

## PRELIMINARY ANALYSIS ON THE DISTRIBUTION OF SAILFISH AND LONGBILL SPEARFISH IN THE ATLANTIC OCEAN IN 1993 BASED ON THE LOGBOOK DATA

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### SUMMARY

Distribution of sailfish and longbill spearfish in 1993 are described based on the new format logbook data in which catches of these two species are reported separately. Distribution patterns of the two species were similar to those in the 1960s, though the data in the main distribution area were not available. The mixture ratio of sailfish and spearfish by 5x5 blocks was analyzed. There was no significant difference in the mixing ratio between 1956-70 and 1993.

### RESUME

Le présent document décrit la distribution des voiliers et "longbill spearfish" in 1993, d'après les données de livres de bord se conformant au nouveau modèle, et dans lesquels les prises de ces deux espèces sont enregistrées séparément. Le mode de distribution des deux espèces était similaire à celui des années soixante, bien que l'on ne dispose pas de données pour la principale aire de distribution. Le taux de mélange des voiliers et "spearfish" par carrés de 5°x5° a été analysé. Le taux de mélange ne présentait aucune différence significative entre 1956-70 et 1993.

### RESUMEN

Se describe la distribución del pez vela y el *Tetrapturus pfluegeri* + *T. belone* en 1993, basándose en el nuevo formato del cuaderno de pesca, en el cual los datos de captura de estas dos especies se comunican por separado. Las pautas de distribución de estas dos especies fueron similares a las de los años 60, si bien no se pudo disponer de los datos de las principales áreas de distribución. Se analizó la proporción de mezcla de pez vela y *Tetrapturus pfluegeri* + *T. belone* por bloques de 5°x5°. No había diferencia significativa en la proporción de mezcla entre 1956-70 y 1993.

### Introduction

The species combined catch record of sailfish (*Istiophorus platypterus*) and longbill spearfish (*Tetrapturus pfluegeri*) in the Japanese catch reporting system of the tuna longline fishery has made it difficult to use commercial data on these two species for the scientific purposes. Kikawa and Honma (1982) used the catch data by species obtained by the survey cruises from 1957 to 1970 for the partition of commercial catch statistics from 1956 to 1980, assuming that the mixture rate of the two species in 5x5 blocks remained constant even if the level of abundance changed. After 1970, there was no survey cruise by the Japanese research vessels in the Atlantic Ocean and no new information on the distribution of the two species was obtained.

In 1993 the new catch reporting system was introduced in the Japanese longline fishery. In the new system the catch of sailfish and longbill spearfish are reported separately. In this report, the distribution of the two species and rate of mixing are described based on the provisional 1993 database.

### Materials and methods

The logbook database in new reporting system in 1993 were used. The coverage ratio of database used in the present analysis was assumed to be some 70-80%. In the new database format the catch of sailfish and longbill spearfish in number are recorded separately. A total of 23,013

operations were used in the present analysis. There was no catch of both species in 96% of the total operations and catches of sailfish and longbill spearfish in number were 1,454 and 1,227, respectively. The catch records were aggregated by 5x5 degree blocks. For comparison, the results of Kikawa and Honma (1982) were compared with those of the present study (Fig. 1).

### Results and discussions

Figs. 1 and 2 show the distributions of catch and CPUE for sailfish and longbill spearfish in 1993. Most of catch for both species were obtained from the central part of the Atlantic around 10° S (Fig. 1), but some of sailfish were obtained from the coastal waters in Gulf of Guinea. In the distribution of CPUEs, there are some clear differences between the two species. Sailfish is distributed in the central part of the Atlantic around 10° S and high CPUEs were also observed in the coastal waters in Gulf of Guinea. The distribution of sailfish was limited mostly between 20° N and 20° S. On the contrary, longbill spearfish is distributed mainly between 40° N and 30° S with higher concentration in the central part of the Atlantic. These distribution patterns of the two species are very similar to those described in Ueyanagi *et. al.* (1970).

Fig. 3 shows the percentage of sailfish catch in the total of sailfish and longbill spearfish catches by 5x5 blocks. The percentages of sailfish in 1957-1970, cited from Kikawa and Honma (1982), are also presented for the comparison. The percentages were highly variable even among the adjacent blocks. Then it is difficult to find out differences in percentage between the two periods. However, in both period, the high percentages were observed off Africa in the tropical Atlantic.

The results of Wilcoxon signed rank test showed T-value was 181 and there was no significant difference at 99% level in the percentage of sailfish between the two periods. Fig. 4 shows the relationship of percentage of sailfish between the two periods. The solid line indicates the resultant regression line. The Geometric Mean regression (GM regression) was applied in this analysis (Ricker, 1972). The estimated regression equation is as follows,

$$\% \text{ of sailfish in 1956-70} = 0.88 * \% \text{ of sailfish in 1993} + 1.95,$$

correlation coefficient=0.63, number=24.

The correlation coefficient was significant at 99% level. The regression was significant (Table 1) and 95% of confidence interval of the slope ranged 0.52 to 1.25. This range may suggest there is no clear difference in percentage of sailfish between the two period as the Wilcoxon test suggested.

Fig. 5 shows the distribution of effort (number of hooks) in 1993 and the distribution of species combined CPUEs of sailfish and longbill spearfish in the 1960s. In the 1960s when the effort of the Japanese longline fishery was distributed widely all over the Atlantic Ocean, the high CPUEs

of sailfish and longbill spearfish were obtained from the coastal waters along the south America and off Gulf of Guinea. On the contrary, the effort in 1993 was distributed in the area where the high CPUEs were not observed in the 1960s. This means the coverage of the effort was insufficient to observe the mixture of the two species in the main distribution area. Attending the present analysis suggested that there was no clear difference in mixture condition of sailfish and longbill spearfish, there was no sufficient data for the comparison in detail by areas for the whole Atlantic Ocean.

### Literature cited

Kikawa, S. and M. Honma 1982: Trends in the Japanese sailfish/longbill spearfish catches in the Atlantic Ocean as apportioned into separate species. *ICCAT Coll. vol. Sci. Pap.* XVIII (3), 645-649.

Ricker, W.E. 1972: Linear regressions in fishery research. *J. Fish. Res. Board. Can.* 30(3), 409-434.

Ueyanagi, S., S. Kikawa, M. Uto, and Y. Nishikawa 1970: Distribution, spawning, and relative abundance of billfishes in the Atlantic Ocean. *Bull. Far Seas Fish. Res. Lab.* 3, 15-55. (In Japanese with English summary).

Table 1 Analysis of variance for the regression of percentage of sailfish in 1956-70 on it in 1993.

	DF	sum of Squares	Mean Square	Observed F	Pr>F
Model	1	12596.8	12596.8	14.4904	0.00097
Error	22	19125.1	869.324		
Corrected Total	23	31722			



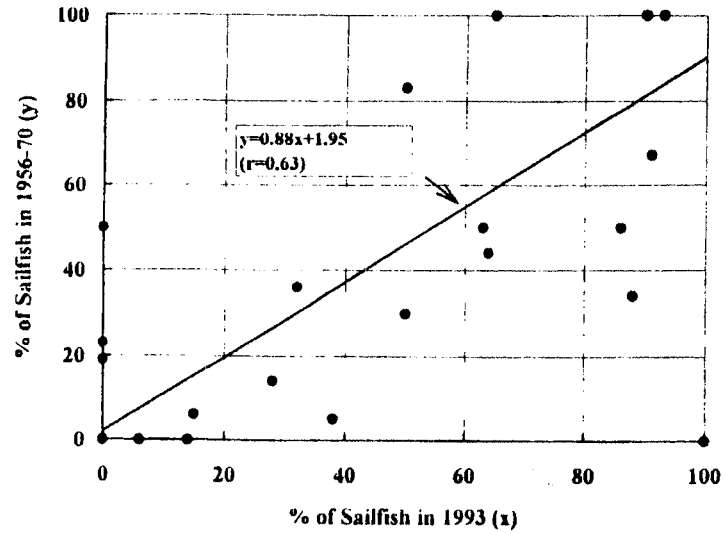


Fig. 4 Relationship of percentage of sailfish by 5x5 blocks between in 1956-70 (Kikawa and Honma, 1982) and in 1993.

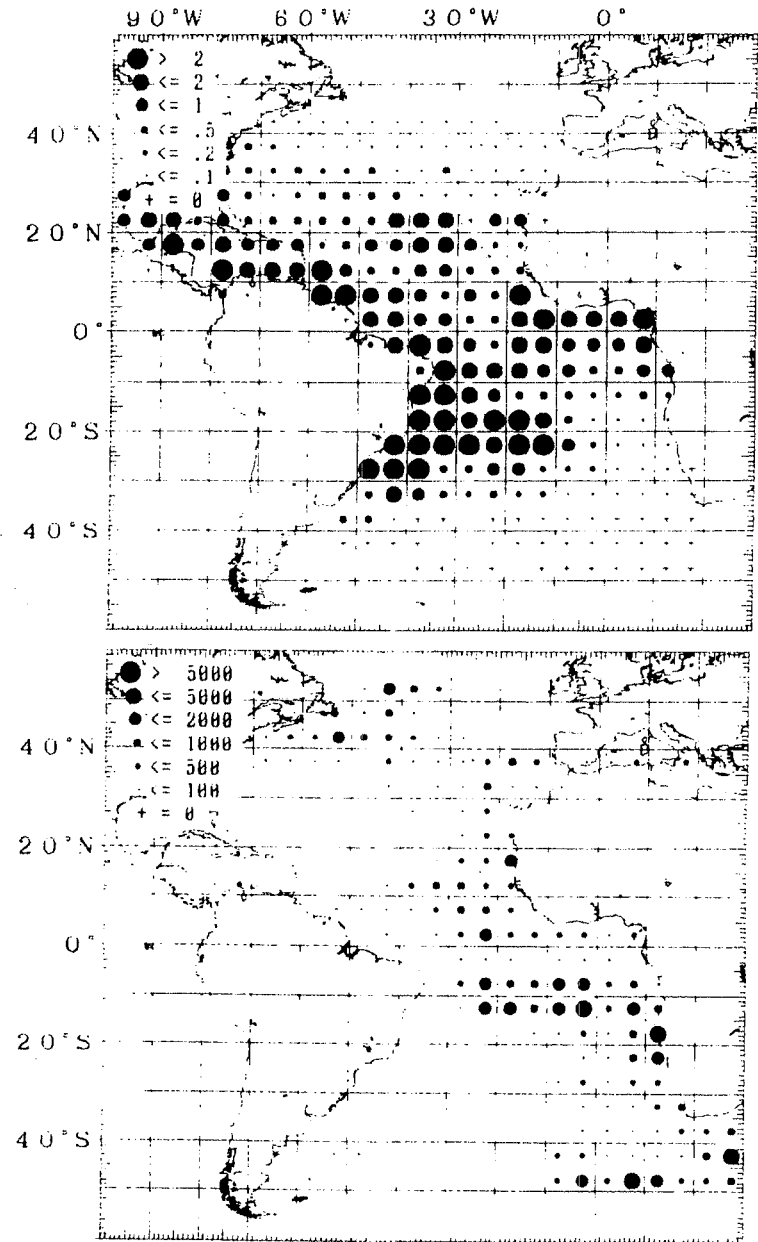


Fig. 5 Distribution of species combined CPUEs of sailfish and longbill spearfish in the 1960s (top) and distribution of fishing effort (number of hooks) in 1993 (bottom).