CATCH STATISTICS AND SAMPLE LENGTH COMPOSITION IN JAPANESE ATLANTIC TUNA PURSE SEINE FISHERY, 1971 AND 1972, WITH A BRIEF REVIEW OF THE FISHERY SINCE 1964

by

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SUMMARY

Summary figures and tables, and an explanatory note, are given on 1971 and 1972 catch and effort data, and 1971 sample length composition data from the Japanese Atlantic tuna purse seine fishery. The basic data appear in ICCAT Data Record, Vol. 2.

In addition, the authors have briefly reviewed the history of the fleet from 1964 to 1972, and have provided general comments on some indices of catch-per-unit-effort.

RESUME

Ce rapport comprend des chiffres et tableaux résumés, ainsi qu'une note explicative, concernant les données de capture et d'effort pour 1971 et 1972 et de composition par taille de l'échantillon en 1971 de la flotte thonière japonaise de senneurs de l'Atlantique. Les données de base figurent au Vol. 2 du Recueil de Données.

De même, les auteurs donnent un aperçu de la flotte pendant la période 1964-1972 et font des commentaires généraux au sujet de quelques taux de capture par unité d'effort.

RESUMEN

En este documento se ofrece cifras y tablas resumidas y una nota explicativa sobre los datos de capturas y esfuerzo en 1971 y 1972, así como el muestreo de composición de tallas en 1971 de la pesquería japonesa de cerco en el Atlántico. En el Volumen nº 2 de la Colección de Datos de ICCAT se hallan incluídos los datos básicos.

Asimismo, los autores ofrecen una exposición resumida sobre la flota durante el periodo 1964-1972, y hacen comentarios generales sobre algunos índices de captura-por unidad-de-esfuerzo.

The Japanese tuna purse seine fishermen have submitted logbooks and length data to the Fishery Agency since their first operation in the eastern Atlantic Ocean in 1964. These data were already reviewed at various occasions (Honma et al. 1961, Hayasi 1972a, b). Honma and Suzuki (1972, ms) reported the catch statistics compiled by 1° square and the sample length composition by 5° x 10° quadrangle up to 1970. The present paper comprises the series of data in succeeding two years. Also presented here are year-to-year changes of amount of catch and fishing effort, and catch-per-unit-effort in the nine years from 1964 to 1972.

1. Number and size of boats, 1971 and 1972

The Japanese purse seine fleet comprises single-boat and double-boat seiners. Their sizes are officially recorded in gross tonnage, in case of double-boat seiner in that of larger net-operating boat. Table 1 lists gross and capacity tons of all the seiners in the Atlantic Ocean in 1971 and 1972 for convenience of referring to the ICCAT single-boat statistics. Names and sizes of seiners operated in the preceding years are listed by Honma and Suzuki (1972).

2. Catch and effort statistics, 1971 and 1972

Recording format was already described at various occasions (Honma and Suzuki 1972, ms). Compiled from the logbooks are number of boats, number of days of operation and catch by species in the whole Ocean (Tables 2 and 3), and number of hauls and amount of catch by 1° square (Appendix table 1) in January 1971 to December 1972.

Total catch was 9,400 tons in 1971 and 7,800 tons in 1972. Major fishing season for yellowfin tuna and skipjack extended from June to October in the FIS Area 1 (Fig. 1), and slightly later during August through December in the FIS Area 2 (Fig. 2). No boat operated in the FIS Area 3. Generally speaking, the fishing activity rised in later half of the year.

3. Sample length composition, 1971

Appendix table 2 presents length composition of samples taken by the seiners operated in 1971. The data are compiled by month and by quadrangle of Lat. 5° and Long. 10°. A quadrangle is expressed by the smallest figures of Latitude and Longitude: e. g. 5N and 10W denote a quadrangle extending between Lat. 5°N and 10°N, and Long. 10°W and 20°W.

4. Brief review of fishing activity, 1964 to 1972

In the Atlantic Ocean, only limited number of purse seiners were sent from Japan. And we present year-to-year fluctuations in amount of fishing effort and catch, and catch-per-unit-effort, basing on combined data from both single-boat and double-boat seiners.

4-1. Amount of fishing effort.

The Japanese fleet increased from one group (or to in Japanese), of double-boat seiner in 1964 and 1965, to seven units including three single-boat seiners and four tos of double-boat seiners in 1968. Since then number of boat turned

to decrease, and only five units operated in 1972. The trend in number of boats is also found in yearly change of other indices of fishing effort, "number of days at sea", "number of days of operation" and "number of hauls", having reached the peaks in 1968 (Table 4).

The Kuroshio Maru Nos. 81 and 82, 145 gross tons, made the first Japanese purse seining in the Atlantic Ocean in November 1964. Other double-boat seiners arriving there are the Seisei Maru Nos. 10 and 13, and the Hakuryu Maru Nos. 52 and 53 in June 1966, and the Seisei Maru Nos. 17 and 18 in December 1967. All these six boats are about 90 gross tons (Honma and Suzuki 1972). The Hakuryu Maru group withdrew from the Atlantic Ocean in January 1969, and the rest three tos have continued to work there up to 1972. Three single-boat seiners, the Fukuho Maru No. 8, 90 gross tons, the Genpuku Maru No. 82, 499 gross tons, and the Hakuryu Maru No. 55, 499 gross tons, started to operate in July 1968. But, the Fukuho Maru No. 8 left the Atlantic Ocean in January 1969, and the Hakuryu Maru No. 55 in November 1971. A large-sized single-boat seiner of 999 gross tons, the Nihon Maru, joined to the Atlantic purse seining in August 1971.

Two measures of fishing effort were collected, one is "number of days at sea" compiled for the whole fishing ground, and the other is "number of hauls" by 1° square. The "days at sea" are divided into three categories, "days of operation", "days of searching" and "days of cruise" that are defined as follows:

> On "days of cruise" the fishermen did not try to find out fish schools. They payed effort to locate the schools but did not cast their nets on "days of searching". Nets were actually hauled on "days of operation".

Ratios to the "days at sea" average about 58 percent for "days of operation", 37 percent for "days of searching", and 5 percent for "days of cruise". It is noted that the working rate or ratio of "days of operation" to "days at sea" stayed fairly constant from year to year (Fig. 3).

"Days of operation" is correlated with "days at sea" at a high coefficient of 0.98. The correlation coefficient between "days at sea" and "number of hauls" is slightly low, but still as high as 0.90, and suggests a liner relationship (Fig. 4). These high correlations seem to permit one to roughly evaluate "number of days of operation, y" and "number of hauls, z" from "days at sea, x" by the followfin equations.

$$y = (4.501 + 0.5769x) \text{ days, and,}$$

$$z = (182.546 + 0.6717x) \text{ times.}$$

The working rate of the single-boat seiners was lower in the first three years of their operation therein than that of the double-boat seiners. In 1970 the rate was about 40 percent for the former, and about 60 percent for the latter. The difference decreased in 1971, and a higher working rate appeared for the single-boat seiners in 1972 (Fig. 5). The change of working rate implies rapid improvement of single-boat seiners to locate fish schools.

"Number of hauls, y" is also linearly correlated with "days of operation, x" at a high coefficient of 0.98, and the former is approximated by the latter as,

$$y = (23.844 + 1.3984x) \text{ times.}$$

In other words, the Japanese seiners operate about 1.4 times on a working day (Fig. 6).

4-2. Amount of catch.

The data shows that amount of catch increased from less than 500 tons in 1964 to nearly 16,000 tons in 1968, and fluctuated between 5,600 tons and 9,400 tons in the last four years after considerable drop in 1969. Yellowfin tuna exceeded skipjack in amount of catch up to 1969, but skipjack dominated in and after 1970. Sharp decline of large-sized yellowfin tuna contributed the change of species composition of catch (Fig. 7). Another major species are frigate mackerels that have occupied 2 to 15 percent. Bigeye tuna comprised only 4 percent or less (Table 4).

4-3. Catch-per-unit-effort.

Almost the same year-to-year fluctuations appeared in CPUEs calculated on the bases of three indices of fishing effort including "number of days at sea", "number of days of operation" and "number of hauls". Fig. 8 shows the yearly averages of "catch per day of operation", for which longest series of data were made available.

The CPUE index for combined all fishes has considerably fluctuated during the nine years. Yellowfin tuna contributed to the yearly fluctuation in total CPUE up to 1969, but decreased drastically in 1970. CPUE of skipjack also varied widely, but were not on the decrease.

Table 1. Names, sizes and year of operations of Japanese purse seiners in the Atlantic Ocean, 1971 and 1972.

Type	Name	Gross tons	Carrying capacity (tons)	Year of operations
Single-boat	Nippon Maru	999.09	551.08	1971, 1972
	Genpuku Maru No.82	499.66	225	1971, 1972
	Hakuryu Maru No.55	499.57	195	1971
Double-boat	Kuroshio Maru No.81	145.54	-	1971, 1972
	" " No.82	145.28	-	
	Seisei Maru No.10	90.68	-	1971, 1972
	" " No.13	90.64	-	
	Seisei Maru No.17	90.74	-	1971, 1972
	" " No.18	90.66	-	

Table 2. Number of boats and days of operation, and catch in the Japanese Atlantic tuna purse seine fishery, 1971.

Type of boats	Month	Number of boats	Number of days of operation	Number of hauls	Catch in tons							
					Total	Bigeye tuna	Yellowfin tuna			Skipjack	Frigate mackerels	Others & unidentified
							Subtotal	Small	Large			
Grandtotal		6	522	871	9,439.9	248.8	2,232.1	1,208.8	1,023.3	6,221.8	685.3	51.9
Single-boat	Total	3	208	324	1,983.4	71.0	229.3	100.8	128.5	1,647.7	24.3	11.1
	June	1	15	31	90.2	39.9	21.3	2.1	19.2	28.9	-	0.1
	July	1	9	14	54.6	3.3	7.2	3.3	3.9	43.5	0.6	-
	Aug.	3	26	38	255.3	0.6	37.8	14.3	23.5	216.9	-	-
	Sept.	3	48	82	747.7	18.5	67.6	52.6	15.0	645.9	15.7	-
	Oct.	3	58	74	312.6	6.0	23.9	7.9	16.0	265.5	6.2	11.0
	Nov.	3	34	54	284.7	2.7	17.4	14.5	2.9	264.6	-	-
	Dec.	1	18	31	238.3	-	54.1	6.1	48.0	182.4	1.8	-
Double-boat	Total	3	314	547	7,456.5	177.8	2,002.8	1,108.0	894.8	4,574.1	661.0	40.8
	Jan.	3	15	19	269.9	-	73.1	72.2	0.9	161.4	34.6	0.8
	June	3	46	83	878.6	91.5	297.4	48.4	249.0	444.3	44.7	0.7
	July	3	48	74	611.1	36.4	155.5	75.1	80.4	311.6	106.6	1.0
	Aug.	3	59	94	1,763.9	1.8	318.8	304.0	14.8	1,373.2	60.1	10.0
	Sept.	3	56	113	1,636.5	1.6	277.9	272.8	5.1	1,137.1	209.9	10.0
	Oct.	3	42	81	1,373.4	12.2	436.3	201.1	235.2	816.2	95.5	13.2
	Nov.	3	48	83	923.1	34.3	443.8	134.4	309.4	330.3	109.6	5.1

Table 3. Number of boats and days of operation, and catch in the Japanese Atlantic tuna purse seine fishery, 1972.

Type of boats	Month	Number of boats	Number of days of operation	Number of hauls	Catch in tons							
					Total	Bigeye tuna	Yellowfin tuna			Skipjack	Frigate mackerels	Others & unidentified
							Subtotal	Small	Large			
Grandtotal		5	545	877	7,750.2	308.1	2,826.8	995.6	1,831.2	3,386.3	1,188.7	40.3
Single-boat	Total	2	212	400	2,398.6	87.4	889.8	114.4	775.4	1,323.9	97.5	-
	Jan.	1	20	36	246.6	-	55.5	32.5	23.0	186.0	5.1	-
	Feb.	1	17	33	307.0	1.6	196.4	17.1	179.3	109.0	-	-
	Mar.	1	5	10	10.3	0.3	8.0	-	8.0	2.0	-	-
	June	2	16	37	166.7	2.8	67.6	4.7	62.9	90.3	6.0	-
	July	2	31	55	363.6	5.2	160.2	28.1	132.1	195.7	2.5	-
	Aug.	2	26	39	295.3	12.0	87.3	14.0	73.3	192.3	3.7	-
	Sept.	2	34	62	393.5	47.0	37.1	4.0	33.1	305.9	3.5	-
	Oct.	2	31	64	245.0	18.5	89.2	14.0	75.2	127.8	9.5	-
	Nov.	1	16	32	156.4	-	45.4	-	45.4	69.8	41.2	-
	Dec.	1	16	32	214.2	-	143.1	-	143.1	45.1	26.0	-
Double-boat	Total	3	333	477	5,351.6	220.7	1,937.0	881.2	1,055.8	2,062.4	1,091.2	40.3
	May	3	6	7	63.3	0.1	39.6	11.8	27.8	17.2	6.4	-
	June	3	35	48	444.1	37.8	122.2	42.2	80.0	260.5	19.8	3.8
	July	3	39	54	871.0	38.9	391.6	169.5	222.1	405.5	31.1	3.9
	Aug.	3	35	45	453.7	67.5	176.2	88.8	87.4	165.2	43.0	1.8
	Sept.	3	34	42	243.7	68.4	29.2	19.5	9.7	110.8	34.3	1.0
	Oct.	3	54	74	673.4	8.0	151.1	119.1	32.0	318.4	191.5	4.4
	Nov.	3	55	92	1,089.5	-	451.0	175.3	275.7	256.3	369.2	13.0
	Dec.	3	75	115	1,512.9	-	576.1	255.0	321.1	528.5	395.9	12.4

Table 4. Amount of effort and catch in the Japanese Atlantic purse seine fishery, 1964-1972.

Year	Number of boats	Number of days at sea	Number of days of operation	Number of hauls	Catch in tons							
					Total	Bigeye tuna	Yellowfin tuna			Skipjack	Frigate mackerels	Others & unidentified
							Subtotal	Small	Large			
1964	1	-	25	34	488.9	-	455.4	-	455.4	32.4	-	1.1
1965	1	-	227	293	4,202.6	-	1,133.5	-	1,133.5	1,802.3	-	1,266.8
1966	3	-	267	-	6,563.0	-	4,812.4	948.6	3,863.8	1,447.7	-	302.9
1967	4	949	590	856	8,005.1	82.0	5,244.2	508.2	4,736.0	2,171.1	442.7	65.1
1968	7	1,610	953	1,292	15,860.5	412.7	7,462.7	2,666.4	4,796.3	6,255.5	1,253.5	476.1
1969	7	1,162	611	827	6,988.9	161.3	5,805.2	650.0	5,155.2	678.8	177.3	166.3
1970	4	724	401	558	5,638.6	92.1	1,317.7	966.1	351.6	3,519.0	686.9	22.9
1971	6	834	522	871	9,439.9	248.8	2,232.1	1,208.8	1,023.3	6,221.8	685.3	51.9
1972	5	953	545	877	7,750.2	308.1	2,826.8	995.6	1,831.2	3,386.3	1,188.7	40.3

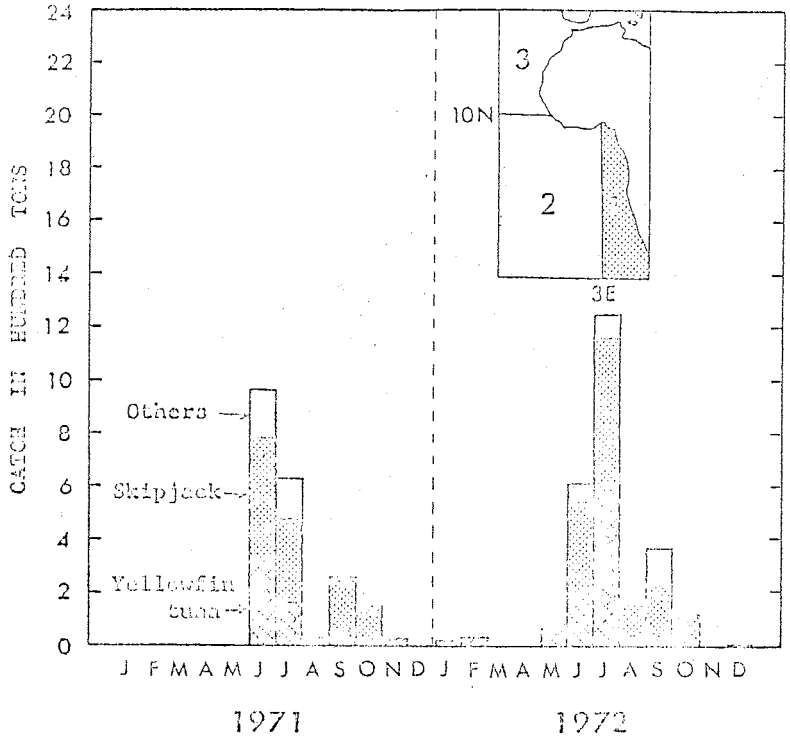

Fig. 1. Monthly catch of tunas by Japanese purse seiners in FIS Area 1.

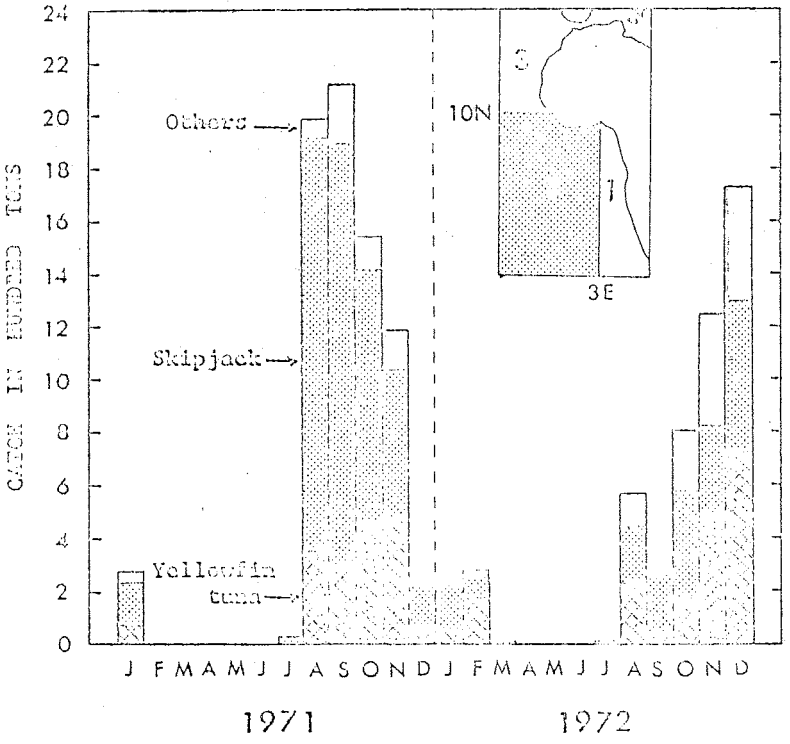

Fig. 2. Monthly catch of tunas by Japanese purse seiners in FIS Area 2.

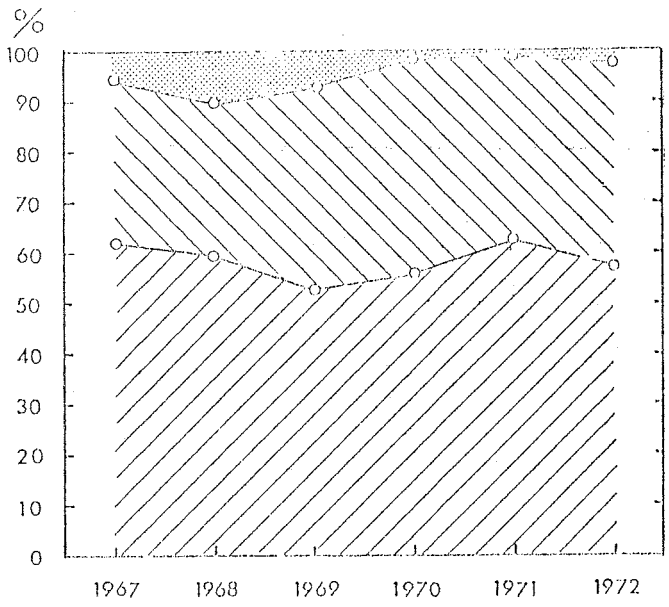

Fig. 3. Ratio of "operation", "searching" and "cruising" in "days at sea" of the Japanese Atlantic purse seine fishery, 1967-1972.

simply cruising days
simply searching days
operating days

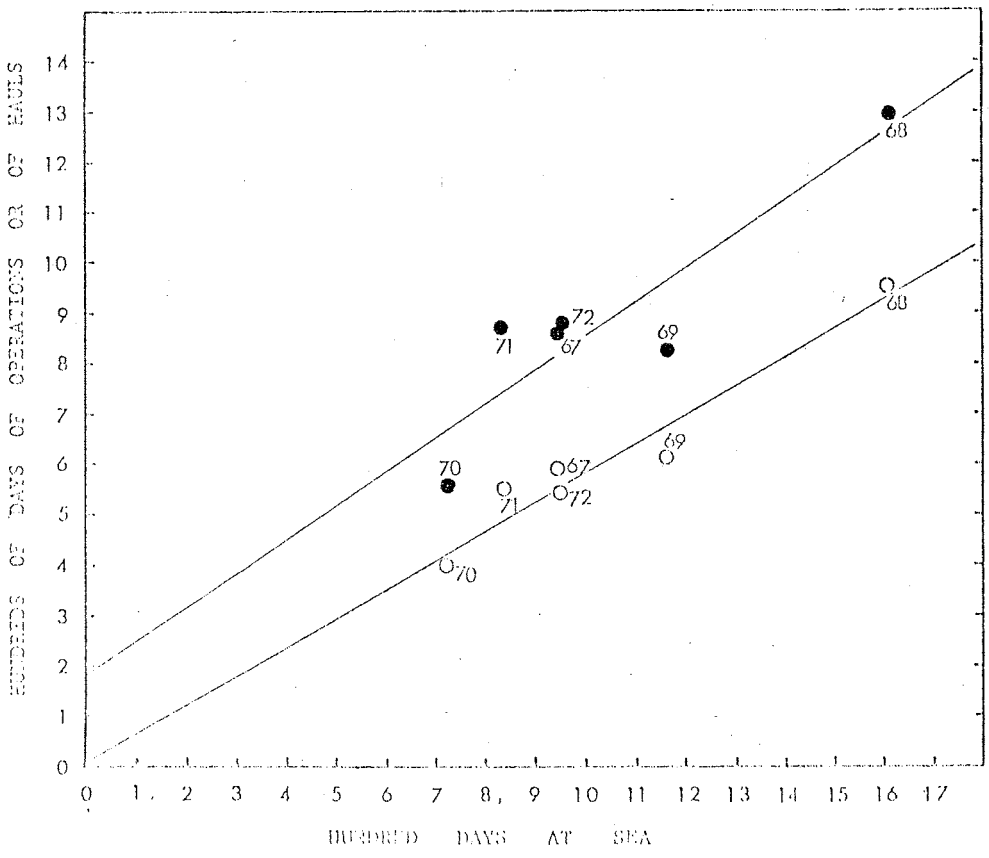

Fig. 4. Correlation of "days of operation(open circles)" and of "number of hauls(closed circles)" to " days of cruise of the days at sea" of the Japanese Atlantic purse seine fishery, 1967-1972. Numerals denote years.

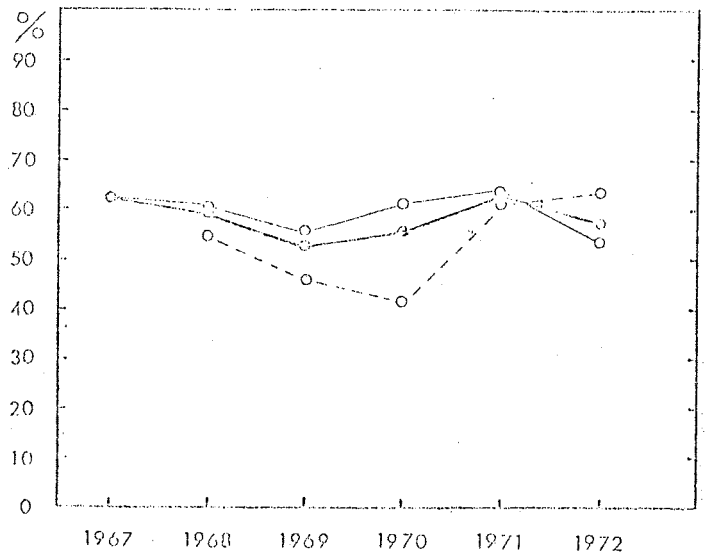

Fig. 5. ratio of "days of operation" to "days at sea" of the Japanese Atlantic purse seine fishery, 1967-1972.

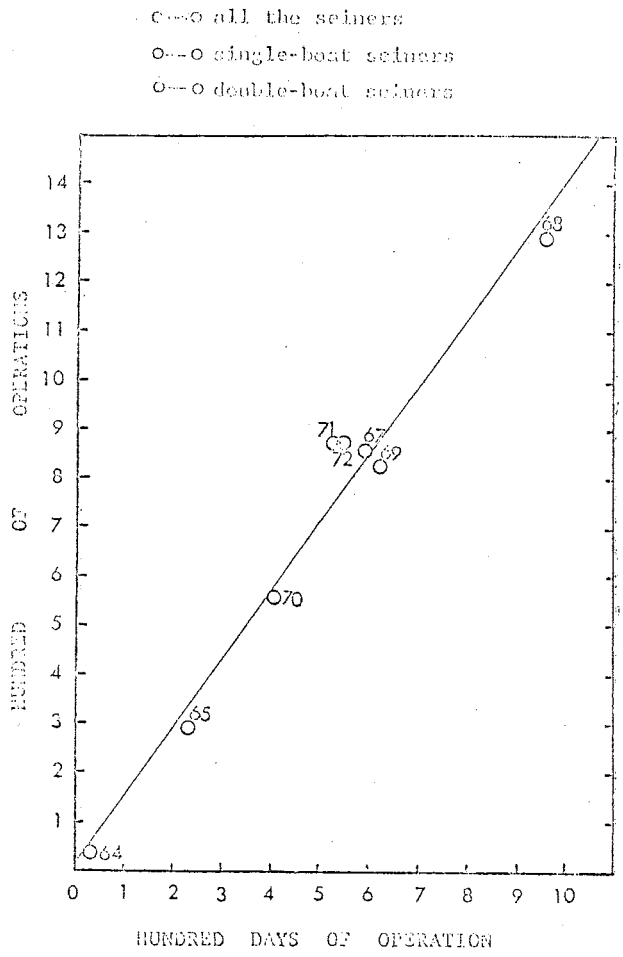

Fig. 6. Correlation between "number of operations" and "days of operation" of the Japanese Atlantic purse seine fishery, 1964 - 1972.
Numerals denote years.

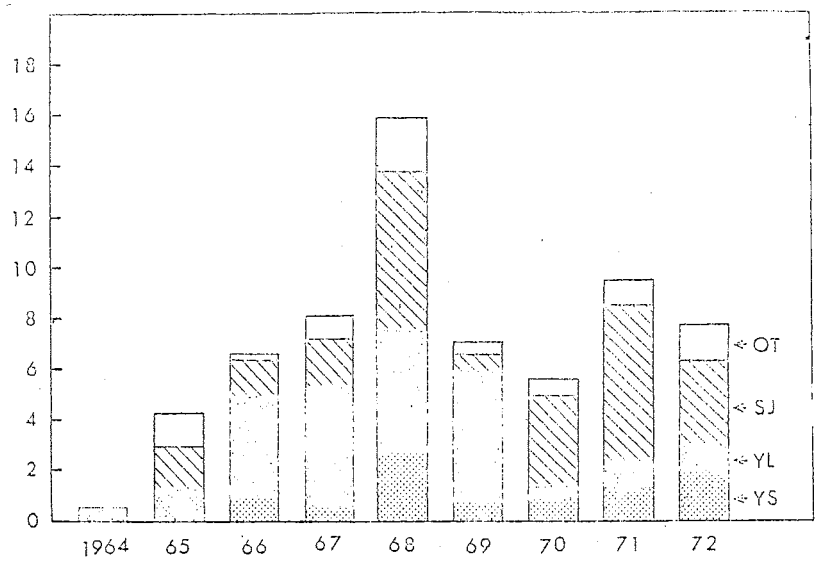

Fig. 7. Yearly catch by species in the Japanese Atlantic purse seine fishery, 1964 - 1972.

YS	small-sized yellowfin tuna, lighter than 20 kg in body weight
YL	large-sized yellowfin tuna, 20 kg or heavier in body weight
SJ	skipjack
OT	others and unidentified

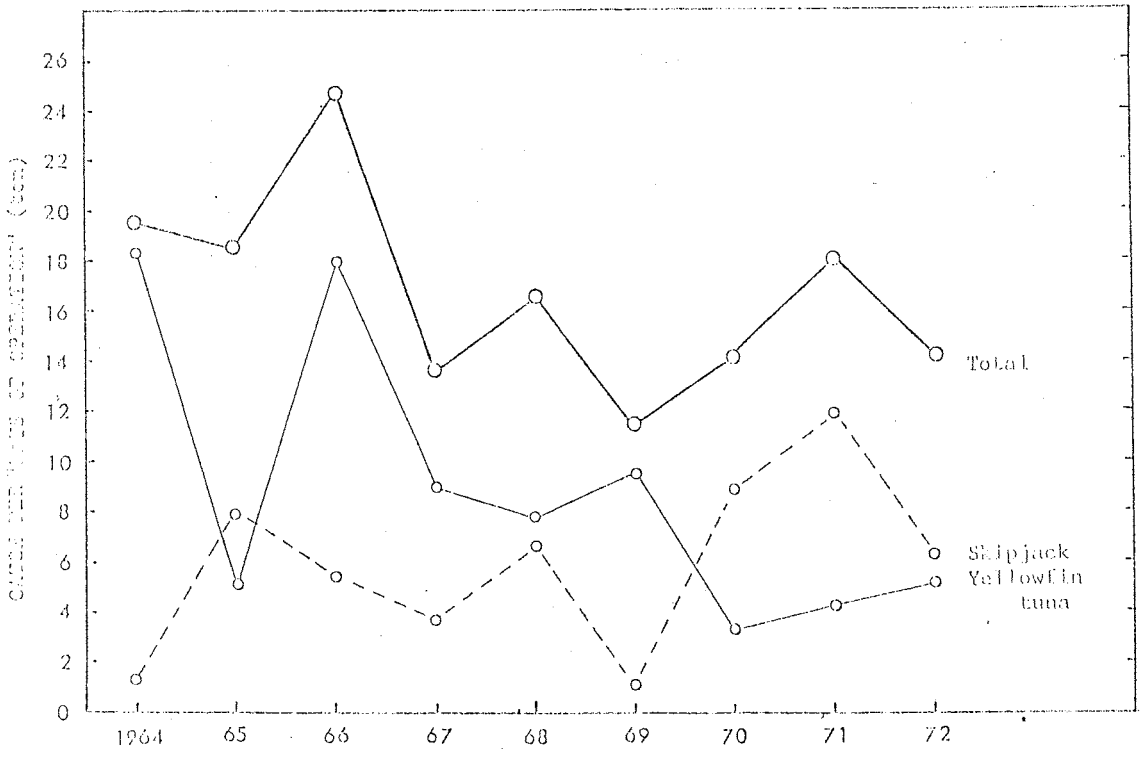

Fig. 8. Yearly averages of catch per "days of operation" in the Japanese Atlantic purse seine fishery, 1964 - 1972.