

OVERALL FISHING INTENSITY AND CATCH BY LENGTH CLASS OF
YELLOWFIN TUNA IN THE JAPANESE ATLANTIC LONGLINE FISHERY, 1956-1973

by

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SUMMARY

This report is the fourth issue in a series to study fishing intensity, length composition of the catch and spawning index of yellowfin tuna exploited by Japanese and other longline fleets in the Atlantic Ocean. The relevant data on catch, effort and biological sampling, obtained primarily from the Japanese longline fleet, were supplemented to the previous report. The recent decreasing trend of the Japanese share in the longline yellowfin catch has been causing a reduction in the accuracy of the estimate of the statistics for the whole longline fishery.

Though there was a further increase in fishing intensity in 1973, the yield remained at the same level as that of recent years. A slight decline in the hook rate of the Japanese fleet again equaled the lowest record of 1972. The length composition in the CARIB area in 1973 indicated the relative increase in large-size fish over 120 cm. compared with the corresponding length composition in 1972. A preliminary estimate of the spawning index for 1973 was almost at the recent lowest level.

RESUME

Ce rapport est le quatrième d'une série portant sur l'étude de l'intensité de pêche, la composition de longueur de la prise et l'indice de ponte de l'albacore exploité par la flottille japonaise et les autres flottilles palangrières dans l'Atlantique. Les données pertinentes de capture, d'effort et d'échantillonnage biologique, en provenance fondamentalement de palangriers japonais, ont été ajoutées au précédent rapport. La tendance récente à la baisse du pourcentage correspondant à la prise japonaise dans la capture palangrière a entraîné une moindre précision des estimations statistiques pour l'ensemble de la flottille palangrière.

Bien que l'intensité de pêche se soit encore accrue en 1973, la production est restée au même niveau que ces dernières années. Une légère baisse du taux par hameçon de la flottille japonaise l'a de nouveau situé au niveau du minimum de 1972. La composition de longueur dans les Caraïbes en 1973 signalait une augmentation relative du poisson de grande taille (plus de 120 cm.) par rapport à la composition de longueur correspondante de 1972. Une estimation préliminaire de l'indice de ponte pour 1973 se trouvait presque au niveau le plus bas de ces dernières années.

RESUMEN

Este informe es el cuarto de una serie que estudia la intensidad de pesca, composición por tallas de las capturas y el índice de desove del rabil, explotado por los japoneses y otras flotas palangreras en el Atlántico. Los datos relevantes de la captura, esfuerzo y muestreo biológico, obtenidos primeramente por la flota palangrera japonesa, se añadieron al informe anterior. La reciente tendencia decreciente de la participación japonesa en la captura de rabil con palangre, ha reducido la precisión de las estimaciones estadísticas sobre el conjunto de la pesquería palangrera.

Aunque hubo un aumento adicional en la intensidad de pesca en 1973, la producción se mantuvo al mismo nivel que en los años recientes. Un ligero descenso en la tasa por anzuelo de la flota japonesa, se equiparó de nuevo al record más bajo de 1972. La composición por tallas en el área del CARIBE en 1973, indicaba un relativo aumento en peces de talla grande, más de 120 cm, si se comparaba a la composición por tallas correspondiente a 1972. La estimación preliminar del índice de desove en 1973 dió un nivel casi tan bajo como el mínimo de los últimos años.

Appendix Table reproduced in Data Record Vol. 7.

Appendice Tableau reproduit dans le Vol. 7 du Recueil de Données.

Apendice Cuadro reproducido en la Colección de Datos Estadísticas Vol. 7.

1. Yield, catch in number and fishing intensity, 1956-1973

The most recently available data for 1973 were supplemented to the previous report: the current statistics on catch in weight (referred to "yield", hereafter) by ICCAT (1975), Japanese statistics on catch in number (referred to "catch", hereafter) and effort by area by Fisheries Agency (1975). There made some revision in longline yield statistics prior to 1972, main part of which was due to the conversion of gilled-and-gutted weight to live weight for the Taiwanese and Korean yields. The procedure of the calculation was already described in the first issue of this series of study (Honma 1975). The same average year in the previous report, 1963-1972, was applied in the present calculation.

The yield of longline yellowfin reached to maximum, 53,000 tons, in 1960. Since then, the yield was on the decrease until 1967, and from 1968 onward has leveled off at around 30,000 tons (Fig. 1). The yellowfin yield by Japanese longline fleet has occupied more than 80 percent of the total longline yield up to 1966. Thereafter, the share of Japanese fleet has become smaller and smaller and declined to only 13 percent of the total yield, 4,200 tons, in 1973. Offsetting the decline of catch of Japanese fleet, the yield by non-Japanese boats has increased along with the year-to-year change of the share by country (Fig. 1). The yellowfin catch in number by Japanese fleet in 1973 was about 109,000 and the hook rate (yearly catch/yearly sum of effective effort) was 0.48, the lowest record (Table 1).

Since 1971, Japanese longline effort on yellowfin tuna expressed by fishing intensity in number of hooks per 5 degree square has decreased to about 185,000 hooks in 1973, less than 50,000 hooks compared with that in 1972 (Table 1). This decreasing trend in recent years is also reflected by the reducing interest in yellowfin tuna by the Japanese fleet. Index of effectiveness of the effort (the ratio of effective effort in number of hooks to nominal number of hooks used) has turned out below 1.0 in recent two years (Fig. 3).

The fishing intensity of the whole longline fleet including non-Japanese boats was estimated on the basis of the Japanese yield and the total longline yield. It is noted that owing to the recent decreasing trend of the Japanese share of yellowfin catch in the total yield the accuracy of the estimated overall fishing intensity has been becoming lower year by year. Though the overall fishing intensity has increased still further in 1973, 25 % more than those in 1970-1972, relationships between the whole fishing intensity and either one of hook rate, catch and yield indicated no substantial change in 1973 and remained still on the recent low level (Fig. 2).

2. Length composition of catch, 1973

In 1973, sampling measurement program of Japanese longline catch covered 12,117 yellowfin tuna in the Atlantic Ocean (FSFRLab, ms), 10,329 of which were from CARIB and 1,706 from GUINEA area. The inconsistency between total number and sum of two areas is due to the overlapped inclusion of the fish taken in the area extending between Long. 20°W and 40°W for both areas. Catch in these two areas was about 104,000 fish, corresponding to 98 percent of total Japanese longline catch in the Atlantic Ocean. Catch in number of fish for 2-cm interval of body length compiled by area and by quarter of the year for 1973 is given in Appendix table 2. In CARIB area, two modes, 104-108 cm and 116-120 cm, are recognized in the yearly total presentation of length composition in 1973 (Fig. 4), whereas a single dominant modal group, 100-108 cm, in 1972. It is also noted that proportion of larger fish than 120 cm increased in 1973 compared with the 1972 composition. The length composition in GUINEA area for 1973 was similar to the corresponding data in that the large-sized fish over 120 cm were dominant. However, the proportion of larger fish than 150 cm decreased in 1973.

3. Spawning index, 1965-1973

The spawning index of 1973 was estimated preliminarily following the same procedure of the calculation as described in the previous report (Honma 1974). In both CARIB and GUINEA areas, the spawning indices in recent years, 1971-1973, have been on the same low level.

References

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Table 1. Hook rate, catch in number, yield in weight and overall fishing intensity of yellowfin tuna in Japanese longline fishery, and catch, yield and overall fishing intensity in the whole longline fishery in the Atlantic Ocean, 1956 - 1973.

Year	Hook rate in percent	Japanese longline fishery			Whole longline fishery		
		Catch in number of fish	Yield in tons	Intensity in 1,000 hooks per 5 ² - square	Catch in 1,000 fishes	Yield in 1,000 tons	Intensity in 1,000 hooks per 5 ² - square
1956	4.64	12,028	..	2.1	2.1
1957	4.32	258,544	13,198	48.0	270	13.8	50.2
1958	4.49	746,490	27,159	134.1	771	28.1	138.6
1959	4.23	1,097,535	44,071	211.7	1,137	45.7	219.4
1960	3.28	1,158,534	50,822	291.0	1,204	52.8	302.5
1961	2.40	980,339	42,609	338.0	1,026	44.6	353.8
1962	1.53	990,472	41,973	537.9	1,082	45.9	587.7
1963	1.21	885,796	37,717	612.9	1,067	45.4	738.2
1964	0.91	879,188	35,106	802.6	1,001	40.0	914.6
1965	0.82	927,267	36,619	943.8	1,017	40.2	1,037.0
1966	0.74	394,538	22,123	451.4	474	26.6	543.6
1967	1.03	366,046	12,809	294.8	611	21.4	493.7
1968	0.86	274,181	13,857	263.6	554	28.0	537.1
1969	0.78	241,832	9,823	237.1	748	30.4	806.6
1970	0.66	189,569	6,674	232.9	878	30.9	1,100.2
1971	0.57	292,062	11,026	422.4	803	30.3	1,164.1
1972	0.52	159,010	7,527	235.5	657	31.1	1,063.4
1973	0.48	108,585	4,189	185.0	822	31.7	1,425.2

Table 2. Sample size and substitution of data for calculating catch by length class.

Area	Quarter			
	I	II	III	IV
CARIB	(II)	119	9,036	1,174
GUINEA	1,600	106	(II)	(II)

Arabic numerals without parentheses denote number of individuals determined by either length or body weight.
Roman numerals in parentheses denote substituted data of the given quarters.

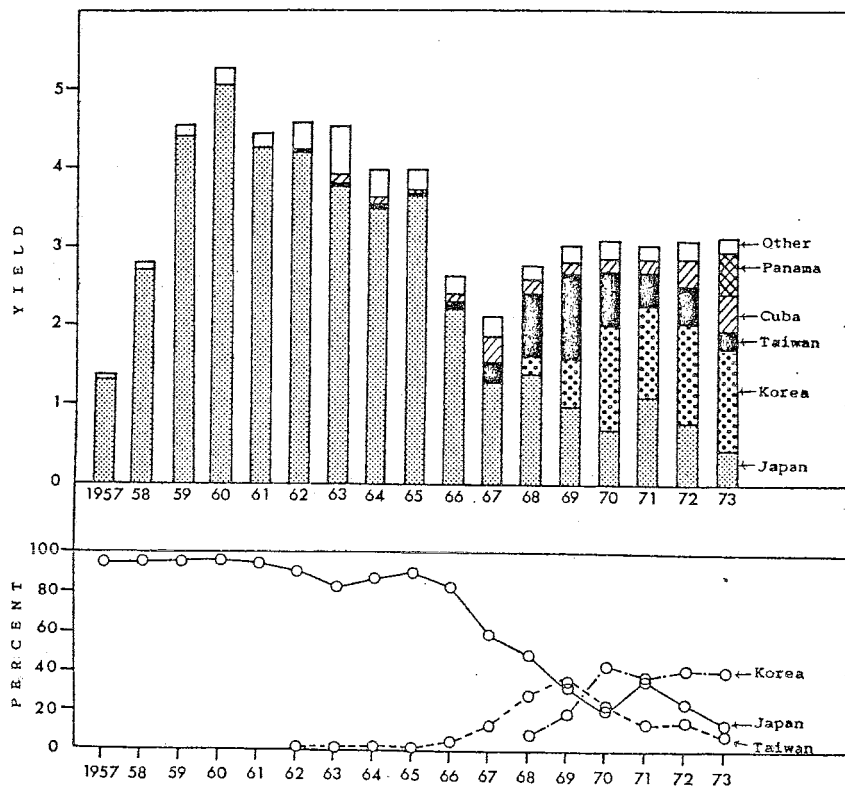


Fig. 1. Yield in ten thousand tons (upper panel), and yield in percent (lower panel) of yellowfin tuna by country in the Atlantic longline fishery, 1957 - 1973.

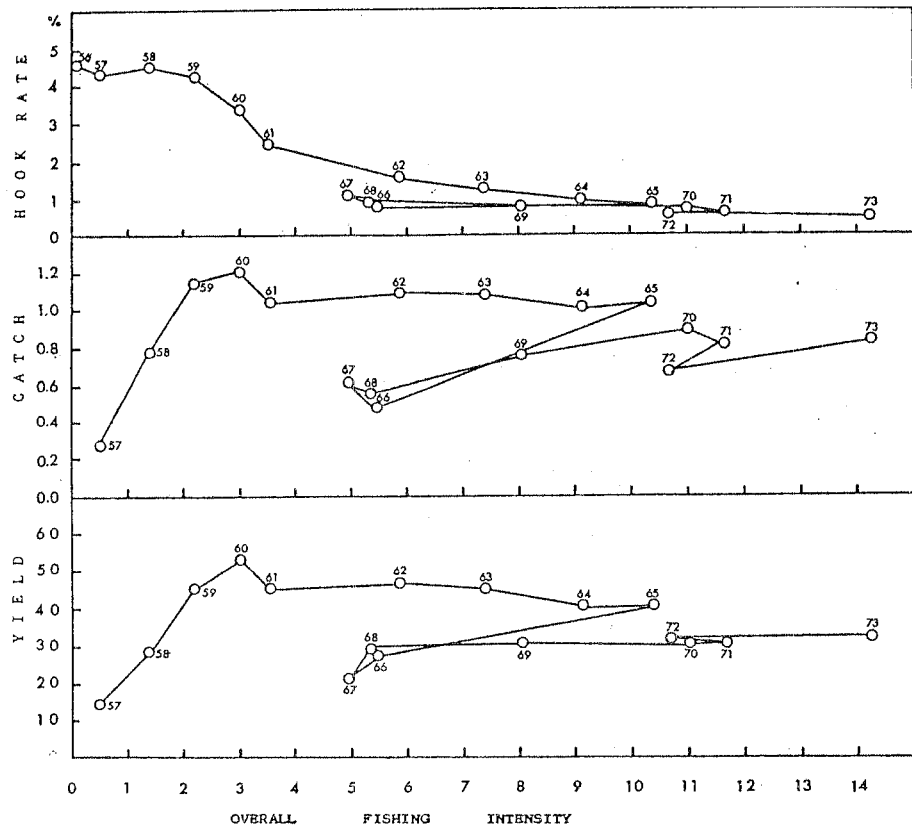


Fig. 2. Hookrate in percent (upper panel), catch in million fish (central panel), and yield in thousand tons (lower panel) of yellowfin tuna against overall fishing intensity in hundred thousand hooks per 5° square in the Atlantic longline fishery, 1956 - 1973.

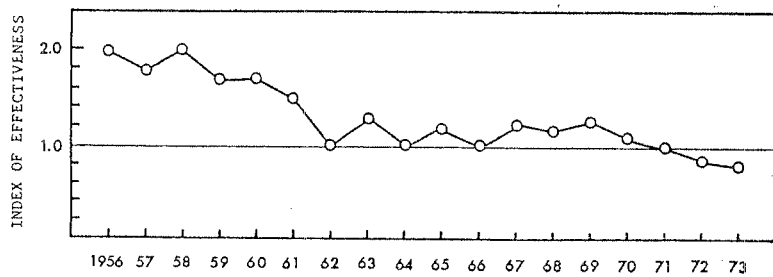


Fig. 3. Yearly average indices of effectiveness of Japanese longline fishery on yellowfin tuna in the Atlantic Ocean, 1956 - 1973.

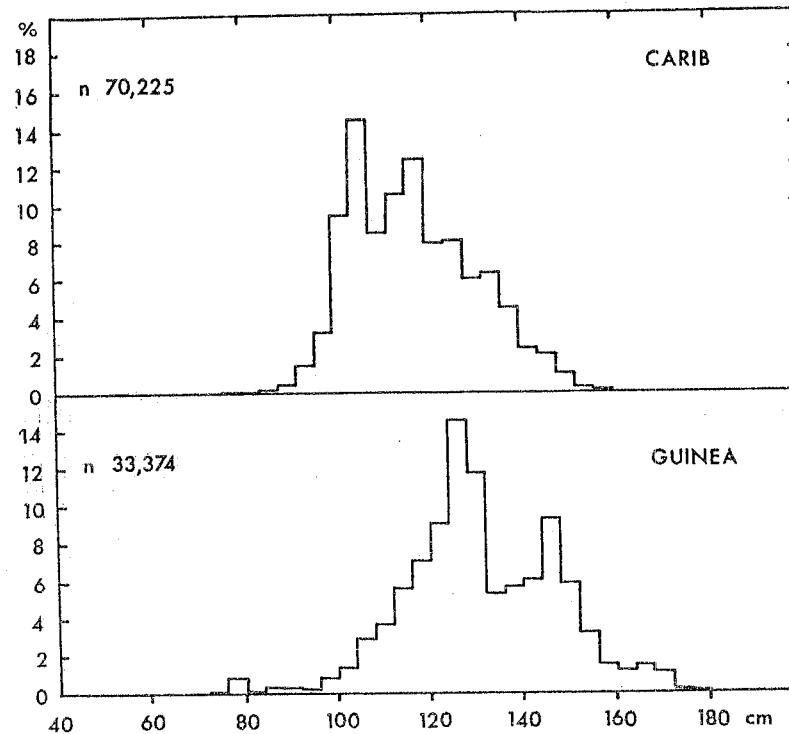


Fig. 4. Percentage length composition of yellowfin tuna caught by Japanese longline fishery in the Atlantic Ocean (CARIB and GUINEA area), 1973.

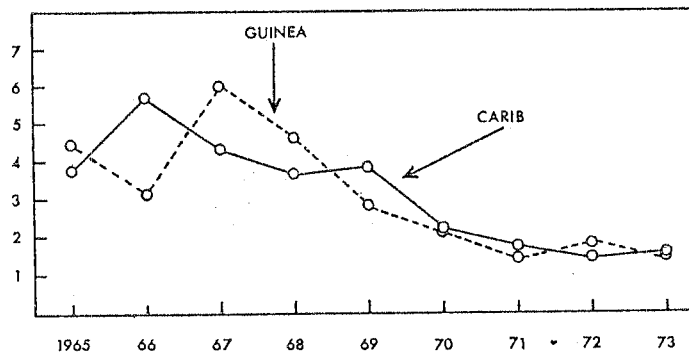


Fig. 5. Spawning index of yellowfin tuna in the Atlantic longline fishery, 1965 - 1973, preliminary.