

ON THE RELATIONSHIP BETWEEN THE ALBACORE STOCKS  
OF THE SOUTH ATLANTIC AND INDIAN OCEANS

by

S. Morita

SUMMARY

In the 1976 ICCAT Report, the Committee recommended that further analysis of albacore catch rates by finer time and area resolution be carried out in order to make clear the stock structure between that of the South Atlantic and Indian Oceans, citing the suggestion by Koto (1969). In this paper some analyses were carried out and conclusions were made based on the catch statistics of longline and length data.

RESUME

Selon le rapport ICCAT 1976, le SCRS avait recommandé que le taux de capture du germon soit analysé de façon plus poussée au moyen d'une résolution spatio-temporelle plus fine, afin de mieux distinguer la structure du stock de l'Atlantique Sud de celle de l'Océan Indien, comme il avait été suggéré par Koto (1969). Le présent document fait part des analyses effectuées à partir des statistiques de capture palangrière et des données de longueur, ainsi que des conclusions qui en ont été tirées.

RESUMEN

En el Informe ICCAT 1976 el SCRS recomendó que se realizasen análisis adicionales de las tasas de captura de atún blanco por estrato espacio/temporal más afinado, con el fin de establecer una distinción entre el stock del Atlántico Sur y el del Indico, citando a Koto (1969). El presente documento presenta análisis y conclusiones basadas en las estadísticas de captura de palangre y en datos de talla.

In ICCAT Report of 1976, the Committee recommended that further analysis of albacore catch rates by finer time and area resolution be carried out in order to make clear the stock structure between that of South Atlantic and Indian Oceans, citing the suggestion by Koto (1969). In this paper some analyses were carried out and conclusions made based on the catch statistics of longline and length data.

#### Basic data

1. Length frequency data, 1 cm interval, by quarter and by  $5^{\circ} \times 5^{\circ}$  area.
2. Annual effort and albacore catch statistics of Japanese Longline fishery, by month and by  $5^{\circ} \times 5^{\circ}$  area, issued yearly by the Japanese Fisheries Agency.

#### Methodology

1. Average length frequency distribution in the area investigated:-

A hypothetical study area was set up in the waters, south of  $20^{\circ}$ S. and between  $0^{\circ}$  and  $50^{\circ}$ E. Based on the length data which were obtained from the Japanese research and commercial boats within the study area during 1965-1975, frequency data of both South Atlantic and Indian Oceans bordered on  $20^{\circ}$ E. were summed up by 1 cm interval and by quarter, and converted into percentage as shown in Fig.1. Fig.2 shows number of the original samples by area.

2. Average CPUE:-

Average values of CPUE by month and by  $5^{\circ} \times 5^{\circ}$  area, in south of  $0^{\circ}$  and between  $20^{\circ}$ W. and  $20^{\circ}$ E. in the South Atlantic during 1956 - 1974, and in the area south of  $0^{\circ}$  and between  $20^{\circ}$  and  $80^{\circ}$ E. in the Indian Ocean during 1966 - 1975 were obtained by dividing the number of total catch by number of total nominal hooks. The result is as shown in the Appendix figures.

#### Results and discussion

1. As shown in Figure 1, the frequency patterns of the two oceans are almost similar in the semester of winter season in the southern hemisphere, although in the first and second quarters there appears to be apparent difference in the length frequency patterns in both the oceans. This difference can be easily recognised as that in the ratio of age groups which were arbitrarily appended in Fig.1. It seems that the age structure in both the oceans in the summer semester reflex the pattern of distribution of albacore which is mainly decided by the several peculiarities of the oceanic structures. On the otherhand, the fact that similar nature of age structure is present in both the oceans in the second and third quarters suggests that there is intermigration of fish off South Africa.

2. In Fig.3, the classified CPUE areas by months representing four quarters are shown. From this it may be found that the distribution of fish as concentrating in areas located in the south during May and August. This status continues from May to August as shown in Appendix Figure. Though it is not evident that the areas of concentration are continuous in the area of  $20^{\circ}$ E. to  $30^{\circ}$ E. which is the border of both the oceans, it seems that there is partial intermigration between both the stocks as seen during June and August.

3. Koto (1969) pointed out intermigration between both the stocks. The facts dealt with in this paper also suggest a possibility of the intermigration during the winter season. If there is such a phenomenon, it might be mainly consisted of 4+ years old (January 1st assumed to be the day to which age should be counted backward). The fact that 4+ age group (shown as III in Fig.3) predominates in the first quarter in the Indian Ocean area and the fourth quarter in the Atlantic area reduces the value of such an assumption that the intermigration of both stocks is one-way immigration from the Indian Ocean to South Atlantic. However, further analyses must be carried out to confirm this conclusion. Therefore, further studies such as tagging and stock identification etc. should be carried out.

#### Literature cited

- Shiohama, T., N. Myojin and H. Sakamoto : The catch statistic data for the Japanese tuna longline fishery in the Atlantic Ocean and some simple considerations on it. Rep. of Nankai Reg. Lab., No 21, 1-131. (1965) (in Japanese with English summary).
- Annual report of effort and catch statistics by area on Japanese tuna longline fishery, 1962-1975. (Ser.) : Res. and Develop. Dept. Fish. Agency of Japan.
- Koto, T. : Studies on the albacore--XIV. Distribution and movement of the albacore in the Indian and the Atlantic Oceans based on the catch statistics of Japanese tuna long-line fishery. Bull. Far Seas Fish. Res. Lab., No 1, 115-129. (1969). (in Japanese with English summary).

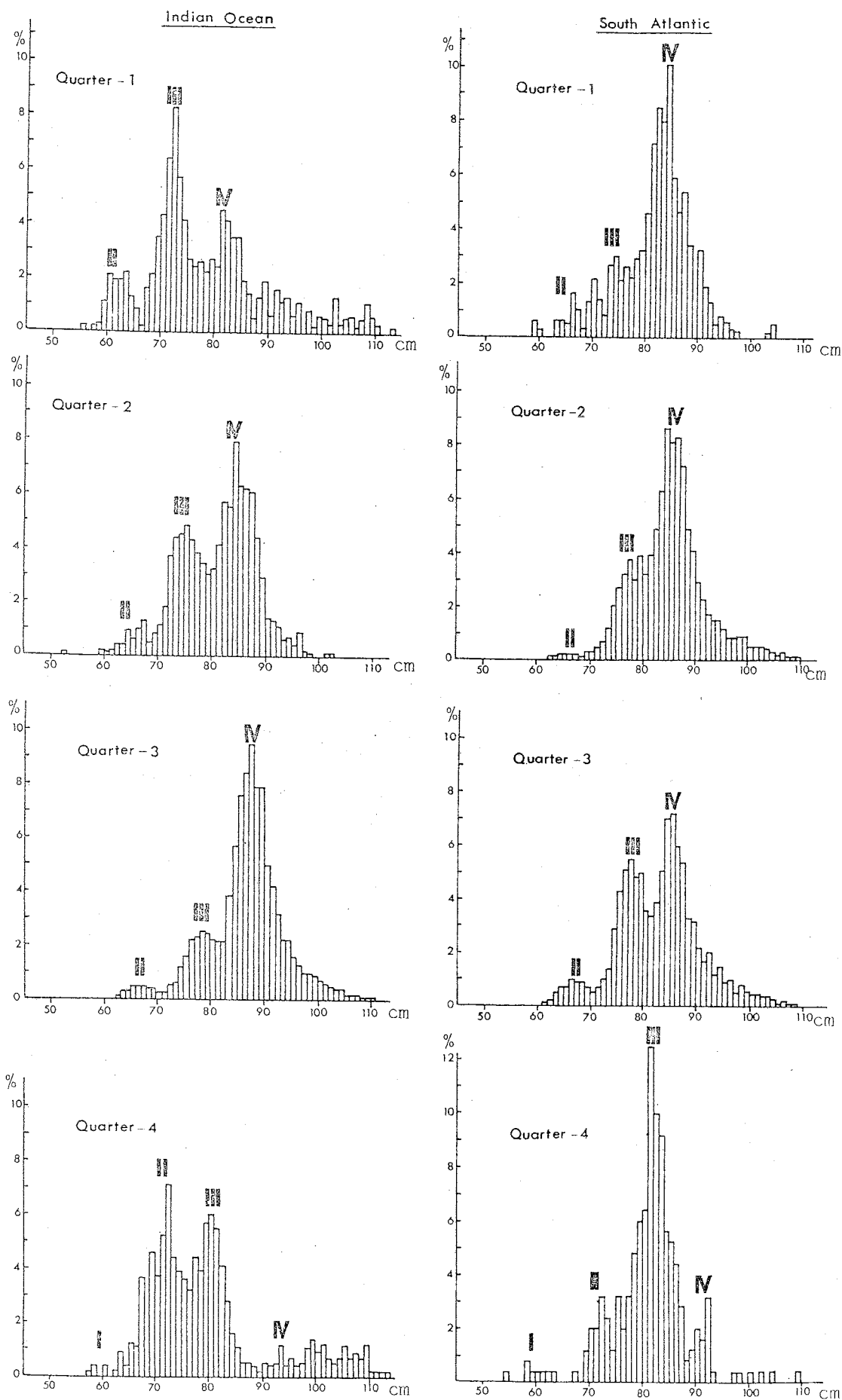
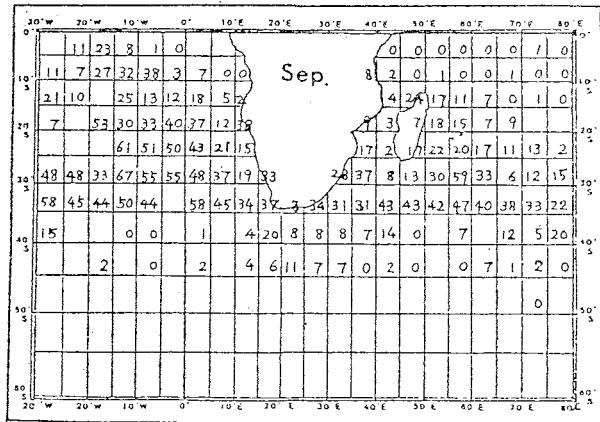
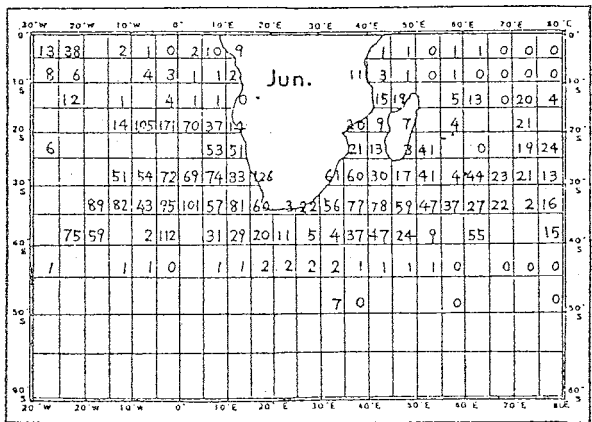
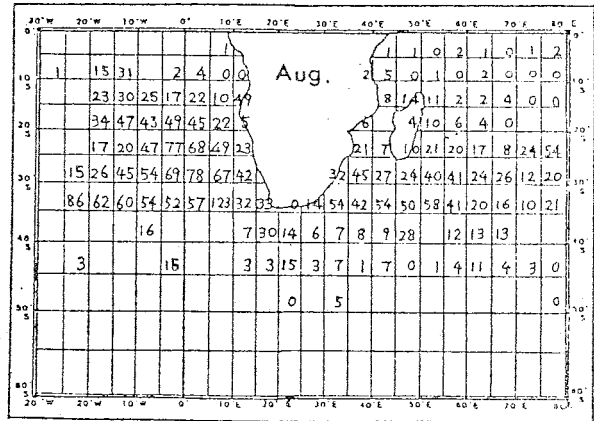
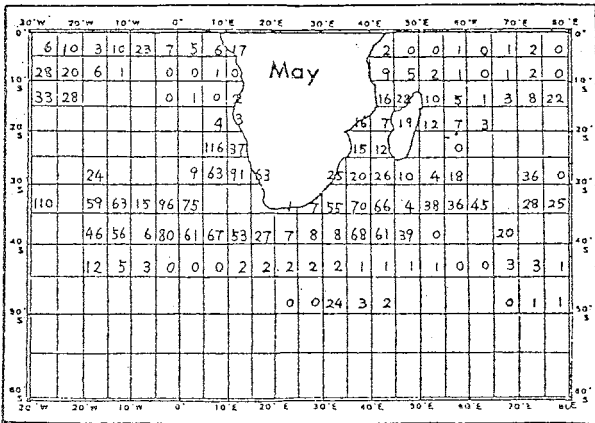
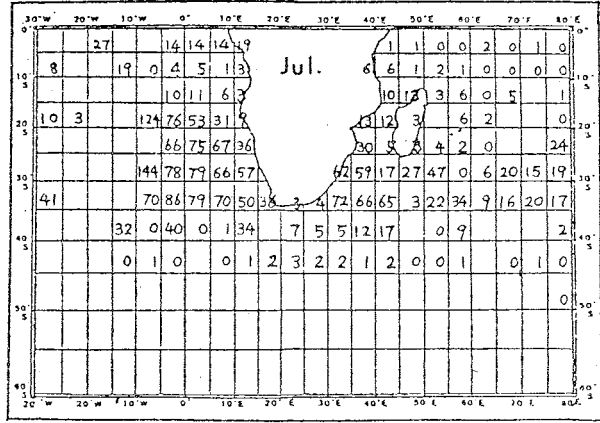
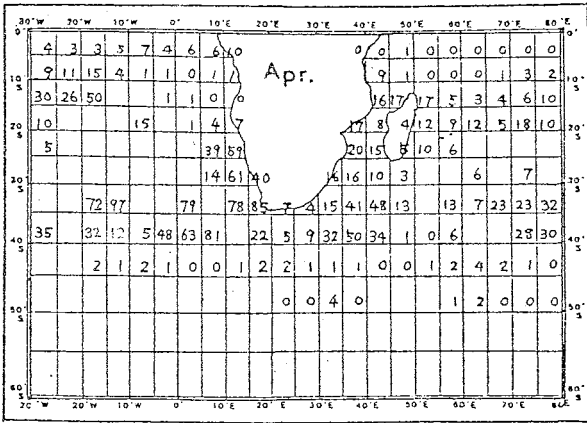


Figure 1 Length composition of albacore by quarter in the Indian and South Atlantic Oceans. Roman numerals appended arbitrarily shows age-group.





Appendix Figure

Monthly distribution of average CPUE by 5° area. CPUE is expressed by catch in number per 1000 hooks. Average CPUE's for west of 20°E and east of 20°E were obtained during 1966-1974 and 1966-1975, respectively.

