

SPATIAL AND TEMPORAL CHANGES FOR CATCH AND EFFORT INCLUDING ALBACORE CATCH FOR JAPANESE LONGLINE FISHERY

Takayuki Matsumoto¹

SUMMARY

Status of effort, albacore catch and CPUE was summarized for Japanese longline fishery operating in the Atlantic Ocean including recent trends. Japanese longline vessels targeted albacore around 1960s, albacore became non-target after that, but the proportion of albacore is increasing in recent years, and is one of the target species. Historical change in proportion of fishing effort by area is observed. Trend of albacore CPUE differs by area, but generally it was high during the early period (until around 1970), sharply decreased around early 1970s, kept comparatively constant in a low level until early or mid-2000s, and increased after that. The number of hooks per basket differs by area and period.

RÉSUMÉ

L'état de l'effort, de la prise du germon et de la CPUE, y compris des tendances récentes, a été résumé pour la pêcherie palangrière japonaise opérant dans l'océan Atlantique. Les palangriers japonais ciblaient le germon vers les années 60 et l'ont ensuite capturé comme prise accessoire, mais la proportion du germon a connu une augmentation au cours de ces dernières années et il constitue l'une des espèces cibles. On a observé un changement historique dans la proportion de l'effort de pêche par zone. La tendance de la CPUE du germon diffère par zone, mais en règle générale, celle-ci était élevée pendant la première période (environ jusqu'en 1970), a brutalement chuté au début des années 70, a maintenu un niveau relativement faible jusqu'au début ou milieu des années 2000, puis a remonté par la suite. Le nombre d'hameçons par panier diffère par zone et période.

RESUMEN

Se resumen el estado del esfuerzo, la captura de atún blanco y la CPUE de la pesquería de palangre japonesa que opera en el océano Atlántico, incluidas las tendencias recientes. Los buques palangreros japoneses se dirigían al atún blanco desde aproximadamente los 60, y posteriormente el atún blanco ya no fue la especie objetivo, pero la proporción de atún blanco está aumentando ligeramente en años recientes y es una de las especies objetivo. Se observa el cambio histórico en proporción al esfuerzo pesquero por área. La tendencia de la CPUE del atún blanco difiere por área, pero generalmente era elevada durante el primer periodo (hasta aproximadamente 1970), descendió abruptamente en torno a principios de los 70, se mantuvo comparativamente constante en un nivel bajo hasta principios o mediados de los 2000 y aumentó posteriormente. El número de anzuelos por cesta difiere por área y periodo.

KEYWORDS

Catch/effort, Longline, CPUE, Albacore

¹ National Research Institute of Far Seas Fisheries, 7-1, Orido 5-chome, Shimizu, Shizuoka, 424-8633, Japan. matumot@affrc.go.jp

1. Introduction

Longline is the only tuna-fishing gear deployed by Japan at present in the Atlantic Ocean. In the Atlantic it started in 1956. Therefore, it has long history and it covers almost entire Atlantic Ocean. In addition, detailed data for catch and effort are available from logbooks. Therefore, CPUE for Japanese longline fishery is important for stock assessment for albacore as well as other tuna and tuna-like species. However, one concern was raised from ICCAT albacore working group that albacore CPUE by Japanese longline showed contrasting trends and negative correlations with Taiwanese longline CPUE (Anon., 2014a). Therefore, ICCAT albacore species group meeting in 2013 recommended to describe spatial dynamics of Japanese and Chinese Taipei longline fisheries: their temporal changes and analyze their effect on the standardized CPUE series (Anon., 2014b). This document was prepared to response that recommendation.

In this document, historical and spatial changes of catch and CPUE for major tuna and tuna-like species including albacore and those of the fishing effort by Japanese longline fishery are described including recent trend. These are aimed to provide information for improvement of standardization of albacore CPUE by Japanese longline fishery.

2. Data source and analysis

In order to count the number of hooks and catches in number of tunas and billfishes including albacore, basic data used here is the logbook database that have been compiled at National Research Institute of Far Seas Fisheries (NRIFSF) based on the logbooks mandatory submitted by the fishermen of the longline vessels larger than 20 gross ton (GRT). The data are so-called “raised” data, which is aggregated by month and 5°x5° block, and then expanded with coverage rate of the logbook. The basic data is available for 1952-2013. Data for 2013 are preliminary. Another data source is logbook database which is aggregated by month, 5°x5° block and number of hooks between floats (hooks per basket, HPB). This data is not raised, and is available for 1975-2013.

Several analyses were conducted based on the subareas shown in **Figure 1** as well as entire Atlantic and Atlantic albacore north (north of 5°N) and south (south of 5°N) area.

3. Trend of catch, effort and CPUE

Figure 2 shows historical change in fishing effort and albacore catch in number in the entire Atlantic. **Figure 3** and **Figure 4** show the trend of fishing effort and nominal CPUE of albacore, respectively, in each area. **Figure 5** shows species composition (in number) of the catch in each area. **Figure 6** shows geographical distribution of the effort (number of hooks), albacore catch and CPUE by decade, and **Figure 7** shows geographical distribution of species composition of the catch by decade. **Figure 8** and **Figure 9** show recent annual trend for effort, albacore catch and CPUE, and distribution of species composition, respectively.

Fishing effort in the entire Atlantic fluctuated, peaked in 1996 (123 million hooks), and has been decreasing after that (**Figure 2**). Albacore catch in number sharply increased between mid-1950s and mid-1960s, peaked in 1964 (2.1 million fish), sharply decreased until early 1970s, and kept in a low level (usually less than 10 thousand fish) after that (**Figure 2**). It is slightly increasing with fluctuation after 1998, and sharply increased during 2012-2013.

The proportion of fishing effort in each area differed depending on the period (**Figure 3**, **Figure 6**). Fishing effort was mainly distributed in the tropical area during 1950s-1960s, and spread to subtropical and temperate areas during 1960s. It mainly distributed in the northeast and northwest area during early 1970s, and mainly in the northwest and temperate south area during late 1970s. After that it mainly distributed in the tropical area, but the proportion of northwest and/or temperate north area was also high between mid-1990s and mid-2000s. In recent years, the proportion in the southeast area became higher, although fishing effort was mainly distributed in the tropical area. The proportion for northwest area was very low in recent years; annual fishing effort in “northwest1” (20-40°N, west of 30°W) was less than 10,000 hooks during 2012-2013, whereas that in “northwest2” (20-45°N, west of 30°W) was higher than 500,000.

Nominal CPUE for albacore in the entire Atlantic shows comparatively similar trend to that for the catch level after mid-1960s (**Figure 4**). The trend for nominal CPUE differs depending on areas, but generally it was high during the early period (until around 1970), sharply decreased around early 1970s, kept comparatively constant in a low level until early or mid-2000s, and increased after that. CPUE in the tropical area was usually low except for early period (until around 1970), but it increased during 2012-2013. Sharp increase in CPUE in recent years was seen in the “northwest1” (20-40°N, west of 30°W), southwest and southeast areas.

Species composition of the catch differed depending on area and period (**Figure 5, Figure 7**). Bigeye and/or yellowfin tuna dominated in the tropical area, although comparatively high proportion (more or less 20%) of albacore was observed before 1970. In recent years the proportion of albacore got higher in the tropical area (both north and south). In the mid-latitude area, in addition to bigeye and/or yellowfin tuna, albacore was also dominant in several areas and periods, for example, in the early and recent period in the northwest, southwest and southeast areas. In the high latitude, bluefin and southern bluefin tuna were usually dominant in the north and south area, respectively, suggesting that these species were almost exclusively targeted.

In recent years, high albacore catch and CPUE were observed mainly in the temperate area of south Atlantic, especially around Namibia and South Africa, where albacore was main component of the catch (**Figure 8, Figure 9**). Catch in the temperate area of north Atlantic was not high because of low fishing effort. In 2013, comparatively high catch and CPUE was observed in the tropical area as well.

4. Change in number of hooks between floats

Figure 10 shows historical change in the proportion of fishing effort (number of hooks) by each category of number of hooks per basket (HPB). In the all Atlantic Ocean, 4-7 HPB was dominant until mid-1980s, but it sharply decreased after that. The effort for 8-11 and 16-21 HPB was main component between late 1990s and mid-2000s. After that 16-21 became dominant, but the proportion for 12-15 HPB got higher in recent years.

In the tropical area, 16-21 HPB has been main component since mid-1990s, but the proportion for 12-15 HPB has been slightly increasing since early 2000s. In the northwest and temperate south areas, 4-7 HPB was dominant until early 1990s, but it sharply decreased around mid-1990s and 8-11 HPB became dominant after that. In the southeast and temperate north areas, the proportion for 12-15 HPB had been increasing until around 2010, and it became dominant in recent years. According to the results of CPUE standardization for Japanese longline fishery, 12-15 HPB got highest CPUE both in the north and south Atlantic (Kiyofuji, 2014; Matsumoto, 2014). Therefore, possibly the increase in the proportion of this gear configuration leads to increased targeting of albacore.

5. Conclusion and recommendation

The results in this paper indicate that historical changes occurred for fishing ground and target species for Japanese longline fishery, and that in recent years albacore is targeted in a part of area. As high catch of albacore as well as comparatively high fishing effort was usually observed in the northwest and southeast area, these areas are candidate for ‘core area’ for CPUE standardization. However, as for northwest area, the area 20-40°N, west of 30°W (“northwest1”), which was proposed as core area for both Japanese and Taiwanese longline (Anon., 2014a), has a problem of very few fishing effort in recent years. Therefore, it may be better to expand so that it includes more fishing effort (for example, “northwest2” in this paper). Detailed comparison of the trend of CPUE and the distribution of catch and effort between Japanese and Taiwanese fishery is necessary.

Methods for CPUE standardization is desired to be improved so that it incorporates historical change in fishing ground and targeting, as well as the areas of high albacore catch and CPUE.

Finally it should be pointed out that from 2014 fishing year, individual TAC for south Atlantic albacore has been applied to Japan, 1,355t (except for transfer from other countries). So it may have some effects on albacore CPUE by Japanese longline fishery.

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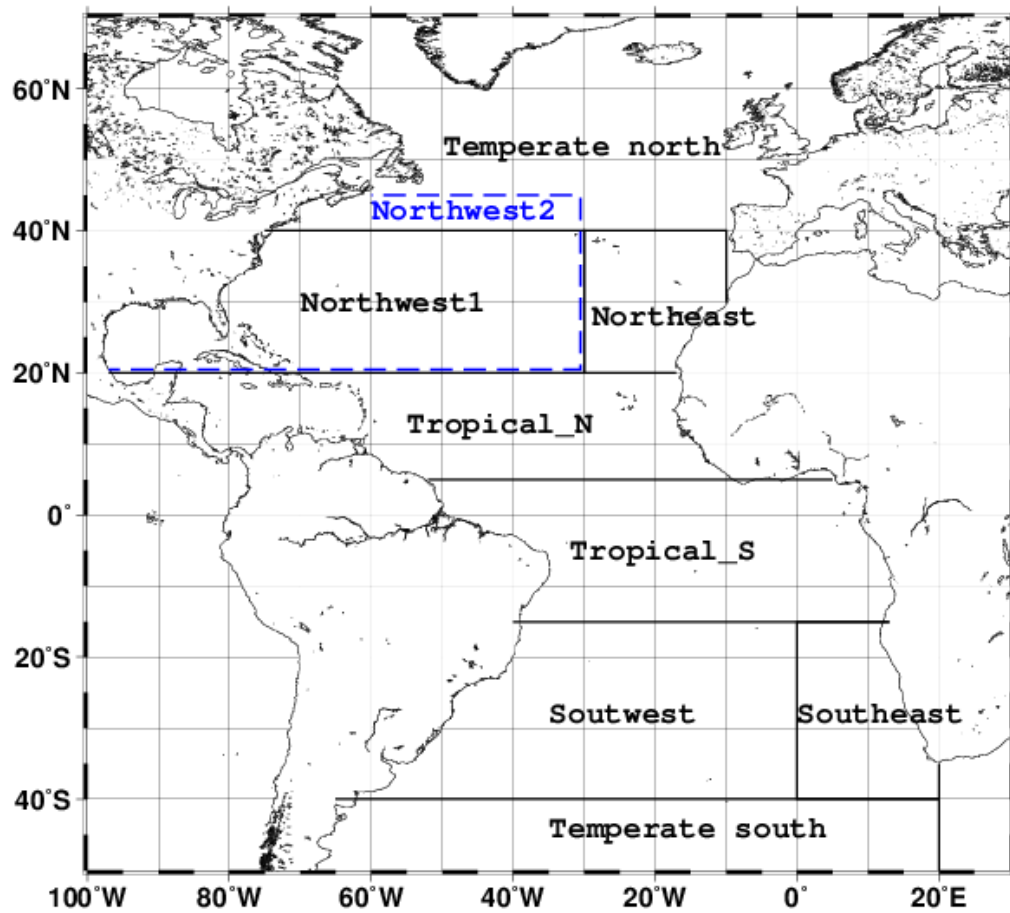


Figure 1. The geographical range to compile fishing effort, species composition of the catch and nominal CPUE for albacore by Japanese longline fishery.

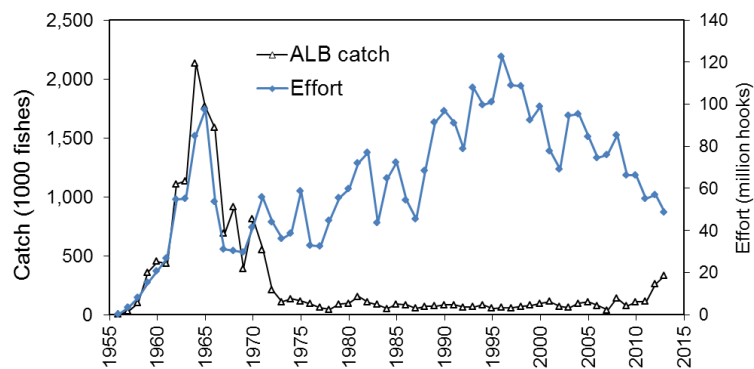


Figure 2. Historical change in fishing effort and number of albacore catch by Japanese longline fishery in the Atlantic Ocean.

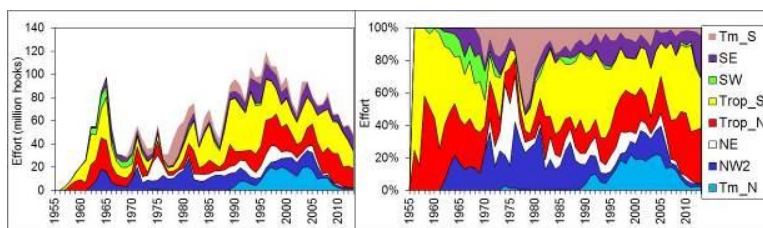


Figure 3. The number of hooks employed for each area.

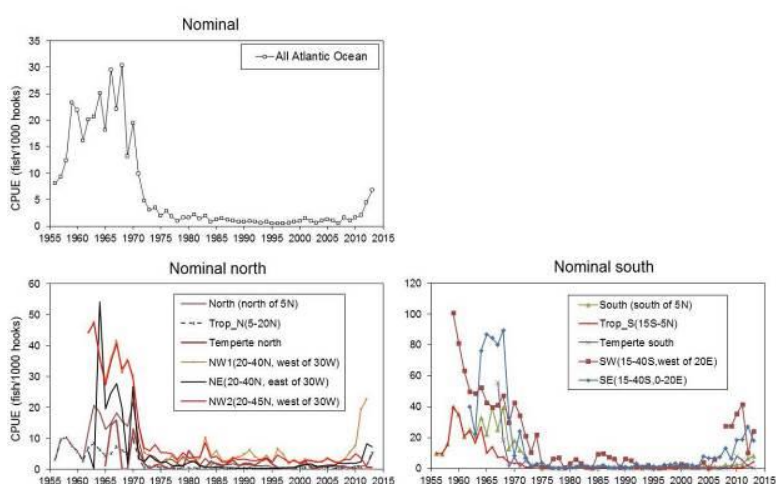


Figure 4. Nominal CPUE of albacore caught by Japanese longline fishery in each area. Upper: all Atlantic, lower left: north area, lower right: south area.

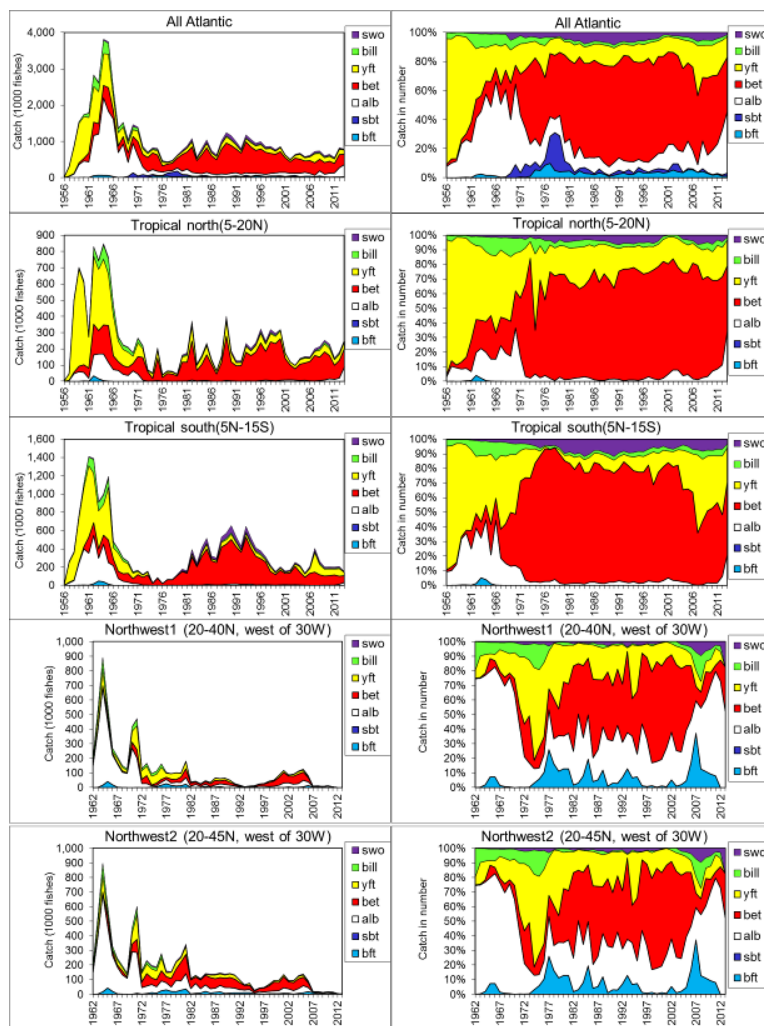


Figure 5. Species composition (in number) of the catch by Japanese longline fishery in each area.

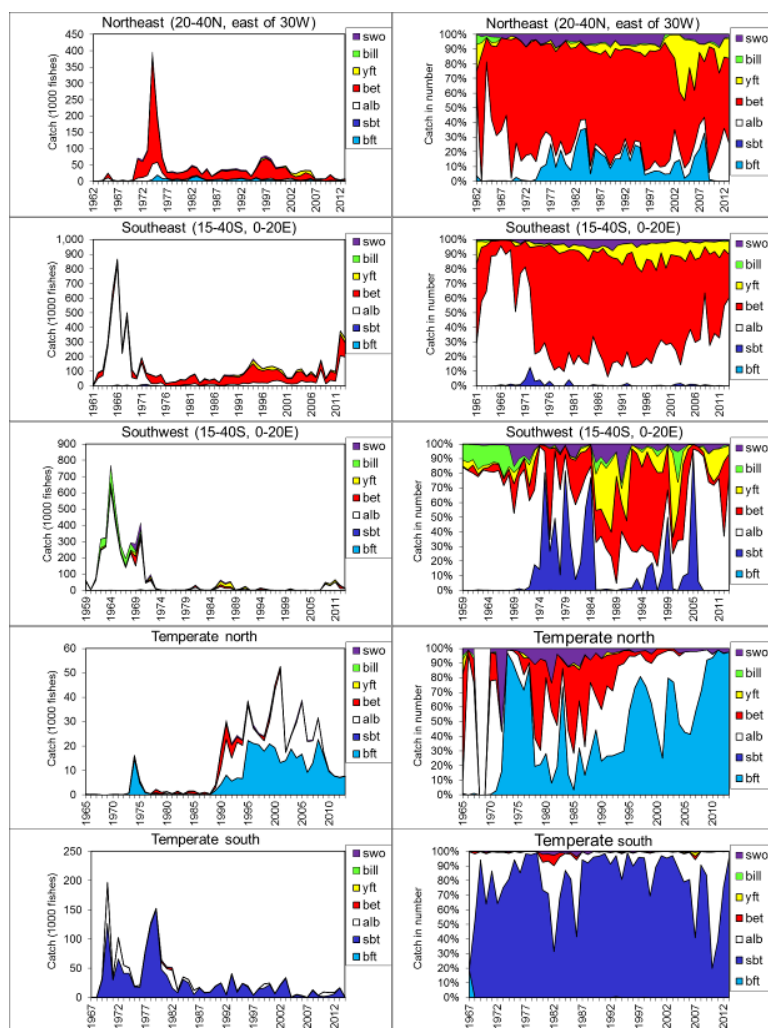


Figure 5. Species composition (in number) of the catch by Japanese longline fishery in each area. (continued)

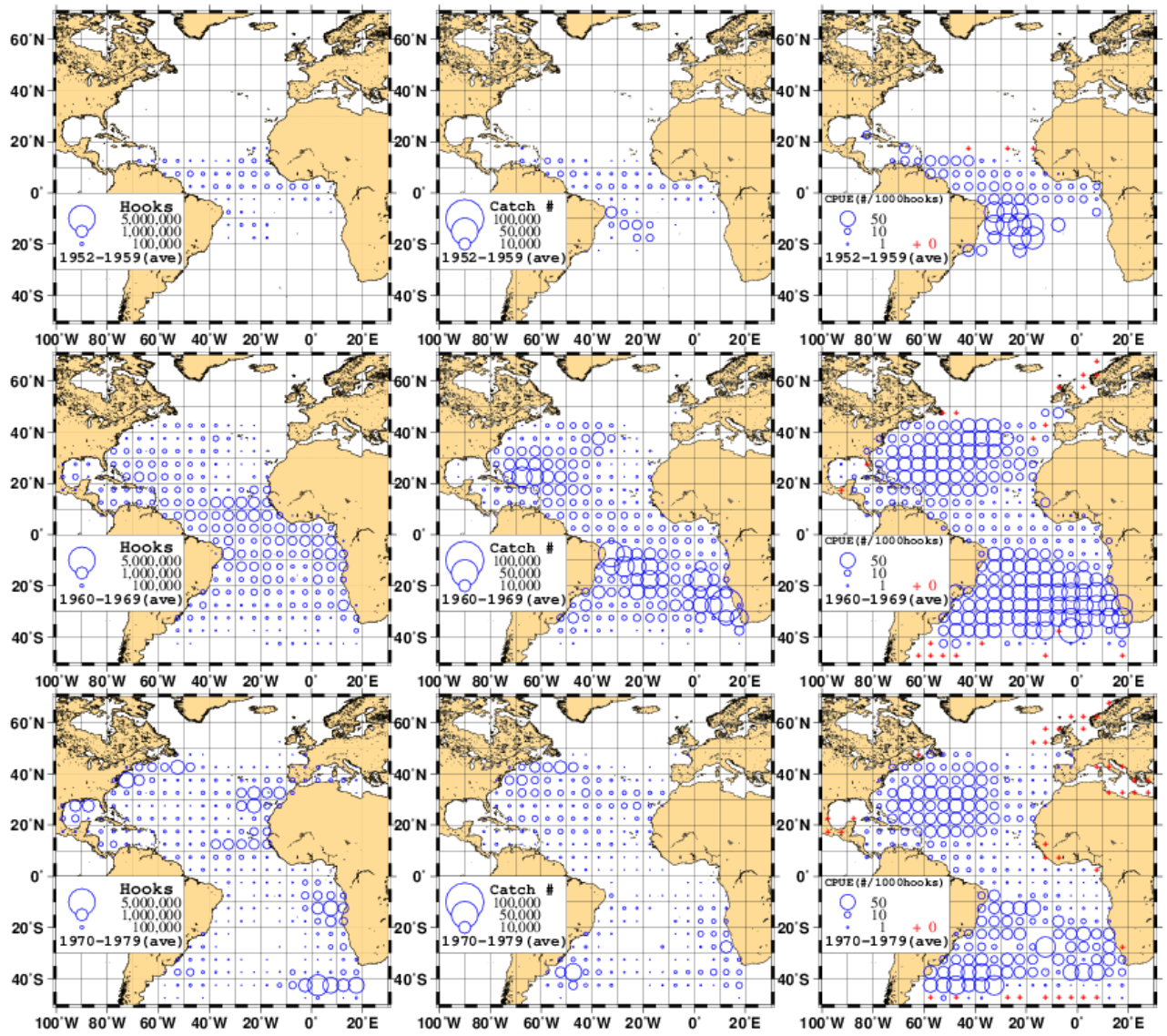


Figure 6. The average distribution of the effort (number of hooks), albacore catch (number of fish) and CPUE (number of fish/1000hooks) for each decadal period.

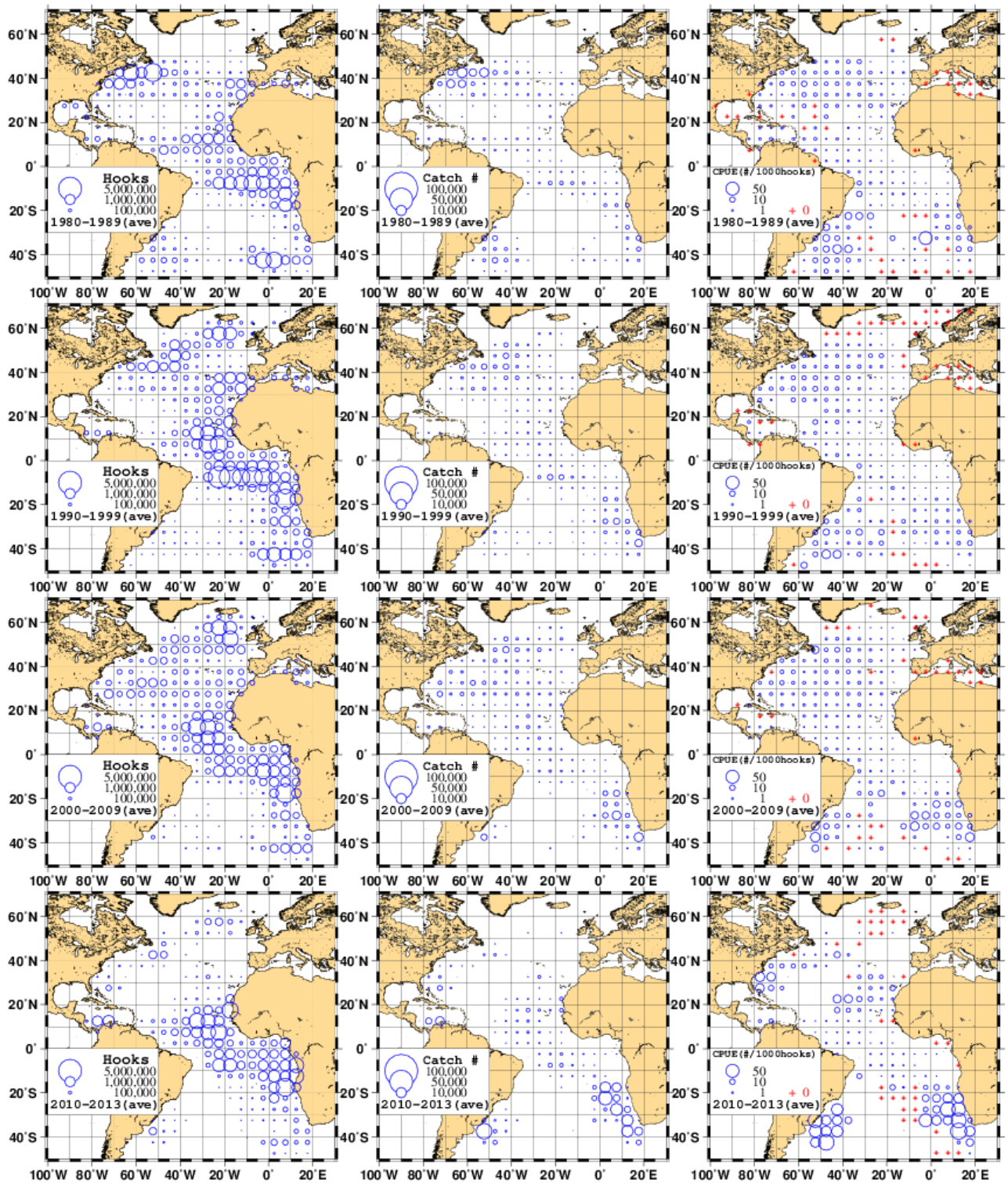


Figure 6. The average distribution of the effort (number of hooks), albacore catch (number of fish) and CPUE (number of fish/1000hooks) for each decadal period. (continued).

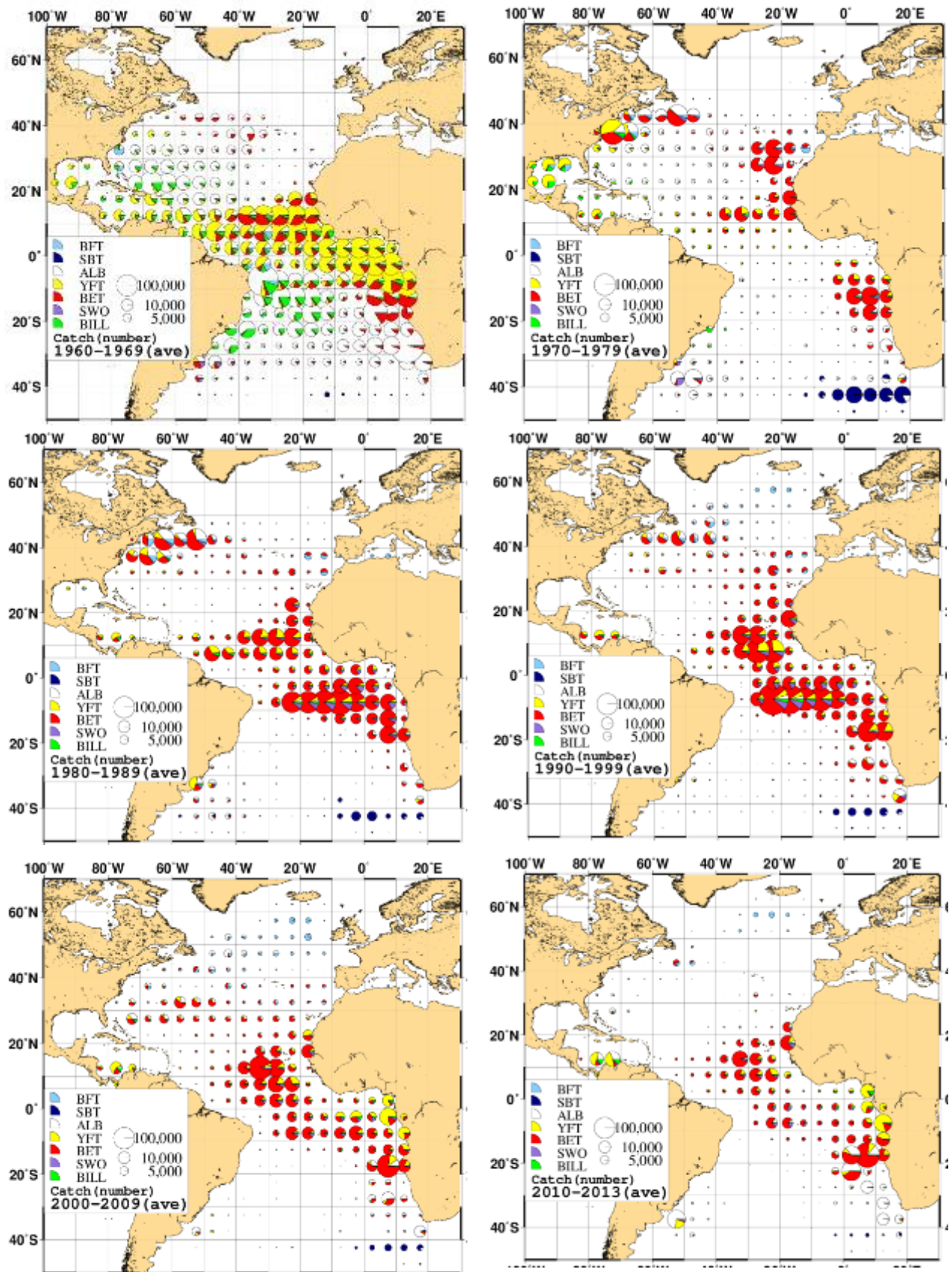


Figure 7. The averaged distribution of amount of catch in number by species for each decade. Size of circle shows amount of total of catches i.e. bluefin tuna (BFT), southern bluefin tuna (SBT), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO) and billfishes (BILL).

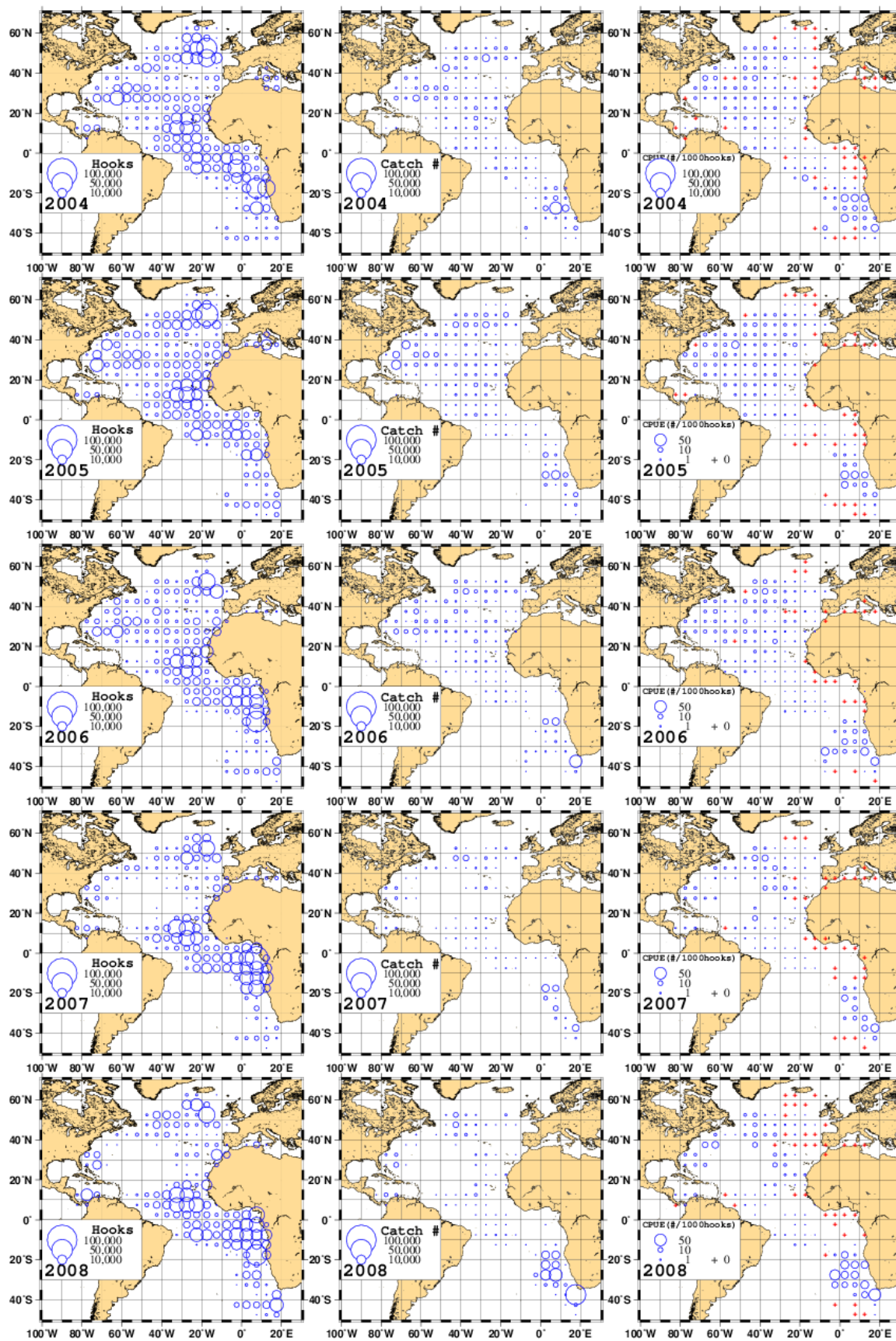


Figure 8. The geographical distribution of the effort (number of hooks), albacore catch (number of fish) and CPUE (number of fish/1000hooks) in recent years.

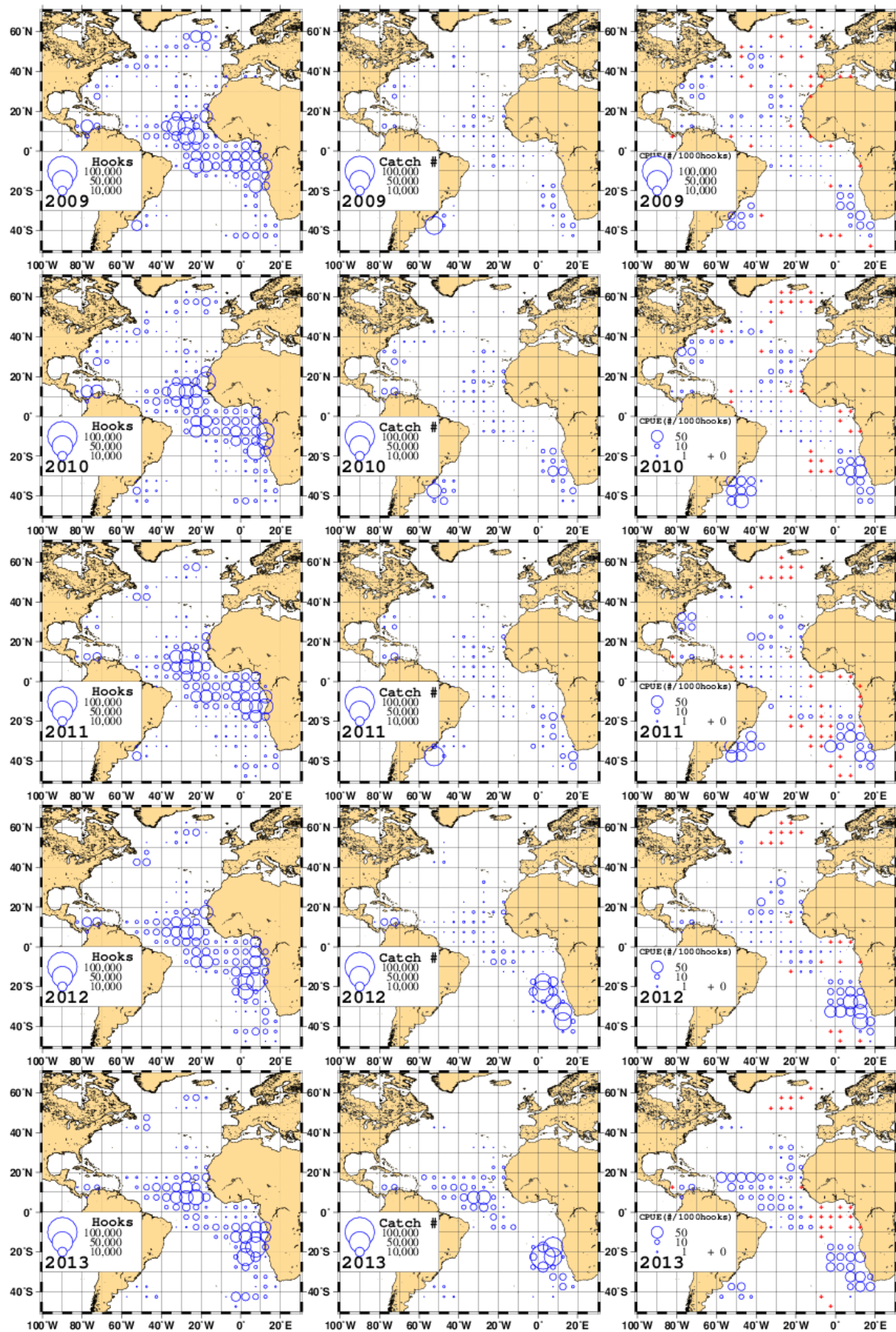


Figure 8. The geographical distribution of the effort (number of hooks), albacore catch (number of fish) and CPUE (number of fish/1000hooks) in recent years. (continued)

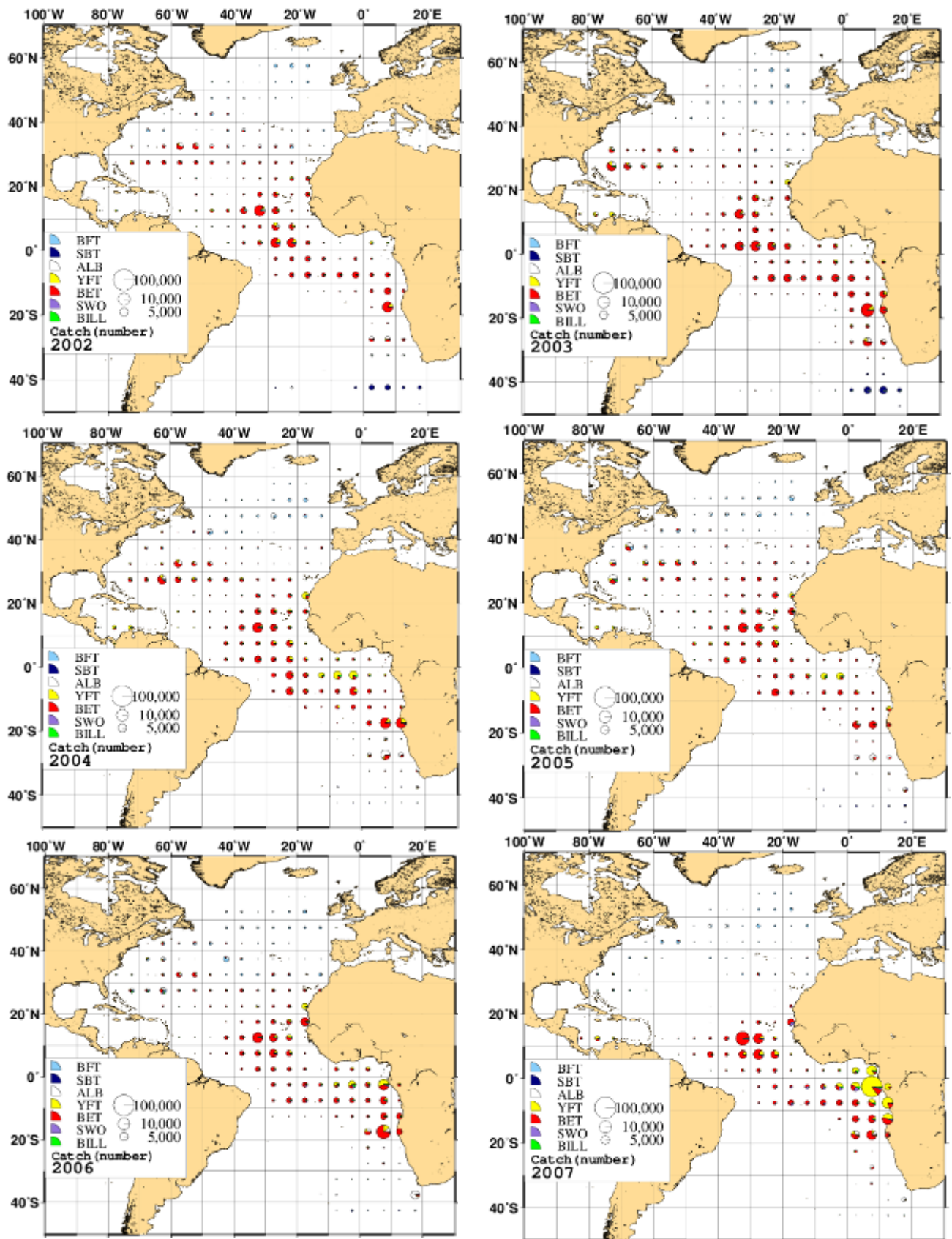


Figure 9. Annual recent distribution of amount of catch in number by species. Size of circle shows amount of total of catches i.e. bluefin tuna (BFT), southern bluefin tuna (SBT), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO) and billfishes (BILL).

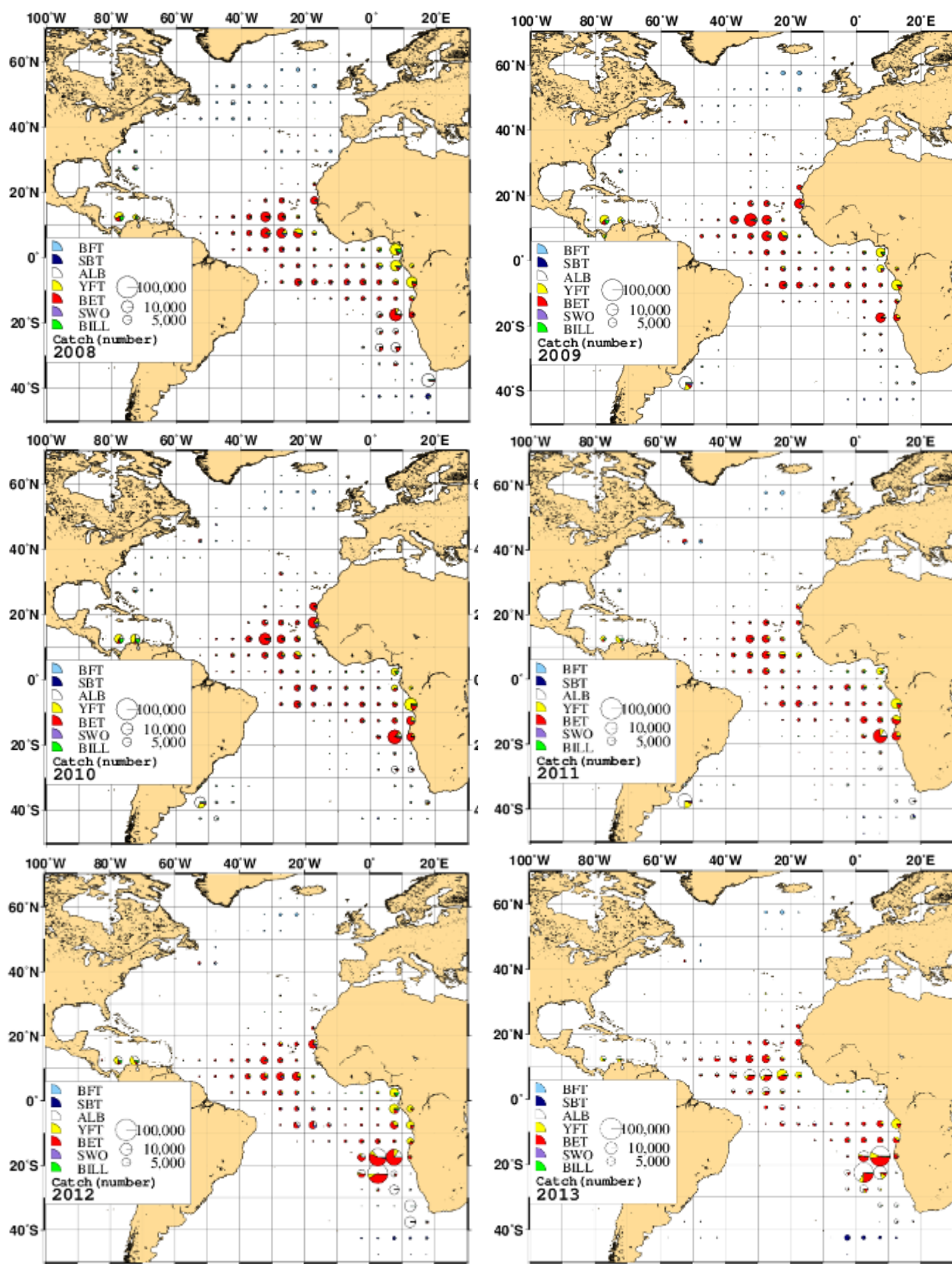


Figure 9. Annual recent distribution of amount of catch in number by species. Size of circle shows amount of total of catches i.e. bluefin tuna (BFT), southern bluefin tuna (SBT), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO) and billfishes (BILL). (continued)

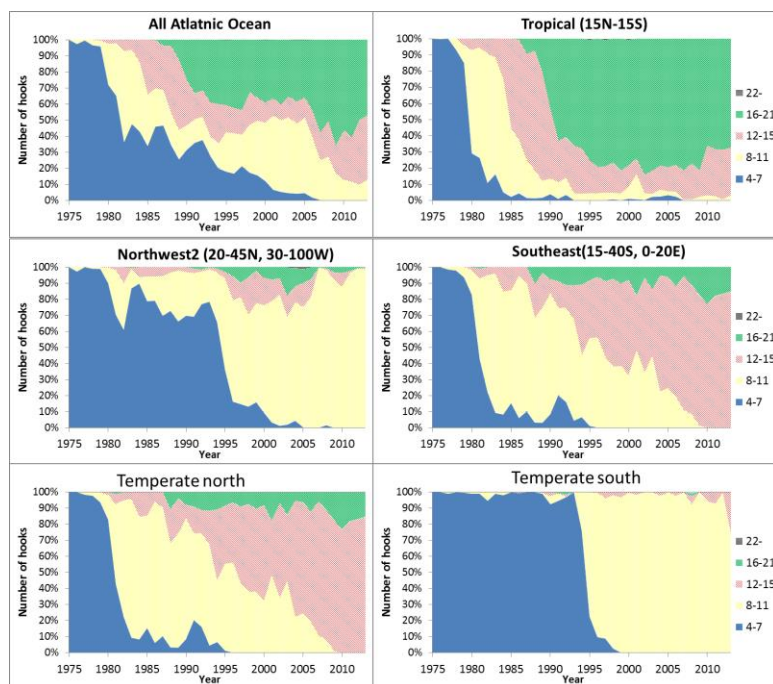


Figure 10. Change in the proportion of fishing effort (number of hooks) by each category of number of hooks between floats in several areas.