

BY AREA COMPARISON OF ALBACORE CATCH RATES OBTAINED FROM THE LONGLINE FISHERIES IN THE SOUTH ATLANTIC

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SUMMARY

Four major areas and five 5-degree square blocks were selected, based on the compatibility and integrity of historic albacore catch and effort data of the longline fisheries, to compare the CPUE trends among these areas.

The results indicate that there are two types of fishing areas in the south Atlantic: (1) areas where albacore are the major interest; and (2) areas of both albacore and bigeye resources are available and thus it is merely a technical arrangement for a capable fishing master to shift target species whenever he deems it appropriate.

For the areas of type 1, such as in the northwestern part of the south Atlantic, monthly CPUEs of the Taiwanese longline fisheries showed a slightly declining trend from 1978 to 1985, then leveled off and kept fairly steady since then. For the areas of type 2, such as the central eastern and southwestern parts of the south Atlantic, two types of CPUE trends could be identified. For the Taiwanese longline fleet, which has recently diversified its target species from solely for albacore, monthly CPUEs appeared to have declined since 1986, together with a wider fluctuation in the percentage of the catch of albacore. For the Japanese longline fleet, which has been targeting bigeye in the same areas for more than two decades, monthly albacore CPUEs showed a fairly stable trend since 1978.

The discrepancy in the trends of albacore CPUEs revealed by the Taiwanese and the Japanese longline fleets in the same time-area strata may have been caused by the shift in target species of the Taiwanese fleet which will then significantly affect the catchability of the Taiwanese fleet on the albacore resource.

RESUME

Quatre zones principales et cinq blocks de carrés de 5° ont été sélectionnés, basés sur la compatibilité et la totalité des données historiques de prise et effort du germon des pêcheries palangrières, pour comparer les tendances de CPUE entre ces zones.

Les résultats indiquent qu'il existe deux types de zones de pêche dans l'Atlantique sud: (1) les zones de germon sont du plus grand intérêt; et (2) les zones de germon et de thon obèse sont disponibles; ceci est donc un accord purement technique pour qu'un patron de pêche expert puisse changer d'espèce cible lorsqu'il le considère approprié.

Pour les zones de type 1, telles que celles de la partie nord-ouest de l'Atlantique sud, les CPUE mensuelles des pêcheries palangrières taiwanaises semblent avoir montré une tendance légèrement à la baisse de 1978 à 1985, puis se sont nivelées et sont ensuite restées stables. Pour les zones de type 2, telles que les zones centre-est et sud-ouest de l'Atlantique sud, deux types de tendances de CPUE ont pu être identifiées. Pour la flottille palangrière taiwanaise, qui a récemment changer d'espèce cible, qui pêchait uniquement du germon, depuis 1986, la CPUE mensuelle a souffert un déclin, accompagnée d'une fluctuation plus ample du pourcentage des prises de germon. Quant à la flottille palangrière japonaise, qui vise le thon obèse dans les mêmes zones depuis plus de deux décennies, les CPUE mensuelles de germon, il semble que depuis 1978 elles se soient maintenues relativement stables.

La divergence dans les tendances de la CPUE de germon indiquée par les flottilles palangrières taiwanaises et japonaises dans la même strate spatio-temporelle peut avoir été causée par le déplacement des espèces visées de la flottille taiwanaise, ce qui aurait une répercussion importante sur la capturabilité du germon de la flottille taiwanaise.

## RESUMEN

Se seleccionaron cuatro áreas principales y bloques de 5°x5°, basados en la compatibilidad y en la totalidad de los datos históricos de captura y esfuerzo de atún blanco por las pesquerías de palangre, para comparar las tendencias de las CPUE entre estas áreas.

Los resultados indican que hay dos tipos de caladeros en el Atlántico sur: (1) el principal interés está constituido por las áreas de atún blanco, y (2), se encuentran disponibles las áreas de recursos de atún blanco y patudo, por lo tanto, se trata meramente de un arreglo de tipo técnico para que un patrón experto pueda cambiar la especie-objetivo cuando lo considere oportuno.

Para las áreas de tipo 1, tales como la parte noroeste del Atlántico sur, las CPUE mensuales de las pesquerías de palangre de Taiwan parecieron experimentar una tendencia ligeramente decreciente desde 1978 a 1985, nivelándose después y manteniéndose bastante estables desde entonces. Para las áreas de tipo 2, tales como las zonas centro-este y sudoeste del Atlántico sur, se pudieron identificar dos tendencias de CPUE. Para la flota de palangre taiwanesa, que recientemente ha diversificado su especie-objetivo en vez de perseguir solamente atún blanco, las CPUE mensuales parecieron sufrir un descenso desde 1986 junto con una más amplia fluctuación de porcentaje de captura de atún blanco. En cuanto a la flota de palangre de Japón, que ha estado persiguiendo patudo en las mismas áreas durante más de dos décadas, las CPUE mensuales de atún blanco se mantuvieron al parecer, con una tendencia bastante estable desde 1978.

La discrepancia en las tendencias de las CPUE de atún blanco mostrada por las flotas palangreras de Taiwan y Japón en los mismos estratos espacio-temporales puede haber sido motivada por el cambio de especie perseguida de la flota de Taiwan, que en ese caso afectaría de manera significativa a la capturabilidad de esta flota sobre el recurso de atún blanco.

## INTRODUCTION

Taiwanese longline fishery in the South Atlantic Ocean started early 1960s and became targetting on albacore since late 1960s. The fishery developed rapidly in early 1970s and has leveled off since mid 1970s. Taiwanese catch of albacore ranged from 10 to 29 thousand mt in the past two decades. In recent years, however, there is a tendency of deploying deep longline technology to catch mainly big eye for the Japanese sasimi market. This development has changed the target species and ways of fishing from traditional albacore toward other more desirable species such as big eye.

When target species shifting from albacore to big eye, as has experienced by Japanese longline fisheries in the mid 1960s, the accessibility for the former target species will inevitably be declined intentionally through fishing arrangements which will then significantly affect the catchability of the species.

The main purpose of this study is to investigate areal contrasts in shifting of target species through comparison of the albacore CPUE trends compiled from the longline fisheries in the South Atlantic Ocean. The results thus obtained will also give us a clue of the real abundance fluctuation of South Atlantic albacore resource.

## MATERIALS AND METHODS

Catch and effort statistics by 5-degree square block resolution of the Taiwanese and the Japanese longline fisheries are the major source of data used in this study. Five blocks, viz., 25 05 (or 8404 in Taiwanese Code), 25 10 (8406), 30 10 (8606), 30 15 (8608), and 30 45 (8619), of Japanese data set from 1978-1991 were chosen, according to areal compatibility between the two fleet, in current study.

Cluster analyses were applied to the Taiwanese data set in assistance of choosing blocks of high compatibility in percentage catch composition. These blocks can thus be considered as a areal group for this study.

## RESULTS

The geographic distribution of monthly fishing areas recovered from the Taiwanese longline fishery in the South Atlantic Ocean from 1986 shows that there is a significant reduction in effort distribution in the central part of the South Atlantic. In 1986, there is a year round fishing activity in the central part of the Ocean (Fig. 1), such activities were significantly reduced or disappeared after 1988 (Fig. 2). After 1988, the Taiwanese longline fishing activities were more toward the areas of close to the two continents (Fig. 3).

Based on the results of cluster analysis and the integrity of the historic Taiwanese catch and effort data, four areas were selected for this study. They are: the northwestern (Area 4), the northeastern (Area 5), centro-western (Area 6), and centro-eastern (Area 7) part of the South Atlantic Ocean, as shown in Figure 4.

The trends of catch rates (in terms of number of fish, weight, and percentage) and the average weight per fish were shown in Figure 5 for Area 4. Both the catch rates in number and weight showed a slightly decline trend from 1978 to 1985 and leveled off since 1986. Similar trend is observed in Area 6 and Area 7 except that the catch rates in recent couple of years were slightly lower in company with higher fluctuation in albacore percentage catch composition.

The trends of catch rates and average weight per fish were shown in Figure 6 for Area 5. It showed a decline trend in catch rate from 1978 to 1982 and seemed level off since then, although the variation in catch rate are comparatively higher. The variation of albacore percentage catch appeared much higher in this area as compared to the rest of the areas indicates the complexity nature of the fishery and the tuna resources in this area.

The Taiwanese CPUE trend drawn from block number 25 10 (8406), as shown in Figure 7, indicated there is a CPUE drop in 1988 and has kept the same level since then, yet the drop is also in company with an appearance of higher variation both in albacore and big eye percentage catch rates. The same phenomena were also observed in blocks 25 05 (8404), 30 10 (8606), and 30 45 (8619).

The Japanese CPUE trend drawn from block number 25 10 (8406), as shown in Figure 8, indicated there is no albacore CPUE level decline since the early 1980s. The same phenomena were also observed in block numbers 25 05 (8404), 30 10 (8606), and 30 45 (8619).

## DISCUSSION

The results so far obtained can be summarized as follows: There are two types of fishing area in the South Atlantic: (1) areas of albacore are the major interest; and (2) areas of both albacore and big eye resources are available thus it is merely a technical arrangement for a capable fishing master to shift target species whenever he sees appropriate.

For the areas of type 1, such as in the northwestern part (Area 4) of the South Atlantic, monthly CPUEs of Taiwanese longline fisheries appeared a slightly decline trend from 1978 to 1985 then leveled off and kept fairly steady since then. For the areas of type 2, such as the centro-eastern (Area 5) and the southwestern (Area 6) parts of the South Atlantic, two types of CPUE trends could be identified. For the Taiwanese longline fleet, which has recently diversified her target species from solely for albacore, monthly CPUEs appeared a decline since 1986 in company with a wider fluctuation of percentage catch of albacore. For the Japanese longline fleet, which has been targetting on big eye in the same areas for more than two decades, monthly albacore CPUEs appeared a fairly stable trend since 1978.

The discrepancy in trends of albacore CPUEs revealed by the Taiwanese and the Japanese longline fleets in the same area-time strata may have been caused by the shifting target species of the Taiwanese fleet which will then significantly affect the catchability of the Taiwanese fleet on the albacore resource.

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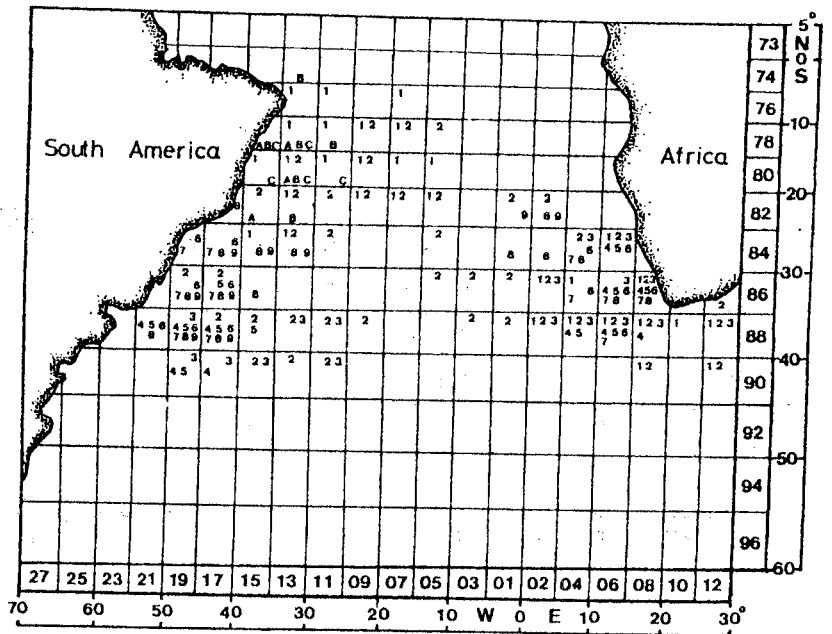
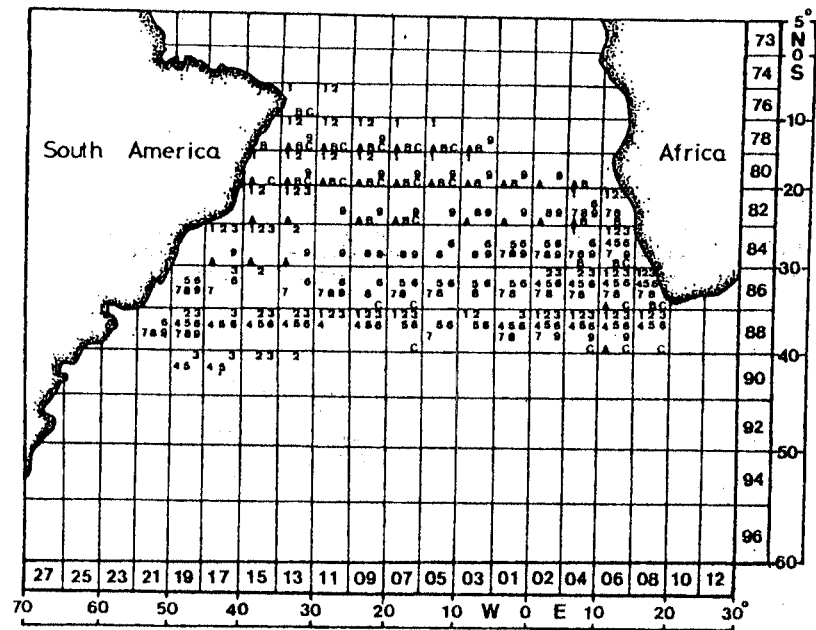


Fig. 1. Geographic distribution of monthly fishing areas (by 5-degree square block) recovered from the Taiwanese longline fishery fished in the South Atlantic Ocean in 1986.

Fig. 2. Geographic distribution of monthly fishing areas (by 5-degree square block) recovered from the Taiwanese longline fishery fished in the South Atlantic Ocean in 1988.

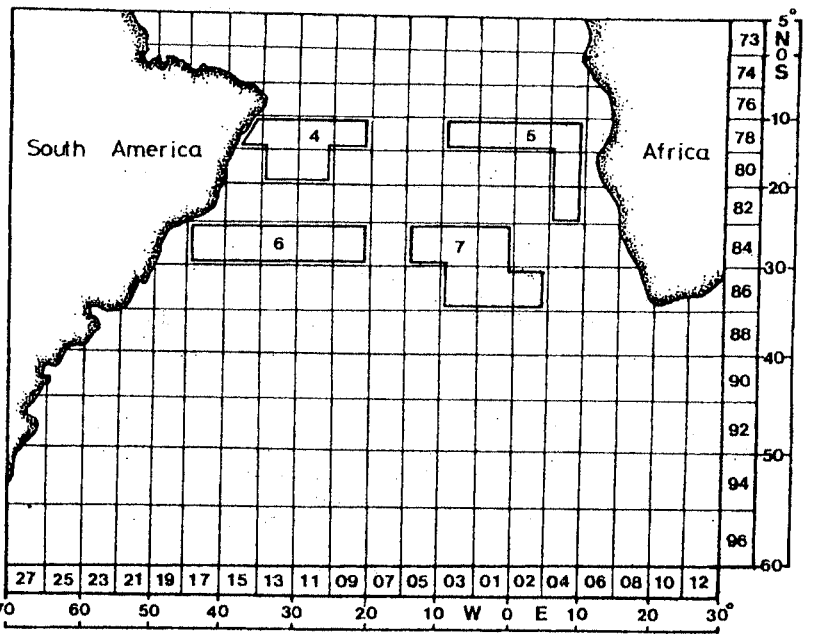
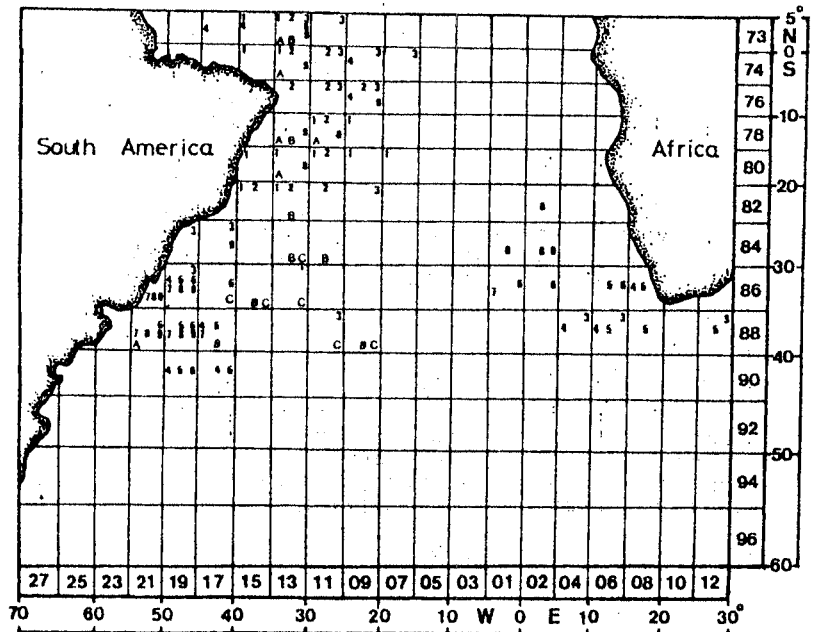


Fig. 3. Geographic distribution of monthly fishing areas (by 5-degree square block) recovered from the Taiwanese longline fishery fished in the South Atlantic Ocean in 1992.

Fig. 4. Map shows the selected areas for comparison of CPUE trends.

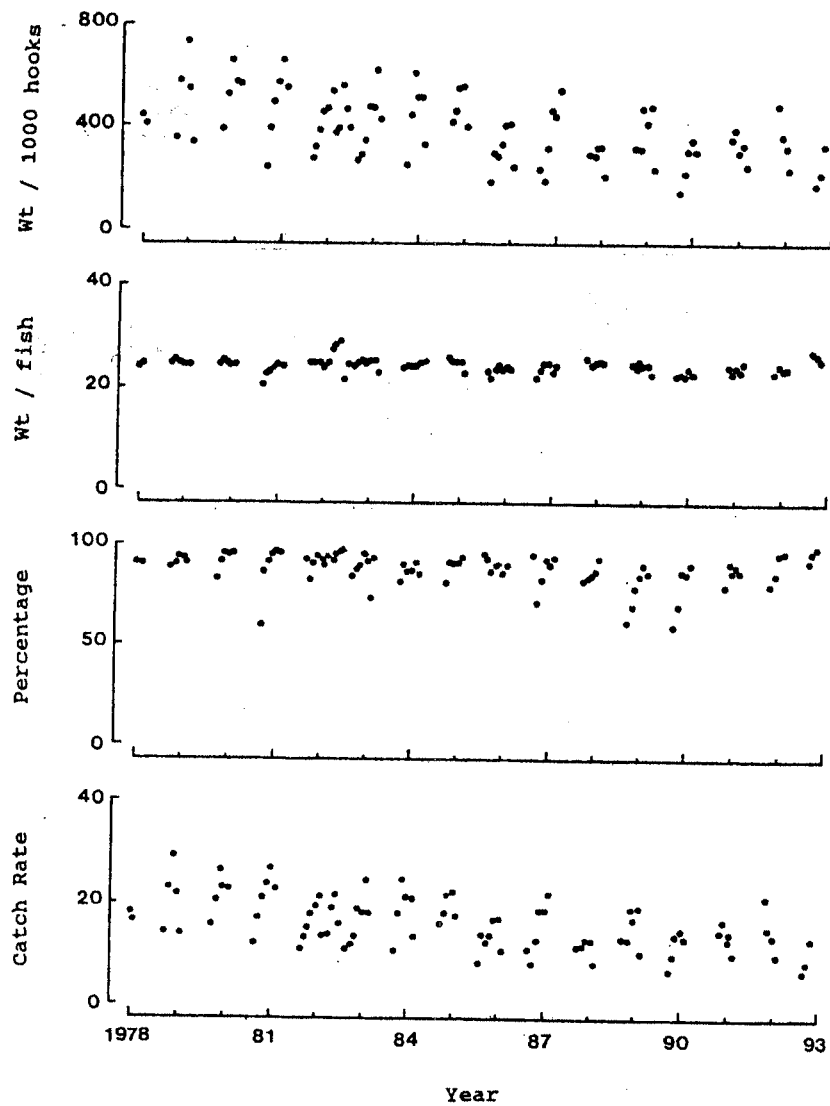


Fig. 5. Trends of (1) catch rate in kg per 1000 hooks; (2) average weight in kg per fish; (3) percentage catch; and (4) catch rate in number of fish per 1000 hooks of albacore in the northwestern part of South Atlantic Ocean (Area 4).

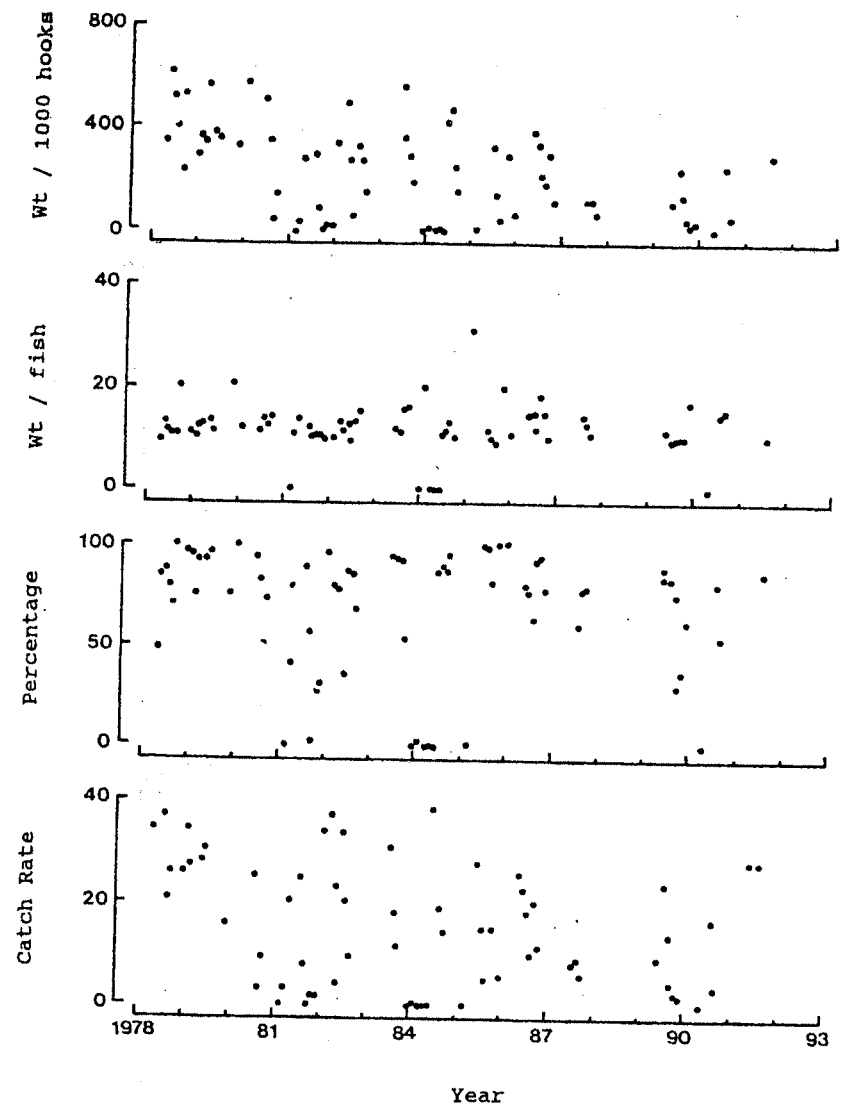


Fig. 6. Trends of (1) catch rate in kg per 1000 hooks; (2) average weight in kg per fish; (3) percentage catch; and (4) catch rate in number of fish per 1000 hooks of albacore in the northeastern part of South Atlantic Ocean (Area 5).

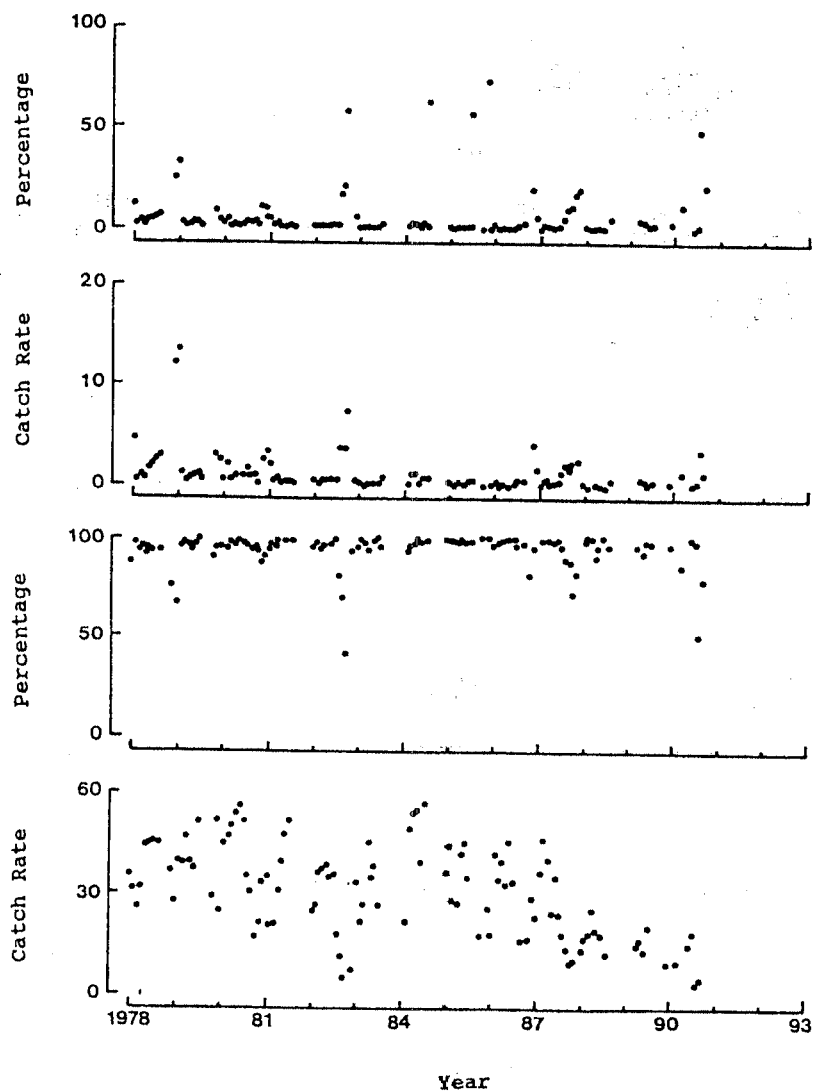


Fig. 7. Percentage catch and catch rate in number of fish per 1000 hooks of big eye tuna (upper two rows) and albacore (lower two rows) caught by the Taiwanese longliners from 5-degree square block number 25 10 (8406).

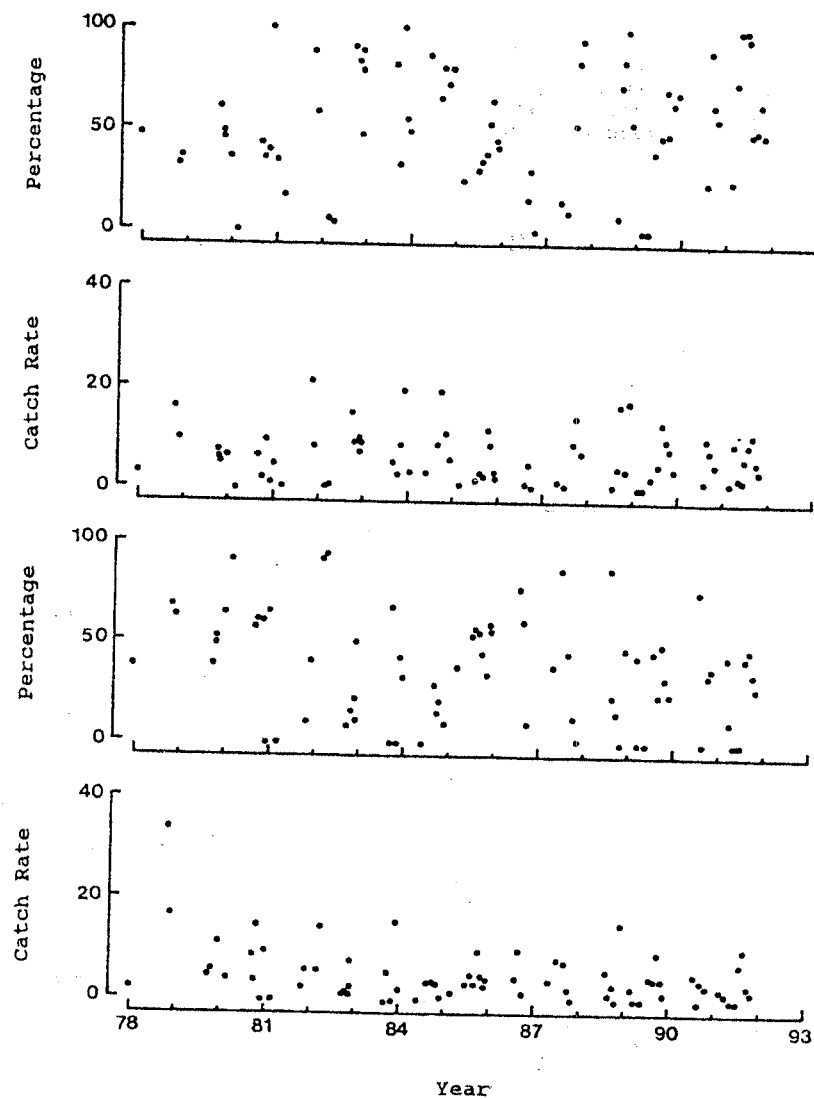


Fig. 8. Percentage catch and catch rate in number of fish per 1000 hooks of big eye tuna (upper two rows) and albacore (lower two rows) caught by the Japanese longliners from 5-degree square block number 25 10 (8406).