DEMOGRAPHY OF BILLFISHES INCIDENTALLY CAUGHT BY THE KOREAN TUNA FISHERIES IN THE ATLANTIC OCEAN

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SUMMARY

This paper describes a trend in billfish catches by the Korean tuna fisheries in the Atlantic Ocean, which began in the mid-1960s and have mainly targeted albacore, yellowfin, and bigeye tuna. Billfishes, such as blue marlin, white marlin, and sailfish have been caught as by-catch species by Korean longliners. The proportion of billfish catches fluctuated between 1% in the early 1980s and 33% in the early 1990s, averaging 5.6% for the total catch. Species composition of billfish catches showed that blue marlin constituted a higher proportion than the two other species, white marlin and sailfish. Catch per unit effort (CPUE) of blue marlin has increased in recent years compared to that of the early 1980s, whereas white marlin and sailfish estimates remained similar. In recent years, the Korean longline fishing grounds have narrowed year after year and concentrated more around the central Atlantic.

RÉSUMÉ

Le document décrit une tendance de la capture d'istiophoridés par les pêcheries thonières coréennes dans l'Océan Atlantique, qui ont commencé leurs activités au milieu des années 60 et qui ont principalement ciblé le germon, l'albacore et le thon obèse. Des istiophoridés, tels que le makaire bleu, le makaire blanc et le voilier, ont été pris en tant que prises accessoires par les palangriers coréens. La proportion des captures d'istiophoridés a fluctué entre 1 % au début des années 80 et 33 % au début des années 90, soit une moyenne de 5,6 % pour la prise totale. La répartition spécifique des captures d'istiophoridés montre une proportion plus élevée de makaire bleu que de makaire blanc et de voilier. La capture par unité d'effort (CPUE) de makaire bleu a augmenté au cours des années récentes comparée à celle du début des années 80, alors que les estimations de makaire blanc et de voilier sont restées les mêmes. Au cours des années récentes, les lieux de pêche des palangriers coréens se sont rétrécis année après année, et se sont rapprochés de l'Atlantique central.

RESUMEN

El documento describe una tendencia de la captura de marlines por la pesquería coreana de túnidos en el Atlántico, iniciada a mediados de los años 60 y cuyas especies objetivo han sido atún blanco, rabil y patudo. Los marlines, como la aguja azul, aguja blanca y pez vela, han sido captura fortuita de los palangreros coreanos. La proporción de las capturas de marlines fluctuó entre 1% a principios de los años 80 y 33% a principios de los 90, promediando el 5,6% de la captura total. En la composición por especies de la captura de marlines, la aguja azul presentaba una proporción superior a la de las otras dos especies, aguja blanca y pez vela. La captura por unidad de esfuerzo (CPUE) de la aguja azul ha incrementado en los últimos años en relación con el principio de la década de los años 80, mientras que las estimaciones respecto a la aguja blanca y el pez vela son similares. En los últimos años, los caladeros del palangre coreano se han ido reduciendo, concentrándose en la zona central del Atlántico.

1. INTRODUCTION

Since 1977, when the Korean fleet of tuna fisheries reached a peak at 136 vessels, there has been a trend showing a decrease in number of vessels in the Atlantic Ocean. As a result, only four Korean tuna longliners were fishing for tuna and tuna-like species in 1994. The total catch by the tuna longliners amounted to about 1,800 MT in 1994, which corresponded to about 4% of the 1977 total catch.

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Korean tuna fisheries in the Atlantic Ocean have mainly targeted albacore, yellowfin, and bigeye tuna which are commercially important fish species from the economic viewpoint of Korea. Species composition of billfish, which have been caught in small amounts as by-catch species by Korean longliners, includes blue marlin, white marlin, and sailfish.

In this paper we briefly review the Korean tuna fisheries and describe the trend in billfish catches caught incidentally in the Atlantic Ocean during 1980-1994.

2. METHODS

The fisheries data used in the present study were derived from the annual statistics issued for official use by the Ministry of Agriculture, Forestry and Fisheries (1981-1995). The catch per unit effort (CPUE), given in numbers of fish caught per 10,000 hooks, was based on the sampled data of catch and fishing effort statistics collected by the National Fisheries Research and Development Institute (NFRDI, 1981, 1985, 1988, 1990, 1993). These data, compiled by the Ministry and NFRDI, have been submitted to the ICCAT Secretariat in the format of Task I and II data, respectively.

In compiling Task I data, some fishing vessels often report billfish catches under the category 'unclassified' or 'other billfishes' due to difficulties in identification of each billfish species. Therefore, these 'unclassified' or 'other billfishes' catches were apportioned to each species, i.e. blue marlin, white marlin, and sailfish, in proportion to the percentage of each billfish species catch shown in the Task II data.

A breakdown of billfish catches into north and south Atlantic was made at 5^0N as specified by ICCAT (1990). The coverage rate of sampling ranged from 31% to 72% (average 55%) during the period 1980-1994.

3. RESULTS AND DISCUSSION

The Korean tuna fisheries in the Atlantic Ocean began in the mid-1960s with a small fleet of tuna longliners, followed by rapid expansion in the size of the fisheries until 1977, when the highest catch of 47,000 MT was recorded, with 136 vessels. Thereafter, the Korean tuna fisheries have continued to decrease until recent years. Fishing grounds of the Korean fisheries for tuna and tuna-like species have narrowed, concentrating on a limited area of the tropical Atlantic. In 1977, fishing activity was carried out in the area between 40^0N and 40^0S, whereas in 1994 between 10^0N and 10^0S.

During the period 1980-1994, the dominant species among catches was bigeye tuna, followed by yellowfin and albacore. Billfish species incidentally caught by the Korean tuna fisheries were swordfish, blue marlin, white marlin, and sailfish. However, as ICCAT separates swordfish from other billfish species, swordfish statistics are not discussed in this paper.

The proportion of billfish catches to the total catch showed annual variation, fluctuating between 1% in 1980 and 33% in 1991, which was five times higher than the 5.5% average (Table 1). It is unknown what caused this extraordinary high value of billfish by-catch in 1991. It is assumed that there could have been some errors in reporting catch data from fishing vessels. After 1991, the proportion remained relatively stable between 2 and 5%. When billfish catches were broken down into north and south Atlantic at 5^0N, catches from the south Atlantic were higher than those from the north Atlantic.

Species composition of billfish catches showed annual variation with blue marlin representing a higher proportion than white marlin and sailfish.

3.1 Blue marlin

Blue marlin accounted for about 61% of the billfish catch during the period 1980-1993 (Figure 1). However, no blue marlin catch was reported from fishing vessels in 1994. Considering that Korean tuna longliners have operated near the same fishing grounds as in the previous year in which blue marlin accounted for 86% of the total billfish catch from sampled data, further investigation is needed.

The CPUE of blue marlin has shown annual variation ranging from 0.1 to 2.8 fish per 10,000 hooks (Table 2). Unlike white marlin and sailfish, the average CPUE of blue marlin has increased in the 1990s compared to that of the early 1980s, which was generally less than 1.0 fish per 10,000 hooks. It was recognized that the distribution of CPUE of blue marlin did not vary much between fishing areas (Figure 2).

3.2 White marlin

White marlin accounted for about 26% of the billfish catch during the period 1980-1993, with wide fluctuations (Figure 1). The CPUE of white marlin was lower than that of blue marlin but higher than that of sailfish (Table 2). The distribution of white marlin CPUE showed that catch of white marlin was made only in the western Atlantic in 1980 and in the eastern Atlantic in 1993 (Figure 3).

3.3 Sailfish

Sailfish accounts for about 13% of the total billfish catch (Figure 1). The CPUE of this species was less than 1.0 fish per 10,000 hooks on average and showed no clear pattern of change during the 1980-1994 period (Table 2). The distribution of CPUE was similar to that of white marlin (Figure 4).

3.4 Others

Catches of other billfish species, except for these three species and swordfish, have not been reported from Korean tuna fishing vessels. However, it is possible that other billfish, possibly spearfish, might have been caught in very small amounts and thus classified by fishermen as other billfish species or incorporated into sailfish or other species.

4. CONCLUSION

Billfishes have been caught as by-catch species by the Korean tuna fisheries in the Atlantic Ocean targeting albacore, yellowfin, and bigeye tuna. The proportion of billfish catch was 5.6% of the total catch during the period 1980-1994. Billfish catches consisted of 61% blue marlin, 26% white marlin and 13% sailfish.

5. LITERATURE CITED

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Table 1. **Nominal catches (MT) by the Korean tuna fisheries and proportion (%) of billfish in yearly catch in the Atlantic Ocean, 1980-1994.**

Year	No. of vessels	Tuna and other fish	Blue Marlin	White Marlin	Sailfish	Proportion of billfish (%)*	Total
1980	54	18,755	94	18	85	0.96	18,952
1981	56	22,030	126	85	65	1.24	22,306
1982	52	20,862	50	69	52	0.81	21,033
1983	53	16,075	131	15	3	0.86	16,244
1984	51	14,293	344	62	86	3.33	14,785
1985	45	16,565	416	372	101	5.09	17,454
1986	28	9,782	96	71	16	1.84	9,965
1987	29	7,425	152	27	21	2.62	7,625
1988	29	7,392	375	19	15	5.24	7,801
1989	33	11,650	698	135	33	6.85	12,507
1990	17	3,892	324	81	41	10.45	4,338
1991	9	1,510	537	57	30	33.26	2,134
1992	8	1,423	38	1	1	3.49	1,463
1993	4	865	19	2	1	2.24	887
1994	4	1,713	-	91	1	5.25	1,805

Table 2. **Yearly CPUE (no./10^4 hooks) changes of billfishes by the Korean tuna longline fisheries in the Atlantic Ocean, 1980-1994.**

Year	Blue marlin	White marlin	Sailfish
1980	0.21	0.02	0.14
1981	1.55	1.66	2.39
1982	0.05	0.18	0.27
1983	0.39	0.04	0.04
1984	0.82	0.20	0.66
1985	1.08	1.41	0.87
1986	1.06	1.19	0.49
1987	2.06	0.84	0.71
1988	1.59	0.59	0.77
1989	1.68	0.67	0.45
1990	1.41	0.85	0.87
1991	1.35	0.20	0.37
1992	2.44	0.05	0.15
1993	2.81	0.23	0.33
1994	-	1.15	0.01

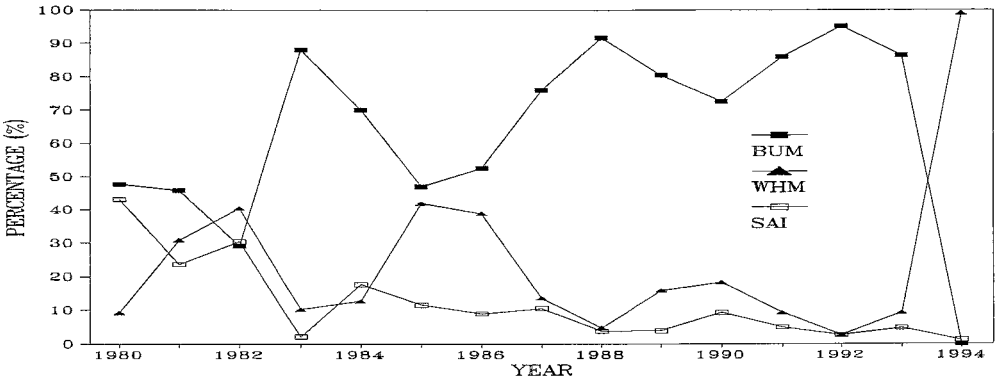

Fig. 1. Species composition of billfish catches during 1980-1994

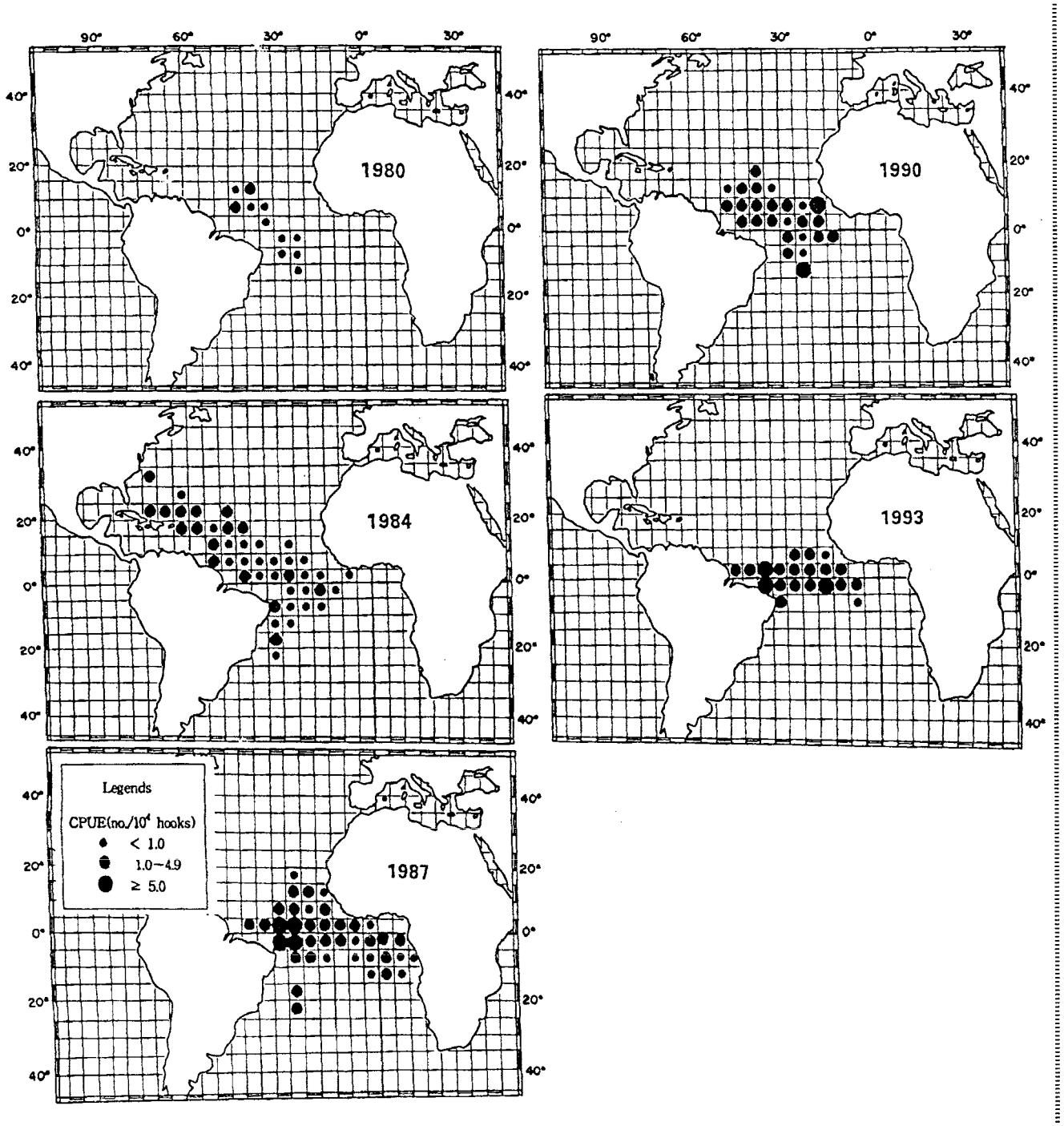

Fig. 2. The CPUE (No./10^4 hooks) distribution of blue marlin.

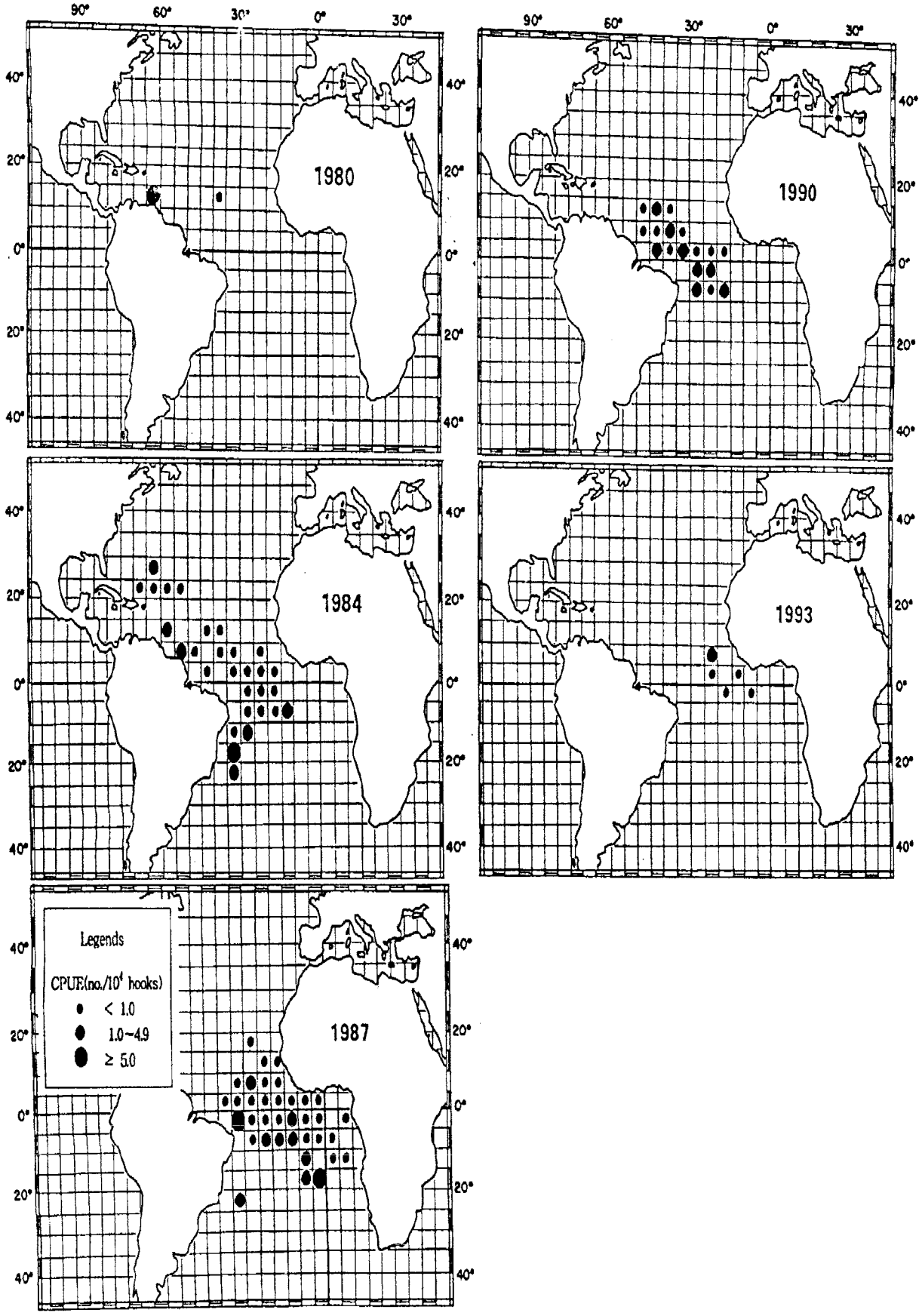

Fig. 3. The CPUE (No./10^4 hooks) distribution of white marlin.

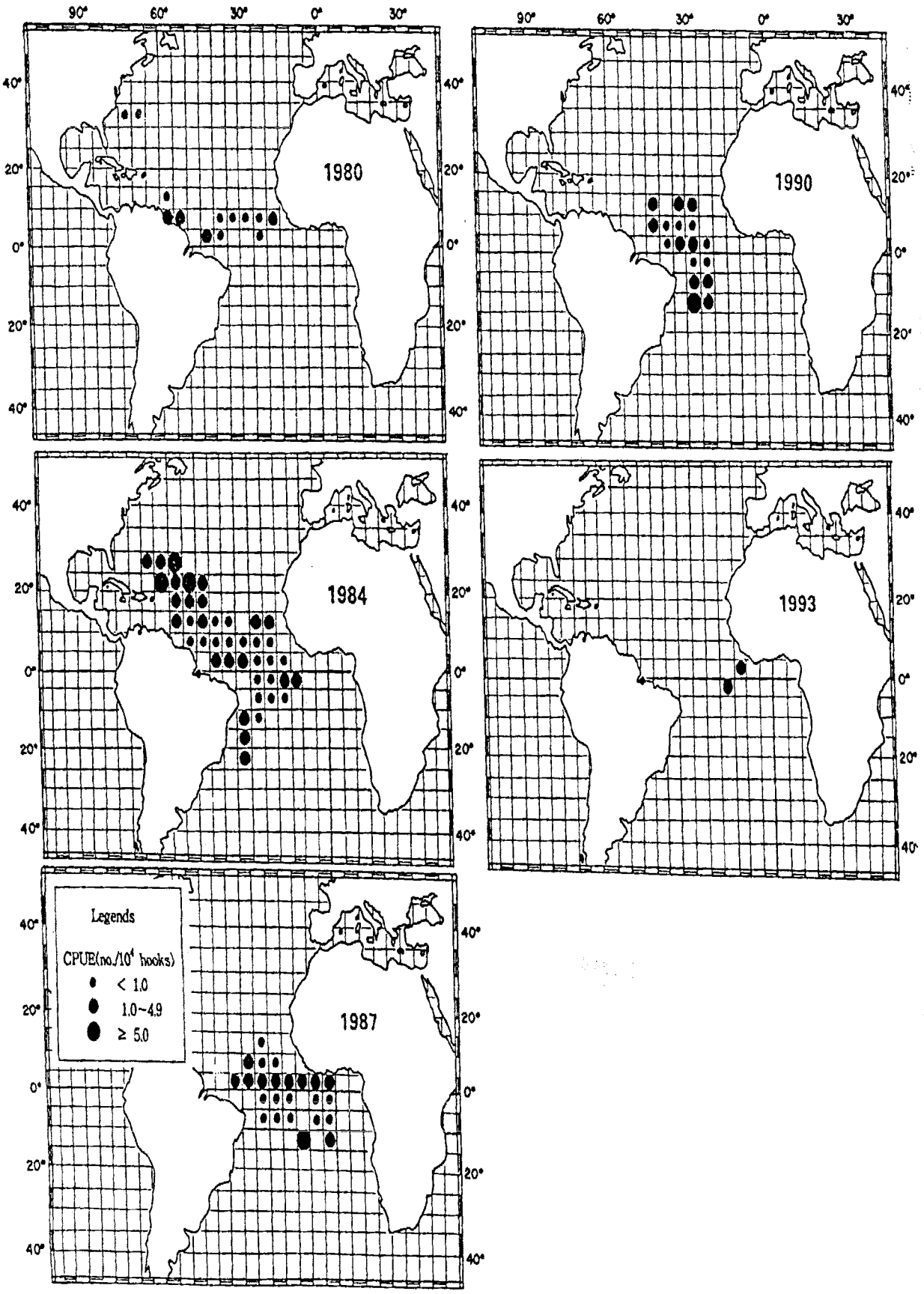

Fig. 4. The CPUE (No./10^4 hooks) distribution of sailfish