OVERALL FISHING INTENSITY AND CATCH BY LENGTH CLASS OF YELLOWFIN TUNA IN JAPANESE ATLANTIC LONGLINE FISHERY, 1956-1972

by

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SUMMARY

Catch, effort and sampling data in 1972 of yellowfin tuna caught by Japanese longline fishery in the Atlantic were processed to supplement the previous report of this series of study. The Japanese share in the longline yellowfin catch has been decreasing in recent years, having been reducing the accuracy in the estimation of the whole longline fishing intensity.

In 1972, the whole longline fishing intensity stayed still on the high level, while the catch remained at the recent low level. A little decline in hook rate in 1972 renewed the lowest record in 1971. The length composition indicated no substantial change compared with that in 1971. A preliminary estimate of the spawning index for 1972 resulted in the lowest condition of recent years.

This report is the third issue of a series of study on fishing intensity, length composition of catch and spawning index of yellowfin tuna exploited by Japanese and other longline fleets in the Atlantic Ocean.

RESUME

Les données de capture, d'effort et d'échantillonnage pour 1972 de l'albacore pris par la pêcherie palangrière japonaise dans l'Atlantique ont été traitées pour compléter le rapport précédent de cette série d'études. La proportion des prises japonaises palangrières d'albacore a décru au cours des dernières années, faisant diminuer l'exactitude de l'estimation de l'intensité de la pêche à la palangre dans son ensemble.

En 1972, l'intensité de la pêche palangrière dans son ensemble est demeurée à un niveau élevé, alors que les prises sont restées au niveau médiocre récent. Une légère baisse du taux par hameçon en 1972 a répété la baisse maximum de 1971. La composition par taille n'indiquait aucune modification sensible par rapport à celle de 1971. Une estimation préliminaire de l'indice de ponte en 1972 a donné les résultats les plus faibles de ces dernières années.

Le présent rapport est le troisième d'une série d'études sur l'intensité de pêche, la composition par taille de la prise et l'indice de ponte concernant l'albacore exploité par les flottilles palangrières japonaise et autres dans l'Océan Atlantique.

RESUMEN

Los datos de capturas, esfuerzo y muestreo de rabil capturado por la pesquería japonesa con palangre en el Atlántico en 1972 han sido procesados complementando así la información disponible en esta serie de estudios. La porción de rabil correspondiente a Japón, capturado por la flota palangrera, ha ido disminuyendo en los últimos años, siendo la estimación de toda la intensidad pesquera con palangre menos precisa que antes.

En 1972, el conjunto de la intensidad pesquera de palangre siguió todavía a un nivel elevado, mientras que la captura permaneció al nivel bajo reciente. En el índice de capturas por anzuelo, se produjo, en 1972, un pequeño descenso registrándose de nuevo la cifra más baja que antes correspondía a 1971. La composición de tallas no indicó cambios sustanciales, comparada con la de 1971. Al hacer una estimación preliminar del índice de puesta correspondiente a 1972, se puso de manifiesto que había sido el más bajo de los últimos años.

Este informe es el tercero de una serie de estudios sobre intensidad pesquera, composición de tallas de las capturas e índices de puesta del rabil explotado por la flota japonesa y otras flotas palangreras en el Oceano Atlántico.

* Appendix Table 2 reproduced in Data Record Vol. 5.

Appendice Tableau 2 reproduit dans le Vol. 5 du Recueil de Données.

Apendice Cuadro 2 reproducido en el Vol. 5 de la Colección de Datos Estadísticos.

1. Fishing intensity, 1956-1972

Procedure of the calculations was already described in the first issue of this series (Honma 1973). The newly added data for 1972 are those provided by ICCAT (1974) on catch in weight (referred to "yield", hereafter) and by Fisheries Agency (1974) on Japanese catch in number (referred to simply "catch", hereafter) and effort statistics. The average year in the present calculation extends from 1963 to 1972.

Since 1966, yellowfin catch taken by Japanese longline fleet has decreased remarkably and Japanese effort on yellowfin tuna expressed by fishing intensity in number of hooks per 5° square has fluctuated rather stably between 220,000 and 420,000 hooks. The yield and catch by Japanese fleet in 1972 were 7,527 tons and 159,010 fish, by about 3,500 tons and 133,000 fish less than each of the previous year respectively. Fishing intensity per 5° square in 1972 amounted to 239,000 hooks. It is noted that hook rate (yearly catch/yearly sum of effective effort) in 1972 was 0.52 percent, still on the decline, and renewed the lowest record in 1971 (Table 1).

The fishing intensity of the whole longline fleet including non-Japanese boats was roughly estimated on the basis of the Japanese yield and that of all participating nations combined. Relations between the whole fishing intensity and either one of hook rate, catch and yield indicate that no substantial change was encountered in 1972 and three elements in recent years have remained still on the low level. Since the Japanese share in yellowfin catch by whole longline fleets has been decreasing in recent years, the accuracy of the estimates of the whole fishing intensity has been reducing. It is urgently required to collect Task 2 statistics from non-Japanese longline boats.

2. Length composition of catch, 1972

In 1972 sampling program of Japanese longline catch covered 5,657 yellowfin tuna in the Atlantic Ocean (Shingu and Hisada ms), 5,108 of which from CARIB area and 739 from GUINEA area (Table 2). Catch in these two areas was about 140,000 fish comprising 88 percent of total Japanese catch in the Atlantic Ocean. Number of samples in the whole Atlantic does not agree with sum of the regional samples because fish taken in the area extending between Long. 20°W and 40°W were used for both areas. The sample length composition was converted to catch by length class through the methods described in the first issue.

Appendix table 2 gives catch in number of fish for each 2-cm interval of body length compiled by area and be quarter for 1972. In CARIB area, yearly total figures in 1972 indicate almost the same length composition in 1971, except a shift of sharp and dominant mode to a little smaller size, 100-108 cm, from 108-116 cm in 1971, and the disappearance of a mode over 140 cm in 1972. The length data in GUINEA area cover only first half of the year. Comparison of the corresponding data in 1971 indicates that large-sized fish over 120 cm were dominant for both years. However, the most dominant modal size of 148-152 cm in 1971 was replaced by smaller modal group of 128-132 cm in 1972 and the fish smaller than 80 cm in 1972 composition were nearly missing.

3. Spawning index, 1965-1972

Following the procedure in the previous issue (Honma 1974), spawning index in 1972 was estimated for CARIB and GUINEA areas on the longline caught yellowfin. Spawning index is calculated by the following equation:

$$S = d \times (\Sigma C_\ell \cdot E_\ell)/C$$

S : spawning index
d : hook rate in each area
C_ℓ : catch of ℓ-th length class
E_ℓ : $p_\ell \times E'_\ell$

$$E'_\ell = 8.955\,\ell^{2.791} \times 10^{-9}$$

p_ℓ : percentage of the fish in ℓ-th length interval

$C : \Sigma C_\ell$

This estimate is of preliminary nature, since E'_ℓ, estimated on yellowfin tuna in the eastern Pacific Ocean (Joseph 1963), should be re-examined with the materials taken from the Atlantic Ocean. In spite of such imperfection included in basic data, it should be noted that, in both the CARIB and GUINEA areas, the spawning index has been decreasing since 1969, having lowered to about a half of the level in 1966 (Fig. 3).

Appendix table 1. Extent of distribution range of yellowfin tuna in 5-degree square in the average years, and amount of effective effort in thousand hooks and overall fishing intensity in thousand hooks per 5-degree square of Japnese longline fishery, 1956-1972.

Month	Area	1956		1957		1958		1959		1960	
		X	f	X	f	X	f	X	f	X	f
Total	-	(258)	1.9	(5,978)	45.1	(16,620)	125.2	(25,951)	197.5	(35,358)	270.6
1	140.71	-	-	-	-	1,854	13.2	1,440	10.2	1,973	14.0
2	135.86	-	-	89	0.7	1,194	8.8	1,273	9.4	3,611	26.6
3	110.13	-	-	67	0.6	961	8.7	1,613	14.6	2,372	21.5
4	123.45	-	-	171	1.4	694	5.6	2,348	19.0	3,814	30.9
5	133.71	-	-	613	4.6	1,037	7.8	2,292	17.1	2,790	20.9
6	136.08	42	0.3	219	1.6	1,923	14.1	2,647	19.5	3,048	22.4
7	126.84	20	0.2	727	5.7	1,664	13.1	2,499	19.7	4,156	32.8
8	130.98	88	0.7	695	5.3	964	7.4	2,755	21.0	4,320	33.0
9	135.12	35	0.3	653	4.8	1,801	13.3	1,994	14.8	2,603	19.3
10	143.52	36	0.2	945	6.6	2,291	16.0	3,283	22.9	2,677	18.7
11	128.30	8	0.1	856	6.7	1,255	9.8	2,185	17.0	2,076	16.2
12	132.62	31	0.2	943	7.1	981	7.4	1,623	12.2	1,918	14.5

Month	1961		1962		1963		1964		1965	
	X	f	X	f	X	f	X	f	X	f
Total	(40,904)	314.2	(64,703)	499.9	(73,174)	573.0	(96,966)	747.4	(113,237)	877.5
1	4,135	29.4	3,280	23.3	2,996	21.3	5,765	41.0	11,006	78.2
2	5,845	43.0	6,458	47.5	9,791	72.1	11,986	88.2	20,957	154.3
3	3,857	35.0	7,366	66.9	12,134	110.2	10,857	98.6	17,061	154.9
4	4,837	39.2	10,518	85.2	13,357	108.2	9,939	80.5	12,427	100.7
5	5,057	37.8	6,159	46.0	6,190	46.3	4,381	32.8	6,510	48.7
6	4,002	29.4	7,037	51.7	2,320	17.0	3,641	26.8	4,549	33.4
7	3,219	25.4	3,759	29.6	2,209	17.4	8,057	63.5	6,342	50.0
8	3,378	25.8	6,216	47.5	5,936	45.3	13,073	99.8	10,771	82.2
9	899	6.7	5,717	42.3	4,642	34.4	9,938	73.5	7,636	56.5
10	1,346	9.4	4,280	29.8	4,505	32.0	7,678	53.5	5,546	38.6
11	2,108	16.4	1,991	15.5	3,753	29.2	5,277	41.1	5,171	40.3
12	2,221	16.8	1,922	14.5	5,251	39.6	6,374	48.1	5,261	39.7

Month	1966		1967		1968		1969		1970	
	X	f	X	f	X	ff	X	f	X	f
Total	(53,452)	419.4	(35,452)	276.2	(31,762)	244.8	(28,331)	220.0	(28,073)	215.8
1	4,227	30.0	1,249	8.9	4,825	34.3	1,674	11.9	1,848	13.1
2	6,790	50.0	4,775	35.1	3,373	24.8	3,080	22.7	2,669	19.6
3	10,330	93.8	5,359	48.7	4,809	43.7	4,124	37.4	2,973	26.7
4	7,070	57.3	4,949	40.1	2,102	17.0	2,707	21.9	2,059	16.7
5	3,236	24.2	2,371	17.7	1,742	13.0	2,753	20.6	1,414	10.6
6	2,542	18.7	1,377	10.1	3,055	22.4	3,063	22.5	4,562	33.5
7	4,400	34.7	2,400	18.9	2,939	23.2	2,456	19.4	4,116	32.4
8	6,724	51.3	2,436	18.6	3,467	26.5	3,382	25.8	3,038	23.2
9	4,529	33.5	2,520	18.7	2,046	15.1	1,666	12.3	2,212	16.4
10	2,491	17.4	2,767	19.3	1,973	13.5	1,228	8.6	1,655	11.5
11	640	5.0	2,058	16.0	866	6.8	1,097	8.5	1,072	8.4
12	473	3.6	3,190	24.1	601	4.5	1,101	8.3	491	3.7

Month	1971		1972	
	X	f	X	f
Total	(50,925)	390.3	(28,113)	219.0
1	1,742	12.4	970	6.9
2	2,650	19.5	2,524	18.6
3	4,685	42.5	4,016	36.5
4	3,778	30.6	3,164	25.6
5	2,633	19.7	2,468	18.5
6	5,539	40.7	2,470	18.2
7	6,144	48.4	3,901	30.8
8	9,424	71.9	3,299	25.2
9	7,529	55.7	2,941	21.8
10	5,061	35.3	1,493	10.4
11	1,338	10.4	556	4.3
12	403	3.0	311	2.3

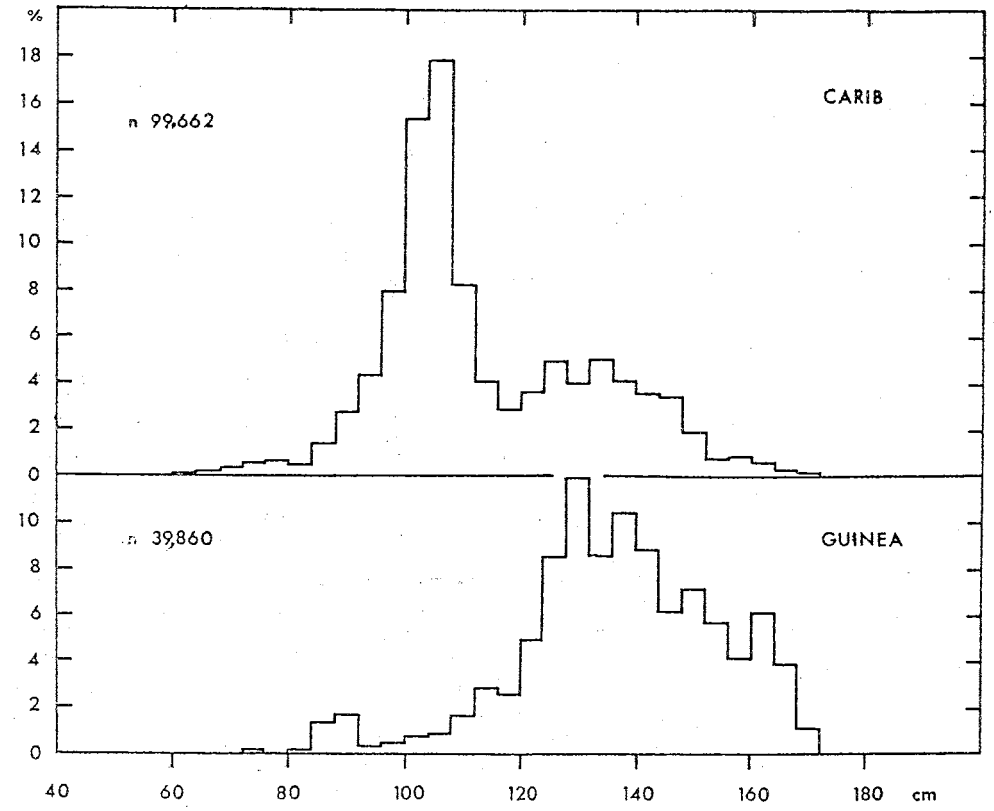

Fig. 2. Percentage length composition of yellowfin tuna caught by Japanese longline fishery in the Atlantic Ocean(CARIB and GUINEA area), 1972.

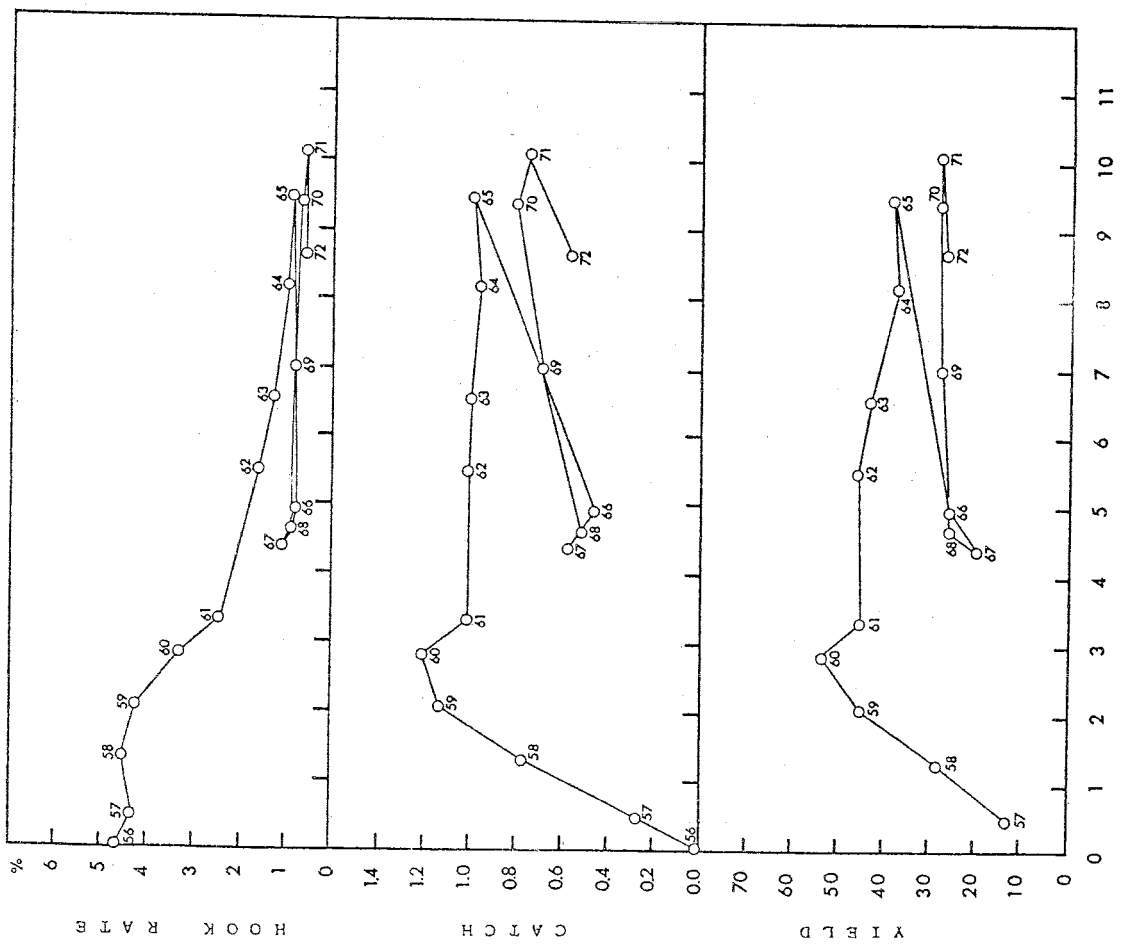

Fig. 1. Hook rate in percent (upper panel), catch in million fish (central panel), and yield in thousand tons (lower panel) of yellowfin tuna against overall fishing intensity in hundred thousand hooks per 5° square in the Atlantic longline fishery, 1956-1972.

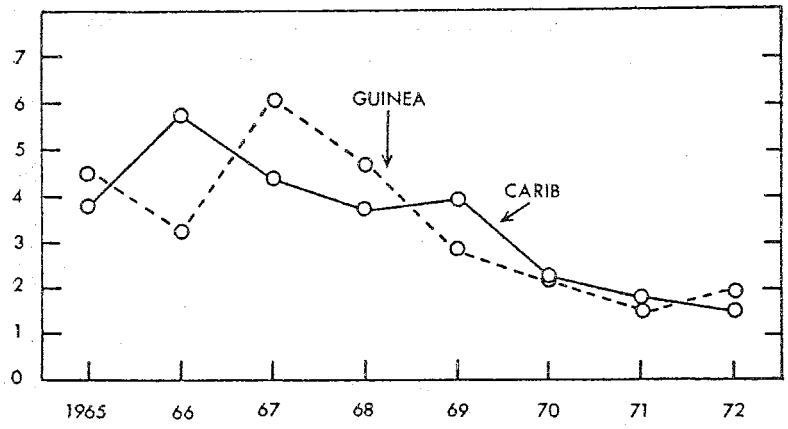

Fig. 3. Spawning index of yellowfin tuna in Atlantic longline fishery, 1965-1972.

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