

ESTIMATION OF OVERALL FISHING INTENSITY OF ATLANTIC LONGLINE ALBACORE, 1956-77

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SUMMARY

This report is to follow up the estimated effective fishing effort and overall fishing intensity on north and south stocks of Atlantic albacore caught by the longline fishery up to 1977, on the basis of Japanese and Taiwanese longline data. The method of calculation was already explained by Shiohama (SCRS/77/84). The calculation was also conducted for adult and young categories of each stock. The CPUE of the North Atlantic albacore stock in 1977 decreased rather sharply and indicated the lowest value. The 1977 CPUE of the southern stock remained at recent levels. The estimated effective effort or fishing intensity in 1977 did not show substantial change in either or both stocks compared to the 1976 situation.

RESUME

Ce rapport a pour but de suivre l'effort de pêche effectif estimé et l'intensité de pêche globale des stocks nord et sud du germon de l'Atlantique capturé jusqu'en 1977 par la pêcherie palangrière, sur la base des données palangrières japonaises et de Taiwan. La méthode de calcul avait déjà été décrite par Shiohama (1978, SCRS/77/84). Le calcul a également été effectué pour les adultes et pour les juvéniles de chaque

stock. En 1977, la CPUE du stock nord du germon a diminué assez brusquement, donnant sa valeur la plus faible. La CPUE de 1977 du stock sud-est restée la même qu'au niveau récent. La même année, l'effort effectif estimé et l'intensité de pêche n'ont montré dans ces deux stocks aucun changements substantiels par rapport à 1976.

RESUMEN

Este documento trata de completar la efectividad del esfuerzo de pesca estimado y sobre todo la intensidad de pesca global en los stocks de atún blanco en el Norte y Sur del Atlántico, capturados por la pesquería palangrera hasta 1977, basada en datos de los palangreros de Japón y Taiwan. El método de cálculo fue explicado anteriormente por Shiohama (1978, SCRS/77/84). El cálculo se llevó también a cabo en categorías de adultos y jóvenes de cada stock. En 1977, la CPUE en el stock de atún blanco del Norte, decreció bastante rápidamente e indicó una estimación más baja. En 1977, la CPUE del stock del Sur, permaneció en los recientes niveles. El esfuerzo efectivo estimado o la intensidad de la pesca en 1977, no mostró un cambio demasiado substancial en ambos stocks, comparado a la situación de 1976.

1. Estimation of catch and effort by stock

Data on total catch of whole logline fleet in the Atlantic that are composed of several countries were referred to Statistical Bulletin Vol.8 (ICCAT 1979), as shown in Table 1. It is noted here that:

- 1) Japanese catch statistics since 1971 were revised by exclusion of the catch amount in the area between 20°E and 30°E off south Africa, in order to correspond catch in weight exactly to the catch and effort statistics (Task II). The extent of this revision was very small.
- 2) USSR data were available from 1976 on, but they were ^{not} utilized in the estimation of fishing intensity by stock due to the uncertainty of the fishing area. Since the amount of catch was small, this procedure would have only minor effect on the estimation of total fishing intensity.

According to the same procedure given by Shiohama (1978), the total catch statistics were assigned to respective stock unit of north and south Atlantic, each of which has subareas for adult and young fish. The results are indicated in Appendix tables 1 and 2.

The calculation of effective fishing effort and fishing intensity by stock and subarea was conducted by the method already explained by Shiohama (op. cit.). This technique considers quarterly change in distribution of albacore for the standardization of effort. Catch and effort statistics of Japanese and Taiwanese fleet were used as basic data and then the estimates for the total were obtained by extrapolating with the ratio of total yield to combined catch of Japan and Taiwan. The results are shown in Appendix tables 1 and 2.

2. North stock

The 1977 albacore yield by the longline fleet in the north Atlantic was 12,060 MT, about 25% (3,700 MT) less than that of 1976. Catch by country indicates that Taiwanese fleet harvested 5,945 MT (49%), Korean 4,344 MT (36%) and Japanese 800 MT (7%), in descending order. Catch from the adult fishing ground shared 5,681 MT (47%) and the rest (6,379 MT; 53%) was composed of the fish from the young fishing ground. Both catches in 1977 were smaller than those of the previous year, respectively.

The estimated overall fishing intensity in 1977 was 180,128 hooks (effective effort/5 square) for total north stock, which increased by 6% compared to 1976 value but the cpue (hook rate) in 1977 decreased to 0.98 from 1.53 of 1976. The 1977 cpue for adult subarea recorded the lowest, although it had recovered once in 1976. The cpue in the young fish ground decreased concurrently but not to the extent of the adult instance (Appendix table 1). As shown in Fig. 1, the relation of yield to fishing intensity for whole north stock indicates that since 1974 the annual catch fluctuated between 12 and 16 thousand MT with the increasing trend of fishing intensity. It appears that further increase in effort would not result in the proportional increase in catch.

3. South stock

The estimated total catch of south stock in 1977 was 29,238 MT, being composed of 10,632 MT (36%) from adult subarea and 18,606 MT (64%) from young subarea (Appendix table 2). The albacore in the south Atlantic has been exclusively captured by the longline gear, and more than 80% was caught by the Taiwanese fleet. The three cpue's for whole, adult and young areas in 1977 remained at about the average level of recent years, 1972 onward.

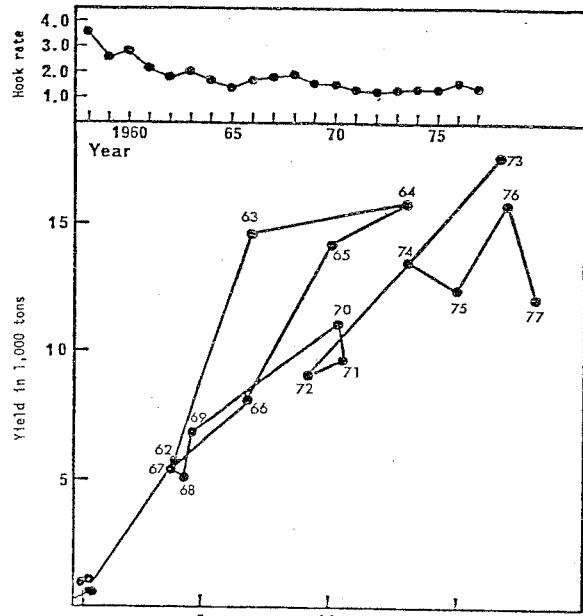
The 1977 overall fishing intensity on the south stock was estimated as 224,700 hooks, being increased by 7% to the 1976 value but not far from the recent years' level. The relationship between catch and effort (Fig. 2) reacted linearly in recent years since 1973, but on a lower level than that up to 1972.

References

- ICCAT 1979: Statistical Bulletin Vol. 8, 1977 (Final).
 Shiohama, T. 1978: Overall fishing intensity and yield by the Atlantic longline fishery for albacore, 1956-1975. (SCRS/77/84). Col. Vol. Sci. Pap., Vol. VII (2), 217-224.

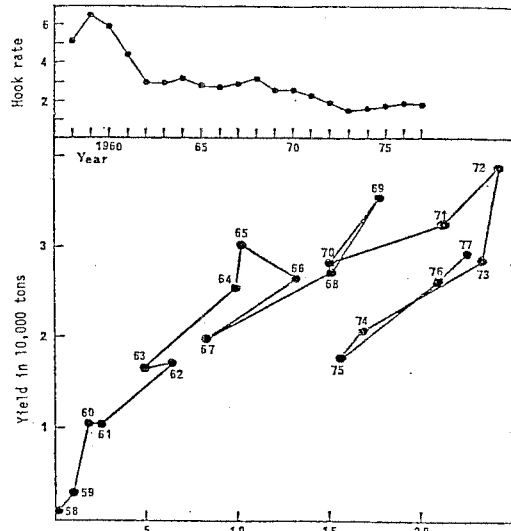
Table 1. Yield, by country, of the albacore caught by the longline fleet in the Atlantic Ocean (in MT), up to 1977.
 Data source: ICCAT Statistical Bulletin.

Year	ARGENTINE	TAIWAN	JAPAN	KOREA	PHUAMA	VENEZUELA	BRAZIL	CUBA	ITALY	SOUTH AFRICA	USSR	TOTAL
1956			23									23
1957			860									860
1958			1,992									1,992
1959			3,614									3,614
1960	1,000		9,804									10,804
1961	1,500		9,233									10,733
1962	700	17	22,138									22,855
1963	1,500	10	25,692									27,202
1964	1,500	103	29,451	167								30,221
1965	1,100	214	42,634	500	0	0	0	0				44,221
1966	800	204	26,885	6,746	0	0	0	0				34,635
1967	700	1,020	12,490	10,279	0	0	0	0	0			24,489
1968	1,200	8,699	15,163	7,285	0	0	0	0	0			32,347
1969	400	14,898	11,048	16,030	0	0	0	0	0			42,376
1970	500	16,900	11,773	10,041	0	0	0	0	0			39,214
1971	300	20,262	9,690	11,339	0	0	200	0	0			42,091
1972	100	29,395	3,407	13,577	412	800	100	100	0			47,891
1973	44	31,658	1,747	8,525	4,207	0	78	0	0			46,262
1974	13	26,224	2,168	5,216	400	0	167	0	0			34,188
1975	100	21,514	1,637	6,073	482	0	93	100	0			29,899
1976	48	29,427	1,418	8,755	1,873	133	267	100	40		84	42,156
1977	80	29,815	930	9,345	569	191	157	100	130		-212	41,510



Overall fishing intensity in 10^4 hooks per 5^2 square

Fig. 1 Annual hook rate, and relationship between yield and fishing intensity of the north Atlantic albacore caught by the longline fishery, 1958-1977.



Overall fishing intensity in 10^4 hooks per 5^2 square

Fig. 2 Annual hook rate, and relationship between yield and fishing intensity of the south Atlantic albacore caught by the longline fishery, 1958-1977.

Appendix table 1. Catch and effort statistics of the adult, young and whole albacore in the North Atlantic Ocean, 1956-1977.

Year	Whole Stock				Adult				Young						
	CPUE	Effective Effort (1000 hooks)	Intensity per 5 square	Catch in number	Yield in tons	CPUE	Effective effort (1000 hooks)	Intensity per 5 square	Catch in number	Yield in tons	CPUE	Effective effort (1000 hooks)	Intensity per 5 square	Catch in number	Yield in tons
1956	1.09	10	24	104	2	0.92	11	41	104	2	-	-	-	-	-
1957	5.65	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	1,657	4,744	52,164	1,131	2.37	2,202	8,053	52,164	1,131	-	-	-	-	-
1961	2.17	827	2,113	17,999	380	1.79	982	3,593	17,999	380	3.01	0	3	9	0
1962	1.87	15,466	39,509	281,264	3,733	1.56	18,273	46,828	280,802	5,727	1.26	34	290	463	6
1963	2.03	26,921	68,771	545,308	14,429	1.74	31,079	113,664	539,646	14,533	7.59	75	431	5,655	96
1964	1.67	50,359	128,646	841,426	18,816	1.38	52,523	192,091	723,286	14,321	3.17	3,716	31,487	117,795	1,485
1965	1.42	39,487	100,874	559,211	14,175	1.14	28,376	103,779	322,145	5,663	2.21	10,719	90,620	234,261	4,512
1966	1.68	24,459	47,592	440,090	8,145	1.16	19,751	72,234	230,008	5,365	2.86	4,546	55,443	187,199	2,780
1967	1.79	15,004	38,330	268,474	5,442	1.37	8,946	32,465	123,169	3,258	2.79	5,212	44,164	145,205	2,164
1968	1.87	16,831	42,996	314,053	5,111	1.52	12,932	47,296	196,461	3,489	2.72	4,316	36,573	117,390	1,622
1969	1.56	17,894	45,711	279,501	6,866	1.14	12,703	44,430	138,897	4,121	2.57	5,480	46,429	140,626	2,745
1970	1.51	40,124	101,901	607,392	11,107	1.34	25,084	91,738	335,608	7,437	3.00	13,295	112,651	263,783	3,625
1971	1.33	40,890	104,432	543,619	9,475	0.92	20,486	74,921	169,394	4,466	2.01	17,315	105,010	304,460	5,227
1972	1.25	35,648	91,117	445,035	9,071	0.90	17,620	64,441	157,908	4,467	1.80	14,329	121,413	257,772	4,404
1973	1.32	64,990	166,025	836,266	17,415	1.02	38,576	141,081	393,954	10,486	1.89	21,629	183,262	406,394	6,929
1974	1.36	50,690	129,498	690,344	11,499	1.06	28,686	105,443	307,063	7,742	1.99	18,100	152,361	360,351	5,737
1975	1.36	56,239	140,804	793,059	12,437	0.80	34,465	126,349	274,241	5,913	2.19	21,758	184,357	417,283	6,517
1976	1.33	66,037	168,498	1,012,035	15,741	1.40	21,077	80,009	304,453	6,857	2.07	30,041	254,706	621,258	8,924
1977	0.98	70,511	180,118	692,666	12,060	0.71	33,309	121,618	237,045	5,821	1.42	29,389	249,019	417,810	6,379

Appendix table 2. Catch and effort statistics of the adult, young and whole albacore in the South Atlantic Ocean, 1956-1977.

Year	Whole Stock				Adult				Young						
	CPUE	Effective Effort (1000 hooks)	Intensity per 5 square	Catch in number	Yield in tons	CPUE	Effective effort (1000 hooks)	Intensity per 5 square	Catch in number	Yield in tons	CPUE	Effective effort (1000 hooks)	Intensity per 5 square	Catch in number	Yield in tons
1956	2.83	34	77	967	21	2.35	41	146	967	21	-	-	-	-	-
1957	4.63	575	1,294	26,428	725	3.83	694	2,465	26,428	725	-	-	-	-	-
1958	5.15	1,015	2,283	52,273	1,047	4.27	1,225	4,347	52,273	1,047	-	-	-	-	-
1959	4.54	4,544	10,226	297,509	3,015	5.42	5,886	19,471	297,509	3,015	-	-	-	-	-
1960	5.90	8,187	18,417	483,184	10,473	4.89	9,880	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	28,503	64,121	862,187	17,172	2.49	32,483	115,287	807,978	16,480	4.23	1,262	7,755	59,230	642
1963	2.96	21,851	49,156	647,784	16,581	2.43	23,618	83,917	573,664	15,447	4.11	1,731	10,638	71,228	1,154
1964	3.18	43,747	99,415	1,388,991	25,405	2.55	44,660	158,502	1,138,210	22,552	4.83	5,049	31,024	283,787	2,853
1965	2.83	45,253	101,802	1,282,129	30,193	2.02	31,121	110,454	627,881	18,835	4.30	14,887	91,463	639,575	11,378
1966	2.73	38,368	131,306	1,595,341	25,488	1.74	23,296	118,172	578,081	13,496	4.07	23,172	142,372	943,346	13,002
1967	2.91	36,764	81,710	1,068,213	19,847	1.84	26,930	95,471	494,459	11,737	4.63	11,287	69,346	522,709	5,110
1968	3.17	66,940	150,588	2,123,111	27,226	2.23	22,712	116,101	728,403	14,749	4.31	26,720	164,169	1,152,391	12,487
1969	2.59	78,487	176,566	2,035,600	35,310	1.86	45,697	162,185	889,936	21,333	3.62	26,475	162,662	998,011	14,177
1970	2.41	66,663	149,967	1,741,343	28,112	1.52	42,648	151,363	647,344	15,303	4.06	23,204	146,252	965,264	12,829
1971	2.28	93,825	211,071	2,137,697	32,416	1.27	37,962	205,714	738,478	16,211	2.45	35,656	219,072	1,239,476	16,205
1972	1.89	103,437	242,142	2,034,794	38,820	1.18	32,450	184,152	618,697	17,733	2.67	44,105	289,417	1,257,688	21,087
1973	1.53	103,456	232,737	1,587,814	28,647	0.80	34,837	194,625	437,490	11,893	2.26	46,130	283,422	1,042,127	16,754
1974	1.42	74,457	167,501	1,202,656	20,669	0.99	35,310	125,318	349,282	8,871	2.34	33,664	206,029	788,219	11,818
1975	1.75	69,332	155,970	1,214,447	17,569	1.01	29,853	105,908	301,894	6,547	2.52	34,127	209,679	860,573	11,022
1976	1.87	93,147	209,545	1,744,334	26,311	1.15	41,206	146,246	475,323	10,609	2.67	44,645	274,302	1,190,215	15,702
1977	1.83	99,884	224,700	1,827,711	29,230	0.89	41,261	160,993	443,591	10,632	2.72	48,332	295,955	1,313,394	18,406