

REVISED CATCH AND EFFORT STATISTICS BY AREA ON
TAIWANESE TUNA LONGLINE FLEETS IN THE ATLANTIC, 1967-1974

by

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SUMMARY

Sample statistics of catch and effort data for the Taiwanese longline boats in the Atlantic were extrapolated to represent the total estimated statistics, utilizing the coverage rates shown in the Taiwanese statistical bulletins. Analysis of the trend in fishing effort indicates a shift of interest from yellowfin to albacore.

RESUME

Un échantillon de données de capture et d'effort des palangriers taiwanais dans l'Atlantique a été extrapolé pour illustrer les chiffres totaux estimés, au moyen des taux de couverture indiqués dans les bulletins statistiques du Taiwan. L'analyse des tendances de l'effort montre un déplacement de l'intérêt de l'albacore au germon.

RESUMEN

Por medio de las tasas de cobertura dados en los boletines estadísticos de Taiwan, se extrapola una muestra de datos de captura y esfuerzo de los palangreros taiwaneses que operan en el Atlántico, con el fin de ilustrar el total de estadísticas estimadas. El análisis de la tendencia en el esfuerzo de pesca indica que el interés aplicado al rabil, se desplaza hacia el atún blanco.

1. Introduction.

Taiwanese tuna longline boats started their operations in the Atlantic from 1962 (ICCAT, 1971) and the catch and effort statistics by area have been published since 1967. These, however, were sample statistics.

In this report, total Taiwanese catch and effort by area were estimated and compiled in the same manner with Japanese statistics in an attempt to improve the basic data for stock assessment. Some characteristics of the Taiwanese tuna longline fishery were commented briefly.

2. Material and method.

Original Taiwanese data used in this report were obtained from two sources, one from the Taiwan Fisheries Bureau (1972-1974 editions) via the Secretariat of the ICCAT, the other from the Institute of Oceanography of National Taiwan University (IONIU) (1967-1971 editions). Both of them, sample statistics, are being compiled by month of the year and 5° square with monthly coverage rates in most cases. As for the coverage rates unavailable from the previous data, "Annual catch statistics of Taiwan's tuna longline fishery" (IONIU et al., 1973-1975) and "Report on survey of production and marketing of Taiwan's tuna longline fishery" (Taiwan Fisheries Bureau, 1968-1974) were referred.

Total number of hooks and number of catch by species were estimated multiplying the corresponding sample values by reciprocals of the coverage rates (Table 1), that is,

$$E_{ijk} = S_{ijk} \cdot K_{jk}$$

where, E_{ijk} : Estimated total number of hooks or fish by species in i-th 5° sq., j-th month and k-th year.

S_{ijk} : Sample number of hooks or fish by species in i-th 5° sq., j-th month and k-th year.

K_{jk} : Reciprocal of coverage rate in j-th month and k-th year.

As a rule, by month of the year, reciprocal of the coverage rate is multiplied to obtain the total estimates. However, constant rates throughout the year were applied for three years (1967-1969), during the period only annual rates were available.

The coverage rates fluctuate from the highest 43.7% in June 1970 to the lowest 9.9% in October 1973 ranging from 13% to 18% in terms of annual mean (Table-1).

3. Table of total estimates.

Estimated catch and effort statistics by 5° square and month were tabulated ("Effort and catch statistics by area on Taiwan's tuna longline fishery, 1967-1974 (Atlantic Ocean)") and were submitted to the ICCAT Secretariat. The figures for 1967 are underestimated because the estimation was based on only July-December data. For reference, first page of the output is shown in Appendix table 1, codes of which are as follows:

OCE: 3; Atlantic

YY: Last two digits of the Christian Era.

MM: Month

LONG: Longitude and east-west codes (Longitude denotes the smallest degree in each 5° sq. and 1, 2 indicate east and west, respectively).

LAT: Latitude and north-south codes (Latitude denotes the smallest degree in each 5° sq. and 1, 2 indicate north and south, respectively).

HOOKS: Nominal number of hooks

BF: Bluefin tuna

SBF: Southern bluefin tuna

ALB: Albacore

BIG: Bigeye tuna

YF: Yellowfin tuna

EB: Broadbill swordfish

S4: White marlin

EM: Blue marlin

BM: Black marlin

SF: Sailfish

SJ: Skipjack

4. Characteristics of the Taiwanese tuna longline fishery viewed through specific preference of fishing effort.

Figure 1 and Table 2 show indices of effectiveness (effective fishing effort/nominal fishing effort) on major species and annual fishing effort, catch in number by species and hook rate (%), respectively. Recent nominal fishing effort has increased from about 30 million hooks during the 1969-1970 period to about 50 million hooks with maximum 62 millions in 1973 (Table 2). Albacore dominates in catch, followed by yellowfin then bigeye.

Indices of effectiveness which account for preference of fishing effort toward specific fish is the highest for albacore (Fig. 1). The indices of effectiveness on albacore were separately calculated for the southern and northern hemispheres taking into account the hypothesis that this species in the north and south Atlantic forms different stock each other. The indices for the southern stock are steadily increasing except for 1968, well over 1.0 for all years dealt in this report. Remarkable increase of interest for the northern stock by the Taiwanese tuna longline boats is reflected by the high indices over 2.0 after 1972.

In contrast to albacore, the indices of effectiveness for other tunas seems to decline gradually from about 1.0 in the 1960's and after 1972 along with billfishes, stay low around 0.5-0.8. It is pointed that the Taiwanese tuna longline fleets aim mainly at albacore.

References

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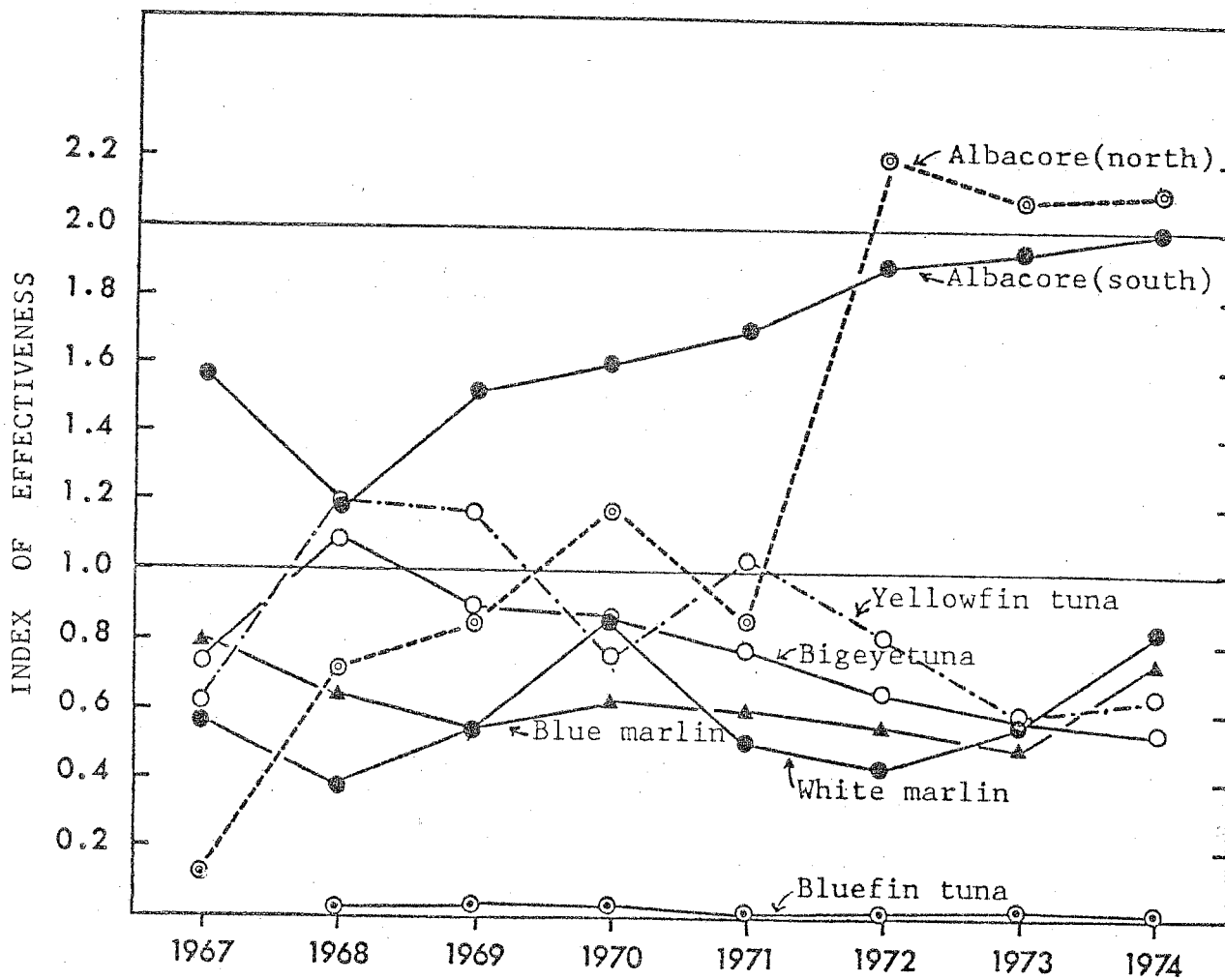


Fig. 1. Yearly average indices of effectiveness by species of Taiwanese longline fishery in the Atlantic Ocean, 1967-1974.

Table 1. Coverage rate of logbooks for Taiwanese tuna longline fleets in the Atlantic Ocean, 1967-1974.

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	Mean
1967	0.2857*												
1968	0.2762*												
1969	0.3098*												
1970	0.4297	0.3658	0.4368	0.4291	0.3008	0.3091	0.3853	0.4193	0.3351	0.3377	0.4343	0.3749	0.3798
1971	0.4030	0.3177	0.2695	0.2834	0.2517	0.2517	0.2682	0.2086	0.2613	0.2549	0.2571	0.2168	0.2703
1972	0.1707	0.1546	0.1828	0.2408	0.2638	0.2229	0.1891	0.1781	0.2051	0.2240	0.2215	0.1626	0.2013
1973	0.1582	0.1251	0.1172	0.1120	0.1153	0.1138	0.1192	0.1423	0.1267	0.0979	0.1613	0.1502	0.1266
1974	0.1904	0.2312	0.2274	0.2704	0.2424	0.2843	0.2862	0.3059	0.3217	0.3054	0.2980	0.3012	0.2720

* constant throughout the year

Table 2. Nominal effort (1,000 hooks), catch in number and hook rate (%) by Taiwanese tuna longline fleets in the Atlantic.

Year	No. of Hooks	Blue-fin	Southern bluefin	Albacore	Bigeye	Yellow-fin	Sword fish	Striped marlin	Blue marlin	Black Marlin	Sail fish	Skipjack
1967	1,841	25		58,103	7,365	8,292	486	261	916	25	242	
	H.R.	0.00		3.16	0.40	0.45	0.03	0.01	0.05	0.00	0.01	
1968	28,305	659		858,840	136,877	276,962	11,578	17,771	10,515	195	41,333	
		0.00		3.03	0.48	0.98	0.04	0.06	0.04	0.00	0.15	
1969	36,603	7,143		983,623	167,531	233,746	15,427	23,843	13,299	1,096	30,887	
		0.02		2.69	0.46	0.64	0.04	0.06	0.04	0.00	0.08	
1970	36,208	3,519		889,469	145,122	109,916	20,354	21,082	10,150	142	25,712	872
		0.01		2.46	0.40	0.30	0.06	0.06	0.03	0.00	0.07	0.00
1971	52,787	568		1,444,321	138,468	188,972	20,864	18,117	11,910	54	57,990	
		0.00		2.74	0.26	0.36	0.04	0.03	0.02	0.00	0.11	
1972	51,979	1,500		1,486,996	84,506	185,967	16,844	11,588	6,179	154	53,561	
		0.00		2.86	0.16	0.36	0.03	0.02	0.01	0.00	0.10	
1973	62,356	2,001		1,655,316	84,687	120,207	21,419	29,469	7,177	43	20,007	
		0.00		2.65	0.14	0.19	0.03	0.05	0.01	0.00	0.03	
1974	53,414	278	896	1,440,284	95,630	95,629	15,585	27,280	6,343	648	17,416	
		0.00	0.00	2.70	0.18	0.18	0.03	0.05	0.01	0.00	0.03	

Appendix table 1.

EFFORT AND CATCH STATISTICS BY AREA ON TAIWAN'S TUNA LONGLINE FISHERY
1967 - 1974
(ATLANTIC OCBAN)

EFFORT AND CATCH STATISTICS BY AREA ON TAIWAN'S TUNA LONGLINE FISHERY, 1967-1974 1 PAGE

YR	MM	LONG	LAT	HODKS	BF	SFF	ALB	BIG	YF	BB	SM	BUM	BM	SF	SJ
3 67	7	60-2	15-1	51873	0	0	595	4	84	4	0	95	0	154	0
3 67	7	5-1	25-2	137137	0	0	9737	858	0	49	25	0	0	0	0
3 67	8	55-2	15-1	174729	0	0	4967	95	340	28	0	84	0	0	0
3 67	8	0-1	25-2	1218761	11	0	17805	693	7	42	14	0	0	0	0
3 67	9	55-2	15-1	108925	0	0	1680	32	136	0	0	102	0	0	0
3 67	9	0-1	20-2	166958	14	0	8197	1463	4	18	4	0	0	0	0
3 67	10	55-2	15-1	194890	0	0	3451	252	581	28	60	161	0	0	0
3 67	10	0-2	10-2	101155	0	0	886	998	56	42	21	11	21	4	0
3 67	10	5-1	20-2	119706	0	0	3962	707	4	46	98	0	0	0	0
3 67	11	60-2	10-1	12601	0	0	130	0	175	0	0	0	0	0	0
3 67	11	65-2	10-1	12601	0	0	105	11	158	0	0	21	0	0	0
3 67	11	60-2	15-1	161288	0	0	2055	214	732	46	35	112	0	0	0
3 67	11	55-2	20-1	12601	0	0	158	0	119	0	0	0	0	0	0
3 67	11	0-2	5-2	121281	0	0	14	1299	368	42	4	7	4	7	0
3 67	12	65-2	10-1	63003	0	0	623	63	690	11	0	25	0	0	0
3 67	12	60-2	15-1	94155	0	0	3738	417	2751	56	0	266	0	0	0
3 67	12	0-2	0-1	89429	0	0	0	259	1537	74	0	32	0	77	0
3 68	1	65-2	10-1	13034	0	0	112	7	101	4	0	11	0	0	0
3 68	1	70-2	10-1	6517	0	0	72	0	4	0	0	0	0	0	0
3 68	1	60-2	15-1	13034	0	0	105	11	72	0	0	4	0	0	0
3 68	1	65-2	15-1	224613	0	0	2607	431	2104	69	29	398	0	0	0
3 68	1	30-2	5-2	7241	0	0	127	25	25	4	76	4	0	7	0
3 68	1	10-2	5-1	6517	0	0	0	91	7	4	0	14	0	36	0
3 68	1	15-2	5-1	27607	0	0	0	286	253	29	0	25	0	51	0
3 68	1	0-2	0-1	28965	0	0	11	29	333	11	0	4	0	0	0
3 68	1	10-2	0-1	119117	0	0	43	228	1303	50	0	18	0	177	0
3 68	1	15-2	0-1	445402	0	0	329	1752	7161	387	185	72	0	421	0
3 68	1	5-2	0-2	437857	0	0	420	1303	7553	301	141	72	0	749	0
3 68	1	10-2	0-2	526720	0	0	1014	2202	14330	561	145	98	0	804	0
3 68	1	20-2	15-2	45619	0	0	293	170	854	69	0	7	0	43	0
3 68	1	20-2	20-2	78965	0	0	319	119	760	65	264	25	0	69	0
3 68	2	55-2	10-1	82114	0	0	1101	156	887	22	485	83	0	0	0
3 68	2	50-2	25-1	6517	0	0	362	7	0	0	0	0	0	0	0
3 68	2	55-2	25-1	11224	0	0	764	7	18	0	0	0	0	0	0
3 68	2	45-2	30-1	40550	0	0	724	0	0	0	0	0	0	0	0
3 68	2	60-2	30-1	12672	0	0	873	29	0	0	0	0	0	0	0
3 68	2	30-2	5-2	36206	0	0	387	127	224	14	0	14	0	87	0
3 68	2	0-2	0-1	41999	0	0	51	51	2056	33	0	14	0	152	0
3 68	2	5-2	0-1	90587	0	0	40	141	1155	47	4	18	0	127	0
3 68	2	10-2	0-1	93049	0	0	47	333	1636	54	80	47	0	485	0
3 68	2	15-2	0-1	76032	0	0	14	731	2353	36	0	22	0	170	0
3 68	2	20-2	0-1	57929	0	0	677	1043	2922	76	0	22	4	130	0
3 68	2	0-1	0-2	566836	0	0	514	583	19432	456	0	130	0	1879	0
3 68	2	0-2	0-2	351919	0	0	210	1148	10022	272	4	58	0	130	0
3 68	2	25-2	0-2	174222	0	0	235	1097	2589	127	29	25	0	282	0
3 68	2	25-2	5-2	43447	0	0	909	40	62	14	0	72	0	177	0
3 68	3	60-2	10-1	196169	0	0	4366	268	2122	36	181	246	0	0	0
3 68	3	60-2	20-1	5793	0	0	54	0	0	0	0	0	0	0	0
3 68	3	60-2	25-1	23896	0	0	1434	0	0	0	0	0	0	0	0
3 68	3	65-2	25-1	162201	0	0	10094	36	116	22	0	109	0	0	0