SCRS/1973/053 Col.Vol.Sci.Pap. ICCAT, 2: 134-140 (1974)

A COMMENT ON THE SKIPJACK STOCK IN THE ATLANTIC OCEAN

by

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SUMMARY

Catches of skipjack in the Atlantic Ocean increased rapidly up to 1968, and then decreased as catches of the more profitable yellowfin tuna increased. This suggests that the surface fishery mainly concentrated on skipjack when fishery on the more profitable species was unfavorable. Average age at first capture in order to reach maximum yield-per-recruit may probably be between 0.9 and 1.6 years even if the fishing intensity were increased so as to bring the coefficient over 1.0. Average weight for these ages may be 0.6 to 1.3 kg. Biological data from several fleets indicated that about 30 percent in terms of weight of the catches consisted of small-size fish less than 40 to 45 cm (1.3 to 2.0 kg).

RESUME

Les prises de listao dans l'Atlantique ont augmenté à un rythme rapide jusqu'en 1968, et ont par la suite oscillé en proportion inverse à celles de l'albacore, qui est plus rentable. Ceci tend à indiquer que la pêcherie de surface s'est surtout dirigée vers le listao lorsque l'autre espèce faisait défaut. L'âge moyen à la première capture permettant d'atteindre un rendement par recrue maximal se trouve sans doute entre 0,9 et 1,6 ans, même si l'intensité de la pêche était accrue de façon à porter le coefficient à plus de 1,0. Le poids moyen à ces âges peut aller de 0,6 à 1,3 kgs. Des données biologiques provenant de plusieurs flottilles indiquent qu'environ 30 % du poids total des prises consistaient en poisson de petite taille de moins de 40 à 45 cms (1,3 à 2,0 kgs).

RESUMEN

La captura de listado en el Oceano Atlántico aumentó rápidamente hasta el año 1968, y después descendió ya que el esfuerzo se dirigió hacia el rabil, especie de mayor precio. Esto indica que la pesquería de superficie se concentró en el listado solo cuando la pesca de la otra especie más productiva no fué favorable. El promedio de edad de la primera captura para obtener el máximo rendimiento-por-recluta probablemente se sitúa entre los 0,9 a 1,6 años, incluso si se elevara la intensidad pesquera hasta alcanzar un coeficiente superior al 1,0. El peso medio para dichas edades puede ser de 0,6 a 1,3 kgs. Los datos biológicos procedentes de varias flotas indicaron que alrededor de un 30 % en peso de las capturas estaba compuesto de peces de pequeña talla, inferior a los 40-50 cms (1,3 a 2,0 kgs.).

Introduction

Many biologists have believed possibility for increasing yield of skipjack (e.g. Rothschild 1966, Silliman 1966, Gulland 1969, Joseph and Calkins 1969, Suda 1970), even if some limitation would be required (e.g. Kasahara 1969, Kawasaki 1972). The present author briefly reviews yield of skipjack in the Atlantic Ocean, as well as yield-per-recruit model and size composition of catch for considering conservation of the stock therein.

1. Year-to-year change of yield

In the Atlantic Ocean, yield of skipjack increased rapidly from 20,000 tons in 1963 and 1964 to 63,800 tons in 1968, and then fluctuated between 42,000 tons and 87,000 tons. The recent fluctuation may be, at lease partly, due to change of species-preference of fishermen, because the yield tended to drop in years for more profitable yellowfin tuna being prosperous (Fig. 1).

2. Yield-per-recruit model

Joseph and Calkins (1969) showed wide variation of growth coefficient ranging between 0.19 and 0.95, but regarded the values of 0.43 and 0.81 be the most probable. Recently Japanese biologists coincidently accepted the growth curves shown in Fig. 2 based on the growth coefficient of 0.36 and length-weight relation determined by Kawasaki (1952). The present author choses two values of the coefficient, 0.36 and 0.81. Lengths on growth curve with the later coefficient are given by Joseph and Calkins (1969) and Lenarz's (1971) equation provides the weights.

There is only slight information on natural mortality coefficient of skipjack. The present author assumes it as 1.0 or 1.2, slightly higher than the value of ecologically related but large-sized yellowfin tuna, 0.8. Joseph and Calkins (1969) estimated the coefficient as 0.14 per month, i.e. 1.68 per year.

Based on these parameters, the yield of skipjack is calculated to attain the maximum for age of first capture of 1.4 to 1.6 years, 34.3 to 40.4 cm in length and 0.8 to 1.3 kg in weight, for growth coefficient of 0.36, or 0.9 to 1.0 year, 33.2 to 40.9 cm and 0.6 to 1.2 kg, for that of 0.81, in case that the fishing intensity rises to a high level producing the mortality coefficient of 1.0 and above (Fig. 3).

3. Size composition of catch

The ICCAT Secretariat (1973b) compiled size composition data of skipjack taken by various fisheries in the Atlantic Ocean. As examples, the values of Ghanian bait-boats, FIS ice-boats and bait-boats, and FIS, Japanese and U.S. purse seiners were selected and converted to cumulative body weight composition based on the equation given by Lenarz (1971). The results indicate that fish less than 40 to 45 cm (1.3 to 2.0 kg) contributed to 30 percent or more of the yield (Fig. 4). This fact is to be taken into account for determining size regulation in order to reduce waste of fish.

4. Conclusion

There is no evidence for that skipjack in the Atlantic Ocean is fully exploited. The yield-per-recruit increeses for the first size of capture between 0.6 and 1.3 kg in body weight. Rise of the lower limits above 1.5 kg may cause appreciable dumping of fish if fishermen could not distinguish in the sea the small-sized fish from larger skipjack.

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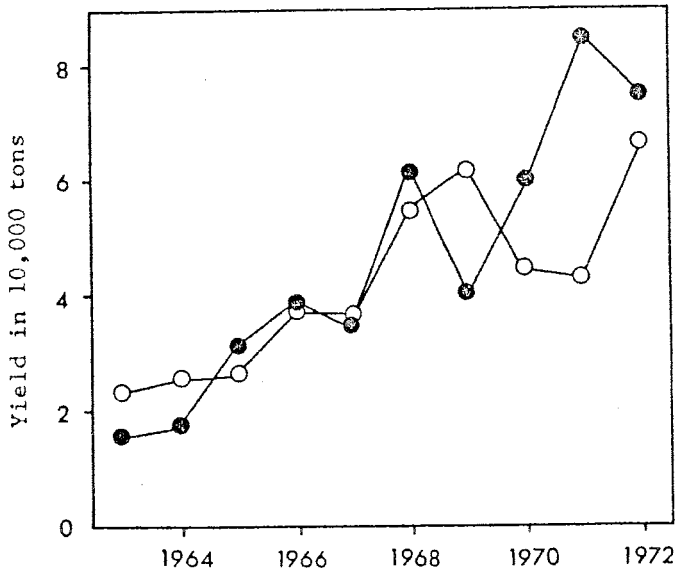

Fig. 1. Yield of skipjack and yellowfin tuna in the surface fishery in the Atlantic Ocean, 1963-1972.

● Skipjack
○ Yellowfin tuna

Data from ICCAT (1973a).

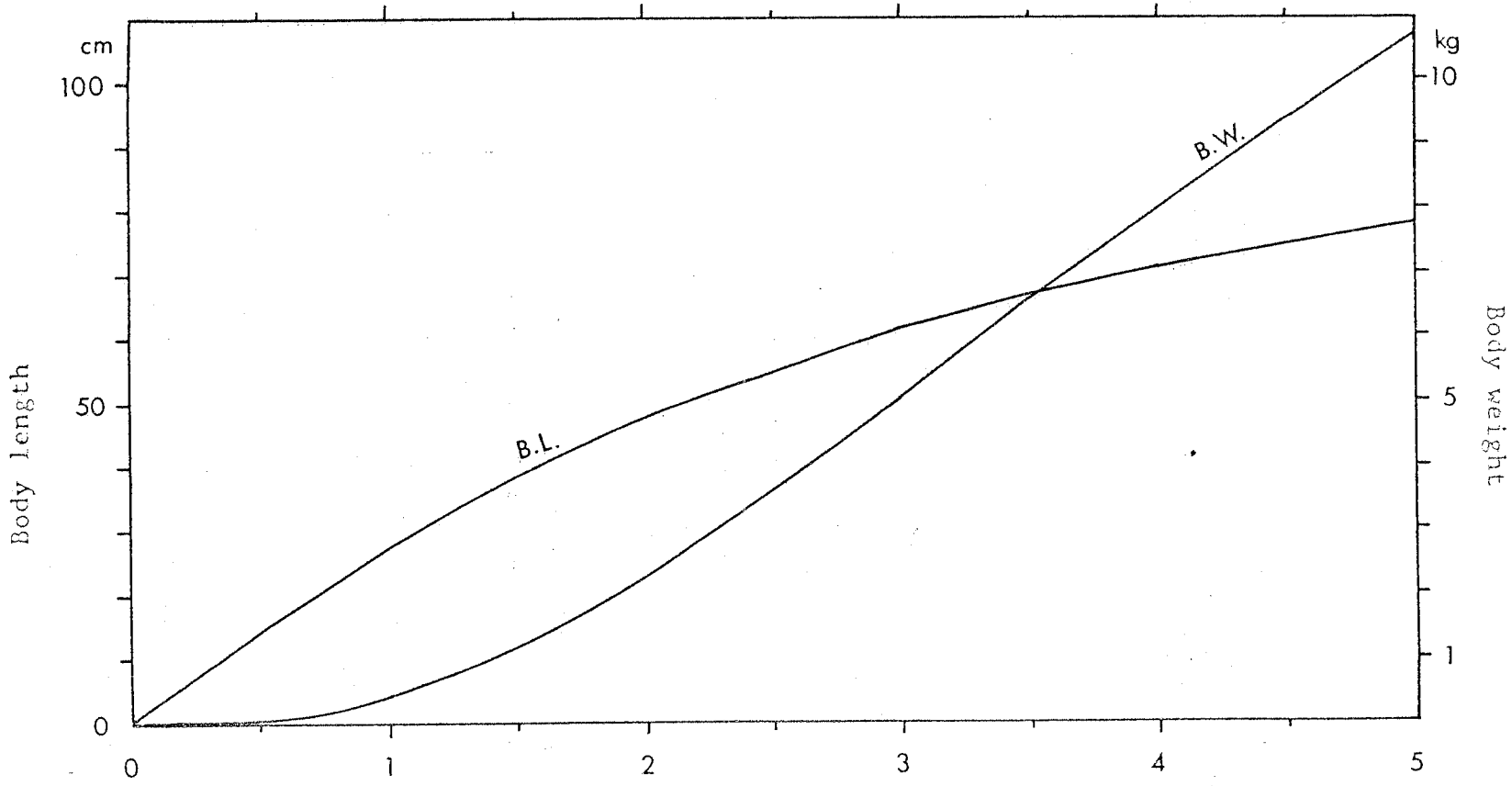

Fig. 2. Growth curves in terms of body length and body weight determined for skipjack in the northwestern Pacific Ocean.

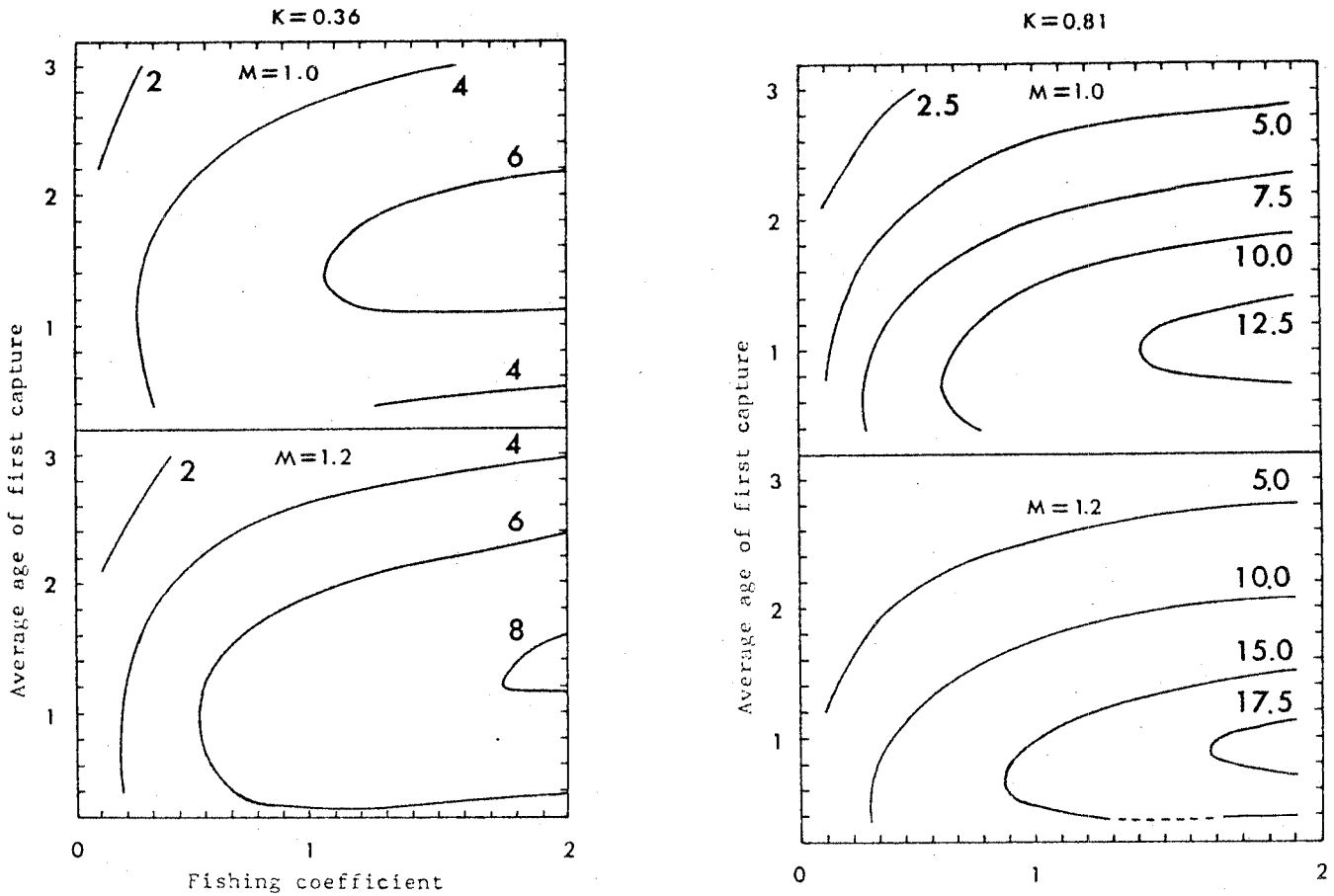

Fig. 3. Isopleth diagrams of yield-per-recruit of skipjack agains fishing coefficient and average age of first capture.

Based on two values of each of growth coefficient, 0.36 and 0.81, and natural mortality coefficient, 1.0 and 1.2.

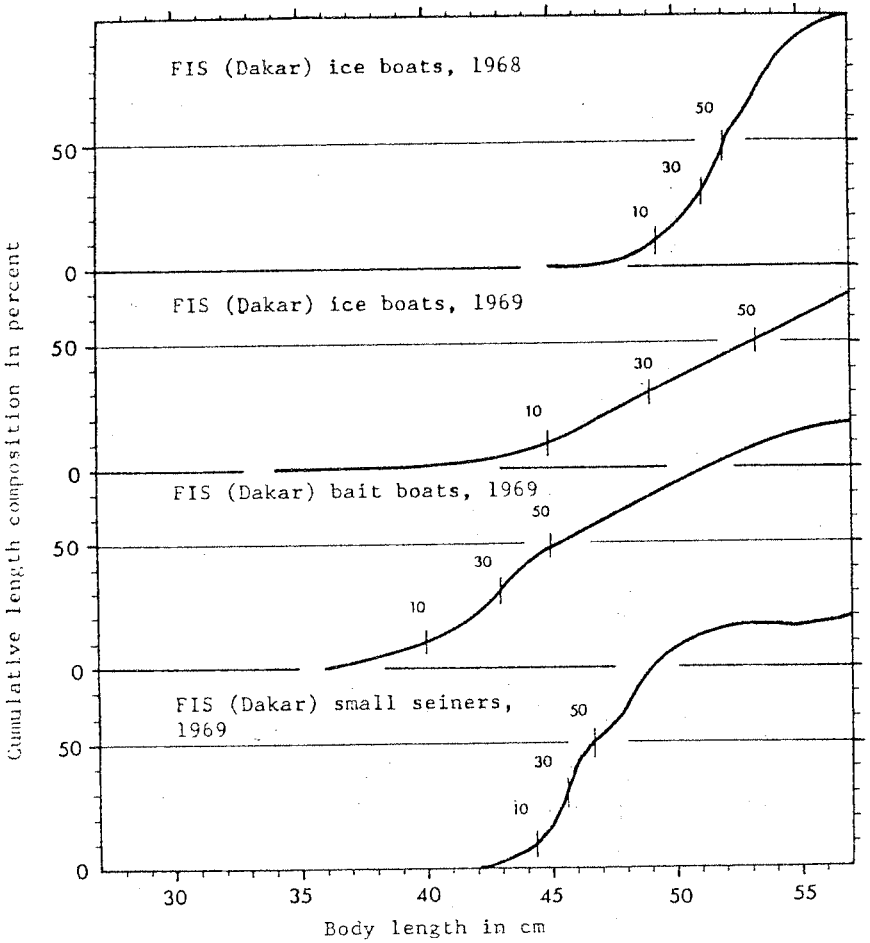

Fig. 4. Cumulative length composition in terms of weight of skipjack in some Atlantic surface fisheries.

Data from ICCAT (1973b).

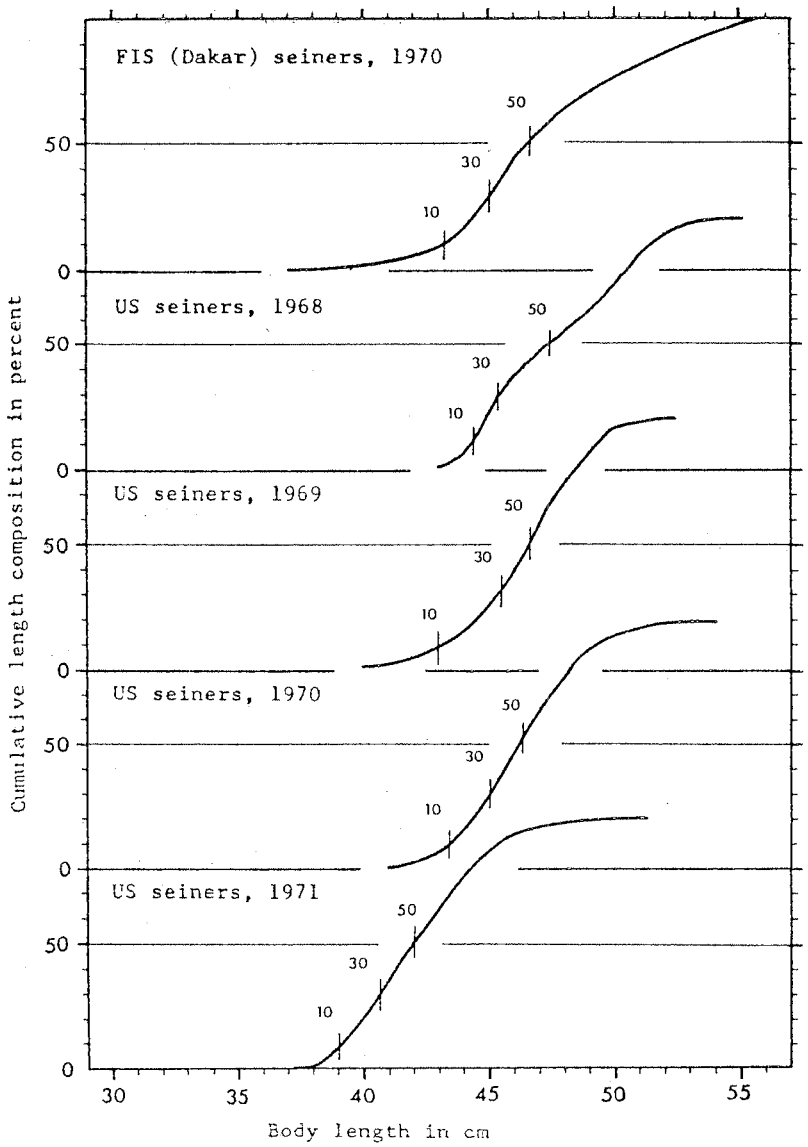

Fig. 4. (Continued-a).

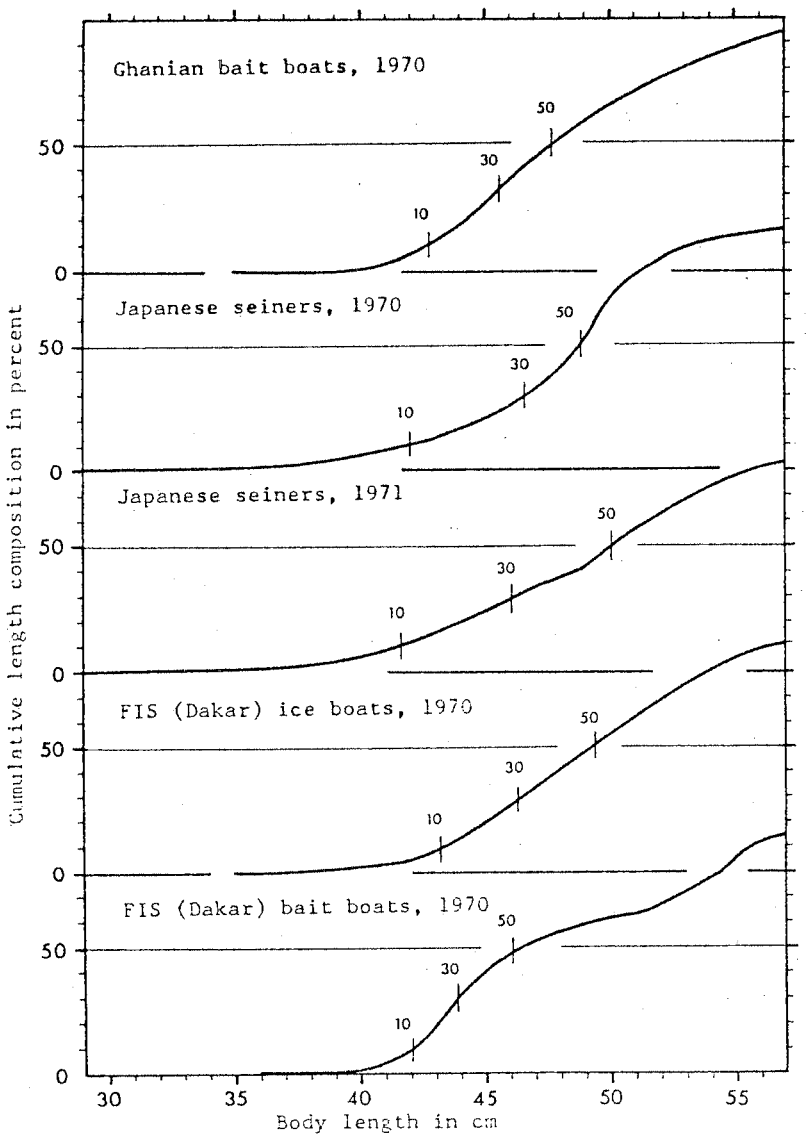

Fig. 4. (Continued-b).