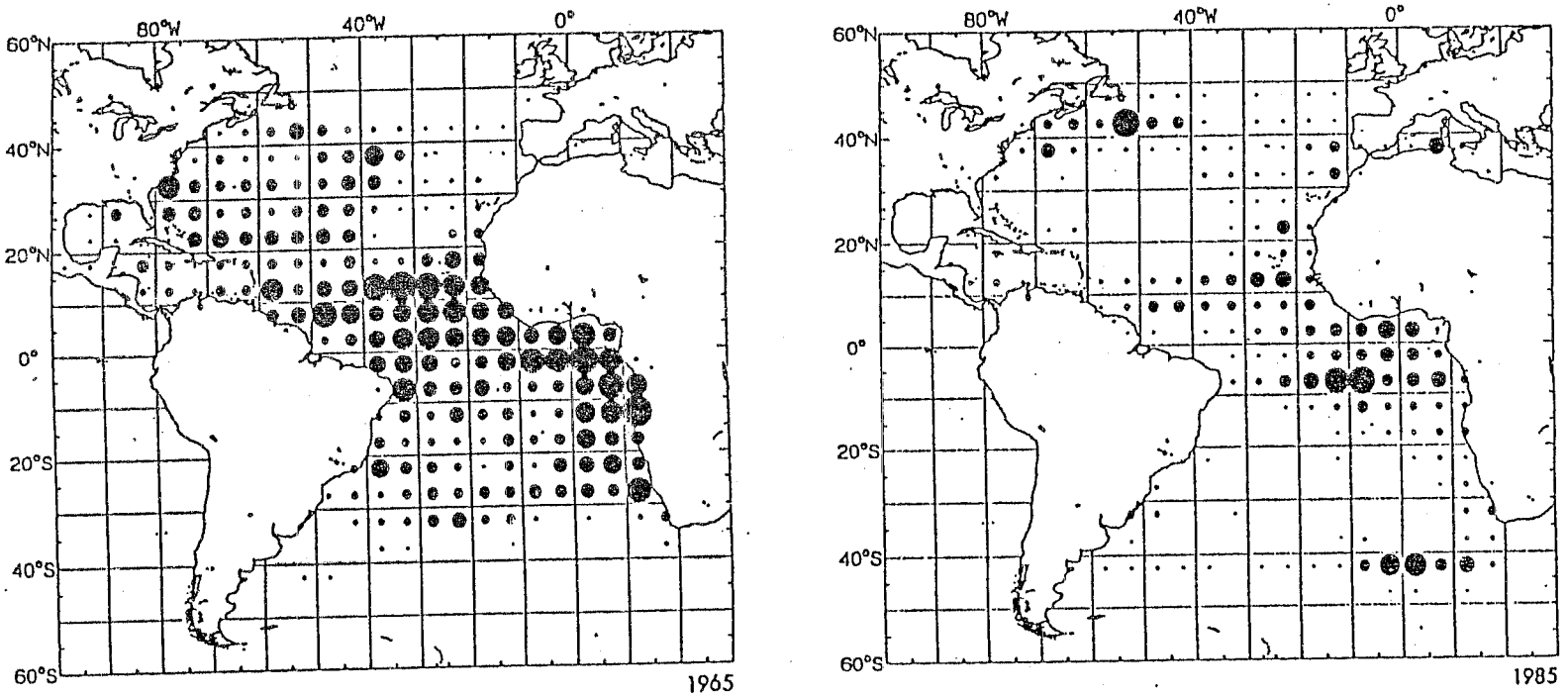

Fig. 3 Two typical fishing grounds before target species shift (1965, left) and after (1985, right). Solid circles indicate nominal number of hooks in each 5 degree square.