

COMPARATIVE EXAMINATION OF SIZE COMPOSITION FOR SKIPJACK AND YELLOWFIN
SAMPLED FROM KOREAN BAITBOATS BASED IN TEMA, 1979-1982

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SUMMARY

There were some inconsistencies for the two sets of data between the length compositions of skipjack and yellowfin measured by Korean fishermen and those by Ghanaian scientists for Korean baitboat catches during 1978 - May 1982. Some tests of statistical hypotheses were conducted and their results in general revealed a significant difference between the two contrasting data. However, from the field survey made by a Korean scientist in May, 1982, it was found that there was not any considerable bias in the measurement and treatment of the fish by Korean fishermen but non-random sample selection might exist.

RESUME

Le jeu de données sur la composition de taille du listao et de l'albacore établi par les pêcheurs coréens et celui rassemblée par les scientifiques ghanéens concernant les prises des canneurs coréens pour la période 1978-mai 1982 présentent quelques contradictions. Des tests utilisant des hypothèses statistiques ont montré qu'en général, les différences entre ces deux jeux de données étaient importantes. Toutefois, d'après une prospection réalisée sur le terrain par un scientifique coréen au mois de mai 1982, on a trouvé qu'il n'existait pas de biais im-

portant dans la façon de relever les mesures et de manipuler le poisson de la part des pêcheurs coréens, mais que la sélection des échantillons pouvait ne pas être faite au hasard.

RESUMEN

Había algunas faltas de concordancia en los dos conjuntos de datos, entre la composición por talla del listado y del rabal, medidos por los pescadores coreanos y los científicos de Ghana, respecto a las capturas por barcos de cebo en el periodo. Se efectuaron algunas pruebas de hipótesis estadísticas y, en general, los resultados revelaron que existía una significativa diferencia entre los dos datos contrastados. Sin embargo, como resultado de la investigación efectuada por un científico coreano sobre el terreno, en mayo de 1982, se halló que no existía ningún sesgo considerable en la medida y tratamiento de los peces por parte de los pescadores coreanos, sino que podría deberse a que la selección de muestras no se hizo en forma aleatoria.

INTRODUCTION

In 1981, Report of the Sub-Committee on Statistics noted that there are two sets of data for Korean longline and bait boat fishery and also there have been consistent discrepancies in the size frequencies of bait boat catches, one is sampled and measured by Ghanaian scientists at Tema, Ghana and the other by Korean fishermen at sea. To review such dissonances the Committee recommended that Secretariat statistically compare these data with results of port sampling (Biennial report, 1980-81, Part II, 1982).

In accordance with the above-mentioned, some statistical examinations as well as comparisons of the two sets of data for size composition were performed to provide the figures on this matter, and also the results of field surveys by a Korean scientist at Tema for about two weeks in May, 1982 were described as ancillary information.

DATA AND PROCESS

The data used in this report are length frequencies data for skipjack and yellowfin of Korean bait boat catches measured by Korean fishermen and those by Ghanaian scientists during the period of 1978 - May 1982. Among them, the data for 1978 - 1980 were already published in Data Record and Statistical Series of ICCAT (see reference). However, the unpublished raw data measured by Ghanaian scientists for 1981 - 1982 were provided from the Fishery Research Unit at Tema by courtesy of Mr. M.A. Mensah when a Korean scientist visited to the Unit, and not only the length frequency data by Korean fishermen but also this by a Korean scientist in May 1982 were added for this task as well.

On the other hand, because both of these data have not covered overall fishing grounds in the Gulf of Guinea at the same periods, the data for the area SJ 73 for skipjack and area SBY 2 for yellowfin as main fishing grounds

of Korean bait boat fishery were pick up and also sampling has been carried out continuously in these areas every year but the data for 1981 - 1982 comprised all the measured data without considering area.

In analyzing the two sets of data statistically some methods, such as test of the difference between two means, Chi-square and Kolmogorov-Smirnov two-sample test etc. were hired out.

COMPARISON OF SIZE COMPOSITION BETWEEN TWO SETS OF DATA

The length frequency distribution of skipjack and yellowfin measured by Korean fishermen and those by Ghanaian scientists for Korean bait boat catches during 1978 - 1982 are shown in Fig. 1 and 2, and these data are plotted on the probability graph paper as shown in Fig. 3 and 4 to know the qualities of two sampling data. There were some inconsistencies between them by year and also the relative values of length distribution were not coincided in any cases of both species, especially in 1982 their figures appeared to have much more fluctuations rather than other years even though the sampling periods differ a little bit from each other. Their summarized results of sampling by species are presented in Table 1.

In order to evaluate the statistical hypotheses for two contrasting samples obtained from the catches of the same fishery, at first the test of difference between two variances was carried out and followed by the test of equality of the means of two samples under the assumption that the variances in the populations from which the two samples were taken are identical. The results of calculation are shown in Table 2.

Given the result of the test of two variances for both species, there were considerably significant throughout the whole years at the 0.05 level ($\alpha = 0.05$). This implies that the null hypothesis is rejected. However, in the tests of the means of two samples there appeared to be no significant

difference for yellowfin in 1980 - 1981. Also the tests of a two-contrasting sample for skipjack and yellowfin observed by Korean fishermen, by Ghanaian scientists and a Korean scientist in 1982 were carried out and the results revealed to be significant with exception of K.F./K.S. for yellowfin (Table 3).

In contrast, Kolmogorov-Smirnov two-sample test was employed to sense the dispersion or skewness of the two samples of continuous observation. Its null hypothesis is identity in the distribution for them. The results of the tests are shown in Table 4 and 5. All values between two samples showed significance differences at the 0.05 and 0.01 level. So it could not be accepted the null hypothesis that the two samples have been taken from population with the same distribution. In addition, results of Chi-square test for goodness of fit also appeared highly significant deviation as a whole.

COLLECTING SAMPLES AND MEASURING FISH BY KOREAN FISHERMEN

The Korean bait boat fishery in the Atlantic has been conducting since 1972 and most of the catches are composed of skipjack that occupies more than 70 percent of the total catch annually and follow by yellowfin and bigeye (Gong and Lee et al, 1981). Those catches are usually being transshipped directly from the fishing vessels to the cargo ship without landing at Tema and then conveyed to the landing port.

Accordingly biological research activities including basic catch and effort data have mainly been performed by Korean fishermen, except for the field work by scientists. As regards International Skipjack year program a Korean scientist sent to Tema in May, 1982 for the purpose of carrying out the dart tagging activities and collecting data concerned. During staying on board he had a lot of opportunities to confirm how fishermen deal with the fish for measuring the size and how they record the data, especially the method of sampling :

When the fish are caught they always separate them into the two or three classes in size by species for economic point of views. They have used a steel tape as a tool of fish measurement and measured the fish length to nearest 1 cm interval along the straight line, not covered line on fish, from the tip of upper jaw to fork in the part of caudal fin so-called fork length. After then they dressed the gut and gill of the fish in size more than about 70 - 80 cm fork length so-called G.G. and also they compared the relations between the round weight and G.G. weight.

So, it was found that Korean fishermen were measuring and treating the fish in accordance with the criteria of fish measurement programmed. However it was a pity that sampling of individuals was not being carried out at random and nonrandomness was largely involved by them. This attributed it to the cause that actually there was very difficult to take the samples at sea systematically and also fishermen were not accustomed to do this work without having sufficient time. Therefore they have taken the samples sporadically and measured the fish. This might be accompanied bias toward the length frequency distribution. Finally, it is obvious that Korean fishermen fully understand this matters and also they exert their efforts to improve the quality of samples.

LITERATURE CITED

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Table 1. The summarized results of sampling by Korean bait boats based at Tema, 1978 - May 1982

Year	No. of fish sampled	Skipjack		Standard deviation	No. of fish sampled	Yellowfin	
		Average length(Cm)	Standard deviation			Average length(Cm)	Standard deviation
1978	KF ¹⁾	812	48.9	9.34	-	-	-
	GS ²⁾	3,250	47.7	5.79	2,281	58.1	11.34
1979	KF	205	53.2	8.97	-	-	-
	GS	3,850	45.8	5.63	3,234	56.2	10.04
1980	KF	677	50.0	9.68	114	54.1	12.96
	GS	3,200	44.8	5.78	2,699	53.4	10.66
1981	KF	337	44.4	8.82	178	48.7	8.73
	GS	1,228	44.6	4.11	863	47.6	4.82
1982 (Jan. - May)	KF	130	48.1	10.23	130	60.5	22.36
	GS	110	44.7	3.47	169	50.0	5.06
	KS ³⁾	150	50.9	8.01	51	64.1	18.44

foot note : 1). Korean fishermen 2). Ghanaian scientist 3). Korean scientist.
In 1982, the data sampled by Ghanaian scientists are from Jan. to March.

Table 2. Results of test of equality of the means of two samples between Korean fishermen and Ghanaian scientists, 1978 - 1981

Year	Skipjack	Yellowfin
1978	3.50 > 2.58 1.96	-
1979	11.69 > "	-
1980	10.09 > "	0.57 < 2.56 1.96
1981	9.52 > "	1.63 < 2.56 1.96

The value 2.56 is at " $\alpha = 0.01$ " and 1.96 is at " $\alpha = 0.05$ ".

Table 3. Results of test of two contrasting means sampled by Korean fishermen (K.F), Ghanaian scientists (G.S) and Korean scientist (K.S) in 1982

Combined data	Skipjack	Yellowfin
K.F./ G.S.	3.56 > 2.58 1.96	5.25 > 2.58 1.96
K.F./ K.S.	2.52 < 2.58 > 1.96	1.11 < 2.58 1.96
K.S./ G.S.	8.46 > 2.58 1.96	5.40 > 2.58 1.96

Table 4. Results of test of Kolmogorov-Smirnov two-sample test between Korean fishermen and Ghanaian scientists in 1980 - 1981

Year	Skipjack		Yellowfin	
	D	critical value	D	critical value
1980	0.368	> 0.057 0.069	0.058	< 0.130 0.156
1981	0.182	> 0.084 0.100	0.176	> 0.112 0.134

Upper values in critical columns are at the 0.05 level and lower at the 0.01 level.

Table 5. Results of test of two contrasting data sampled by Korean fishermen (K.F), Ghanaian scientists (G.S) and Korean scientist (K.S) in 1982

Combined	Skipjack		Yellowfin	
	D	critical value	D	critical
K.F./ G.S.	0.314	> 0.176 0.211	0.284	> 0.158 0.190
K.F./ K.S.	0.350	> 0.163 0.195	0.287	> 0.224 0.269
K.S./ G.S.	0.562	> 0.171 0.204	0.553	> 0.217 0.260

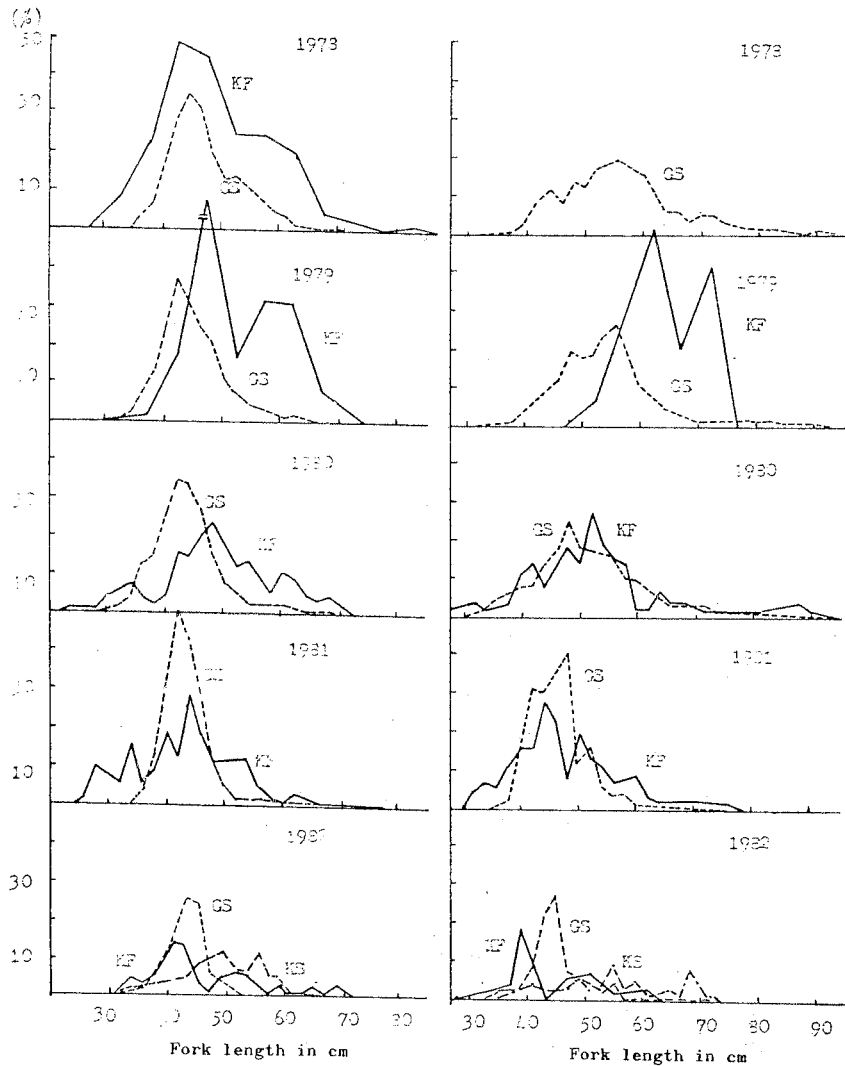


Fig. 1. Length distributions of skipjack sampled by Korean fishermen (K.F.) and Ghanaian scientists (G.S.) during 1978-'82, and by Korean scientist (K.S.) in May 1982.

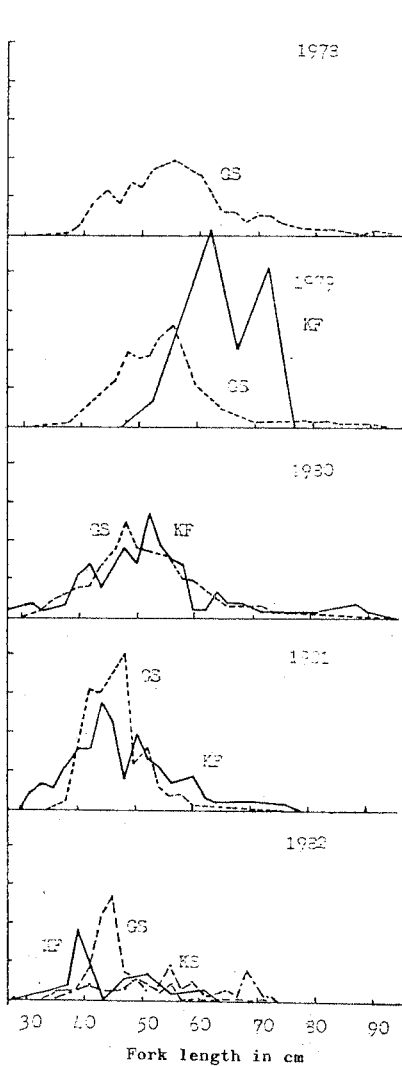


Fig. 2. Length distributions of yellowfin sampled by Korean fishermen (K.F.) and Ghanaian scientists (G.S.) during 1978-'82, and by Korean scientist (K.S.) in May 1982.

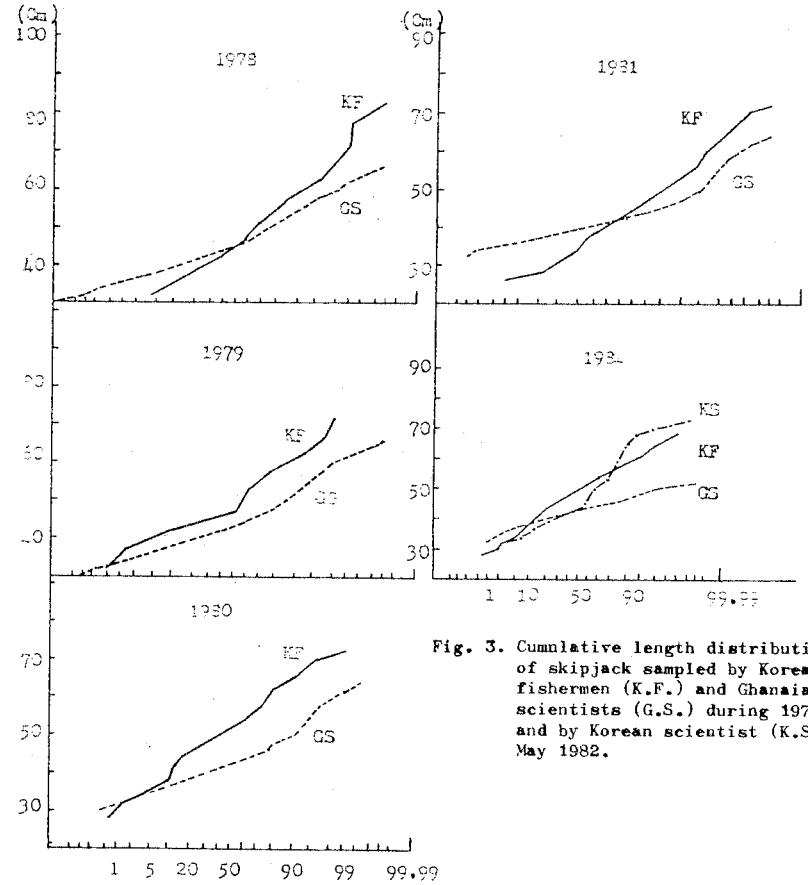


Fig. 3. Cumulative length distributions of skipjack sampled by Korean fishermen (K.F.) and Ghanaian scientists (G.S.) during 1978-'82, and by Korean scientist (K.S.) in May 1982.

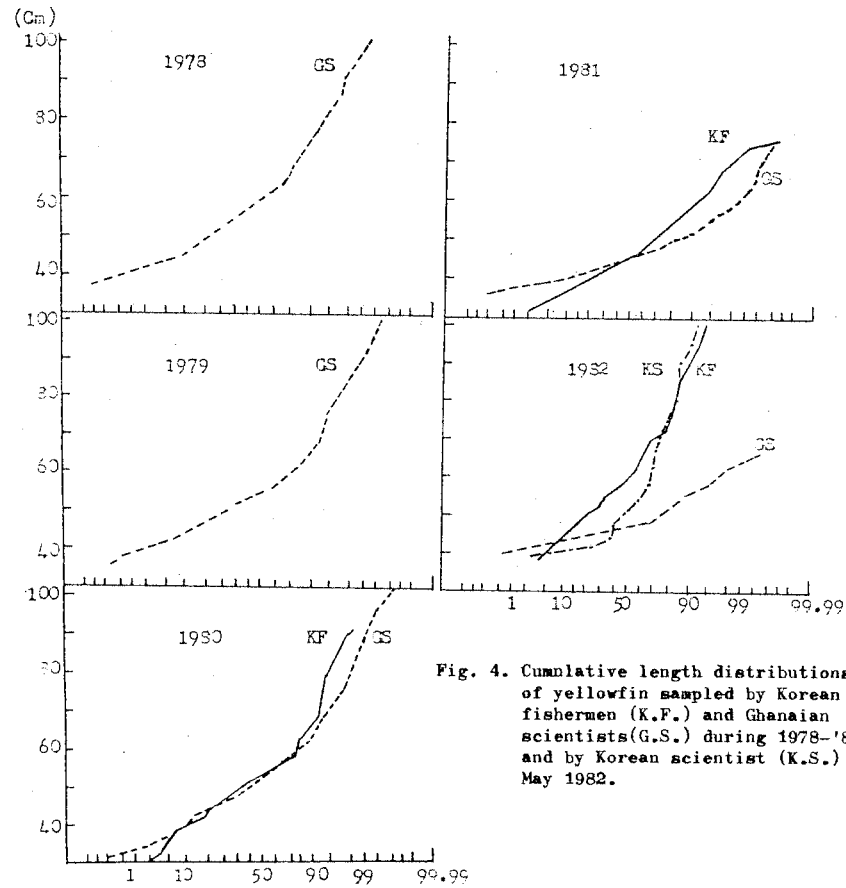


Fig. 4. Cumulative length distributions of yellowfin sampled by Korean fishermen (K.F.) and Ghanaian scientists (G.S.) during 1978-'82, and by Korean scientist (K.S.) in May 1982.