

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

by

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SUMMARY

Catch, effort and biological sampling data for 1973 on albacore caught by the Japanese longline fishery in the Atlantic were supplemented to the previous report of this study (Shiohama and Morita, 1975). Based on the Japanese data, the fishing intensity on the whole longline fleet for the North and South populations was estimated. A continuing decline of the Japanese share in the longline albacore catch has been reducing the accuracy of the estimate on the whole longline fishing intensity.

The hook rate of the North population in the three-year period, 1971-1973, remained at a low level, about one half of the average hook rate of the 1962-1964 period, when the fishing expanded substantially. In the South population, the annual hook rate has been on the decrease since the inception of the fishery and the 1973 hook rate was the lowest. The yield from the South population in 1973 remained at recent levels, in spite of the remarkable increase in fishing intensity. Length composition of the Japanese catch in 1973 was estimated for the North population.

RESUME

Les données de capture, d'effort et d'échantillonnage biologique pour 1973 sur le germon pris par les palangriers japonais dans l'Atlantique ont été ajoutées au précédent rapport (Shiohama et Morita, 1975). L'intensité de pêche de l'ensemble de la flottille palangrière a été estimée à partir des données japonaises, pour les populations du nord et du sud. Une baisse constante du pourcentage correspondant à la pêche japonaise dans la pêcherie palangrière au germon a diminué la précision des estimations sur l'intensité d'ensemble de la pêche palangrière.

Le taux par hameçon pour la population du nord pendant trois ans, de 1971 à 1973, est resté à un niveau médiocre, environ la moitié du taux moyen par hameçon de la période de 1962 à 1964, lorsque la pêche s'était développée de façon importante. En ce qui concerne la population du sud, le taux annuel par hameçon est en baisse depuis le début de la pêcherie, le taux le plus bas étant celui de 1973. La production de la population du sud en 1973 est demeurée au même niveau que ces dernières années, en dépit d'un accroissement énorme de l'intensité de pêche. La composition de longueur de la prise japonaise en 1973 a été estimée pour la population du nord.

RESUMEN

Datos sobre captura, esfuerzo y muestreo biológico para 1973 sobre el atún blanco capturado por la pesquería japonesa de palangre en el Atlántico, se añadieron como suplemento al informe anterior dentro del presente estudio (Shiohama y Morita, 1975). Sobre base de los datos japoneses, se hizo una estimación de la intensidad de pesca en las poblaciones del Norte y del Sur de toda la flota palangrera. El continuo descenso de la participación japonesa en la captura con palangre de atún blanco, ha ido reduciendo la exactitud en la estimación de la intensidad de pesca de toda la flota palangrera.

La tasa por anzuelo de la población del norte durante el periodo de tres años, 1971-73, se mantuvo a bajo nivel, más o menos la mitad de la tasa media por anzuelo en el periodo 1962-1964, durante el cual la pesca se desarrolló en forma apreciable. En la población del sur, la tasa anual por anzuelo ha ido decreciendo desde el comienzo de la pesquería, y la tasa de 1973 fue la más baja. El rendimiento de la población del sur en 1973 permaneció a niveles actuales, a pesar del extraordinario aumento en la intensidad de pesca. La estimación de la composición por tallas que se hizo de las capturas japonesas en 1973, fue sobre la población del norte.

Appendix Table reproduced in Data Record Vol. 7.

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

A pendice cuadro reproducido en la Vol. 7 de la Colección de Datos Estadísticos.

1-2 South population

The longline fleet have been exclusively harvesting this population. The yield in 1973 was 35 thousand tons for which Taiwan accounted 26,000 tons, Korea 8,000 tons Japan 700 tons. The Japanese share in the total catch was only 2%. As was the case in the North population, the concentration index of Japanese longline fleet in recent years has become very low. (Fig. 2)

The yield, catch in number and hook rate plotted against the fishing intensity are shown in Fig. 3. The yield had been on the increasing trend until 1972 with the increase in effort, reaching the highest yield in 1972. However, the yield in 1973 remained at the recent level though the fishing intensity grew remarkably. The annual hook rate has been on the continuous decrease since the inception of the albacore fishing in the South Atlantic, and the most recent hook rate recorded the lowest value.

1. Yield and fishing intensity

Additional data utilized in this report were obtained from ICCAT Statistics Vol. 5 (1975) on catch in weight, Taiwan Fisheries Bureau (1974) on Taiwanese catch in weight and number and effort statistics, and Fisheries Agency (1975) on Japanese catch in number and effort statistics. The previous Taiwanese yields for 1969-1972 were corrected according to the current statistics and the ratio of allocation of Taiwanese catch in 1972 to each population was also revised using the Taiwanese catch statistics by area, 1972. The Taiwanese and Korean catches in 1973 were assigned to each population by the same ratio of allocation used for 1972 Taiwanese data.

The division of area by population unit is shown in Fig. 1. The North and South populations are seemingly delimited by the northern portion of the South Equatorial Current and are regarded to be highly independent with each other.

The procedures of the estimation of the overall yield by area and the calculation of the fishing intensity are referred to Honma (1973) and Shiohama and Morita (1975). The average year in the present calculation extends from 1966-1973. Catch in number and overall fishing intensity for whole longline fleet were estimated by proportionating with the ratio of the overall yield against the Japanese yield in each area.

The hook rate (yearly catch in number / yearly sum of effective effort), catch in number, yield in weight and fishing intensity for Japanese fleet and whole longline fleet are summarized by North and South Populations (Tables 3 and 4). As will be stated in section 3, it is noted that the validity of the estimated several statistics for whole longline fleet has been reducing in recent years. In Appendix table, are tabulated monthly amount of effective fishing effort and fishing intensity of the Japanese fleet for each of the both populations, 1956-1973.

1-1 North population

This population has been utilized by several countries and by two types of fisheries: 1) surface fishing harvesting the immature fish in the higher latitudes of North-eastern Atlantic and 2) longline fishery for the entire stock. The annual concentration index of the Japanese longline fishing fleet on albacore, the ratio of effective effort in number of hooks against nominal number of hooks used, indicates that the interest of Japanese longline fleet on albacore has been low in recent three years. (Fig. 5)

The total yield from North population in 1973^{was} 42 thousand tons: 30 thousand tons for surface fishery and 12 thousand tons for longline fishery (Tables 1 and 3). The 1973 longline yield by country was as follows: Taiwan 5,900 tons, Panama 4,200 tons, Japan 1,500 tons and Korea 500 tons. The Japanese yield accounted for only 12 percent of the total longline catch.

The relations of yield and catch in number to fishing intensity (Fig. 2) indicated that until 1963-1965 the yield increased to about 15,000 tons proportionally with the increasing effort, and since then the yield and effort decreased until 1967-1969. From 1970 onward, in spite of the remarkable increase of the fishing intensity, the catch has remained rather constant. The hook rates of the recent three years, 1971-1973, have remained at low level of one half of average hook rate of 1962-1964, when the albacore fishing expanded substantially. (Fig. 2)

2. Length composition of the catch, 1973

The procedure of the estimation was given in the first issue of this series of study (Shiohama, 1973). In 1973, 3599 albacore were measured from the North population (Table 5), and no data were obtained from the South population.

Appendix Table 2 gives number of albacore in 1 cm interval of length taken by Japanese longline fishery in 1973. The occurrence of smaller fish in N-1 subarea (Fig. 4) was ascribable to the larger samples from the northern portion of the area.

3. Critical note on the study

As was pointed out in the previous study (Shiohama and Morita, 1975), because of the greater concern of the Japanese longline fleet in the Atlantic terminated to catching bluefin group and bigeye tuna, the Japanese yield of albacore has been becoming smaller year by year. This species preference is also reflected by low efficiency of the effort on albacore. Most explicit explanation in this connection is shown in Figs. 6 and 7, in which geographical distributions of albacore catch of Japanese longline fleet in 1965 and 1973 are illustrated. It is obvious that the fishing activities on albacore in 1973 was far from that in 1965 and most of the Japanese albacore catch in 1973 was from the marginal portion of the albacore distribution. In contrast, Taiwanese albacore catch distribution in 1972 (Fig. 8) resembles the Japanese one in 1965. Under this circumstance, it is necessary for the future study to accumulate at least Taiwanese data which have been becoming available. In addition, it is desired that more Task 2 statistics and biological sampling should be collected sufficiently to obtain more reliable estimates.

References

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- Taiwan Fisheries Bureau, 1974. Annual catch statistics of Taiwan's tuna longline fishery.

Table 1. Annual yields of the Atlantic albacore by gear.

(Unit in 1,000 tons)

Year	Longline	Surface	Sport	Unclassified	Total
1957	0.9	39.7			40.6
1958	2.0	48.6			52.1
1959	3.6	50.2			58.9
1960	11.6	65.0		0.0	76.6
1961	10.8	41.8		0.4	55.0
1962	22.8	49.0		1.8	73.6
1963	31.2	42.7		0.5	74.4
1964	41.3	45.8		0.6	87.7
1965	44.3	43.4		0.1	87.8
1966	34.6	40.7		0.1	75.4
1967	25.3	50.7		0.1	76.1
1968	33.0	38.9		0.0	71.9
1969	43.1	33.4		0.2	78.7
1970	39.7	33.5		0.2	73.4
1971	43.3	37.7		0.1	81.1
1972	48.4	34.3		0.2	82.9
1973	46.7	30.4	0.1	-	77.2
1974	34.6	36.5	0.0	-	71.1

Source of data : 1957-1959 from ICCAT Statistical Bulletin, Vol. 1.
 1960-1963 from ICCAT Statistical Bulletin, Vol. 2.
 1964-1974 from ICCAT Statistical Bulletin, Vol. 5.
 Argentina and Brazil yields for 1957-1959 were excluded.

Table 2. Annual yields of albacore, by country, caught by longline fishery in the Atlantic Ocean, 1956-1974.

(Unit in 1,000 tons)

Year	Argentina	Taiwan	Japan	Korea	Panama	Venezuela	Brazil	Cuba	Total
1956			0.0						0.0
1957			0.9						0.9
1958			2.0						2.0
1959			3.6						3.6
1960	1.8		9.8						11.6
1961	1.5		9.3						10.8
1962	0.7	0.0	22.1						22.8
1963	1.5	0.0	29.7						31.2
1964	1.5	0.1	39.5	0.2					41.3
1965	1.1	0.1	42.6	0.5					44.3
1966	0.8	0.2	26.9	6.7					34.6
1967	0.7	1.8	12.5	10.3					25.3
1968	1.2	8.7	15.2	7.3					33.0
1969	0.4	14.9	11.0	16.0		0.0			43.1
1970	0.3	16.9	11.8	10.0		0.8			39.7
1971	0.3	20.4	10.1	11.5		0.8	0.2		43.3
1972	0.1	29.4	3.9	13.6	0.4	0.8	0.1	0.1	48.4
1973	0.0	31.7	2.2	8.5	4.2	-	0.1	-	46.7
1974	-	26.2	2.6	5.2	0.4	-	0.2	-	34.6

Source of data : 1957-1959 from ICCAT Statistical Bulletin, Vol. 1.
 1960-1963 from ICCAT Statistical Bulletin, Vol. 2.
 1964-1974 from ICCAT Statistical Bulletin, Vol. 5.
 Argentina and Brazil yields for 1957-1959 were excluded.

Table 3. Catch and effort statistics of Japanese longline fishery and those estimated for the whole longline fishery in the North population, 1956-1973.

Year	Hook rate Catch in number per 100 hooks	JAPANESE FLEET			WHOLE FLEET		
		Catch in number of fish in 1,000	Yield in 1,000 tons	Intensity per 5 ^u square (1,000 hooks)	Catch in number of fish in 1,000	Yield in 1,000 tons	Intensity per 5 ^u square (1,000 hooks)
1956	1.20	0	0.0	0	0	0.0	0
1957	6.08	5	0.1	1	5	0.1	1
1958	4.36	47	0.9	14	47	0.9	14
1959	3.18	59	0.6	25	59	0.6	25
1960	3.19	52	1.1	21	52	1.1	21
1961	2.15	18	0.4	10	18	0.4	10
1962	1.83	280	5.7	182	281	5.7	183
1963	1.83	345	14.5	345	345	14.5	345
1964	1.64	836	15.8	606	841	15.9	611
1965	1.25	595	14.3	543	559	14.4	547
1966	1.44	318	5.9	285	422	8.2	397
1967	1.53	251	4.8	217	285	5.6	252
1968	1.48	177	3.3	157	286	5.7	269
1969	1.36	146	4.7	140	250	8.0	238
1970	1.42	357	5.9	334	574	9.6	547
1971	1.07	333	6.5	418	535	11.0	706
1972	0.81	63	1.3	105	406	8.8	710
1973	0.94	70	1.5	105	528	12.1	864

Table 4. Catch and effort statistics of Japanese longline fishery and those estimated for the whole longline fishery in the South population, 1956-1973.

Year	Hook rate Catch in number per 100 hooks	JAPANESE FLEET			WHOLE FLEET		
		Catch in number of fish in 1,000	Yield in 1,000 tons	Intensity per 5 ^u square (1,000 hooks)	Catch in number of fish in 1,000	Yield in 1,000 tons	Intensity per 5 ^u square (1,000 hooks)
1956	2.25	1	0.0	0	1	0.0	0
1957	5.91	27	0.7	5	27	0.7	5
1958	5.01	52	1.0	12	52	1.0	12
1959	5.80	298	3.0	54	298	3.0	54
1960	5.08	400	8.7	82	483	10.5	99
1961	4.18	413	8.9	168	483	10.4	127
1962	2.81	827	16.4	308	861	17.1	322
1963	3.15	589	15.2	203	645	16.7	223
1964	2.96	1,298	23.7	469	1,383	25.4	502
1965	2.37	1,214	28.3	595	1,270	29.9	629
1966	2.16	1,268	21.0	696	1,529	26.4	876
1967	2.27	437	7.7	219	1,033	19.8	560
1968	2.35	739	11.9	380	1,596	27.3	874
1969	1.85	244	6.3	157	1,203	35.1	871
1970	1.96	454	5.9	283	2,035	30.1	1,442
1971	1.74	218	3.6	153	1,709	33.3	1,365
1972	1.34	148	2.6	134	1,989	39.5	2,059
1973	0.70	38	0.7	63	1,764	34.6	3,179

Table 5. Sample size and substitution of data for calculating catch, by length class, 1973.

Numerals in parentheses denote substitutions of data.
 (1) Roman numerals ; substituted data of the given quarter.
 (2) Arabic numerals ; substituted data of the given year.

Area	Quarter			
	I	II	III	IV
N-2	955	(III, 1973)	866	154
N-1	1094	(I, 1973 except the data north of 30°N plus 16 fish taken in August)		

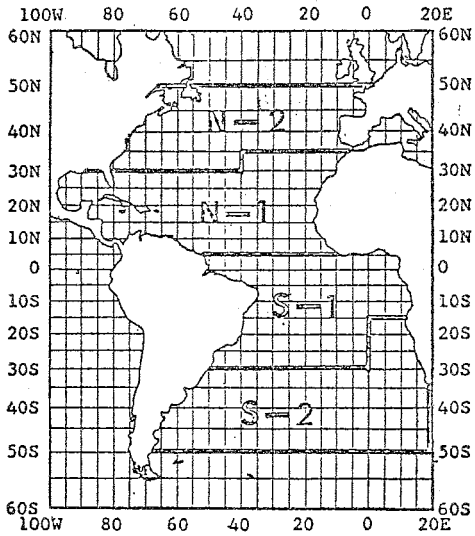


Fig. 1. Definition and division of the Atlantic Ocean for calculating amount of fishing effort and catch by length class of albacore in Japanese longline fishery 1956-1973.

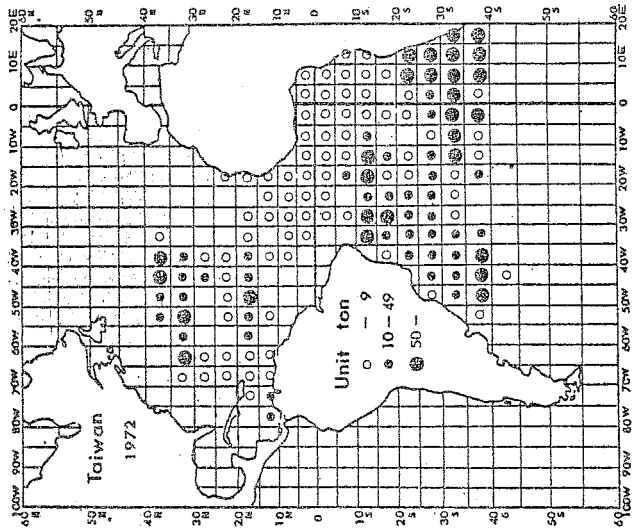


Fig. 8. Distribution of the catch in weight by Taiwanese fleet from which obtained the operating informations (1972).

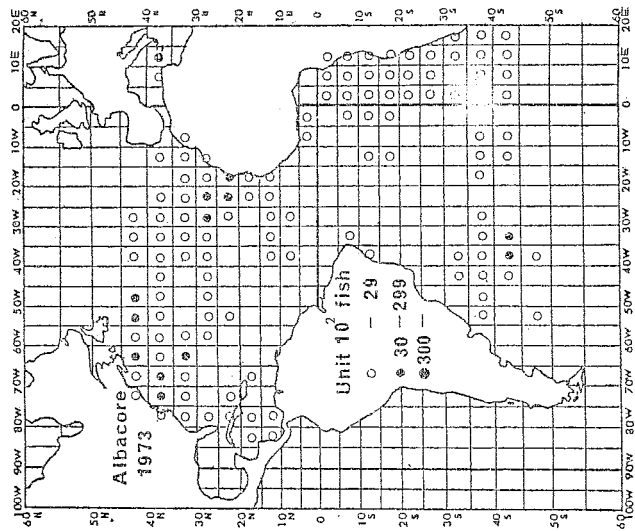


Fig. 7. Distribution of the total catch in number by Japanese longline fishery (1973).

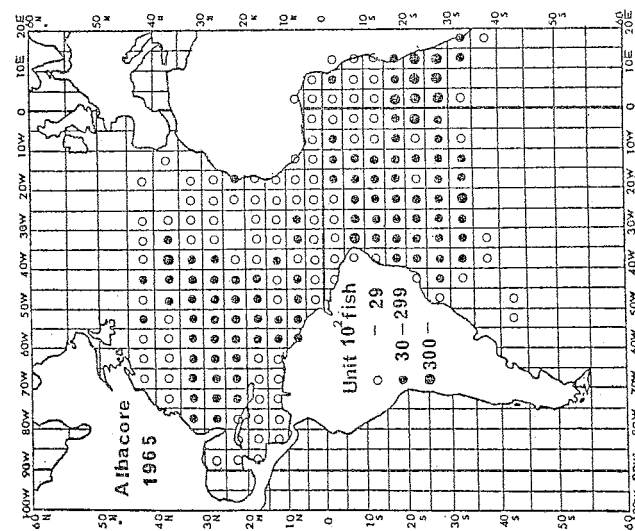


Fig. 6. Distribution of the total catch in number by Japanese longline fishery (1965).

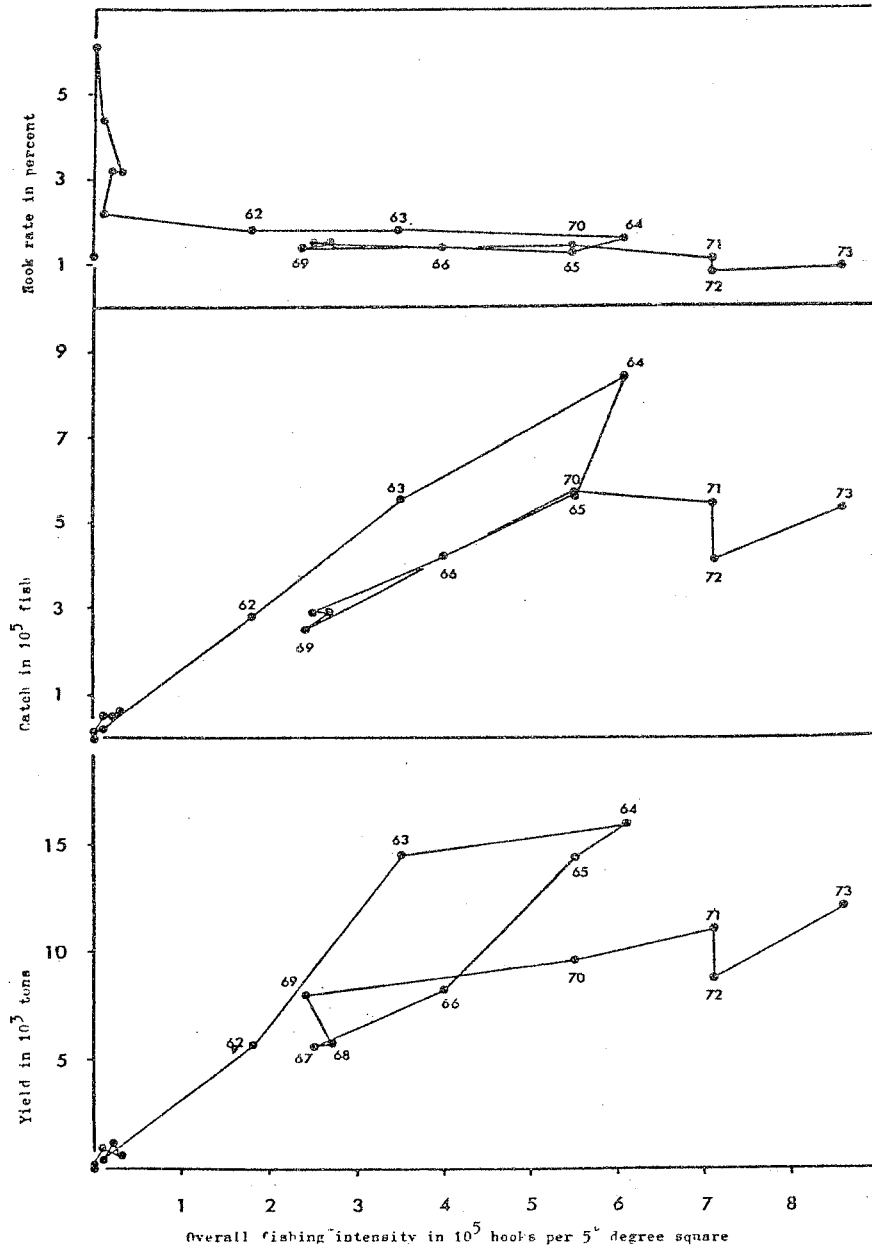


Fig. 2. Hook rate, catch and yield of albacore against overall fishing intensity in the North Atlantic longline fishery, 1956-1973.

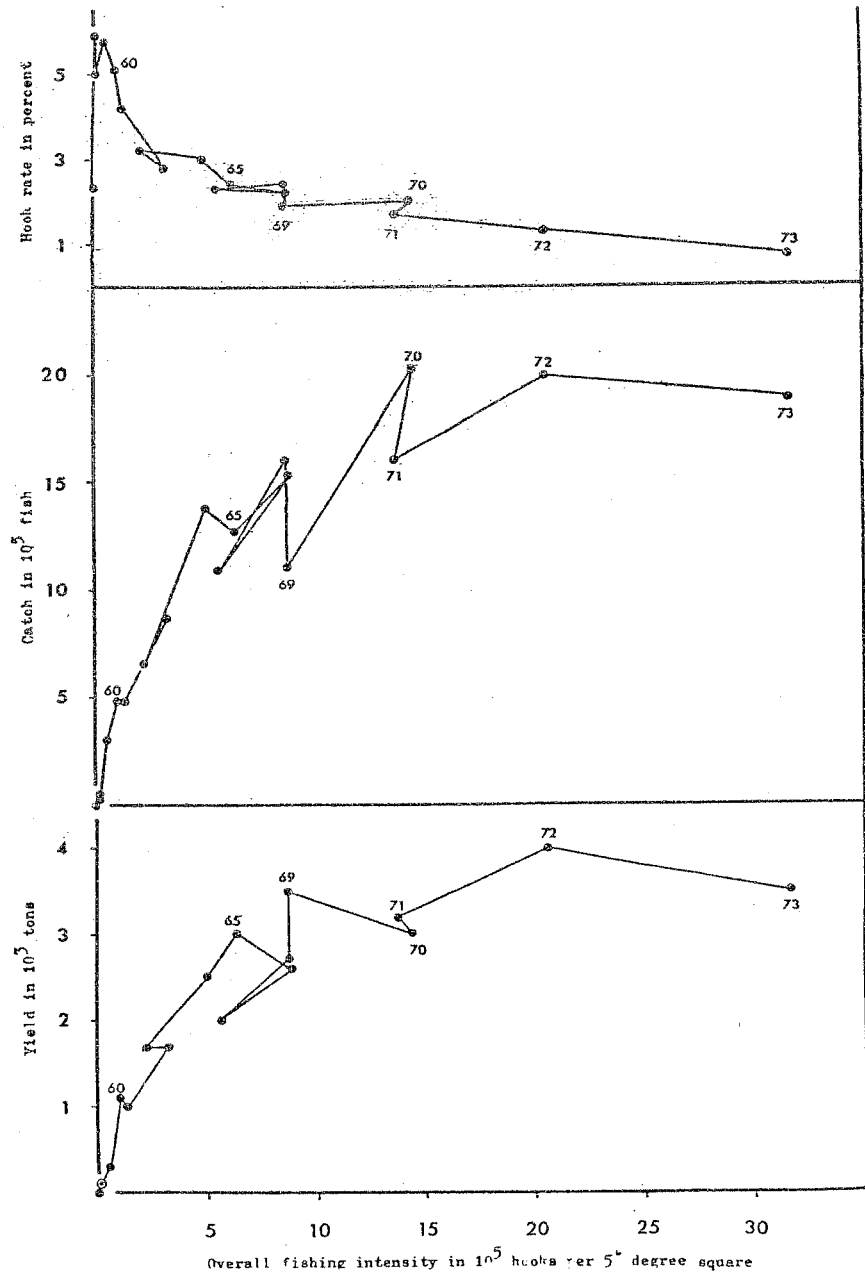


Fig. 3. Hook rate, catch and yield of albacore against overall fishing intensity in the South Atlantic longline fishery, 1956-1973.