

ESTIMATION OF OVERALL FISHING INTENSITY OF ATLANTIC LONGLINE ALBACORE, 1956-76

by

T. Shiohama

SUMMARY

This report is to update the series of estimated statistics on standardized effort on Atlantic albacore caught by the longline fishery up to 1976. Following the estimation procedure explained in the previous report (Shiohama 1978: SCRS/77/84), effective fishing effort and overall fishing intensity were calculated for northern and southern stocks by adult and young areas, respectively. In 1976, in both north and south stocks, catch, effort and hook rates turned out to increase but to a minor extent.

RESUME

Le présent rapport constitue une mise à jour des séries de statistiques estimées pour l'effort normalisé portant sur l'albacore atlantique pêché à la palangre jusqu'en 1976. En suivant la méthode d'estimation décrite dans le précédent rapport (Shiohama, 1978, SCRS/77/84), on a calculé l'effort de pêche effectif et l'intensité de la pêche dans son ensemble, pour les stocks du nord et du sud, séparément pour les zones d'adultes et de juvéniles. L'effort et le taux par hameçon ont apparemment diminué en 1976, bien que légèrement, pour le stock nord comme pour le stock sud.

RESUMEN

Este informe actualiza las series de estadísticas estimadas sobre el esfuerzo normalizado aplicado al atún blanco del Atlántico capturado por la pesquería de palangre hasta 1976. Siguiendo el procedimiento de cálculo, expuesto en el documento anterior (Shiohama 1978: SCRS/77/84) se calcularon el esfuerzo de pesca efectivo y la intensidad global de pesca para los stocks norte y sur, por zonas de adultos y jóvenes respectivamente. En 1976, la captura, el esfuerzo y las tasas de anzuelos se vieron ligeramente incrementadas en ambos stocks.

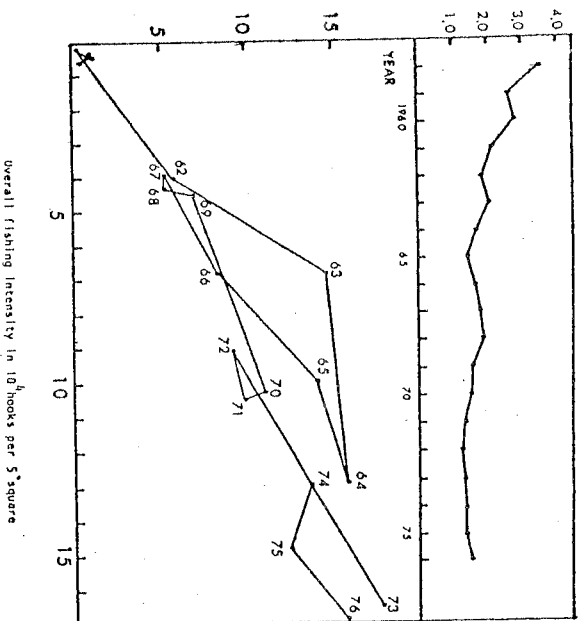


Fig. 1 Annual hook rate, and relationship between yield and fishing intensity of the north Atlantic albacore caught by the longline fishery, 1958-1976.

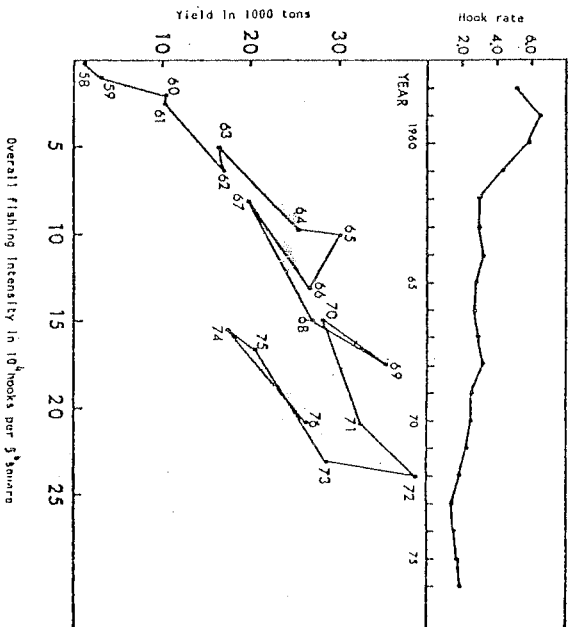


Fig. 2 Annual hook rate, and relationship between yield and fishing intensity of the south Atlantic albacore caught by the longline fishery, 1958-1976.

1. Catch by stocks.

According to the procedure by Shiohama (op. cit.), catches by countries in the ICCAT Statistical Bulletin were assigned to subareas, adult and young areas, in each stock, and the results are shown in Table 1.

2. Calculation of effective fishing effort and overall fishing intensity.

The details of the technique for the calculation was already explained by Shiohama (op. cit.). Considering the seasonal shifts in geographical area of albacore, sub-areas of adult and young fish are designated quarterly which can be referred to the Appendix Figure 1 of Shiohama (op. cit.). For Japan and Taiwan, effective effort and fishing intensity were first obtained by sub-areas. Then, the values were extrapolated to whole longline fleet with the ratio of total yield to combined catch of Japan and Taiwan. The results with relevant data are given in Appendix tables 1 and 2.

3. North stock.

The 1976 total albacore yield by whole longline fleets was 15,800 tons which is about 25 % larger than the last year. The main albacore fishing countries were Taiwan and Korea, harvesting more than 75 % of the total yield. Taiwanese and Japanese fleets operated mostly in the young ground, while Korean fleet did in the adult ground. In general, judging from the recent trend in degree of effectiveness of the fishing effort on albacore, Taiwanese fleet concentrated in albacore fishing ground, while the concern of the Japanese fleet on albacore has been very low.

As shown in Fig. 1, hook rates (cpue) in 1976 resulted in a little increase, being coupled with relatively marked increase in the adult ground (Appendix table 1). The relationship between fishing intensity and yield indicates that recent utilization of northern albacore by longline fishery has been on relatively high level, and that the increased effort and yield in 1976 followed almost the same trend of recent years. For the more appropriate analysis of the stock condition, inclusion of the results of the activity of the surface albacore fishery in the northeastern Atlantic is essential.

4. South stock.

The south stock has been harvested exclusively by the longline fishery. Taiwanese and Korean fleets caught more than 98 % of the total catch, 85 % and 13 %, respectively. The catches of other nations are very minor in 1976. Taiwanese fleet fished in both young and adult grounds, whereas Korean fleet operated mainly in the adult ground. In recent years, more fish have been removed from the young ground than the adult (Appendix table 2). The hook rate recorded the lowest (1.53) in 1973, since when it turned out a little upwards, reaching to 1.87 in 1976, and this trend has been experienced in both young and adult grounds (Appendix table 2). It is also indicated that in the relation of yield to effort (Fig. 2) the yield increased correspondingly with the increased fishing intensity until 1972, and then both yield and fishing intensity have been down on the lower level. In 1976, the yield and fishing intensity increased proportionally to the recent level of the relation between catch and effort.

Reference.

Shiohama T., 1978: Overall fishing intensity and yield by the Atlantic longline fishery for albacore, 1956-75. Col. Vol. Sci. Pap. Vol.VII (2), 217-224.

Table 1-1. Yield, by country, of the albacore caught by the longline fleet in the north Atlantic (in MT), up to 1976.
Data source: ICCAT Statistical Bulletin.

YEAR	TAIWAN	JAPAN	KOREA	PANAMA	VENEZUELA	CUBA	TOTAL
1956		2					2
1957		135					135
1958		945					945
1959		599					599
1960		1,131					1,131
1961		380					380
1962	17	5,716					5,733
1963	18	14,611					14,629
1964	103	15,713	-				15,816
1965	114	14,061	-				14,175
1966	204	5,836	2,105				8,145
1967	761	4,681	-				5,442
1968	1,907	3,204	-				5,111
1969	2,352	4,514	-				6,866
1970	4,675	5,814	613				11,102
1971	2,871	6,366	704				9,941
1972	5,826	1,263	828	412	800	100	9,229
1973	11,745	1,410	520	4,207			17,882
1974	9,425	2,004	1,899	400			13,728
1975	6,557	1,384	4,008	482		100	12,531*
1976	7,044	1,324	5,247	1,873	133	100	15,761

* 40 tons of Italian catch is included.

Table 1-2. Yield, by country, of the albacore caught by the longline fleet in the south Atlantic (in MT), up to 1976.
Data source: ICCAT Statistical Bulletin.

YEAR	ARGENTINE	TAIWAN	JAPAN	KOREA	BRAZIL	TOTAL
1956			21			21
1957			725			725
1958			1,047			1,047
1959			3,015			3,015
1960	1,500		8,673			10,473
1961	1,500		8,893			10,393
1962	700	-	16,422			17,122
1963	1,500	-	15,081			16,581
1964	1,500	-	23,738	167		25,405
1965	1,100	-	28,573	500		30,173
1966	800	-	21,047	4,641		26,488
1967	700	1,059	7,809	10,279		19,847
1968	1,200	6,792	11,959	7,285		27,236
1969	400	12,546	6,534	16,030		35,510
1970	500	12,225	5,959	9,428		28,112
1971	300	17,491	3,747	10,835	200	32,573
1972	100	23,569	2,630	12,749	100	39,148
1973	44	19,913	744	8,005	78	28,784
1974	13	16,799	444	3,317	167	20,740
1975	100	14,957	382	2,065	93	17,597
1976	48	22,393	95	3,508	267	26,311

Appendix table 1. Catch and effort statistics of the adult, young and whole albacore in the North Atlantic Ocean, 1956-1976.

Year	Whole stock					Adult					Young				
	CPUE	Effective effort (1000 hooks)	Intengity per 5 ⁰ square	Catch in number	Yield in tons	CPUE	Effective effort (1000 hooks)	Intengity per 5 ⁰ square	Catch in number	Yield in tons	CPUE	Effective effort (1000 hooks)	Intengity per 5 ⁰ square	Catch in number	Yield in tons
1956	1.09	10	24	104	2	0.92	11	41	104	2	-	-	-	-	-
1957	5.66	88	224	4,957	135	4.78	104	380	4,957	135	-	-	-	-	-
1958	3.57	1,322	3,378	47,243	945	3.02	1,566	5,728	47,243	945	-	-	-	-	-
1959	2.61	2,267	5,791	59,117	599	2.21	2,678	9,793	59,117	599	-	-	-	-	-
1960	2.81	1,857	4,744	52,164	1,131	2.37	2,202	8,053	52,164	1,131	-	-	-	-	-
1961	2.13	827	2,113	17,599	380	1.79	932	3,593	17,599	380	3.01	0	3	9	0
1962	1.82	15,466	39,509	281,266	5,733	1.54	18,273	66,828	280,802	5,727	1.36	34	290	463	6
1963	2.03	26,921	68,771	565,308	14,629	1.74	31,079	113,664	539,646	14,533	7.59	75	631	5,655	96
1964	1.67	50,359	128,646	841,428	15,816	1.38	52,523	192,091	723,236	14,331	3.17	3,716	31,487	117,795	1,435
1965	1.42	39,487	100,874	599,211	14,175	1.14	28,376	103,779	322,145	9,663	2.21	10,719	90,820	236,361	4,512
1966	1.68	26,459	67,592	444,098	8,145	1.16	19,751	72,234	230,008	5,365	2.86	6,546	55,463	187,199	2,780
1967	1.79	15,004	38,330	268,474	5,442	1.37	8,996	32,865	123,169	3,258	2.79	5,212	44,164	145,305	2,184
1968	1.87	16,811	42,976	314,051	5,111	1.52	12,932	47,296	194,661	3,459	2.72	4,316	36,573	117,390	1,622
1969	1.56	17,894	45,711	279,501	6,866	1.14	12,203	44,630	138,897	4,121	2.57	5,480	46,429	140,604	2,745
1970	1.51	40,124	102,501	607,392	11,102	1.30	25,094	91,738	335,608	7,477	2.00	13,295	112,651	265,793	3,625
1971	1.33	40,793	104,210	542,460	9,941	0.93	20,401	74,612	158,812	4,543	2.01	17,115	145,018	344,460	5,293
1972	1.25	35,480	90,637	442,689	9,229	0.90	17,470	63,894	156,567	4,509	1.80	14,329	121,413	257,772	4,720
1973	1.32	64,634	165,114	851,567	17,882	1.02	38,391	140,464	392,065	10,751	1.88	21,629	183,262	406,794	7,131
1974	1.36	50,518	129,053	687,996	13,728	1.06	28,806	105,351	306,215	7,820	1.99	18,094	153,227	360,474	5,908
1975	1.38	57,974	148,100	749,317	10,531	0.80	34,291	125,111	272,850	5,439	2.19	21,089	183,778	474,745	6,592
1976	1.53	66,037	168,608	1,012,053	15,761	1.40	21,877	80,809	306,465	6,857	2.07	30,061	254,706	621,205	8,004

Appendix table 2. Catch and effort statistics of the adult, young and whole albacore in the South Atlantic Ocean, 1956-1976.

Year	Whole stock					Adult					Young				
	CPUE	Effective effort*	Intengity per 5 ⁰ square	Catch in number	Yield in tons	CPUE	Effective effort*	Intengity per 5 ⁰ square	Catch in number	Yield in tons	CPUE	Effective effort*	Intengity per 5 ⁰ square	Catch in number	Yield in tons
1956	2.63	34	77	967	21	2.35	41	146	967	21	-	-	-	-	-
1957	4.63	575	1,294	26,628	725	3.83	694	2,465	26,628	725	-	-	-	-	-
1958	5.15	1,015	2,283	52,273	1,047	4.27	1,225	4,347	52,273	1,047	-	-	-	-	-
1959	6.54	4,546	10,226	297,509	3,015	5.42	5,406	19,471	297,509	3,015	-	-	-	-	-
1960	5.90	8,187	18,417	483,184	10,473	4.89	9,850	35,067	483,184	10,473	-	-	-	-	-
1961	4.38	11,032	24,817	482,642	10,393	3.62	13,206	46,871	478,689	10,346	4.08	91	556	3,697	47
1962	3.02	28,501	64,121	862,187	17,122	2.49	32,483	115,287	807,978	16,480	4.23	1,262	7,755	53,330	642
1963	2.96	21,851	49,156	647,784	16,581	2.43	23,616	83,817	573,664	15,447	4.11	1,731	10,638	71,228	1,134
1964	3.18	43,747	98,415	1,388,991	25,405	2.55	44,660	158,502	1,138,210	22,552	4.83	5,049	31,024	243,787	2,453
1965	2.83	45,253	101,802	1,282,129	30,173	2.02	31,121	110,454	627,981	18,835	4.30	14,887	91,463	639,575	11,338
1966	2.73	58,368	131,306	1,595,341	26,488	1.74	33,296	118,172	578,081	13,466	4.07	23,172	142,372	943,346	13,092
1967	2.91	36,766	82,710	1,068,213	19,847	1.84	26,900	95,471	494,459	11,737	4.63	11,287	69,346	522,709	8,110
1968	3.17	66,940	150,598	2,123,111	27,236	2.23	32,712	116,101	728,403	14,749	4.31	26,720	169,167	1,152,341	12,487
1969	2.59	78,487	176,566	2,035,600	35,510	1.86	45,697	162,195	849,736	21,333	3.62	26,475	166,562	958,011	14,177
1970	2.61	66,663	149,967	1,741,343	28,112	1.52	42,648	151,363	647,344	15,303	4.06	23,804	146,282	965,364	12,609
1971	2.28	93,581	210,522	2,132,136	32,573	1.27	57,780	205,067	736,154	16,252	3.48	35,613	218,809	1,237,955	16,321
1972	1.89	107,192	241,141	2,028,378	39,148	1.18	52,261	185,482	616,473	17,780	2.67	47,015	289,862	1,255,277	21,364
1973	1.53	101,241	232,253	1,584,516	28,784	0.80	54,615	193,826	435,699	11,935	2.26	46,092	293,193	1,041,235	16,849
1974	1.62	74,420	167,418	1,202,057	20,740	0.99	35,284	125,227	349,027	8,881	2.34	33,666	206,829	788,219	11,859
1975	1.75	69,314	155,930	1,214,130	17,597	1.01	29,851	105,946	301,776	6,552	2.52	34,127	209,679	860,573	11,045
1976	1.87	93,147	209,515	1,746,324	26,311	1.15	41,206	146,216	475,323	10,609	2.67	44,645	274,302	1,190,215	15,702

* Unit : Number of 1000 hooks