

STATUS OF THE WHITE AND BLUE MARLINS CAUGHT BY THE LONG-
LINE FISHERIES IN THE NORTH ATLANTIC OCEAN, 1956-76

by

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SUMMARY

Longline catch and effort for white marlin have been relatively stable during the recent years, while those for blue marlin have been subject to a considerable change. With longline data up to 1976, production model parameters were estimated under various conditions using PRODFIT (Fox, 1975).

RESUME

Pour la pêche palangrière, les captures et l'effort de ces dernières années sont demeurés relativement stables en ce qui concerne le marlin blanc, alors qu'ils se sont considérablement modifiés pour le marlin bleu. A partir de données palangrières allant jusqu'à 1976, on a estimé les paramètres du modèle de production dans diverses conditions au moyen du programme PRODFIT (Fox, 1975).

RESUMEN

En lo que se refiere a la aguja blanca, la captura y el esfuerzo de palangre han permanecido relativamente estables a lo largo de los últimos años, mientras que en lo que respecta a la aguja azul, han sufrido importantes variaciones. Se estimaron los parámetros del modelo de producción en varias condiciones, utilizando datos de palangre (hasta 1976) y PRODFIT (Fox, 1975).

This report supplements the previous one (SCRS/77/87) with the 1976 data and additional estimation. The 1976 catches of the white marlin and blue marlin from the North Atlantic Ocean were estimated from the ICCAT statistical records (Stat. Bul., vol. 8). Historical data from the fisheries were fitted to the PROFIT (Fox, 1975) to estimate production model parameters under possible conditions. Sources of data and procedures for the total estimation of longline data are the same as in the previous report (op.cit.).

White marlin

From 1975 to 1976, there are a slight increase in the catch from the North Atlantic Ocean and a decrease in the fishing intensity (Table 1 and Fig. 1). The change in the CPUE for the white marlin as a single North Atlantic stock is shown in Fig. 3, where it is expressed by the number of fish per 1000 effective hooks. From 1972 to 1976, it is slightly lower on an average level than in the earlier years but not in a decreasing trend. Historical data for this from the Japanese longline fisheries are given in Table 4.

Production model parameters were estimated for two cases where the number of major age groups fished is assumed as 3 (K=3) and 4 (K=4), respectively. Data prior to 1961 were excluded in this procedure, as it seems that these data do not represent the actual state and will unduly affect the result. For each of the K, the result obtained under the three different m's, 0.0, 1.0 and 2.0, was given in Table 2. The degree-of-fit index is low on all combinations of the K and m. Within the scope of values obtained, it is relatively good when the m=2. With this value of m, two cases of the K give a similar result, i.e. the MSY is around 1,700 tons and the f-opt around 750×10^3 hooks/5° area. These estimates are lower than those by the logistic model in the previous report where the average effort was not considered. The 1976 effort is less than the level of effort corresponding to the MSY and the actual 1976 catch is a little below the equilibrium catch in any of the combinations (Table 2). If we choose the above result, however, it would be noted that the level of effort in recent years from 1970 to 1975 had been a little over the effort that corresponds to the MSY. It may be considered that the white marlin stock in the North Atlantic Ocean has been nearly fully fished by the longline fisheries.

Blue marlin

There is a considerable drop in the catch as well as the fishing intensity from 1975 to 1976 (Table 1 and Fig. 2). According to the ICCAT statistical records, this sudden drop is equally observed in the catches by all the Korean, Japanese and Taiwanese fleets. Except for the early years of the fishery, the CPUE for the blue marlin has been consistently low. Since 1963, it has been in a decreasing trend, although very gradual. From 1972 to 1976, there is a further decrease in the CPUE level and in 1976 it is the lowest ever (Fig. 3).

As shown in our previous report, plots of the catch and effort data from the fisheries are widely scattered (Fig. 2). The degree-of-fit index, however, is higher in the blue marlin than in the white marlin and, in comparison between the cases of the K=3 and K=4, the better fit is in the latter. This relatively good fit from the widely scattered plots is due to the procedure where the plots for the early 2 or 3 years, i.e. the 1962-'63 data for the K=3 and the 1962-'64 data for the K=4, are not considered for the average effort. As seen in Fig. 2, the early 1962-'64 catches are unusually high comparing to the effort during this period. It is not explained whether such widely deflected points are valid or those from the artifact. For the above reason, the apparently good fit does not seem to warrant the fitting of actual data to this model in the case of the blue marlin. For better approach, analytical works on age-length data will prove inevitable.

Table 1 Catch and fishing intensity for the white marlin and blue marlin by the longline fisheries in the North Atlantic Ocean, 1956-1976.

Year	White marlin		Blue marlin	
	Catch	f	Catch	f
1956			5	*
1957	5	3	90	5
1958	15	42	270	47
1959	30	98	500	76
1960	40	43	460	74
1961	130	48	490	59
1962	670	191	4,270	315
1963	1,040	392	4,310	544
1964	2,250	883	4,140	828
1965	1,760	537	2,410	689
1966	1,550	427	1,180	412
1967	805	299	1,450	466
1968	1,180	519	2,330	748
1969	1,250	374	2,150	590
1970	1,910	882	3,540	1,133
1971	2,080	825	3,090	1,236
1972	1,310	773	2,030	1,168
1973	1,570	808	1,850	937
1974	1,790	835	2,730	1,534
1975	1,530	904	2,630	1,345
1976	1,590	645	810	582

Catch in tons.

f Fishing intensity, 1000 hooks/5° area.

Table 2 Estimated production model parameters for the North Atlantic white marlin caught by the longline fisheries, 1962-1976.

K	M	Umax	Uopt	fopt	Ymax	Degree-of-fit index	1976 actual catch	1976 equilibrium catch
3	0.0	6.36	-	∞	2,713	0.418	1,590	1,633
	1.0	5.31	1.95	879	1,719	0.454	1,590	1,644
	2.0	4.54	2.27	753	1,709	0.495	1,590	1,673
4	0.0	7.78	-	∞	2,382	0.463	1,590	1,615
	1.0	5.37	1.98	858	1,696	0.494	1,590	1,629
	2.0	4.61	2.30	730	1,683	0.522	1,590	1,660

K Number of age groups under exploitation.

U Catch in tons/1000 effective hooks/5° area.

F Fishing intensity, 1000 effective hooks/5° area.

Table 3 Estimated production model parameters for the North Atlantic blue marlin caught by the longline fisheries, 1962-1976.

K	M	U _{max}	U _{opt}	f _{opt}	Y _{max}	Degree-of-fit index	1976 actual catch	1976 equilibrium catch
3	0.0	18.07	-	∞	2,791	0.589	810	2,206
	1.0	6.75	2.48	1,002	2,489	0.614	810	2,195
	2.0	5.19	2.60	993	2,580	0.611	810	2,137
4	0.0	11.22	-	∞	2,803	0.700	810	1,961
	1.0	5.61	2.07	1,115	2,303	0.711	810	1,945
	2.0	4.55	2.28	1,040	2,367	0.702	810	1,908

Table 4 Catch in number, effective effort and CPUE for the white marlin and blue marlin by the Japanese longline fishery in the North Atlantic Ocean, 1956-1976.

Year	White marlin			Blue marlin		
	C	X	U	C	X	U
1956	0	13,781	0	96	17,858	5.3757
1957	145	203,666	0.7120	1,130	295,139	3.8287
1958	522	2,747,868	0.1900	3,398	2,810,053	1.2096
1959	1,133	6,008,856	0.1886	6,347	4,416,780	1.4370
1960	1,311	2,965,691	0.4421	5,829	4,570,668	1.2753
1961	2,155	1,565,557	1.3765	4,213	2,556,694	1.6478
1962	20,379	12,074,130	1.6878	51,958	19,540,418	2.6590
1963	32,521	25,215,957	1.2897	51,858	32,448,629	1.5982
1964	75,458	62,487,155	1.2076	50,284	49,748,074	1.0108
1965	56,870	35,685,355	1.5937	26,878	37,375,089	0.7191
1966	50,139	28,531,837	1.7573	11,367	19,438,157	0.5848
1967	13,011	8,878,445	1.4655	5,008	8,051,186	0.6220
1968	12,513	8,569,780	1.4601	4,785	7,926,137	0.6037
1969	16,248	9,554,666	1.7005	9,860	12,339,984	0.7990
1970	19,682	14,865,045	1.3240	8,908	13,866,896	0.6424
1971	34,438	27,079,887	1.2717	16,309	30,818,398	0.5292
1972	12,361	12,359,016	1.0002	4,389	10,331,581	0.4248
1973	12,502	8,982,356	1.3918	3,273	6,354,748	0.5150
1974	12,233	8,637,832	1.4162	3,389	6,370,762	0.5320
1975	14,766	16,650,942	0.8868	8,254	16,947,360	0.4870
1976	15,785	13,413,692	1.1768	3,227	9,914,059	0.3255

C Catch in number
X Effective number of hooks

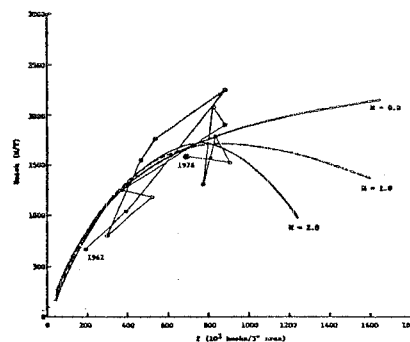


Fig. 1 Catch/effort plots for white marlin, 1962-1976, with curves fitted to the model for m=0, 1 and 2 (K=3)

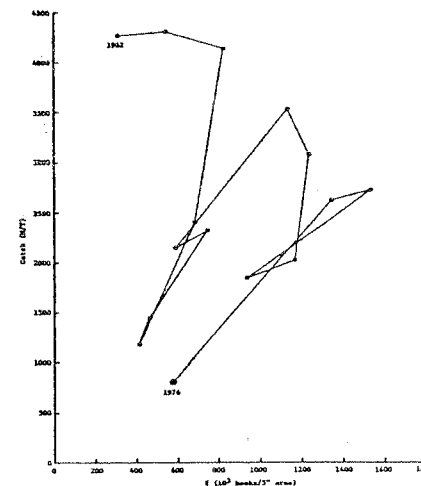


Fig. 2 Catch/effort plots for blue marlin, 1962-1976.

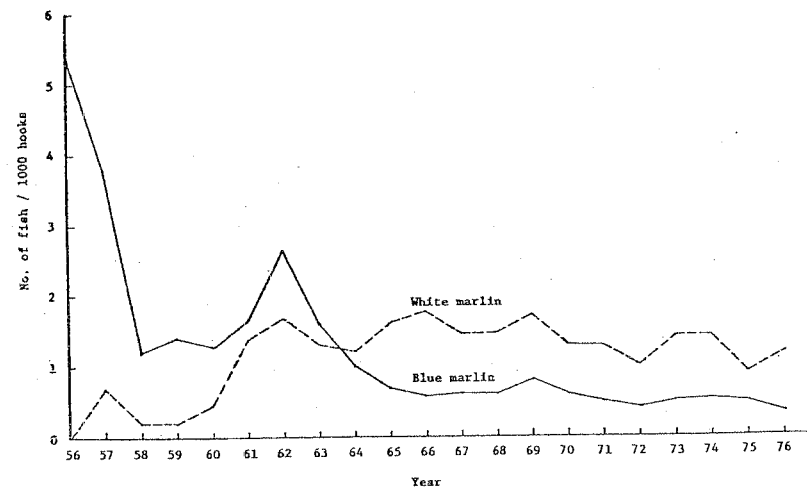


Fig. 3 CPUE for the white marlin and blue marlin caught by Japanese longline fisheries in the North Atlantic Ocean, 1956-1976.